Comment Letter D1

From: Jason Anderson <jasona@cleantechsandiego.org>
Sent: Friday, January 21, 2011 10:52 AM
To: ECOSUB
Subject: CleanTECH San Diego Support Letter For Tule Wind Project
Attachments: 1 20 11 CTSD Tule Support Letter - CPUC.docx

Please accept the attached letter as one of support for the Tule Wind Project.
Thank you.

Jason Anderson
VICE PRESIDENT, CLEANTECH SAN DIEGO &
EXECUTIVE DIRECTOR, CLEANTECH SAN DIEGO
EDUCATION FOUNDATION

9191 Towne Centre Drive, Suite 410
San Diego, CA 92122

c: 619.920.8902
e: jasona@cleantechsandiego.org

Top 10 | Cleantech Cluster Organizations for 2010!

CleanTECH San Diego is a non-profit membership organization formed to accelerate San Diego as a world leader in the clean technology economy. We are a catlyst that serves as the hub for a diverse group of stakeholders to advance a common agenda.

January 20, 2011

Iain Fisher, Project Manager
California Public Utilities Commission
c/o Dudek
605 Third Street
Encinitas, CA 92024

Re: Proposed Tule Wind Power Project

Dear Mr. Fisher:

On behalf of CleanTECH San Diego, I am writing to express strong support for the certification of the EIR/EIS for the Tule Wind Power project. This project is important to the San Diego region and will provide renewable energy to more than 60,000 homes in the county. Furthermore, the project will help the state of California come one step closer to meeting its renewable energy goals. D1-1

CleanTECH San Diego is a nonprofit trade association focused on supporting San Diego's transition to a clean energy economy. We have a broad and diverse membership that includes private sector members such as Bank of America, Viridity Energy, Waste Management, Honeywell, Synthetic Genomics, and Kyocera Solar, as well as local governments, nongovernmental agencies and universities and research institutes. We are intensely interested in enabling technologies to ensure that we maximize the potential benefit of the clean energy economy in our region. D1-2

The Tule Wind Power project will create approximately 325 jobs during construction and 12 permanent jobs for local residents. Not only will this bring the County of San Diego $5 million per year in tax revenue, but it will also help to boost our local economy and support the growing clean technology industry. Supporting this project would further San Diego's role as a leader in clean technology. D1-3

In summary, we believe McCain Valley is the optimal region for the Tule Wind project. The mitigation measures proposed in the EIR will address the issues of concern regarding the placement of the wind farm. By keeping the Tule Wind Power project at its currently proposed size, San Diego will be increasing its natural power sources in a sustainable and responsible manner. I urge you to certify the EIR/EIS and allow the Tule Wind Power project to proceed as proposed. D1-4

Sincerely,

Lisa Bicker
President and CEO

Comment Letter D2

SAN DIEGO REGIONAL CHAMBER OF COMMERCE

402 West Broadway, Suite 1000
San Diego, California 92101-3585

Tel 619.544.1300
www.sdchamber.org

January 21, 2011

Mr. Iain Fisher, California Public Utilities Commission
Mr. Greg Thompson, Bureau of Land Management
c/o Dudek
605 Third Street
Encinitas, CA 92024

RE: Proposed Tule Wind Power Project
Draft Environmental Impact Report/Draft Environmental Impact Statement (EIR/EIS)

Dear Mr. Fisher, dear Mr. Thompson:

On behalf of the San Diego Regional Chamber of Commerce, I urge you to certify the EIR/EIS for the Tule Wind Power Project.

California is leading the way to combat climate change by investing in clean, renewable energy sources. Developing wind energy is key to meeting the State of California's renewable energy standards and helping reduce greenhouse gas emissions. Therefore, this project is an important component in ensuring that California meets these goals. It will benefit our region by providing clean, renewable energy to power up to 60,000 homes in the San Diego region and increasing our energy production and reliability

D2-1

The Chamber had several presentations on the proposed Tule Wind Power Project and heard from speakers in support and in opposition. We acknowledge that, as with any large project, there are a number of concerns. We understand that Iberdrola Renewables, the project proponent, has a strong track record of developing wind energy projects that minimize impacts to the surrounding community through their work on many other projects. Iberdrola Renewables also has a long history of working hard to site wind farms responsibly, and participates actively in studies to look at ways to reduce wind power's impact on wildlife. Therefore, we are confident that the concerns raised by the surrounding community can be addressed by the mitigation measures proposed in the EIR.

D2-2

This project provides an important opportunity to augment our region's clean energy portfolio. We urge you to certify the EIR/EIS and allow the project to move forward at its currently proposed size.

D2-3

Thank you for taking our recommendation under consideration.

Sincerely,

Ruben Barrales
President & CEO

RB:av

Comment Letter D3

INDUSTRIAL ENVIRONMENTAL ASSOCIATION

January 26, 2011

Mr. Iain Fisher, California Public Utilities Commission
Mr. Greg Thomsen, Bureau of Land Management
c/o Dudek Engineering
605 Third Street
Encinitas, CA 92024

Re: Proposed Tule Wind Power Project

Dear Mr. Fisher and Mr. Thomsen:

The Industrial Environmental Association (IEA) represents manufacturing, technology and research and development companies throughout the San Diego region. Our organization has an active Energy Committee which tracks local, state and federal issues as they affect renewable portfolios, energy supply, reliability and costs to our businesses.

IEA has also worked extensively in promoting renewable energy issues. Many of our companies are very proactive in the energy field and have taken significant steps to lessen their dependence on the grid by implementing energy efficiency measures as a result of combined energy/water efficiency audits, installing photovoltaic and building combined heat and power. This next month we will be taking a tour of a fuel cell project and are also learning more about alternative fuels. D3-1

As an organization, we have a commitment to renewable energy and would like to add our strong support for the proposed Tule Wind Power Project. This Tule project has the potential to provide significant renewable energy resources for the benefit of the San Diego area and has the added benefit of substantially reducing greenhouse gas emissions to address climate change. D3-2

Wind projects can only be sited in select areas. We believe the McCain Valley area of East San Diego represents a high quality wind resource area and is very appropriate to develop this wind energy project. D3-3

Thank you for your consideration of our comments, and we urge you to move forward by certifying the EIR/EIS to allow the Tule Wind Power Project to proceed forward. D3-3 Cont.

Sincerely,

Patti Krebs

Patti Krebs, Executive Director
Industrial Environmental Association
110 West "C" Street, #900
San Diego, CA 92101
(619) 544-9684
e-mail: pattik@iea.sdcoxmail.com

Comment Letter D4

JAN 3 1 2011

MOUNTAIN HEALTH

Locations

Mountain Empire Family Medicine
Campo
31115 Highway 94
Campo, CA 91906
(619) 478-5311
Fax (619) 478-2267

Alpine Family Medicine
Alpine
1620 Alpine Boulevard
Alpine, CA 91901
(619) 445-6200
Fax: (619) 320-3343

Escondido Family Medicine
Escondido
255 N. Ash Street, Ste. 101
Escondido, Ca 92027
(760) 745-5832
Fax (760) 745-7847

25TH Street Family Medicine
San Diego
316 25th Street
San Diego, Ca 92102
(619) 238-5551
(619) 238-3807

Mountain Empire Community Center
Campo
976 Sheridan Rd.
Campo, CA 91906
(619) 478-2384
Fax: (619) 478-9473

January 27, 2011

Iain Fisher, California Public Utilities Commission
Greg Thomsen, Bureau of Land Management
c/o Dudek
605 Third Street
Encinitas, California 92024

Re: Proposed Tule Wind Power Project

Dear Mr. Fisher and Mr. Thomsen:

This letter is written to urge you to certify the EIR/EIS for the Tule Wind project at its currently proposed size. The wind resource in McCain Valley is rare and valuable, and the mitigation measures proposed in the EIR will address the issues of concern. D4-1

Mountain Health & Community Services, Inc. has been serving the rural, southeast region of San Diego County for over 35 years, and provides the only local source of primary care and mental health services to this severely medically underserved area. We are very concerned with the health issues of our rural population, and believe that working toward enhancing and developing clean and renewable energy sources is vital to the long term health and wellbeing of us all. D4-2

The time to commit to renewable energy is long overdue. The Tule Wind Power Project can help reduce CO2 emissions by approximately 250,000 tons per year, making our air cleaner, reducing our impact on climate change and lowering our dependence on foreign oil. The Tule Wind Power Project will provide renewable energy to power more than 60,000 San Diego area homes and go a long way toward helping the region meet California's renewable energy goals. D4-3

As a life long resident of rural East San Diego County, these issues are important to me. I urge you to certify the EIR/EIS and allow the Tule Wind Power Project to proceed as proposed. The negative effects of no action in regard to safe, fossil free energy for our future will be far greater if this project does not move forward.

Thank you for your consideration of this request.

Sincerely,

Judith A. Shaplin

Judith A. Shaplin
President & Chief Executive Officer

Comment Letter D5

Tule Wind Farm Statement

28Jan2011

I represent the San Diego Renewable Energy Society that has about 180 members the last time I checked. We are a chapter of the American Solar Energy Society that has about 10,000 members nationally. We strongly support the Tule project and the substations necessary to connect this project to our electricity transport system. We also support substation development to connect future wind projects. Why do we act in the name of these many members and lend our credibility to these projects? We do so because we think the local impacts are acceptable compared to the overall goal of moving San Diego and the U.S. to a sustainable future and reducing the catastrophic impacts of global warming that are looming over the next decades and centuries. Our generation happens to the one that needs to act so that future generations have a change to live on a planet that we would recognize --- rather than one that would be so changed that we would have difficulty recognizing it in a century. Without our making many difficult choices, they will have few choices.

D5-1

Without question, there would be impacts from the proposed Tule wind farm. The draft DEIS/R lists about 90 impacts that were studied. About 40 had no residual impacts, and another 40 or so were able to identified measures that could mitigate impacts without adverse residues. The remaining dozen or so would provide impacts either during construction or operation that could be reduced but not totally mediated. Things like changing the scenic vista, construction dust, noise and ground vibration, light glare, possible disruption to eagles and the quino butterfly. It looks like a careful job was done in these studies and the team that conducted the evaluation should be thanked.

D5-2

Lets go back for a minute to put this project in context. The whole purpose of the Tule wind farm is to contribute to the goal of about 80% renewables by the year 2050 to help San Diego reach its climate change goals. (Currently the goal is 20% by 2010, and 33% by 2020 but the science is indicated the need for 80% by 2050.) If this clean project were blocked along with the many other clean energy projects that are pending, then we would fall far short of our goals and the impacts would be many and varied.

We have already witnessed the early impacts of global warming. One is the persistent drought and the rapidly increased number and intensity of forest fires --- now called firestorms. About 15 people were killed and how many animals of all species were lost during the Cedar fire alone. It was only one of a dozen fires raging at the same time in 2003. Talk about impacts. This was caused by the persistent drought that aided the bark beetle in killing 80% of some tree species in San Diego County. This drought extends to the entire southwest and will cause water issue in San Diego over the decades to come. The warming will also cause earlier snowmelt in the Sierras, our natural water storage system, causing spring floods and overwhelming our current system of dams. Thus, less water will be available in the summer for crops and even impact urban water needs. Increase air pollution is projected, as is a huge loss of wildlife species if business as usual continues. Some estimates are as high as 80% species loss by the end of the century. Rising ocean level will definitely impact San Diego directly and indirectly. Besides costal flooding, a major part of our water supply from the Sacramento River delta is already below sea level.

D5-3

The loss of the Tule energy project and others in the eastern deserts will all contribute to these many and varied impacts from global warming. This must be balanced against some local and immediate impacts. The most obvious is the visual impacts of these very tall wind generators that are a real and tangible loss, to those who choose to live in the Boulevard area because of its remoteness and those who visit the area for that reason.

San Diego is blessed with an abundance of natural places to enjoy and restore oneself from the travails of urban life. San Diego has the largest State Park in the 48 (over 600,000 acres) as well as a major national forest, several other state parks, county parks, and preserves of all kinds. As the former president of the Volcan Mountain Preserve Foundation, I truly appreciate the need to set aside open spaces. As someone who hikes several tunes a week in these remote places, I know the value of these special places. So we have to commend San Diego County, the state and the federal government in the very credible job they have done in setting aside open lands for us to enjoy.

This existing and wonderful resource should be balanced with some land being used for other purposes that fulfill other needs. For example, we have a sizable land area dedicate to activities that totally trash the land, destroy all habitats, increase pollution significantly, and are terribly noisy every day --- not just during a year or two of construction. Off-road recreational vehicle areas have all these impacts but they meet a need. The need is recreational and meets some people's needs to "get away" with family and friends. This is seen as a reasonable use of the land in certain amounts even thought it is totally destruction in so many ways.

D5-3 Cont.

The Tule wind farm will have vastly less impacts that recreational off-road vehicle use. A wind farm actually only uses about 2% of the land in the wind farm designated area. This is mainly for the service road connecting each generator. Each generator uses an area similar to the size of a large residential house and the substation uses a few acres. Trying to balance different needs, we have found a way to allocated some land to off-road vehicle use. We should also find a way to use some land for clean energy projects that are vital to our future.

Meeting different needs implies that the conflicts and impacts of meeting these needs need to be balanced. Accepting some local impacts of a clean energy wind farm, to reduce or eliminate a host of local, county, state, national and global impacts likely to result from excessive carbon emissions, is a balancing act that we must deal with.

I must note that it is unfair that some of us have more impacts because of where we live than the rest of us who live elsewhere. I think that these local folks should be compensated for their local impacts. As far as I know, we ask them to accept these impacts such as the local visual impact, and we do not offer than any local compensation. They are asked to enjoy the benefits we all enjoy at large and to magnanimously accept their real, local impacts. There is a certain amount of inequity in this that has yet to be addressed. I enjoin the CPUC, CEC, BLM, San Diego County, other agencies, and the energy system developer to consider ways to try to balance impacts with compensation. Possibly something as simple as a reduction in energy bills for all those who can "see" the wind generators from their property. The amount of the compensation might be proportional to the distance from the Tule site. This seems

D5-4

entirely fair and could be a modest expense since there are so few home site that can see the propose wind farm. D5-4 Cont.

With this in mind, I must tell you that the proposed Tule wind farm will have visual impacts for me, and very strong impacts. I will see these large turbines as tangible evidence that we are finally moving in the right direction. That we are making the difficult decisions to balance the present with future needs and that these limited local impacts pale in comparison with the sum total of all the insults we will unleash on San Diego and the rest of the world if we continue business as usual. These slowly rotating kinematic sculptures will look absolutely beautiful to me. They will certainly make me smile. So the scenic vista will be diminished for some and augmented for others. How do you establish it this is a net positive or negative impact. D5-5

I know that some species will be disrupted during construction and some might be disturbed later. I also know that the project is required to avoid to the extend possible, by locating the turbines in a way to minimize impacts. I ask the parties that are responsible for the actual plant layout, to use the DEIS/R data to minimize impacts.

There will definitely be bird and bats kills resulting from the Tule wind farm. This project will generate about 3% of the electrical energy used in San Diego County. Even if 20% of our national energy came from wind farms, it would increase the current damage that we inflict on birds and bats by less than 1%. Is this acceptable? In the grand scheme of things, that looks like a very acceptable impact. But California has learned a lot about avian impacts over the past few decades as we have build wind farms and actually measured the avian impacts and learned about the siting specifics that led to impacts. We now have models that can help us understand what leads to avian impacts. These models would also allow us to mitigate these impacts by siting choices before construction. I know this understanding will be utilized in layout out the plant. D5-6

I have walked the nearly Campo wind farm and read the literature about wind farm noise. I found that I could not hear the wooosssh of the blades over the ambient wind sounds when I walked about 1000 feet from the turbines. It was a windy day and the wind farm was operating at rated power. I know that on quieter evenings, home occupants will be able to hear the wooosssh at a further distance if the ambient wind noise is lower. To avoid this, the siting decisions should keep the generators at least 0.5 miles from any homes. D5-7

There is concern that these wind machines will cause forest fires. As you know, this wind farm is not located in forest but in a rather arid location with little ground cover. However, older wind generators did overheat and start a fire, and some of them did cause ground level grass fires. As with noise, the fire issue has changed significantly in the current generation of wind machines. Each machine now costs 5 to 10 million dollars and needs to operate for over 10 years or so to pay back the investment. So there is a strong interest on the part of the wind farm owner to not have the machine burn up. So much for intent --- what about the specifics? D5-8

These machines are high above ground on a steel tower placed in the middle of a 70 by 70 foot gravel pad with a lack of vegetation around base of tower. The high voltage wires from the machines are underground, lightning protection devices on each tower, and temperatures inside the generators are monitored. Shut down is automatic when above normal temperatures are sensed. The data seems to show that lightning damage to newer machines is rare. However, I have unable to find comprehensive data on any ground fires caused by these newer machines.

This project will hook into existing transmission lines via the proposed substation. The fire danger of the existing transmission lines is neither increased nor decreased due to the creation of this wind farm. These existing high voltage transmission lines do not seem to have any history of starting fires. They are usually shut down if a fire comes close to them to avoid a short circuit to the ground that would damage the wires. The towers holding the wire do need to be washed to remove fire residues before turning the power back on. This situation would be exactly the same after the wind farm as it was before.

D5-8 Cont.

Although it was not considered in the draft Environmental Impact Report (DEIS/R), some people are concerned about property values dropping. A very comprehensive study of 25,000 residences showed there was an impact of wind farms on adjacent property values --- they increased property values. Ten wind farm projects in the US in seven states were identified. For each community adjacent to a wind farm, one was found without a wind farm that was comparable. Selling prices for homes were studied in each set of communities for 3 years before and 3 years after the wind farm was built. All this data was analyzed and gave the results of increased property values in the majority of the communities adjacent to a wind farm. More recent studies support these conclusions

D5-9

Finally, some people point to the alternative of generating the clean energy solely by putting solar devices on buildings in the San Diego. They claim that there are no impacts of this approach since the buildings already exist within the urban power grid and there is no need to use transmission lines. Certainly seems like an attractive alternative. Is this really a viable choice?

Since I am representing the American Solar Energy Society, you can be assured that I support solar energy on buildings within the urban grid. This is an attractive member of the renewable energy portfolio and we support it whole heartily. Can it be the sole renewable option to the exclusion of wind farms, desert solar plants, geothermal, biomass plants including mining urban waste dumps? In a word, NO.

D5-10

It is definitely a member in good standing of this team of options. The reasons that it can't be the sole renewable option are many and varied. When the amount of clean energy becomes more than a trivial amount, it is necessary to consider the operation of entire electric grid that is required to meet the needs of a city such as San Diego. San Diego is typical of cities in this county that runs 24/7. Rooftop solar is a mid day power source that operates on average at about 18% of its rated capacity. The engineers say that its capacity factor is 0.18 and it delivers 18% of the energy it could produce if it were to operate all the time.

The current mix of power sources in San Diego have a combined capacity factor of about 0.54 and they operate 54% of rated capacity on average. It is currently made up of a mixture of baseload, intermediate and peaking power plants. The peaking plants have a low capacity factor like fixed PV, but fossil peakers are used only during times of peak load as necessary since they are more expensive and polluting. Even though fixed rooftop PV has a low capacity factor, it cannot be dedicated to peak load. It produces power when the sun shines and typically reaches maximum power at noon. This is not a very good match to the summer time peaking load that occurs in late afternoon or early evening in San Diego. However, it is operating during the day when most of our power is used. Typically, the peaking credit for rooftop PV is from 20 to 60% of its rated capacity. For the urban grid to function you need something else to provide power 24/7 that can also meet late afternoon peaking. The something else would either be fossil powered electricity and/or expensive electricity storage. We are trying to move away from fossil energy and electricity storage is expensive and typically will double the cost of the energy that goes through storage. This is a significant impact – a cost impact.

D5-10 Cont.

The other way to balance the grid so that it both reduces fossil dependency and keeps cost reasonable is for a mixture of renewable power sources. This mixture would have some baseload (geothermal, bio-gas, bio-mass or small hydro), intermediate (desert concentrating solar thermal plants with cheap thermal storage), sunrise to sunset solar tracking plants, fixed solar desert plants, less expensive wind with night time and day time capability, and finally, fixed PV. The capacity factor for this mixture goes from about 0.92 for baseload, to about 0.42 for desert solar with cheap storage, to about 0.28 for tracking solar, 0.22 for desert fixed PV, and 0.18 for fixed rooftop PV. Wind is about 0.4 and is available during the night and day depending on the season and daily weather. By mixing these options, you can achieve the capacity factor that is desirable as there is greater and greater use of renewables. As you approach 80% renewables by 2050, you can envision about ¼ baseload, ¼ of the middle capacity factor tracking solar, and ¼ fixed rooftop PV and ¼ wind as a viable mix. Even this mixture could benefit from some storage capability in the 2050 time frame being available to the grid whether it be utility scale battery, hydrogen, on-board batteries in PHEV and EV vehicles, pumped hydro, or movable mass storage. The eventual amount and type of storage would need to be determined by future dynamic grid studies that are not available at this time. If you limit yourself to just fixed rooftop PV at 0.18 capacity factor, it would make the job of a balanced grid extremely difficult and expensive.

D5-11

Of all the renewable options that are commercially available at this time, PV is the most expensive. Its costs have been dropping since commercial applications started in the 60s and they continue to drop. Over the last decade, the cost learning factor is about 17.5% based on global production. That is, for every doubling of global production, the cost of an installed PV system reduces by 17.5%. This rate had been about 22% in previous decades so the rate of cost reduction is still high but is reducing somewhat. If this rate of cost reduction continues for another decade, the current levelized cost of a residential PV system would go from today's 20 cents/kWh with current federal and state subsides in San Diego, to 16 cents/kWh without any subsidy in 10 years. Today's cost for residential electricity is about 17.5 cents/kWh in San Diego and has risen historically at close to 5%/yr. Clearly, the unsubsidized cost in 10 years would be attractive if a home owner had the cash to invest or

D5-12

could negotiate financing. This is a goal that California and federal policy is striving to attain. This would still be the most expensive form of renewable energy in 2020 since the other alternatives would be from 8 to 14 cents/kWh without subsidies. However, the extra cost of residential PV is moderated by a number of considerations such as its contribution to reducing electric distribution cost if the PV is distributed evenly in the grid. There are other more external considerations that favor distributed PV. It will still be an attractive option and stays in the mix.

D5-12 Cont.

So what does all this come down to?

Based on balancing the grid and avoiding expensive storage costs, rooftop PV cannot be the sole renewable electricity option and must take its place among the other desirable forms of renewable electricity. Neither can wind be the sole renewable option. But wind is a valuable addition to the renewable energy mix in the San Diego region. It is clean. It is the least expensive renewable energy source. It can be easily integrated into grid operation especially if the grid operators use previous day wind forecasting. Typically, wind farms generate more energy at night and tend not to meet daytime electricity needs and especially not meet summer peaking loads. Fortunately, the Tule wind site has wind characteristics that are favorable even to meeting summer peaking loads and has an average capacity factor of about 0.4. So, it will be able to help meet the new and potentially large night time electric vehicle load as well as the day time summer peaking loads in San Diego. This is an attractive combination of characteristics and may be unique to the Tule site.

D5-13

When we stand back and look at Tule in light of the bigger picture, we see a clear advantage in going ahead with Tule. The modest local impacts are more than out weighted by the local, regional, state, national and global advantages it contributes to.
We must note that it is unfair to have these local impacts fall on the shoulders of the people who live near the Tule site. Justice demands that a way needs to be found to partially balance these impacts with local benefits.

D5-14

Respectfully submitted,

Rich Caputo

Board of Directors
San Diego Rnewable Energy Society

Board of Directors
American Solar Energy Society

P.O. Box 1660
Julian, CA 92036
760-765-3157
richardcaputo@sbcglobal.net

Comment Letter D6

-----Original Message-----
From: Richard Caputo [mailto:richardcaputo@sbcglobal.net]
Sent: Friday, January 28, 2011 3:51 PM
To: ECOSUB
Subject: Tule Wind Project

Mr. Fisher:

I would like to submit this statement in support of the Tule Wind project to the CPUC.

Thank you for including this as part of the public process that you are operating to give this project full consideration. D6-1

Richard Caputo

Founding Chair
San Diego Renewable Energy Society
www.sdres.org

Board of Director
American Solar Energy Society
www.ases.org

P.O. Box 1660
Julian, CA 92036
760-765-3157

TULE WIND news

IBERDROLA® RENEWABLES

A Green Energy Update

Summer/Fall 2010

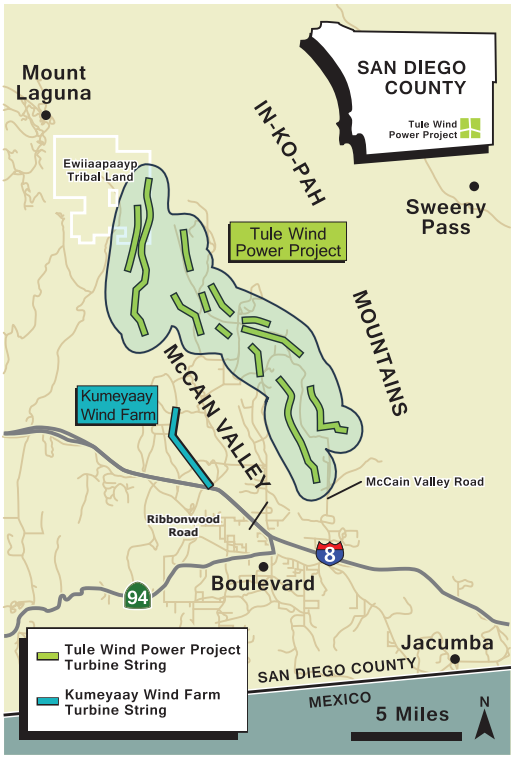
Tule Wind Power Project

Californians are leading the way to make the earth a better place for our families and future generations. Supporting the development of clean, renewable energy sources will significantly improve the air we breathe, lower our dependence on imports of dirty fossil fuels and boost our local economies with much-needed jobs and tax revenue. Iberdrola Renewables is proud to be part of a clean energy future for San Diego County with the proposed Tule Wind Power Project.

For more than five years, Iberdrola Renewables has been monitoring the wind resource in the Backcountry's McCain Valley – finding that the strongest winds typically occur between 9 a.m. and 6 p.m. – the same period when San Diego County's peak power demand occurs. Another feature that makes this an ideal location for the project is Tule Wind's longstanding reservation on the existing Southwest Powerlink 500-kV transmission line.

Quick Facts:

- Clean, renewable energy for 60,000 San Diego-area homes
- Located in McCain Valley in eastern San Diego County
- Up to 200 megawatts (MW) of clean power
- 67-134 turbines, sized at 1.5-3.0 MW, depending on the preferred technology
- Primarily on Bureau of Land Management and Ewiiaapaayp tribal land
- Small portion of the turbines planned for state and private land



Iberdrola Renewables aims to develop this project in such a way that it minimizes impacts to the Backcountry. As with any wind farm, less than two percent of the land in the wind lease area will be used for actual wind power production. The rest of the area will remain available for existing uses, such as hiking, rock-climbing, and off-highway vehicle recreation.

All existing roads and campgrounds in McCain Valley will remain open to the public and many of the public roads will be improved. Also, wind energy facilities require very little water to operate. So precious groundwater supplies will only be impacted to the extent of water required for restroom facilities for Tule Wind Power's onsite employees.

TULE WIND POWER

IBERDROLA RENEWABLES

Tule Wind Power Project Timeline

Scoping
January/February 2010

Agency Preparation of DEIS/R
Spring/Summer/Fall 2010

Public Release o
Late 201

Final EIS/
Late 201

We Need Your Help

Iberdrola Renewables needs the support of local residents like you. After five years of environmental studies, we are ready to seek approval from the federal and state governments. In early spring 2011, we will be up for our final approval with the County of San Diego. If you want to take a stand for improving the quality of life for you and your family, now is the time to take action. Here's how:

- **Sign a support card** and join our mailing list. Hearings on the environmental studies are scheduled to take place in late 2010. We'll let you know when it's time for you to act. You may fill out the enclosed support card or go online: www.tulewind.com/stay_informed/index.html
- **Write a letter.** Submit official comment urging the California Public Utilities Commission (CPUC) and Bureau of Land Management (BLM) to approve the Tule Wind Power Project.
- **Attend a hearing.** Speak out in support of responsible renewable energy development.
- **Tell a friend.** There are many ways you can help, but it's important to do something. By standing together, we will develop responsible solutions that improve our health and well-being. Please reach out to us via e-mail at info@TuleWind.com or call (866) 753-5577.

Environmental Studies to be Released

Iberdrola Renewables believes that the key to being a good neighbor is developing responsible projects that provide an overall positive impact to the environment. This is achieved two ways: Iberdrola Renewables' projects are carefully planned in a way that minimizes environmental impacts, and with each new renewable energy source there comes a reduced reliance on power drawn from fossil-fueled power plants, providing clean air benefits to the entire region.

Later this year, the public will be invited to review and comment on the Draft Environmental Impact Statement/Report (DEIS/R) developed in accordance with the National Environmental Policy Act and California Environmental Quality Act. The Bureau of Land Management (BLM) and California Public Utilities Commission (CPUC) will be evaluating comments received and respond to them in the final EIS/R.

Iberdrola Renewables has conducted five years of comprehensive environmental studies in accordance with federal, state and county guidelines, and in many cases, is going above and beyond what's required.

The Tule Wind Power Project is expected to receive BLM approval in late 2010. The County of San Diego will review the project after it receives environmental clearance. The Tule Wind Power Project is slated to come online by the end of 2012, in order to qualify for federal stimulus funds under the American Recovery and Reinvestment Act. This will translate into a meaningful savings in the cost of the power.

Stewards of the Environment

In October 2008, Iberdrola Renewables became the first U.S. wind power company to voluntarily adopt an Avian and Bat Protection Plan. It is important to Iberdrola Renewables as an organization to go above and beyond required environmental studies to protect our valuable natural resources.

This July, Iberdrola Renewables hosted a tour of the proposed Tule Wind Power Project site attended by 20 representatives from the local, state and national environmental communities. Organizations represented included the National Resources Defense Council, Center for Biological Diversity, Sierra Club, Audubon Society, The Wilderness Society and San Diego Wildlife Coalition, among others. Iberdrola Renewables environmental and permitting managers led discussions about findings from five years of environmental studies and the company's efforts to minimize environmental impacts.

D6-2
Cont.

)EIS/R

Major Use Permit
County of San Diego
2011

Online
2012

Record of Decision
Bureau of Land Management
Late 2010/Early 2011

Construction
2011

Tule Wind Power in the Community

Iberdrola Renewables representatives have been active in the San Diego community, sharing information about the proposed project with residents from all over the county.

April of this year was an eventful beginning to the warm season, and found Iberdrola Renewables at San Diego Earthworks EarthFair and I Love a Clean Alpine. In May, company representatives spoke to wind energy enthusiasts at the Campo Lake Morena Roundup Festival and the Santee Street Fair. This year's unusually long June gloom did not stop the outreach team from attending the 31st Annual Ocean Beach Street Fair and Chili Cookoff, where they met many San Diegans who were supportive of renewable energy alternatives for the county.

You can see what visitors to these events have had to say about the proposed project on www.YouTube.com/tulewind. Look for the outreach team at events in North County this fall.

Wind Energy in the News

Wind Farms Do Not Negatively Impact Property Values

A comprehensive study released by Lawrence Berkeley Labs in 2009 examined the impacts that wind farms had on local property values. After using multiple models to evaluate the sale of over 7,000 homes in the vicinity of 24 U.S. wind farms, the Labs could not find any evidence that the farms had significant (positive or negative) effects on the sale of these homes. (Source: http://tinyurl.com/yfswhfm)

Wind Turbines Are Quiet

For those who are curious about whether wind turbines affect human health due to noise factors, they can rest easy. The National Health and Medical Research Council found, through an independent research study, no evidence that wind turbines have a direct effect on human health. These results are supported by recent scientific literature from all over the world, and conclude that turbines do not produce enough noise to affect humans. (Source: http://tinyurl.com/2455nb4)

Fire Safety

Iberdrola Renewables knows that fire is a major concern for San Diego – East County in particular. The Tule Wind Power Project's 10-12 full-time employees will be trained in fire prevention. Additionally, all turbines on Iberdrola Renewables projects are monitored 24/7 from a local operations building, as well as from the National Control Center in Portland, Oregon. If a turbine experiences a malfunction, the onsite operations and maintenance staff are immediately notified by an automated monitoring system. Iberdrola Renewables gives extra consideration to fire safety when designing wind production and transmission systems. Safety measures include using steel poles instead of wood, longer insulators to reduce the potential for arcing, and burying transmission lines when possible. The Tule Wind Power Project's improved road system will add fire breaks, give fire fighters better access to remote areas and serve as an additional evacuation route for the McCain Valley. Iberdrola Renewables is developing a comprehensive Fire Protection Plan in consultation with CAL FIRE, BLM Fire Control and local fire agency staff.

Who We Are

Headquartered in Portland, Oregon, Iberdrola Renewables operates 41 wind power projects throughout the country with seven more in construction now. Iberdrola Renewables is committed to maintaining and even improving the quality of life in the communities it serves, and is often invited back to develop second or third projects – and in one community, we're on our sixth! The wind energy production from Iberdrola Renewables' projects alone meets the electricity demand of about a million typical American homes each year with clean, homegrown electricity.

For more information, please call (866) 753-5577, e-mail info@tulewind.com or visit www.TuleWind.com.

Join the Conversation!

Follow Tule Wind Power on Twitter and Facebook to get plugged in to the latest news and updates on the project and share your thoughts and opinions about renewable energy.

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YouTube .com/TuleWind

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IBERDROLA RENEWABLES

TULE WIND POWER PROJECT
17744 SKY PARK CIR STE 100
IRVINE CA 92614-9768

Support the Tule Wind Power Project for the wind-rich McCain Valley in eastern San Diego County. The project will bring clean, renewable energy to 60,000 local homes – providing improvements to the air we breathe and the environment around us. Tule Wind Power will contribute to the reliability and security of our energy supply and the economic viability of the region. The project's many benefits include:

- **Boosting the local economy by creating much needed JOBS**
  The project will provide up to 325 green jobs at the peak of construction and up to 12 permanent operations and maintenance jobs.
- **Improving the air we breathe**
  The Tule Wind Power Project will reduce carbon emissions by 250,000 tons annually. Emissions of sulphur and nitrogen oxides from fossil fuel generation are also displaced, improving air quality for all!
- **Funding important county services**
  The project will provide $5 million annually to county revenues, for much-needed services such as public safety and social services.
- **Increasing energy supply and reliability**
  The Tule Wind Power Project will help San Diego and the State of California meet their renewable portfolio standard goal of 33 percent renewable energy usage by 2020. And local generation means a more stable and reliable grid, to the benefit of businesses and residences alike.
- **Reduces the cost of power over the long term**
  If approved and built on-schedule, the project will receive federal stimulus funds, translating into a meaningful savings in the cost of the power.

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Tule Wind Farm Statement 28Jan2011

I represent the San Diego Renewable Energy Society that has about 180 members the last time I checked. We are a chapter of the American Solar Energy Society that has about 10,000 members nationally. We strongly support the Tule project and the substations necessary to connect this project to our electricity transport system. We also support substation development to connect future wind projects. Why do we act in the name of these many members and lend our credibility to these projects? We do so because we think the local impacts are acceptable compared to the overall goal of moving San Diego and the U.S. to a sustainable future and reducing the catastrophic impacts of global warming that are looming over the next decades and centuries. Our generation happens to the one that needs to act so that future generations have a change to live on a planet that we would recognize --- rather than one that would be so changed that we would have difficulty recognizing it in a century. Without our making many difficult choices, they will have few choices.

Without question, there would be impacts from the proposed Tule wind farm. The draft DEIS/R lists about 90 impacts that were studied. About 40 had no residual impacts, and another 40 or so were able to identified measures that could mitigate impacts without adverse residues. The remaining dozen or so would provide impacts either during construction or operation that could be reduced but not totally mediated. Things like changing the scenic vista, construction dust, noise and ground vibration, light glare, possible disruption to eagles and the quino butterfly. It looks like a careful job was done in these studies and the team that conducted the evaluation should be thanked.

D6-3

Lets go back for a minute to put this project in context. The whole purpose of the Tule wind farm is to contribute to the goal of about 80% renewables by the year 2050 to help San Diego reach its climate change goals. (Currently the goal is 20% by 2010, and 33% by 2020 but the science is indicated the need for 80% by 2050.) If this clean project were blocked along with the many other clean energy projects that are pending, then we would fall far short of our goals and the impacts would be many and varied.

We have already witnessed the early impacts of global warming. One is the persistent drought and the rapidly increased number and intensity of forest fires --- now called firestorms. About 15 people were killed and how many animals of all species were lost during the Cedar fire alone. It was only one of a dozen fires raging at the same time in 2003. Talk about impacts. This was caused by the persistent drought that aided the bark beetle in killing 80% of some tree species in San Diego County. This drought extends to the entire southwest and will cause water issue in San Diego over the decades to come. The warming will also cause earlier snowmelt in the Sierras, our natural water storage system, causing spring floods and overwhelming our current system of dams. Thus, less water will be available in the summer for crops and even impact urban water needs. Increase air pollution is projected, as is a huge loss of wildlife species if business as usual continues. Some estimates are as high as 80% species loss by the end of the century. Rising ocean level will definitely impact San Diego directly and indirectly. Besides costal flooding, a major part of our water supply from the Sacramento River delta is already below sea level.

The loss of the Tule energy project and others in the eastern deserts will all contribute to these many and varied impacts from global warming. This must be balanced against some local and immediate impacts. The most obvious is the visual impacts of these very tall wind generators that are a real and tangible loss, to those who choose to live in the Boulevard area because of its remoteness and those who visit the area for that reason.

San Diego is blessed with an abundance of natural places to enjoy and restore oneself from the travails of urban life. San Diego has the largest State Park in the 48 (over 600,000 acres) as well as a major national forest, several other state parks, county parks, and preserves of all kinds. As the former president of the Volcan Mountain Preserve Foundation, I truly appreciate the need to set aside open spaces. As someone who hikes several tunes a week in these remote places, I know the value of these special places. So we have to commend San Diego County, the state and the federal government in the very credible job they have done in setting aside open lands for us to enjoy.

This existing and wonderful resource should be balanced with some land being used for other purposes that fulfill other needs. For example, we have a sizable land area dedicate to activities that totally trash the land, destroy all habitats, increase pollution significantly, and are terribly noisy every day --- not just during a year or two of construction. Off-road recreational vehicle areas have all these impacts but they meet a need. The need is recreational and meets some people's needs to "get away" with family and friends. This is seen as a reasonable use of the land in certain amounts even thought it is totally destruction in so many ways.

D6-3
Cont.

The Tule wind farm will have vastly less impacts that recreational off-road vehicle use. A wind farm actually only uses about 2% of the land in the wind farm designated area. This is mainly for the service road connecting each generator. Each generator uses an area similar to the size of a large residential house and the substation uses a few acres. Trying to balance different needs, we have found a way to allocated some land to off-road vehicle use. We should also find a way to use some land for clean energy projects that are vital to our future.

Meeting different needs implies that the conflicts and impacts of meeting these needs need to be balanced. Accepting some local impacts of a clean energy wind farm, to reduce or eliminate a host of local, county, state, national and global impacts likely to result from excessive carbon emissions, is a balancing act that we must deal with.

I must note that it is unfair that some of us have more impacts because of where we live than the rest of us who live elsewhere. I think that these local folks should be compensated for their local impacts. As far as I know, we ask them to accept these impacts such as the local visual impact, and we do not offer than any local compensation. They are asked to enjoy the benefits we all enjoy at large and to magnanimously accept their real, local impacts. There is a certain amount of inequity in this that has yet to be addressed. I enjoin the CPUC, CEC, BLM, San Diego County, other agencies, and the energy system developer to consider ways to try to balance impacts with compensation. Possibly something as simple as a reduction in energy bills for all those who can "see" the wind generators from their property. The amount of the compensation might be proportional to the distance from the Tule site. This seems

entirely fair and could be a modest expense since there are so few home site that can see the propose wind farm.

With this in mind, I must tell you that the proposed Tule wind farm will have visual impacts for me, and very strong impacts. I will see these large turbines as tangible evidence that we are finally moving in the right direction. That we are making the difficult decisions to balance the present with future needs and that these limited local impacts pale in comparison with the sum total of all the insults we will unleash on San Diego and the rest of the world if we continue business as usual. These slowly rotating kinematic sculptures will look absolutely beautiful to me. They will certainly make me smile. So the scenic vista will be diminished for some and augmented for others. How do you establish it this is a net positive or negative impact.

I know that some species will be disrupted during construction and some might be disturbed later. I also know that the project is required to avoid to the extend possible, by locating the turbines in a way to minimize impacts. I ask the parties that are responsible for the actual plant layout, to use the DEIS/R data to minimize impacts.

There will definitely be bird and bats kills resulting from the Tule wind farm. This project will generate about 3% of the electrical energy used in San Diego County. Even if 20% of our national energy came from wind farms, it would increase the current damage that we inflict on birds and bats by less than 1%. Is this acceptable? In the grand scheme of things, that looks like a very acceptable impact. But California has learned a lot about avian impacts over the past few decades as we have build wind farms and actually measured the avian impacts and learned about the siting specifics that led to impacts. We now have models that can help us understand what leads to avian impacts. These models would also allow us to mitigate these impacts by siting choices before construction. I know this understanding will be utilized in layout out the plant.

D6-3
Cont.

I have walked the nearly Campo wind farm and read the literature about wind farm noise. I found that I could not hear the wooosssh of the blades over the ambient wind sounds when I walked about 1000 feet from the turbines. It was a windy day and the wind farm was operating at rated power. I know that on quieter evenings, home occupants will be able to hear the wooosssh at a further distance if the ambient wind noise is lower. To avoid this, the siting decisions should keep the generators at least 0.5 miles from any homes.

There is concern that these wind machines will cause forest fires. As you know, this wind farm is not located in forest but in a rather arid location with little ground cover. However, older wind generators did overheat and start a fire, and some of them did cause ground level grass fires. As with noise, the fire issue has changed significantly in the current generation of wind machines. Each machine now costs 5 to 10 million dollars and needs to operate for over 10 years or so to pay back the investment. So there is a strong interest on the part of the wind farm owner to not have the machine burn up. So much for intent --- what about the specifics?

These machines are high above ground on a steel tower placed in the middle of a 70 by 70 foot gravel pad with a lack of vegetation around base of tower. The high voltage wires from the machines are underground, lightning protection devices on each tower, and temperatures inside the generators are monitored. Shut down is automatic when above normal temperatures are sensed. The data seems to show that lightning damage to newer machines is rare. However, I have unable to find comprehensive data on any ground fires caused by these newer machines.

This project will hook into existing transmission lines via the proposed substation. The fire danger of the existing transmission lines is neither increased nor decreased due to the creation of this wind farm. These existing high voltage transmission lines do not seem to have any history of starting fires. They are usually shut down if a fire comes close to them to avoid a short circuit to the ground that would damage the wires. The towers holding the wire do need to be washed to remove fire residues before turning the power back on. This situation would be exactly the same after the wind farm as it was before.

Although it was not considered in the draft Environmental Impact Report (DEIS/R), some people are concerned about property values dropping. A very comprehensive study of 25,000 residences showed there was an impact of wind farms on adjacent property values --- they increased property values. Ten wind farm projects in the US in seven states were identified. For each community adjacent to a wind farm, one was found without a wind farm that was comparable. Selling prices for homes were studied in each set of communities for 3 years before and 3 years after the wind farm was built. All this data was analyzed and gave the results of increased property values in the majority of the communities adjacent to a wind farm. More recent studies support these conclusions

D6-3 Cont.

Finally, some people point to the alternative of generating the clean energy solely by putting solar devices on buildings in the San Diego. They claim that there are no impacts of this approach since the buildings already exist within the urban power grid and there is no need to use transmission lines. Certainly seems like an attractive alternative. Is this really a viable choice?

Since I am representing the American Solar Energy Society, you can be assured that I support solar energy on buildings within the urban grid. This is an attractive member of the renewable energy portfolio and we support it whole heartily. Can it be the sole renewable option to the exclusion of wind farms, desert solar plants, geothermal, biomass plants including mining urban waste dumps? In a word, NO.

It is definitely a member in good standing of this team of options. The reasons that it can't be the sole renewable option are many and varied. When the amount of clean energy becomes more than a trivial amount, it is necessary to consider the operation of entire electric grid that is required to meet the needs of a city such as San Diego. San Diego is typical of cities in this county that runs 24/7. Rooftop solar is a mid day power source that operates on average at about 18% of its rated capacity. The engineers say that its capacity factor is 0.18 and it delivers 18% of the energy it could produce if it were to operate all the time.

The current mix of power sources in San Diego have a combined capacity factor of about 0.54 and they operate 54% of rated capacity on average. It is currently made up of a mixture of baseload, intermediate and peaking power plants. The peaking plants have a low capacity factor like fixed PV, but fossil peakers are used only during times of peak load as necessary since they are more expensive and polluting. Even though fixed rooftop PV has a low capacity factor, it cannot be dedicated to peak load. It produces power when the sun shines and typically reaches maximum power at noon. This is not a very good match to the summer time peaking load that occurs in late afternoon or early evening in San Diego. However, it is operating during the day when most of our power is used. Typically, the peaking credit for rooftop PV is from 20 to 60% of its rated capacity. For the urban grid to function you need something else to provide power 24/7 that can also meet late afternoon peaking. The something else would either be fossil powered electricity and/or expensive electricity storage. We are trying to move away from fossil energy and electricity storage is expensive and typically will double the cost of the energy that goes through storage. This is a significant impact – a cost impact.

The other way to balance the grid so that it both reduces fossil dependency and keeps cost reasonable is for a mixture of renewable power sources. This mixture would have some baseload (geothermal, bio-gas, bio-mass or small hydro), intermediate (desert concentrating solar thermal plants with cheap thermal storage), sunrise to sunset solar tracking plants, fixed solar desert plants, less expensive wind with night time and day time capability, and finally, fixed PV. The capacity factor for this mixture goes from about 0.92 for baseload, to about 0.42 for desert solar with cheap storage, to about 0.28 for tracking solar, 0.22 for desert fixed PV, and 0.18 for fixed rooftop PV. Wind is about 0.4 and is available during the night and day depending on the season and daily weather. By mixing these options, you can achieve the capacity factor that is desirable as there is greater and greater use of renewables. As you approach 80% renewables by 2050, you can envision about ¼ baseload, ¼ of the middle capacity factor tracking solar, and ¼ fixed rooftop PV and ¼ wind as a viable mix. Even this mixture could benefit from some storage capability in the 2050 time frame being available to the grid whether it be utility scale battery, hydrogen, on-board batteries in PHEV and EV vehicles, pumped hydro, or movable mass storage. The eventual amount and type of storage would need to be determined by future dynamic grid studies that are not available at this time. If you limit yourself to just fixed rooftop PV at 0.18 capacity factor, it would make the job of a balanced grid extremely difficult and expensive.

D6-3 Cont.

Of all the renewable options that are commercially available at this time, PV is the most expensive. Its costs have been dropping since commercial applications started in the 60s and they continue to drop. Over the last decade, the cost learning factor is about 17.5% based on global production. That is, for every doubling of global production, the cost of an installed PV system reduces by 17.5%. This rate had been about 22% in previous decades so the rate of cost reduction is still high but is reducing somewhat. If this rate of cost reduction continues for another decade, the current levelized cost of a residential PV system would go from today's 20 cents/kWh with current federal and state subsides in San Diego, to 16 cents/kWh without any subsidy in 10 years. Today's cost for residential electricity is about 17.5 cents/kWh in San Diego and has risen historically at close to 5%/yr. Clearly, the unsubsidized cost in 10 years would be attractive if a home owner had the cash to invest or

could negotiate financing. This is a goal that California and federal policy is striving to attain. This would still be the most expensive form of renewable energy in 2020 since the other alternatives would be from 8 to 14 cents/kWh without subsidies. However, the extra cost of residential PV is moderated by a number of considerations such as its contribution to reducing electric distribution cost if the PV is distributed evenly in the grid. There are other more external considerations that favor distributed PV. It will still be an attractive option and stays in the mix.

So what does all this come down to?

Based on balancing the grid and avoiding expensive storage costs, rooftop PV cannot be the sole renewable electricity option and must take its place among the other desirable forms of renewable electricity. Neither can wind be the sole renewable option. But wind is a valuable addition to the renewable energy mix in the San Diego region. It is clean. It is the least expensive renewable energy source. It can be easily integrated into grid operation especially if the grid operators use previous day wind forecasting. Typically, wind farms generate more energy at night and tend not to meet daytime electricity needs and especially not meet summer peaking loads. Fortunately, the Tule wind site has wind characteristics that are favorable even to meeting summer peaking loads and has an average capacity factor of about 0.4. So, it will be able to help meet the new and potentially large night time electric vehicle load as well as the day time summer peaking loads in San Diego. This is an attractive combination of characteristics and may be unique to the Tule site.

D6-3
Cont.

When we stand back and look at Tule in light of the bigger picture, we see a clear advantage in going ahead with Tule. The modest local impacts are more than out weighted by the local, regional, state, national and global advantages it contributes to.
We must note that it is unfair to have these local impacts fall on the shoulders of the people who live near the Tule site. Justice demands that a way needs to be found to partially balance these impacts with local benefits.

Respectfully submitted,

Rich Caputo

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San Diego Rnewable Energy Society

Board of Directors
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Tule Wind Farm and Electrical Connections in South East San Diego County

Many objections are raised about a wind farm in the mountains in eastern San Diego County such as the Tule Wind Farm. Typical comments are that the noise from a wind farm would be intrusive, property values would fall, large numbers of birds and bats would be killed, it would start forest fires, it would spoil our beautiful vista, etc., etc. What are the facts today? D6-4

What about the noise? We are not talking about 1980s technology. That was noisy. We are talking about 2008+ technologies that is not noisy. Well, how noisy is not noisy? You can stand at the base of the tower and have a normal conversation without rising you voice. At 750 to 1000 feet, a wind farm generates a noise that is about the same as you sitting in your kitchen with your refrigerator is running. That is a range of about 35 to 45 dB --- 35dB is a quiet bedroom, a library is about 40dB while 45dB is a really quiet office. When I visited the Campo wind farm, I could not hear the swish of the blades at about 1000 feet. So, the edge of the wind farm should be at least 0.5 miles away from residences to have no noise intrusion. D6-5

What about property values plummeting? A very comprehensive study of 25,000 residences showed there was an impact of wind farms on adjacent property values --- they increased property values. Ten wind farm projects in the US in seven states were identified. For each community adjacent to a wind farm, one was found without a wind farm that was comparable. Selling prices for homes were studied in each set of communities for 3 years before and 3 years after the wind farm was built. All this data was analyzed and gave the results of increased property values in the wind farm adjacent communities. So, if you are worried about property values, make sure you build a wind farm nearby. D6-6

What about the large number of birds and bats that would be killed? Well, wind generators do kill birds. Each one kills about 1 to 2 birds per year on average. That is a problem but residences kill 1 to 10 birds a year. The road that your car drives on kills 15 to 20 birds per mile. Your house cat kills 1 to 2 birds per year. All told, human activities (and house cats) kill from 260 to 1380 million birds a year. Even if 30% of all our electricity in the USA was generated by wind farms, they would kill about 0.6 million birds. So where does this leave us? One could conclude that bird kill from wind farms are insignificant in the general scheme of human activities. Yet, the California Energy Commission's (CEC) policy is "no activity should kill birds without mitigation simply because other human activities also kill birds." A wise policy. Now that a number of wind farms have been built in California and we have a better understand of what factors contribute to higher bird kills, wind farms can be designed to reduce the impact on birds. The CEC demands that each new wind farm be designed to mitigate bird impact based on this new understanding. We wouldn't know the likely impacts of this proposed wind farm until a bunch of data was collected and analyzed. This would only occur at the completion of the draft Environmental Impact Statement. D6-7

Older wind generators did start fires and some of them did cause ground level grass fires. As with noise, the fire issue has changed in the current generation of wind machines. Each machine now costs 1 to 3 million dollars and needs to operate for about 15 years or so to pay back the investment. So there is a strong interest on the part of the wind farm owner to not have the machine burn up. So much for intent. What about the specifics. These machines are high above ground on a steel tower placed in the middle of a 50 by 70 foot gravel pad with a lack of vegetation around base of tower. The high voltage wires from the machines are underground, lightning protection devices on each tower, and temperatures inside the generators are monitored. Shut down is automatic when above normal temperatures are sensed. The data seems to show that lightning damage to newer machines is rare. However, I have unable to find comprehensive data on ground fires caused by these newer machines one way or the other but it does not seem to be a problem. Even recent lightening strikes or other causes to the lightening balls that destroyed the blades of almost all of the wind generators at the nearby Campo wind farm did not initiate any ground fires. D6-8

Finally, you certainly can see a modern wind generator. They are large with the tower being about 300' tall and each of three blades being about 150' long. The question is when you see them, what is your reaction? That depends on the eye of the beholder. It can range from a stick in the eye reaction if it spoils the view you are used to. Or you can see elegant and beautiful kinetic sculptures that are symbols of a less polluting future. D6-9

Some say that we will lose our vista and it would be a tragedy for San Diego County. When you look at the map of San Diego County, you will see an enormous amount of land are dedicated to county parks and preserves, state parks and preserves and national forests and recreation areas. One nearby state park is over 600,000 acres. San Diego County is truly blessed with more than ample outdoor space to enjoy in many ways. To take these few 100 acres that are a combination of private, state, Native American and BLM land for the laudable purpose of generating clean energy, is not depriving San Diegans of natural vistas. We have many, many natural vistas and are suggesting using this particular piece of land for a commitment to a cleaner tomorrow. We need to keep things in perspective. D6-10

This is a local impact that falls mainly on those living within view of these wind generators. This single 200 MW wind farm will duplicate the renewable energy generated in San Diego by all the roof-top PV systems installed as part of the state CSI $3.3 billion dollar program over 10 years. This is a notable contribution to San Diego reduction of green house gases (GHG) and thus will moderate some of the Climate Change (CC) impacts from San Diego. Although this is a global problem it has local impacts. One of the most onerous is the increase in frequency and intensity of east county fires in San Diego. The persistent droughts set up conditions for what are now called firestorms. CC will have other significant impacts on San Diego including ocean rise, water supply difficulties and adverse changes in air pollution related diseases. This wind farm will contribute its part to reducing GHG and local impacts related to GHG but it will increase the local impacts especially the change in the viewscape. Only the full environmental study will be able to balance these impacts and point out which is the better bargain. D6-11

Some people say why don't we put all our eggs into one basket and only use rooftop PV as our renewable energy source. Urban-sited PV does have a lot of advantages as one of a portfolio of renewable energy options. It is in the urban center without explicit need for transmission connections to the existing grid. However, large amounts of urban PV would need the distribution system to be redone to handle energy movement both ways on the system. This would be a major upgrade to the existing distribution system that assumes that electricity flows in one direction in most parts of the distribution system. D6-12

Also, large amounts of PV would require backup since it only has significant energy production over about six hours on the typical day, and misses the summer time peak demand that is in the late afternoon-early evening in San Diego. Each 100 MW of PV typically displace about 20 to 60 MW the peak power demand. The needed backup would take the form of retention of fossil energy use and power plants and/or expensive energy storage. In San Diego that imports about 60% of its energy, large amounts of urban PV would depend on the transportation system to bring in the backup energy. So, rather than a particular link to an existing transmission system such as the Tule wind farm, large amounts of urban PV would require the entire existing transmission system for it to function. D6-13

Rooftop PV is expensive and is about three times more expensive that wind energy without subsidies. As with wind, PV does not do a very good job at displacing peak electrical power. So both depend on other renewable energy sources such as baseload geothermal, baseload biomass electric plants and desert solar thermal plants with cheap thermal storage to make the electric grid system work with some stability and adequately meeting peak power demands. Without these other renewable energy options, you would depend too heavily on fossil fuels and expensive storage. This wind farm and roof-top PV need to be considered as part of a portfolio of renewable energy sources because neither wind nor PV do well as "the" single energy source of the future. They both need grid back up and support. You really can't consider them alone as is often done in environmental impact studies. They need to be part of a system that functions well as an electric system. If used exclusively as the "the" renewable energy source, they would introduce imbalances in the grid that would require extensive use of fossil fuels or expensive storage. D6-14

All of the above is an attempt to address the negative allegation made against a wind farm. Most of the allegations seem to have little support.

There is a very strong case that you can make for wind farms as a form of renewable energy. This is usually acknowledged by most and then we jump right to the BUT…. What are the elements of a strong case for? The major elements are that for every Kwhr of wind electricity that substitutes for how we now generate electricity, we eliminate air and water pollutants, eliminate green house gases, lower the cost of electricity, don't deplete fossil fuels, and avoids a host of other conventional energy problems and generate jobs both locally and elsewhere in the U.S. D6-15

What air pollutants do we eliminate? There would be no sulfur dioxide or nitrogen oxides which make acid rain, or any smog formation from nitrogen oxides, or particulate matter to clog our lungs, or heavy metals such as mercury to cause brain damage to children. To put numbers on this, if 30% US electricity provided by wind and it substituted for today's coal plants, then SO2 would be reduced by 16 billion pounds/yr, and NOx reduced by 9 billion pounds/yr. The avoided human health impacts would be: avoided deaths of 14,364 people/yr; avoided asthma attacks of 300,000/yr, avoided upper respiratory symptoms of 2.07 million/yr. And a bunch of CO2 would not be generated and reduce the people induced warming of the planet. D6-16

What good does reducing green house warming gases do for us? It reduces things like weather extremes such as increased floods and droughts, more frequent and more violent tropical storms (such as Katrina), and rising ocean level. So every KWhr of wind electricity steers us away for our current tinkering with global climate and steer us toward a more stable future. D6-17

Wind electricity also avoids all the dreadful other impacts of coal, oil and gas extraction and transport. It also avoids all the geo-political complications and incredible cost of our current immersing in the middle-east. It avoids hazards of nuclear power which are many and insidious such as the dilemma of small probability of catastrophic accident, the use of weapon grade nuclear materials with links to terrorism, the further terrorist threat of "mole" disrupting nuclear plant operation and causing melt down, the terrorist threat of small organized group taking over a nuclear plant and causing melt down, and the long term (geological) radioactive waste storage problem. D6-18

Wind is a real benefit and should be pursued vigorously to replace fossils and nuclear power. We can't rely on others in far away places to solve our problem of generating too much green house gases for our own good. This seems like a good place to site a wind farms in our region. This coupled with a host of other things to improve our efficient use of energy and a portfolio of other renewable sources of energy should get us to a much brighter future. D6-19

Rich Caputo
San Diego Renewable Energy Society
28Jan10
Julian, CA

Comment Letter D7

From: Donna Tisdale [mailto:tisdale.donna@gmail.com]
Sent: Wednesday, February 02, 2011 12:24 PM
To: aei@cpuc.ca.gov; catulewind@blm.gov; ECOSUB; public.advisor@cpuc.ca.gov
Cc: svolker; jharris; sabrahams; Dan Garrett; jvolker; ablodgett
Subject: ECO Substation comment extenison request

Mr. Fisher, Mr. Thomsen, Dudek, Public Advisor,

Please find the attached letter from Backcountry Against Dumps requesting a mimimum 30-45 day
extension to the current February 16th deadline for the joint PUC/BLM DEIR/EIS for ECO Substation,
Tule Wind, and Energia Sierra Juarez Gen-Tie line.

Regards,

Donna Tisdale,President
Backcountry Against Dumps
619-766-4170

cc: Law Offices of Stephan C Volker

BACKCOUNTRY AGAINST DUMPS
P.O. BOX 1275, BOULEVARD, CA 91905

Iain Fisher, CPUC
Greg Thomsen, BLM

February 2, 2011

via: aei@cpuc.ca.gov ; ecosub@dudek.com; public.advisor@cpuc.ca.gov ; catulewind@blm.gov

RE: Formal request for minimum 30-45 day extension to the February 16th comment deadline for the joint PUC/BLM Draft DEIR/DEIS: ECO Substation, Tule Wind, and Energia Sierra Juarez Gen-Tie Projects:

Dear Mr. Fisher and Mr. Thomsen,

This is a formal request for a minimum 30-45 day extension to the current February 16th comment deadline.

The joint review for these three projects, and the cumulative impact projects, is incredibly complex and time consuming. The DEIR/EIS is confusing to the average citizen. It is difficult to find, understand, and to compare the proposed project, the numerous environmentally superior alternatives, the agency preferred project, and the many analyzed, dismissed, and retained alternatives. Impacted residents, including concerned tribal members, are unsure how to respond. Public Advisor contact information was only recently posted. D7-1

After the January 19th community meeting on industrial wind turbines, adverse health effects and property value impacts, that our non-profit group organized and co-hosted with the Boulevard Planning Group, The Protect Our Communities Foundation, the East County Community Action Coalition, and the Rural Economic Action League, several tribal members shared their concerns. They believe that their health, and that of their children and neighbors, is already being adversely affected by the 25 Kumeyaay Wind turbines located on the Campo Nation. Non tribal residents are also being affected. D7-2

Growing Native American awareness of, and objection to, the significant and cumulative adverse impacts to extensive cultural resources from multiple large-scale projects is resulting in litigation. The BLM's controversial and unlawful land use changes downgrading McCain Valley, that removed previous protections, allowing Tule Wind and the Sunrise Powerlink, a Connected Action to the SDG&E's ECO Substation, are the subject of unresolved litigation filed by our attorney. A hearing is set for March 7th in US District Court in San Diego. D7-3

The health and safety of our human and natural communities, and cultural resources, are placed at-risk by these for-profit projects. We are truly in the eye of a life- and future-altering frenzy that will forever transform our quiet and visually appealing rural character into a perpetually moving and buzzing industrial energy zone. D7-4

Our request for an additional 30-45 days for review and comment on these massive projects is a well-justified and small request in the overall scheme of things to come, and the burden that is being forced upon us. D7-5

Regards,

/s/

Donna Tisdale, President

cc: Interested Parties

Comment Letter D8

FEB 10 2011

Westfield
225 Broadway
Suite 1700
San Diego, CA 92101
Telephone 619.544.8100
Facsimile 619.238.9485

February 4, 2011

Iain Fisher, CPUC
Greg Thomsen, BLM
c/o Dudek
605 Third St.
Encinitas CA 92024

Dear Mr. Fisher and Mr. Thomsen,

I am writing in support of SDG&E's proposed ECO Substation Project. I believe the DEIR/EIS made some excellent points when it noted that without ECO, "There would be no new renewable energy source in the southeastern portion of San Diego County, and consequently, the region may not meet its California RPS program and associated Executive Order requirements to develop renewable energy on federal lands in compliance with the Energy Policy Act of 2005." D8-1

Westfield, which owns and operates several regional shopping malls in San Diego County and throughout the United States, has a strong corporate commitment to sustainability. We believe in working with the communities we serve by leading the way in green building techniques, technologies and materials, designing shopping center environments to reduce consumption, encourage sustainability and advance environmental responsibility. D8-2

Among our sustainable business practices are the pursuit of renewable energy and energy consumption reduction and management. We believe that the ECO Substation Project is critical to helping us carry out our green policies by making renewable energy more readily available in the communities we serve. ECO will help foster the development of wind and solar generating facilities to connect to the San Diego power grid, allowing our region to reduce its dependence on fossil-fueled power plants. This will result in improved air quality for everyone.

Furthermore, Westfield, just like all other businesses in the region, depends on a reliable energy supply to remain economically viable and competitive. The ECO Substation Project will improve electric reliability in Eastern San Diego County, which is a key area of focus for us, and throughout SDG&E's electric system. D8-3

Finally, the ECO Substation Project will generate new construction jobs and facilitate the creation of hundreds of green jobs through the development of associated renewable energy projects. All of this will have a positive effect on our regional economy.

Westfield believes that the ECO Substation Project is critically important for San Diego's economy, air quality and environmental sustainability. We encourage the CPUC and BLM to move the project forward as quickly as possible.

Sincerely,

Jerry Engen
Senior Vice President

Comment Letter D9

From: Luke Gordon [mailto:Skydanzer@Comcast.net]
Sent: Saturday, February 05, 2011 8:40 PM
To: ECOSUB; catulewind@blm.gov
Subject: Regarding - Prehearing on Feb 18, 201 @ 10 AM in San Diego State Office building, 6th floor, Courtroom 1- 6003, 1350 Front St., San Diego, CA

Dear CPUC Staff and Dudek,

Regarding - Prehearing on Feb 18, 201 @ 10 AM in San Diego State Office building, 6th floor, Courtroom 1- 6003, 1350 Front St., San Diego, CA

We strongly support the proposed alternative route designated ECO 3C/3E as opposed to the currently designated ECO 3B because of the following negative environmental impacts:

I am the owner of record of the parcel no. 659 030 04 00 and 612-120-53-00 or the property commonly known as 1585 Jewel Valley Rd. I purchased this property in 1994 in order to make it available to a religious community that I am a member of. Our organization is called the New Being Project. We are a 501(c)3 non-profit recognized as a church by the IRS. D9-1

I have served as proxy owner of the property while the community has organized itself to take ownership of the property. In 2005 I transferred an adjacent property to the community's newly formed non-profit, Rasayana. We currently have an active contract for sale by which Rasayana will take legal ownership of the above referenced parcel after completing the term of its mortgage which I hold in my name. The community uses 3 adjacent parcels which effectively give it 160 acres for its use. Our community uses the property as a retreat residence for church members and also for farming and animal husbandry activities as permitted by its S92 zoning designation. We purchased the property primarily for its secluded, rural atmosphere and to grow food for our community. We serve the local community by offering free classes and free food offerings.

1. We are farming on the land. Where the towers and lines run this will restrict the acreage available for farming. This will result in loss of future income and the loss of being able to grow our own food, which is one of the reasons we bought the property. D9-2
2. I bought this property for their and my use. I bought the property, and they rent it from me because of, a). Its natural beauty – I would have never have even considered buying the property if I knew that the power lines and tower would be put on my property. As a matter of fact, I would sell my property and I am sure Rasayana would sell their property except for the fact that with the money I have invested in the property I would never recoup on a sale and a power line and towers would make property virtually worthless, sine the primary value of the property is in its natural beauty (Aesthetics). b). Seclusion and c). - I am also concerned that with this high voltage line that more development may occur in D9-3

the area. With more future possible development then there would be more people, traffic and noise in the area. One of the reasons that I bought the property was because it is on a dead-end unpaved road in a secluded rural area. D9-3 Cont.

e). Electromagnetic Radiation – Me and my friends are very sensitive to E.M. from high power lines. I know that some of my friends will not come out to the property with a high voltage power line running through it weather it actually to causes harm or not. D9-4

f). I am also concerned about how ground water contamination could affect the wells that supply us with potable water and contamination of the food we grow. D9-5

In conclusion, I am VERY concerned about entering on my property for testing, for later construction and ultimately a permanent high power transmission line and towers on my land. My preference would be to: D9-6

- 1st to move the transmission line around my property and out of sight so it does not destroy the natural beauty of the property and other deleterious effect mentioned above.
- 2nd possibility which would be objectionable, but better than the proposed plan, would be to bury the line rather than put it above ground on towers. D9-7

Also, please refer to the letter (see following letter below) written by William Vandivere, P.E. President/Director, Rasayana for a more detailed account of the issues I mentioned above. D9-8

Yours truly,

Luke Gordon

Iain Fisher
California Public Utilities Commission
c/o Dudek
605 Third Street
Encinitas, CA 92024

RE: Response to NOP for Proposed SDGE East County Substation and Transmission Line Project

Dear CPUC Staff and Dudek,

I hold the office of President and am a Director of Rasayana, a 501(c)(3) non-profit religious and educational organization. Rasayana's principal office is located in Berkeley, CA. Our non-profit, corporate purpose is to own land, buildings and supporting infrastructure for the religious and educational use of other non-profit organizations in furthering the teachings of schools of spiritual wisdom, including but not exclusive to: Yoga, Kaishmir Shavism, Taoism, Tantric Buddhism, Bon and D9-9

Sufism. In so doing, Rasayana's supports the communities that practice and live the teachings of the various spiritual traditions of our planet.

Rasayana owns or leases three parcels (#659 030 04, #659 030 11 00, and #612 120 53 00) comprising a total of 165 acres off Jewel Valley Road in Boulevard. Two residences and related structures occupy the parcels with street addresses of 1585 and 1521 Jewel Valley Road. The combined residences and the surrounding parcel lands also comprise a retreat center which offers daily free yoga, free food, and free spiritual instruction to the public, as well as an expansive schedule of spiritual intensives (typically 5-6 days) and weekend retreats. The residences house full-time residents/staff associated with long-time tenant, The New Being Project, also a 501(c)(3) non-profit, religious and educational organization. The New Being Project (NBP) has leased these properties with the assistance of friend and community member Luke Gordon since 1994. It has done so solely due to the land's seclusion and the absence of urban influences, the natural beauty of the terrain, the availability of potable groundwater and arable land for the development of sustainable agriculture, and its proximity to the coastal metropolitan areas of San Diego and Los Angeles and Orange Counties. Additional income for Rasayana and NBP is derived from subletting of the retreat facilities to other spiritual organizations for specific program events.

D9-9 Cont.

The proposed route for the 138kV transmission lines extending northward from the border to the ECO Substation would pass through and essentially dissect our property. Since the three parcels together are utilized for a single undissectable purpose (spiritual training, retreat programs and sustainable living), this massive physical and electromagnetic intrusion (i.e. electromagnetic field) would have a significant and adverse impact on both Rasayana's ability to maintain the properties for their intended function/purpose and the economic value of the property should it be necessary to sell it at diminished market value.

D9-10

Environmental Impact Concerns Related to Transmission Line Construction/Operation

Based on the Significance Criteria cited in the NOP checklist, Rasayana has the following concerns regarding the project's environmental impacts on the subject property:

D9-11

1) Aesthetics/Visual Impact- The 150 ft-high transmission towers and electrical lines would dominate the landscape of the parcels and have a significant and unavoidable impact on the existing and visual beauty of the terrain and on scenic vistas from the property's granitic mountain outcrops. Given the use of the properties as a spiritual retreat and training center, the impact would be doubly egregious.

2) Agricultural Resources- The construction of improved access road(s) to the tower sites and any impervious surfaces associated with the tower foundations would likely convert arable land to non-agricultural use in perpetuity. The current lessee, NBP, cultivates some of the property for onions, and additional land for

D9-12

vegetables for consumption by the NBP community as part of NBP's sustainable living program. Their objective, supported fully by Rasayana, is to expand the current acreage in cultivation to include most of the parcels forded by the proposed towers. The areal extent of project-related conversion would depend on the extent and positioning of these impervious surfaces on the land.

D9-12 Cont.

3) Hazardous Materials and Water Quality- The NOP indicated that some hazardous materials would be used in conjunction with tower construction, operation and maintenance. The alluvial aquifer that underlies the 1585 Jewel Valley Road property supplies 95-99 percent of the potable water used by the retreat center. Introduction of hazardous materials into surface soils, abetted by infiltration and percolation of rainfall, will over time reach the water supply aquifer- as no impermeable strata overlie it. If such unintended contamination of surface soils were to occur as the result of tower and related facilities construction, operation or maintenance, the impact on groundwater quality could be significant.

D9-13

4) Hydrology- The construction of impervious surfaces associated with tower foundations and access roadways would potentially decrease the area of groundwater recharge for the drinking water aquifer. The areal extent of this impact would depend on the actual area occupied by such impervious surfaces. During the recent drought, groundwater levels in the two on-site wells that supply potable water to the property's storage tanks have receded seasonally to levels that have begun to affect well pumping capacities. Thus, small decreases in recharge become more significant.

   Another potential hydrologic impact related to construction-related excavations (e.g. for foundation piers) and road reconstruction is the presence of a relatively shallow potable water line that crosses the existing unimproved access road and links the on-site water wells with the storage tanks just east of the roadway. Damage to this water line during construction could cut-off water supplies to both residences and force cancellation of planned income-producing retreats until repairs were completed.

D9-14

5) Geology and Soils- The construction of the transmission towers and support infrastructure will denude portions of the property. Subsequent winter rains could increase site erosion and downslope sedimentation. Regeneration of desert vegetation takes more time than does vegetation in wetter climates. Thus, the period of susceptibility will be longer without appropriate measures to revegetate the site and control soil erosion.

D9-15

6) Electromagnetic Field- The EMF impact of above-ground transmission towers and lines would be as significant and unavoidable as the visual impact to those involved in spiritual residency/training, studies and retreats. One of the benefits of meditation and related spiritual practices is the resulting refinement of one's ability to sense/feel and perceive the natural world. The EMF created by high-voltage transmission would negate the benefits gained through these spiritual

D9-16

practices for prospective participants- and make it impossible for Rasayana to fulfill its non-profit purpose.

D9-16 Cont.

Potential Mitigations for Identified Environmental Impacts

To reduce the significance of the impacts identified above, Rasayana recommends the following:

Visual/Aesthetics: As indicated in the letter from J. Freeburn, representing lessee NBP, I concur that two possible mitigations are available for reducing this impact to a less than significant level:

Mitigation 1a- Preferred Mitigation: Reroute the transmission towers and lines to points far enough removed from the Rasayana/L. Gordon properties to eliminate them from any sight lines available on the property.

Mitigation 1b- Lesser Preferred Mitigation: Bury the segment of the lines that would pass through our properties. While it would likely be more costly to implement than the proposed above-ground alignment, it would allow Rasayana and lessee, NBP, to continue to utilize the land for their shared purpose. (Also, see relation to EMF impact mitigation.)

Agricultural Resources:

Mitigation 2: The impact on agricultural resources would be mitigated in full or in part by implementation of Mitigation 1a or Mitigation 1b, respectively.

D9-17

Hazardous Materials and Water Quality:

Mitigation 3- Apply Best Management Practices (CA. Stormwater Quality Manual-Construction Activity) during construction for on-site transport, handling and source controls of hazardous materials. Provide for inspection of construction activities by a County inspector, water quality inspector/specialist from the Regional Water Quality Control Board, or other oversight agency to ensure compliance. Provide evidence of post-project sequestration of potential hazardous materials leakage from transmission tower facilities from surrounding soils. This will also facilitate possible cleanup operations/maintenance should unanticipated leakage/spills occur.

Hydrology: Groundwater Recharge and Water Line Disturbance

Mitigation 4a- Use porous pavement in place of regular asphalt pavement for any segments of access road reinforcement. This would allow for infiltration of rainfall and reduce the local impact on groundwater recharge to the potable water aquifer underlying the property to a level of insignificance.

Mitigation 4b- Contact Rasayana and NBP representatives prior to the start of any construction so that the existing water line alignment can be flagged and avoided/protected during construction.

Geology and Soils:

Mitigation 5- Prepare an erosion control and long term revegetation plan for all areas disturbed by grading, tower construction and line installation. This plan should include plant species, specifications for installation, short-term irrigation for establishment and any physical measures to protect soils prior to the establishment of the near-ground canopy of desert vegetation.

D9-17 Cont.

Electromagnetic Field:

Mitigation 6- Impacts from EMF can be fully mitigated by implementing Mitigation 1a above, or can be mitigated to an acceptable degree by implementing Mitigation 1b.

Rasayana joins respondents Jim Freeburn (NBP) and Luke Gordon in asking that we collectively be contacted and enjoined in the process of mitigating the impacts of the ECO Substation and Transmission Line project on our properties.

Yours truly,

William Vandivere, P.E.
President/Director, Rasayana
& Principal, Clearwater Hydrology

2974 Adeline St.
Berkeley, CA 94703
(510)421-1756
(510)841-1610 (fax)

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Comment Letter D10

-----Original Message-----
From: Richard Caputo [mailto:richardcaputo@sbcglobal.net]
Sent: Thursday, February 10, 2011 8:02 PM
To: ECOSUB
Subject: Comments on Tule Project Alternative C.5.4.1 Distributed Generation Rooftop PV

The comments are attached.

Rich

Richard Caputo
Founding Chair
San Diego Renewable Energy Society
www.sdres.org
P.O. Box 1660
Julian, CA 92036
760-765-3157

Tule Project Alternative C.5.4.1

2) Distributed Generation --- Rooftop PV

You quote San Diego fixed panel PV at a capacity factor of 0.2 Using the SAM model hosted by NREL, the capacity factor is 0.18

The Tule project projected wind capacity factor is close to 0.4 The ratio of the two would be over 2 rather than the 1.5 you use. So 100 % more PV would have to be installed compared to the wind project rather than 50%. D10-1

In addition to the lack of feasibility of installing enough city PV to match the 360 MW anticipated from the wind projects in a similar timeframe, there are other grid balancing issues. See this section of the longer statement submitted previously. If the mix of renewable energy sources capacity factor starts approaching the current grid capacity factor, then you would minimize the use of fossil energy and expensive electricity storage. These factors impact fossil use and cost impacts. D10-2

This distributed generation via rooftop PV produces the claim that there are no impacts of this approach since the buildings already exist within the urban power grid and there is no need to use transmission lines. Certainly seems like an attractive alternative. Is this really a viable choice as identifies in Alternative C.5.4.1 of the DEIS/DEIR. D10-3

Since I am representing the American Solar Energy Society, you can be assured that I support solar energy on buildings within the urban grid. This is an attractive member of the renewable energy portfolio and we support it whole heartily. Can it be the sole renewable option to the exclusion of wind farms, desert solar plants, geothermal, biomass plants including mining urban waste dumps? In a word, NO.

Solar panels on buildings is definitely a member in good standing of this team of options. The reasons that it can't be the sole renewable option are many and varied. When the amount of clean energy becomes more than a trivial amount, it is necessary to consider the operation of entire electric grid that is required to meet the needs of a city such as San Diego. San Diego is typical of cities in this county that runs 24/7. Rooftop solar is a mid day power source that operates on average at about 18% of its rated capacity. The engineers say that its capacity factor is 0.18 and it delivers 18% of the energy it could produce if it were to operate all the time. D10-4

The current mix of power sources in San Diego have a combined capacity factor of about 0.54 and they operate 54% of rated capacity on average. It is currently made up of a mixture of baseload, intermediate and peaking power plants. The peaking plants have a low capacity factor like fixed PV, but fossil peakers are used only during times of peak load as necessary since they are more expensive and polluting. Even though fixed rooftop PV has a low capacity factor, it cannot be dedicated to peak load. It produces power when the sun shines and typically reaches maximum power at noon. This is not a very good

match to the summer time peaking load that occurs in late afternoon or early evening in San Diego. However, it is operating during the day when most of our power is used. Typically, the peaking credit for rooftop PV is from 20 to 60% of its rated capacity. For the urban grid to function you need something else to provide power 24/7 that can also meet late afternoon peaking. The something else would either be fossil powered electricity and/or expensive electricity storage. We are trying to move away from fossil energy and electricity storage is expensive and typically will double the cost of the energy that goes through storage. This is a significant impact – a cost impact.

The other way to balance the grid so that it both reduces fossil dependency and keeps cost reasonable is for a mixture of renewable power sources. This mixture would have some baseload (geothermal, bio-gas, bio-mass or small hydro), intermediate (desert concentrating solar thermal plants with cheap thermal storage), sunrise to sunset solar tracking plants, fixed solar desert plants, less expensive wind with night time and day time capability, and finally, fixed PV. The capacity factor for this mixture goes from about 0.92 for baseload, to about 0.42 for desert solar with cheap storage, to about 0.28 for tracking solar, 0.22 for desert fixed PV, and 0.18 for fixed rooftop PV. Wind is about 0.4 and is available during the night and day depending on the season and daily weather. By mixing these options, you can achieve the capacity factor that is desirable as there is greater and greater use of renewables. As you approach 80% renewables by 2050, you can envision about ¼ baseload, ¼ of the middle capacity factor tracking solar, and ¼ fixed rooftop PV and ¼ wind as a viable mix. Even this mixture could benefit from some storage capability in the 2050 time frame being available to the grid whether it be utility scale battery, hydrogen, on-board batteries in PHEV and EV vehicles, pumped hydro, or movable mass storage. The eventual amount and type of storage would need to be determined by future dynamic grid studies that are not available at this time. If you limit yourself to just fixed rooftop PV at 0.18 capacity factor, it would make the job of a balanced grid extremely difficult and expensive.

D10-4 Cont.

Of all the renewable options that are commercially available at this time, PV is the most expensive. Its costs have been dropping since commercial applications started in the 60s and they continue to drop. Over the last decade, the cost learning factor is about 17.5% based on global production. That is, for every doubling of global production, the cost of an installed PV system reduces by 17.5%. This rate had been about 22% in previous decades so the rate of cost reduction is still high but is reducing somewhat. If this rate of cost reduction continues for another decade, the current levelized cost of a residential PV system would go from today's 20 cents/kWh with current federal and state subsides in San Diego, to 16 cents/kWh without any subsidy in 10 years. Today's cost for residential electricity is about 17.5 cents/kWh in San Diego and has risen historically at close to 5%/yr. Clearly, the unsubsidized cost in 10 years would be attractive if a home owner had the cash to invest or could negotiate financing. This is a goal that California and federal policy is striving to attain. This would still be the most expensive form of renewable energy in 2020 since the other alternatives would be from 8 to 14 cents/kWh without subsidies. However, the extra cost of residential PV is moderated by a number of considerations such as its contribution to reducing electric distribution cost if the PV is

distributed evenly in the grid. There are other more external considerations that favor distributed PV. It will still be an attractive option and stays in the mix.

The attached graphic shows all five options as fingers that when working together as one, became a very powerful fist to make renewable electricity a real solution.

Richard Caputo
POBox 1660
Julian, CA 92036
760-765-3157
San Diego Renewable Energy Society
Chapter of the American Solar Energy Society

D10-4
Cont.

Comment Letter D11

FEB 15 2011

San Diego County Archaeological Society, Inc.

Environmental Review Committee

14 February 2011

To: Mr. Iain Fisher, CPUC/Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, California 92024

Subject: Draft Environmental Impact Report/Draft Environmental Impact Statement
East County Substation, Tule Wind, and Energia Sierra Juarez Gen-Tie Projects

Dear Messrs. Fisher and Thomsen:

I have reviewed the cultural resources aspects of the subject DEIR/DEIS on behalf of this committee of the San Diego County Archaeological Society.

Based on the information contained in DEIR/DEIS, we have the following comments:

1. The cultural resources research performed for the several projects covered by this DEIR/DEIS utilized several different archaeological consulting firms. The tables in Section D.7 summarize the results of their work, but Tables D.7-5, D.7-6 and D.7-7 utilize a format that is much more effective in summarizing the results than the other tables presented in the section. While it ultimately does not affect the impact analysis or mitigation measures, the DEIR/DEIS would have been improved had the other tables been converted to the more comprehensive format. For example, it clearly would have been desirable to have included in the table whether each site is or is not NHRP-eligible rather than leaving it to the reader to find that information in the text and then refer back to the table for the description of the site. D11-1

2. The bottom paragraph on page D.7-15 mentions two sites, SDI-7073 and SDI-7083, which were not relocated. What were these sites? Section D.7 does not provide a description of those two sites. Failure to relocate these sites could, depending on the site types, be a concern. Please revise Section D.7 to correct this omission. D11-2

3. Table D.7-3 lists 31 previously-recorded sites along the 138 kV transmission line corridor, and the text on page D.7-17 states that "15 sites were relocated during the 2008 field surveys." However, the DEIR/DEIS does not clearly indicate which 16 sites were not relocated. Obviously, the segments of Highway 80 and the SD&AE Railroad would have been among the 15 relocated sites, and a few sites are discussed later in Section D.7. But there would clearly be greater concerns with not relocating a sparse flaked lithic scatter than some of the other 31 sites. Absent identification of which 16 sites were not relocated, the D11-3

evaluation of sites along this corridor is potentially inadequate. Please provide the missing information. D11-3 Cont.

4. For the Tule Wind Project, the text on page D.7-21 states that 39 previously-recorded sites were identified by Tetra Tech in 2008 and 7 more by ASM in 2009. However, Table D.7-5 lists 47 sites. Then, on page D.7-31, it refers to 38 previously-recorded sites. Please explain the different numbers. Isn't the correct number 40? D11-4

5. That same paragraph on page D.7-31 states that: "A total of 152 new sites were identified: 108 in the APE survey, while 43 were identified in the ROW sample." First off, 108 plus 43 does not equal 152. It appears that the DEIR/DEIS authors have simply counted the sites listed in Table D.7-6, which total 108 in the APE and 44 (not 43) in the ROW. But Table D.7-6 includes both previously-recorded and newly-discovered sites, so there are not "152 new sites", but (as stated back on page D.7-25) 102. While this does not affect the assessment of the 152 sites listed in the table, it does indicate poor editing. D11-5

6. The paragraph below Table D.7-8, on page D.7-33, refers to "Excavations at CA-SDI-6119…" But that site is not listed in Table D.7-8 as being within the ESJ Gen-Tie Project APE, though the text on page D.7-61 states that it is and would be impacted. Please explain and revise the text and/or table as necessary. D11-6

7. Regarding mitigation measures, the wording provided includes curation of collections from future archaeological fieldwork at sites, but makes no mention of curation for any material recovered as part of the field research for the various projects. In order to mitigate cumulative impacts to cultural resources, County of San Diego practice requires that they also be curated, regardless of whether the sites are evaluated as significant or not. The same standard should be applied to these projects. D11-7

8. Was the isolated lead ball within the ESJ Gen-Tie APE, mentioned on page D.7-69, collected? If so, it will need to be curated. D11-8

Thank you for affording SDCAS this opportunity to participate in the public review period for this DEIR/DEIS.

Sincerely,

James W. Royle, Jr., Chairperson
Environmental Review Committee

cc: SDCAS President
File

Comment Letter D12

From: Nancy Rader [mailto:nrader@calwea.org]
Sent: Tuesday, February 15, 2011 9:53 AM
To: ECOSUB
Subject: CalWEA Comments on ECO DEIR/DEIS

Hello Dudek,

Attached please find our comments on the ECO Substation and related projects.

Thank you.

Nancy Rader
Executive Director
California Wind Energy Association
2560 Ninth Street, Suite 213-A
Berkeley, CA 94710
(510) 845-5077
www.calwea.org

California Wind Energy Association

February 15, 2011

Mr. Iain Fisher, CPUC
Mr. Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024

Sent via email: ecosub@dudek.com

Dear Mssrs. Fisher and Thomsen,

Wind energy is an important part of our state's energy portfolio. In addition to playing a significant role in reducing pollution and carbon emissions, wind makes our electricity system more reliable and decreases our dependence on fossil fuels.

In 2008, California wind projects generated 5,724 gigawatt-hours (GWh) of electricity -- 2.7% of all power generated within California and enough to supply a city the size of San Francisco. In the same year, out-of-state wind projects generated 1,607 GWh of electricity for California, representing 1.6% of total power imports. Combined, wind projects supplied 7,331 GWh -- 2.4% of California's total electricity supply, enough for all homes in San Diego County. With the expected completion of new transmission facilities, CalWEA expects wind energy to serve 5% of California's electricity supply by 2013.

Our state has enormous wind energy potential, with many wind energy projects under development in the San Diego region and throughout the state. CalWEA believes that wind energy could cost-effectively produce 10% to 20% of the state's electricity supply by 2020, helping California to achieve its ambitious 33%-by-2020 renewable energy goal which, in turn, will be a cornerstone in achieving the state's AB 32 greenhouse-gas-reduction goals. The primary constraint in achieving these wind energy goals is insufficient transmission capacity.

D12-1

The three projects included in the DEIR/DEIS -- the ECO Substation upgrade in eastern San Diego County, development of a generation interconnection line from Energia Sierra Juarez in Mexico and Pacific Wind Development's Tule Wind Project – are important steps forward in increasing electric reliability in the region and enabling the delivery of renewable energy. The planned wind projects for the East County region -- including the Tule Wind Project, Energia Sierra Juarez project, Campo Wind Project, Manzanita Wind Project and Jewel Valley Wind Project -- all demonstrate the potential for wind energy to provide a significant contribution to the state's clean electricity goals. But to successfully plan, permit, interconnect and operate these projects will require a commitment to the infrastructure upgrades contemplated in this Environmental Impact Report.

D12-2

CalWEA urges consideration of the state's renewable energy and greenhouse-gas reduction goals which will bring substantial environmental benefits, and which cannot be realized without the development of electricity infrastructure connecting renewable energy resource areas to load centers. D12-3

Sincerely,

Sincerely,

Nancy Rader
Executive Director

Comment Letter D13

FEB 18 2011

February 17, 2011

Iain Fisher, CPUC/Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024

Dear Mr. Fisher and Mr. Thomsen,

I am writing on behalf of H.O.P.E. of the Mountain Empire, an organic grassroots group of local citizens concerned about the social and economic health of our mountain empire communities. We appreciate this opportunity to comment on your EIR for the ECO/Tule Wind projects in east San Diego county. D13-1

I have attached a copy of the platform of our organization as adopted in 2006 and revised this past year by the unanimous vote of the membership at our annual meeting. As you can see, we support "**Responsible Sustainable Energy**." Responsible can mean many things to many people, but, clearly, these projects will bring much needed clean energy to our region in a responsible manner. D13-2

You cannot have responsible sustainable energy if it adversely impacts the communities it will serve. We believe that the recommendation to under ground the connector lines through Boulevard is very responsible and makes this project a win-win for our region. We also believe that the interconnect to the rich wind areas of Baja California is a good idea. H.O.P.E. has always supported those things that are good for our region and opposed those things that are bad. These projects are clearly good and we hope you will approve them with the recommendation to under ground the connector lines. D13-3

Thank you for you consideration. We look forward to commenting in the future.

Sincerely,

Randy Lenac
Chairman
H.O.P.E. of the Mountain Empire
P.O. Box 188
Campo, CA 91906

H.O.P.E. Platform

H.O.P.E. is committed to:

The preservation and enhancement of our country lifestyle by listening to and representing the community on the following issues:

Preservation of our rural heritage

Respect for property rights

Efficient & Responsible use of our Water Resources

Quality schools

Fire protection and public safety

Enhanced healthcare, community services and conveniences

Improved community access (roads, trails, public transportation)

Economic prosperity & local jobs & property values

Border protection

Housing availability and variety

Youth and senior quality of life

Building relationships with our tribal neighbors

Responsible Sustainable Energy

D13-4

Comment Letter D14

FEB 28 2011

MEBA
Mountain Empire Business Association

Boulevard • Campo • Descanso • Guatay • Jacumba • Lake Morena • Pine Valley • Potrero

February 17, 2011

Iain Fisher, CPUC/Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024

Subj: Comment on ECO Substation and Tule Wind Projects

Dear Mr. Fisher and Mr. Thomsen,

The Mountain Empire Business Association is a coalition, more than 80 strong, of businesses, community organizations, ranches and churches dedicated to promoting economic opportunities and enhancing the quality of life in east San Diego County communities. Together, we work to sustain and enhance the rural character of each community, increase citizen involvement and establish a regional awareness that the Mountain Empire area is still "Just Country."

In December 2010, Mountain Empire Business Association endorsed the ECO Substation and Tule Wind Projects for three reasons: jobs, jobs and jobs. Although there is much to be proud of in the backcountry, we lack an economic engine to improve the quality of life and provide the kinds of opportunities for our young people to live and work in our communities. We believe that responsible renewable energy development, enabled by the ECO Substation Project, can become that catalyst. D14-1

Additionally, the ECO Substation Project will provide improved electric reliability and much needed economic stimulus to the Mountain Empire region.

The Mountain Empire is rich in potential for renewable energy. We should not squander the opportunity to tap wind and solar energy in our backcountry to benefit the greater good. We were pleased to see that the recommended project in the environmental review endorses under grounding the connector lines through the community of Boulevard. We were also please to see that the wind turbines have been placed ample distance from residences, schools and other places where people congregate. We trust that the environmental process will resolve these and other issues so that these projects can become an economic engine without compromising the livability of our region. D14-2

Sincerely,

Rick Northcote
President
Mountain Empire Business Association

Comment Letter D15

FEB 2 2 2011

Mountain Empire Gentlemen's Club
PO Box 455
Campo, Ca 91906

February 17, 2011

Iain Fisher, CPUC/Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024

Subj: Comment on ECO Substation and Tule Wind Projects

Dear Mr. Fisher and Mr. Thomsen,

The Mountain Empire Gentlemen's Club is a group of local individuals of concerned about the future of our rural communities. We come together to support education, healthcare and other things that benefit our region. We support the ECO Substation and Tule Wind Projects because we believe they will help us to meet our future energy needs with clean energy solutions.

We have been concerned in the past about impacts to local residences and schools, but feel strongly that the recommendation to under ground the connector line through Boulevard and locate the wind turbines in remote areas of McCain Valley are good solutions that make sense.

We are pleased to see such innovative and clean projects being promoted in such bleak economic times and hope that the CPUC will encourage their approval and completion.

D15-1

Sincerely,

Gene Vick

Gene Vick

President
Mountain Empire Gentlemen's Club
P.O. Box 455
Campo, CA 91906

Comment Letter D16

FEB 24 2011

GATZKE DILLON & BALLANCE LLP
ATTORNEYS & COUNSELORS AT LAW
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1525 FARADAY AVENUE, SUITE 150
CARLSBAD, CALIFORNIA 92008
TELEPHONE 760.431.9501
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WWW.GDANDB.COM

OF COUNSEL
MICHAEL SCOTT GATZKE
ANTHONY T. DITTY

February 22, 2011

Iain Fisher, California Public Utilities Commission
Greg Thomsen, Bureau of Land Management
c/o Dudek
605 Third Street
Encinitas, CA 92024

Re: Proposed Tule Wind Power Project

Dear Bureau of Land Management and California Public Utilities Commission:

This firm represents EcoLogic Partners, Inc. ("EcoLogic"), a consortium of family-oriented recreation groups committed to preserving public access to the great outdoor venues of the western United States. Our voting members include the American Sand Association, the San Diego Off-Road Coalition, the Off-Road Business Association, and the American Motorcyclists Association District 37. I am writing today to express EcoLogic's support for the proposed Tule Wind Power Project, and to urge the Bureau of Land Management and the California Public Utilities Commission to certify and approve the project's EIS/EIR.

There is no longer any question that the United States, if it is to achieve any kind of lasting energy independence, must develop alternative energy sources. Wind power facilities, when placed in the proper location, have demonstrated their ability to meet this mandate and be part of the nation's much needed multi-platform energy policy. Unfortunately, alternative energy facilities often generate more opposition than support. This is primarily because wind and solar projects tend to be placed in scenic, undeveloped areas that provide significant recreational benefits to the general public. As a result, there is a built-in tension between the need to develop alternative energy facilities and the need to preserve public recreational land. D16-1

EcoLogic, however, is happy to report that the people behind the Tule Wind Project have taken the steps necessary to eliminate this tension and mitigate the project's impacts on public recreation. Through their efforts and cooperative spirit, they have convinced EcoLogic that the project will be able to harness the rare wind resources of McCain Valley, while also preserving and enhancing recreational opportunity in Lark Canyon. For this reason, EcoLogic supports the Tule Wind Project.

We look forward to receiving news that the Project and EIS/EIR have been approved. Please feel free to contact me with any questions. D16-1 Cont.

Sincerely,

David P Hubbard
of
Gatzke Dillon & Ballance LLP

DPH:rlf

Comment Letter D17

Green Power

ENEL RENEWABLE ENERGIES DIVISION
NORTH AMERICA AREA

Enel North America, Inc.

7777 Faye Avenue, Suite 200
La Jolla, California USA 92037
T 858 731 5001 F 858 731 5049

February 28, 2011

Iain Fisher, CPUC
Greg Thomsen, BLM
c/o Dudek
605 Third Street,
Encinitas, CA 92024

Subject: Jewel Valley's Comments on the Joint DEIR/DEIS for the ECO Substation, Tule Wind, and Energia Sierra Juarez Gen-Tie Projects

Dear Mr. Fisher:

EGP Jewel Valley, LLC ("Jewel Valley") submits the following comments on the Draft Environmental Impact Report/Draft Environmental Impact Statement ("DEIR/DEIS") for San Diego Gas & Electric Company's ECO Substation Project. As a developer, owner and operator of renewable energy projects, we strongly support this important project as a means of facilitating renewable energy development in eastern San Diego County. D17-1

The Jewel Valley Project is a potential wind and solar facility under development in eastern San Diego County. This project is included in the DEIR/DEIS as the Jordan Wind Project. The DEIR/DEIS currently states that the Jordan Wind Project is reasonably foreseeable and evaluates potential impacts on a programmatic level. As the developer for this proposed project, Jewel Valley hereby submits these comments to correct certain inaccuracies in the DEIR/DEIS.

1) Project Name and Developer – The correct name for the project is the "Jewel Valley Project" and the developer is Enel Green Power North America, Inc.[1]

2) Project Description – Jewel Valley proposes to construct and operate up to 158 MW of wind generation and up to 10 MW of solar power generation – enough electricity to power the needs of more than 100,000 homes. The project site is located on private land north and south of Interstate D17-2

[1] Jewel Valley is an indirectly, wholly-owned subsidiary of Enel Green Power North America, Inc. ("EGPNA") which is a wholly-owned subsidiary of Enel Green Power S.p.A. ("EGP"), a world leader in renewable energy generation, with approximately 5,900 MW of installed capacity and 618 plants in operation worldwide. In North America, EGPNA owns and operates more than 70 plants generating approximately 800 MW using hydroelectric, wind, geothermal and biomass technologies.

8 near Boulevard, an unincorporated area in east San Diego County. Proposed plans for the northern property include up to 66 MW of wind and may utilize up to 28 wind turbines of 2.3 MW to 3.0 MW each. The northern portion of the project may also include up to 10 MW of solar. The southern portion of the project may include up to 92 MW of wind and may utilize up to 40 wind turbines of 2.3 MW to 3.0 MW each. Turbines are proposed to be approximately 450 feet tall from ground to the tip of the blade fully extended. The project is in the early development stage and meteorological facilities are planned to be installed in May 2011. Should the wind and solar resources prove viable, an Environmental Impact Report will be prepared under the jurisdiction of the County of San Diego Department of Planning and Land Use. Construction could be initiated in January 2014. The proposed point of interconnection for the Jewel Valley Project is the Boulevard Substation.

D17-2 Cont.

3) Reasonably Foreseeable and Suggested Potential Impacts – As noted above, the Jewel Valley Project is in an early-developmental stage and while Jewel Valley understands the CPUC's and BLM's desire to identify other potential projects that may interconnect in the vicinity of the proposed ECO substation and rebuild of the existing Boulevard Substation, we believe it is premature to identify potential impacts, mitigation measures and project vicinity consequences at this stage of our Project's development. The Jewel Valley Project will be subject to a comprehensive environmental evaluation of potential impacts after completing various environmental surveys and the project engineering design. The current evaluation (even on a programmatic basis) cannot accurately predict the impacts or necessary mitigation measures for the project. For these reasons and while it is understood that the CPUC and BLM want to inform agencies and the public about other potential projects in the area, the DEIR/DEIS should more fully acknowledge the uncertainty and speculative nature of the potential impacts associated with our project. While many of the proposed mitigation measures may ultimately be acceptable to the Jewel Valley Project, the identification of unmitigable project impacts should not be determined at this time.

D17-3

Energy experts have identified eastern San Diego County as one of the best areas in the United States for developing renewable resources. A recent Renewable Energy Transmission Initiative (RETI) study found that just a small portion of this region could generate enough wind power to serve the needs of more 500,000 homes.[2] But clean energy projects also need infrastructure. Our region has a unique opportunity to build a cleaner, more sustainable future by tapping into renewable resources. But we can't realize these benefits without the ECO Substation Project. We strongly urge the California Public Utilities Commission to approve the environmentally superior alternative and allow the ECO Substation Project to be built and put into operation.

D17-4

Thank you for your consideration of these comments. Should you have any questions, please do not hesitate to contact me at 858-731-5035.

Sincerely,

Jennifer Purczynski
Senior Manager, Project Development
Enel Green Power, North America, Inc.

cc. Joan Heredia, Permitting Manager, Enel Green Power North America, Inc.

[2] Renewable Energy Transmission Initiative Phase 2B Final Report, May 2010, page 12.

Comment Letter D18

From: Donna Tisdale <tisdale.donna@gmail.com>
Sent: Tuesday, March 01, 2011 8:41 PM
To: iain.fisher@cpuc.ca.gov; ECOSUB
Cc: stephanajohnston@hotmail.com
Subject: 09-08-003: DEIR/EIS wind victim details

Dear Mr. Fisher and Mr Thomsen,

Please include the following information into the record as formal opposition / comment on the joint PUC/BLM Draft EIR/EIS for ECO Substation, Tule Wind and Energia Sierra Juarez. D18-1

The following summary is mine, and the string of e-mail commentary copied below is from Stephana Johnson, a wind turbine victim from rural Norfolk County, Ontario, Canada.
I met Stephana, and other individuals impacted by industrial wind turbine installations and related infrastructure, when I attended the First International Symposium on the Global Wind Industry last October in Picton Ontario.

Stephana was very willing to share her information in order to educate decision makers, and to warn other communities of what can be expected when industrial wind turbines are placed too close to homes and other sensitive receptors.

I spoke to her recently . She is in her 80's and told me she was in such a bad state, from being back in her wind turbine impacted home for four nights, that she felt she could not sit down, gather her thoughts, or focus enough to write a coherent formal comment letter for ECO, Tule ESJ DEIR/EIS. Since last year, she had been staying in a trailer at her son's house but the below freezing weather froze up the heating oil, so she had to go back home for a few nights and deal with the reality of living too close to industrial wind turbines. No one should be subjected to this kind of torture. D18-2

Stephana gave me permission to share her information / informative e-mail string. She does not want others to suffer her fate or that of her neighbors.

During our most recent phone conversation, Stephana provided to me with some of the following details of the project (s), that she has no doubt have resulted in harm to herself and her neighbors. Other details I researched / verified online:

- Clear Creek ll went into operation in Nov 2008. Developed in Clear Creek by AIM Powergen, now owned by Canadian Hydro International.
- Cutus Wind Farm 2008. Developed in Clear Creek by AIM Powergen
- Frogmore Wind 2008. Developed in Clear Creek by AIM Powergen
- 18 Vestas 1.65 MW turbines all within a 1.8 mile radius of her home and others.
- Her home is 526 meters (approximately 1,725 feet) from the nearest turbine
- She was healthy when the turbines started operation, but reports her health and life have been adversely impacted in ways she never imagined.
- When local residents figured out that the wind turbines were at the root of their new health problems, they went door to door asking questions.

D18-3

- 70 residents signed petitions stating they were suffering various symptoms--that started after the turbines started operation.
- Her neighborhood now has10 abandoned homes and more sitting empty or up for sale.
- According to Stephana, there was one suicide, one attempted suicide, and one second trimester miscarriage--all reportedly related to adverse impacts from proximity to industrial wind turbines.

D18-3 Cont.

Regards,
Donna Tisdale,President
Backcountry Against Dumps
PO Box 1275
Boulevard, CA 91905
619-766-4170

---------- Forwarded message ----------
From: stephana johnston <stephanajohnston@hotmail.com>
Date: Sun, Feb 13, 2011 at 3:21 PM
Subject: RE: Clear Creek/Cultus/Frogmore IWT Zone - Supplementary report
To: donna tisdale <tisdale.donna@gmail.com>

Hello Donna

You may sahre the body of each email.

I have tried to delete some of the senders' addresses and names but if I miss any, please do this before sending on. Some of my correspondents are very leery of having their names revealed especially if the name can be connected to a GPS location.

You can leave the names of our politicians and public servants because their names are a matter of public record.

Date: Sun, 13 Feb 2011 12:00:34 -0800

Subject: Re: Clear Creek/Cultus/Frogmore IWT Zone - Supplementary report

From: tisdale.donna@gmail.com
To: stephanajohnston@hotmail.com

Hello Stephana,

Thank you for sharing your nighmare experiences with industrial wind turbines (IWT) so that other communities
and property owners can avoid your dire situation.

Please let me know if I have your permission to send your string of e-mails below, to our state, federal and local decision makers who are in the draft mulit-agency environmental review process for multiple large scale wind turbine, substation,
and transmission line projects. If all proposals are approved, we are facing an estimated 392 IWTs in and around
our rural community of 1,500 or so.

D18-4

I know you are not feeling well, after being at your impacted home for several days, so please feel free to respond with a simple
yes or no.

Donna
619-766-4170

On Fri, Feb 11, 2011 at 7:43 PM, stephana johnston <stephanajohnston@hotmail.com> wrote:

Hi Donna

Here is a series of emails which you may pass on to your group.

From: stephanajohnston@hotmail.com
To: neala.barton@ontario.ca
CC: stephanajohnston@hotmail.com; aorfanakos@ombudsman.on.ca
Subject: FW: Clear Creek/Cultus/Frogmore IWT Zone - Supplementary report
Date: Mon, 10 Jan 2011 13:22:02 -0500

Dear Ms. Barton

Please let me know what "health care" the Ontario government is offering to people like those of us who are SUFFERING from the effects of Industrial Wind Turbines which are DESTROYING our health?

D18-4
Cont.

Date: Mon, 2 Aug 2010 20:40:50 -0400
Subject: Re: Clear Creek/Cultus/Frogmore IWT Zone - Supplementary report
From:
To: stephanajohnston@hotmail.com

I can't believe what is happening to you. You are treated so badly. You have all my sympathy and I wish I could do more. There's a;ways a bed here for you.All the best

Anne

On Mon, Aug 2, 2010 at 4:41 PM, stephana johnston <stephanajohnston@hotmail.com> wrote:

Missing data:

> a minor scrape on the back of my left leg at the beginning of July escalated by mid July not only not healed, but with a very painful swollen left leg and symapthetic? swelling of the right leg as well
> unable to get an appt with my family doc, I went to NGH emerg where a swab of the unhealed wound was sent to the lab and I was sent home with a prescription for a 10 day course of sulfamethoxazole/trimethoprim
> only to be told by my family doc on July 27, that the antibiotic did not work on the 2 bacteria in my wound - Strep. agalactiae and pseudomonas aeruginosa, ubiquitous bacteria which most adults' immune systems wipe out within 10 days
> so, now 2 more antibiotics for 7 days - erythromycin and ciprofloxacin.
> all because an immune system compromised by all the stress of being assaulted daily by 18 Vestas 1.65 MW Industrial Wind Turbines surrounding my home within a 3 km radius!

> what is the MoE, the MoHLTC, the MoE&I, the CMOH going to do to prevent further deterioration of my health from the stress of living surrounded by these killer machines?

From: stephanajohnston@hotmail.com
To: martin.mcconnochie@ontario.ca; brad.farnand@ontario.ca; geoffrey.knapper@ontario.ca; bill.bardswick@ontario.ca; kevin.french@ontario.ca; minister.moe@ontario.ca; arlene.king@ontario.ca; bduguid.mpp@liberal.ola.org; mbest.mpp@liberal.ola.org; dmatthews.co@liberal.ola.org; aorfanakos@ombudsman.on.ca

CC:
Subject: RE: Week in Review from the Clear Creek/Cultus/Frogmore IWT Zone
Date: Sat, 10 Jul 2010 15:42:02 -0400

This is a formal complaint about the vibrations from Industrial Wind Turbines affecting residents at the property legally described as:

Roll Number: 33 10 545 040 26400 0000, Municipality - Norfolk County
1628 Lakeshore Rd, P.O.Box341, Port Rowan ON, N0E1M0
HGN CON SLR PT GORE LOT 19, RP 37R8369 PART1

Complaint reference date: Saturday, July 10, 2010

Since the commissioning of the Clear Creek/Cultus/Frogmore Industrial Wind Turbine Zone on November 22, 2008, I have experience DAILY, a feeling of fullness/stuffiness in both ears, as well as a non-stop buzzing in my cranial cavity with the result being sleep deprivation, night after night.

Following are other symptoms and actions taken:

D18-4 Cont.

>audiology test at Toronto Hearing Clinic with follow-up appt with Dr. Wade which he cancelled

>re-testing at Leeper Clinic in London with a 16 month wait for follow-up with Dr. Parnes; who concluded that, "the cause shifts between the wind turbine and environmental exposure. We believe a(n) epidemiological study could verify the relationship between the symptoms and the wind turbine, We had a discussion with her in detail about that etiology."

>symptom of dizziness while changing body positions resulted in a fleeting period of lack of conscious control, a fall into a wall which left a "head sized" dent in the wall board and me unconscious on the floor [once is ENOUGH, I'll never let this happen again]

>piercing pain, twitching in different parts of body often associated with very low barometric pressure, high humidity, winds from the N or NW

>telephone calls, emails to ministries responsible for granting certificates to erect the IWT's

>telephone calls and emails to MoE agents at the Hamilton office

>telephone calls to the ombudsman's office

>request from family doc for a referral to a Neurologist who might be able to explain the neurological basis for the symptoms

>rental of an apt in Delhi from Dec 15, 2009 to June 30, 2010 in order to catch up on sleep lost IF I stayed overnight at my home

>starting July1, 2010, I have slept in my son's place ~ 16 km away from the IWT's, again without the fullness in the ears, the buzzing in the brain, which is taking longer and longer to dissipate, nor the micro-awakenings which cause sleep deprivation whenever I sleep at my home

>November 22, 2010 will be two years of living in hell

I look forward to action, which will take me out of this torture chamber, on the part of all the responsible parties: AIM/IPC, Norfolk County Council, Mr. McGuinty, MoE&I, MoE, MoHLTC, Dept of Health Protection and Promotion, CMOH.

Yours truly

Stephana Johnston
P.O.Box 341, Port Rowan ON, N0E1M0
519 - 586 - 9437, fax 519 - 586 - 9670

From: stephanajohnston@hotmail.com
To: martin.mcconnochie@ontario.ca; brad.farnand@ontario.ca; geoffrey.knapper@ontario.ca; bill.bardswick@ontario.ca; kevin.french@ontario.ca; minister.moe@ontario.ca; arlene.king@ontario.ca; bduguid.mpp@liberal.ola.org; mbest.mpp@liberal.ola.org; minister.mohltc@ontario.ca

CC:

Subject: RE: Week in Review from the Clear Creek/Cultus/Frogmore IWT Zone
Date: Thu, 1 Jul 2010 18:23:35 -0400

Now that Carl.V. Phillips, MPP, Ph.D., Epidemiologist at U Alberta School of Public Health in his testimony at the Wisconsin Public Service Commission hearing has corroborated that the symptoms which the Norfolk Victims of Industrial Wind Turbines have been describing to you for 18 months now are real and furthermore, we contend that AIM Power Gen/IPC, the responsible Ministries of the Ontario government and Norfolk County must give those of us who have had our formerly healthy lives taken from us, give us the money which we put into our homes so we can rebuild them and live peacefully as we "age in place".

Sat, June 26 - spent in Delhi preparing to move out of respite apt. Slept peacefully.

Sun, June 27 - morning and early aft in Delhi. Drive to CC/C/F for supper and to make several long distance phone calls. Drive to T'burg then back to Delhi to sleep.

Mon, June 28 - final clean up before move of furniture on Tues. then back to CC/C/F for supper and overnight.

Tues, June 29 - unquiet sleep no rest after 6 am. Appt with a Master Electrician to explore relation of ElectroMagnetic Fields to symptoms of ear pressure, jangling neurons and many mini arousals from sleep during the night. He has research to do and will comment as soon as he can. Final move from Delhi. Another sleep disturbed night in CC/C/F.

Wed, June 30 - up at 7 am to drive to Simcoe for the whole day. For the night, stay with son in his trailer ~ 16 km away from the IWT's.

D18-4 Cont.

Thur, July 1 - return to CC/C/F to use computer, make telephone calls, have supper.
Plan to sleep in trailer and have supper in CC/C/F until my home in CC/C/F is bought by AIM/IPC, the Ont govt and Norfolk County. Please advise when the process will begin.

As I finish this report, my brain is buzzing, my head is thumping and I can barely wait until I get out of here.

To: martin.mcconnochie@ontario.ca; brad.farnand@ontario.ca; geoffrey.knapper@ontario.ca; bill.bardswick@ontario.ca; kevin.french@ontario.ca
CC:

Subject: RE: Week in Review from the Clear Creek/Cultus/Frogmore IWT Zone
Date: Fri, 25 Jun 2010 01:21:39 -0400

What REMAINS CONSTANT when I am here in CC/C/F: CONTINUOUS PRESSURE ON THE EARS, CONTINUOUS JANGLING OF NEURONS IN THE BRAIN, SLEEP DEPRIVATION, fatigue upon getting up when day breaks.

Wed, June 16 - even though sleep in the trailer was deep and sound, the pain in the chest which I had ignored Tues had not gone by this morn. Nevertheless, starting at ~ 8 am, I drove NNE to Shelburne to meet Lorrie, Barb, Dave and the documentary film crew. Filming took place at the home of a WCO member in the Melancthon area. Although there were more IWT's here than in CC/C/F, they were not as densely packed.

Next was a visit to experience the effects of the transformer around the corner from Paul's home. Outside, the chest pain worsened; indoors, I sensed nerve jangling similar to that in CC/C/F. Within 5 minutes, nausea and dizziness lead to a need to sit down, but even then, could not bear the sensation fearing that I would fall down, as I had in Jan of 2009, if I stayed any longer. Barb and Dave helped me to my car where I sat until feeling able to drive.

D18-4 Cont.

Once the nausea and dizziness dissipated, I drove on the gravel roads at ~ 30 km/h in a SW direction knowing I would soon come to a road I recognized. [My husband and I had owned a farm on the 2nd line of Amaranth ~ 1961]. In Grand Valley, I sat in the car for ~ 30 min.

Back in Delhi by 8 pm, the increased chest pain had NOT dissipated. Pain killers [2 every 6 h over the next day permitted a deep sleep.

Thur, June 17 - slept to ~ 10 am in Delhi. Minimal chores, minimal meals, mostly trying to recover. Drove to CC/C/F ~ supper time to avail myself of my computer and land line telephone. Pain killers were controlling the chest pain so was able to bear an overnight.

Fri, June 18 - retrieve mail from Pt. Rowan and drive back to Delhi via Simcoe. Another deep and sound sleep in Delhi.

Sat, June 19 and Sun, June 20 - although subjected to the pressure, jangling and fatigue, the need to take advantage of the off peak hydro rates to do several loads of laundry and to cook a large batch set of meals to be used during the Mon to Fri of the next week for both my son and myself, I stayed in CC/C/F.

Mon, June 21 - bk in Delhi to recover and sleep.

Tues, June 22 - having forgotten clean clothing necessitated the 48 km return to CC/C/F where I was by sheer

chance, met Martin as he drove by after taking down the wind monitor at the property of a neighbour. I left for Simcoe as soon as possible, staying overnight in Delhi.

Wed, June 23 - having had a good sleep in Delhi, I spent much of the day on a computer in the Simcoe library and stayed overnight in Delhi.

Thur, June 24 - less than a week left on the lease of the respite apt here in Delhi, most of the day was spent collecting all the items not needed for the last 6 days, drove to CC/C/F to meet my son, ~ supper time. He had agreed to move these large items since the forecast was for rain for the next 4 days and he only has an uncovered pick - up truck. The next non-rain day will be either Tues, June 29 or Wed, June 30 when the rest will be removed.

Fri, June 25 - so, here I sit, nerves jangling, nagging pain in the shoulder, waiting for morning when I will leave for Simcoe. WHAT AN EXISTENCE!

D18-4 Cont.

To: stephanajohnston@hotmail.com
Subject: Visit
Date: Tue, 22 Jun 2010 08:32:58 -0400

Hi Stephana,

I hope you survived your visit to my home last week with no lasting ill effects? I was wondering how my issues from living here part time compare with yours, from your point of view. I.E. I am obviously missing the whooshing noise of the blades, but have to wonder if the rest of the issues are the same except for the "dose".

My theory is that you receive a certain amount from a cluster of turbines and a larger dose from the substation but above a certain amount it is "overkill" sort of like taking a whole bottle of pills if two are sufficient to be fatal. Your input is appreciated as I believe it is up to us to figure this thing out. Thanks, Paul

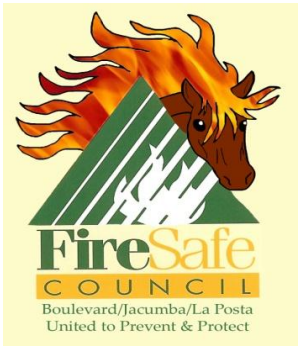
Comment Letter D19

From: Ken Daubach <dumptruck.01@wildblue.net>
Sent: Wednesday, March 02, 2011 10:18 PM
To: ECOSUB; catulewind@blm.gov
Subject: Public Review Comments from the Boulevard/Jacumba/La Posta Fire Safe Council
Attachments: Comments.docx

Please see the attached document. It contains comments from the Boulevard/Jacumba/La Posta Fire Safe Council Board. D19-1

Thank you,

Tammy Daubach
39954 Ribbonwood Rd.
Boulevard, CA 91905
(619)766-4033
dumptruck.01@wildblue.net
Boulevard/Jacumba/La Posta Fire Safe Council Secretary



Boulevard/Jacumba/La Posta Fire Safe Council
43577 Olde Hwy. 80
Jacumba, CA 91934

February 8, 2011
Boulevard/Jacumba/La Posta Fire Safe Council Comments on the East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects,
D.15 Fire and Fuels Management

The Boulevard/Jacumba/La Posta Fire Safe Council consists of 11 board members from and representing the areas of Boulevard, Jacumba, and La Posta Reservation. All members of the board are volunteers. The demographic includes retired locals, housewives, students, full-time employees, tribal members, and former fire fighters. Our mission statement is "The Mission of the Fire Safe Council of San Diego County is to provide education, exchange information, and foster fire prevention and fire safety within the County of San Diego."

Boulevard is located 68 miles from San Diego and 46 miles from El Centro at an elevation of 3,700 feet. Boulevard is comprised of many smaller older communities combined under the name of the post office. These smaller older areas include Live Oak Springs, White Star, Oak Knoll, Manzanita, Calexico Lodge, Mistletoe Lodge, Witches Grove, Tierra Del Sol, Bankhead Springs, and Boulevard. Boulevard has a population of 1,496. Water is provided only by wells. Boulevard is characterized by large lot single-family residences and large and small ranches. The majority of the homes have been built before 1970. Sprinkler systems and many other modern fire safety methods are absent from these homes.

D19-2

Jacumba is located between San Diego and Imperial Valley. The elevation is 2,900 feet and just 200 yards north of the Mexican border. A new enlarged border fence runs through the community. Jacumba has a population of 600. It has a water district which services residents by aquifer water which is the sole source of water for this community. The majority of the homes have been built before 1970. Sprinkler systems and many other modern fire safety methods are absent from these homes.

La Posta is located 56 miles east of San Diego and 52 miles west of El Centro in the Laguna Mountains. La Posta has a population of 18. They have a land area of 3,471 acres.

D19-2 Cont.

The predominate type of vegetation in the Fire Safe Council jurisdiction includes chaparral and scattered riparian areas and live oak groves. The oaks may be affected by the golden spotted oak borer due to the extended drought conditions. The vegetation in the area has very old fuels, some over 60 years old that pose a threat to these communities if they ignite. These communities are prone to very high Santa Ana Winds. The communities of Boulevard, Jacumba, and La Posta are listed as very high areas of fire hazard severity. Boulevard, Jacumba, and La Posta have had no major fires for over 50 years.

D19-3

Stated in D.15.1.1 General Overview: "the Proposed PROJECT would be located primarily within a very high fire hazard severity zone (CAL FIRE 2007a). CAL FIRE uses Fire Hazard Severity Zones to classify the anticipated fire-related hazard for state responsibility areas (SRAs). The very high fire hazard severity designation can be attributed to a variety of factors including highly flammable, dense, drought-adapted desert chaparral vegetation, seasonal, strong winds, and a Mediterranean climate that results in vegetation drying during the months most likely to experience Santa Ana winds. Santa Ana winds are winds originating from the Great Basin that create extreme fire weather conditions characterized by low humidity, sustained high speeds, and extremely strong gusts. ….. wind speeds of 40 miles per hour (mph) can be maintained for hours with gusts from 70 to 115 mph possible….. this situation can lead to serious firer suppression problems, resulting in temporary closure of sections of main highways."

D19-4

Stated in D.15.1.1 Firesheds: "Firesheds are defined as regional landscapes that are delineated based on a number of fire-related features including fire history, fire regime, vegetation, topography, and potential wildfire behavior….As defined in the Sunrise Powerlink EIR/EIS, the ECO Substation and ESJ Gen-Tie

projects both occur entirely within the Boulevard Fireshed while the Tule Wind Project occurs primarily in the La Posta Fireshed with southern portions in the Boulevard Fireshed … firesheds are relevant to the Proposed PROJECT, as the three proposed projects occur within the core area of these two firesheds, and the two firesheds encompass areas within the Santa Ana wind influence areas in relation to potential ignitions from the three proposed projects." D19-4 Cont.

Some of the infrastructure values at risk include the Boulevard Substation (SDG&E), local water district pumps and equipment, Communications Towers at Tierra Del Sol, Jacumba Elementary, Clover Flat Elementary School (Boulevard), the Highland Senior Center, Boulevard Volunteer Fire Station, the Jacumba Volunteer Fire Station, the Anza Borrego Resort, Desert View Tower, two grocery stores, Sacred Rocks, Jacumba Post Office, the Boulevard Post Office, La Posta Casino, unstaffed Sheriff's substation, and a large US Border Patrol Headquarters located in Boulevard. D19-5

Stated in D.15.1.1 Fire History: "Recorded ignitions within the fireshed include a variety of sources, including equipment use, vehicles, campfires (including fires from illegal immigrants), debris burning, lightning, smoking, and powerline-related ignitions." D19-6

These projects will add to the above listed fire dangers. Many of these fire dangers are unpreventable. Fires in Mexico are not suppressed and often threaten or cross the U.S. border. D19-7

There are two volunteer fire departments that provide fire response and assist with medical and other emergencies to the local communities of Jacumba/Boulevard, Jacumba Volunteer Department and Boulevard Volunteer Fire Department in cooperation with the County of San Diego, and the San Diego Rural Jacumba Volunteer Fire Department, CAL FIRE, and BLM.

The Boulevard and Jacumba Volunteer Departments are not permanently manned. Reservists sign up to work on certain days. If no one signs up or they cannot come up to the fire department, the station is unmanned. The stations are manned by about two fire fighters, which is an insufficient number on any type of fire. Only one of the current volunteer fire fighters is a local resident. This means that whenever the interstate and highways are closed due to high winds, weather, or fires, the out of town reservists cannot come to the fire department to assist. D19-8

There is concern for the inability of residents to be able to safely evacuate from some areas of the community as stated by fire representatives and local residents. Fire representatives have stated that it might be helpful for residents to be educated about safer sites to shelter in if they are overcome by fire. D19-9

Stated in D.15.1.1 Wildfire Modeling Results: "…ranked high, very high, or extreme (CAL FIRE 2005)."

Stated in D.15.1.1 Fire History: "….over the last 50 years, 36 wildfires greater than 10 acres have been recorded. ….. Of note, the 1970 Laguna Fire in this fireshed was ignited by a downed electrical distribution line."

Stated in D.15.1.1 Fire Suppression: "Fire suppression responsibilities within the La Posta Fireshed are tasked to the San Diego Rural Fire Protection District, San Diego County Fire Authority, CAL FIRE, BLM, USFS, and Tribal governments. These agencies include significant firefighting resources to serve the area's wildfire potential, especially with the combined CAL FIRE and USFS air attack capabilities that can reach the area within 20 minutes or less." D19-10

The above paragraph does not reflect that the air attack capabilities can only reach the area in 20 minutes or less if there are no other instances in the entire state of California. Another over-looked fact is that although there are significant firefighting resources, there is not sufficient manpower to utilize the resources. D19-11

There is not enough escape potential in these communities. All the roads are two-lane only. There are only two freeway entrances in each community. The traffic added to the roads by the projects would only further obstruct the limited escape routes currently available. D19-12

Listed in D.15.1.1 under Fires Caused by Equipment Use, there are 25 more fire hazard listed. These include hazards during the Construction Phase, Operation and Maintenance Phase, and Fires Caused by Power Lines. For decommissioning, all of these hazards will once again be present. In an area already teeming with fire hazards, this will increase the likelihood of fires greatly. D19-13

Under-grounding with super conducting cable is the preferred Fire Safe Council method. The fire danger risks will be decreased if the line is put under ground. Some items listed in D.15.1.1 that would no longer be a fire hazard are "capacitors that can explode", "structural integrity in high-wind environments", D19-14

"SDG&E power line failure caused by inadequate maintenance practices", "contact between large birds and power line", and "gunshots fired at power line hardware." D19-14 Cont.

As stated in the document, "In addition to more prudent vegetation management and line maintenance, SDG&E prepared a plan in which the utility would shut down power during dry and windy condition s in areas at highest risk for wildfires." This plan is a risk in itself as only one local fire department has a generator, the water is run off of wells which do not work when there is no power, and many of the residents have no generators. SDG&E does have a contract with Red Cross to set up shelters during these power outages, however, there are no buildings east of Campo that are structurally sound for Red Cross to use. The procedures of these shelters enforce that the shelters will be open only from 9AM-5PM, there would be no over-night sheltering, and no services, water or otherwise, for animals. There are no local water supply facilities for residents to get water to take home. Jacumba has a water district but it is not available to the other communities. The nearest location for importing water is 60 miles away. The water is completely unavailable if the roads are closed due to weather or emergency conditions. Local residents, the County of San Diego Board of Supervisors, and CPUC opposed and rejected the shut-down plan. All of the projects in this document are located in the shut-down plan area. D19-15

Stated in D.15.1.1 Fires Caused by Wind Turbines: "When mechanical or electrical failures cause turbines to catch fire, they may burn for many hours due to the limited ability of fire suppression crews to effectively fight fires hundreds of feet above the ground. Wind –blown flaming debris from a turbine fire can ignite vegetation in the surrounding area." According to Tule Wind representatives, fire suppression systems for wind turbines are still in the process and are not yet available. D19-16

Stated in D.15.1.1 Environmental Effects of Fires: "…fire can also be detrimental to biological and other natural resources, such as air quality and water quality." Fires are not just a dangerous hazard; they have impacts that continued even after the initial threat has been extinguished. D19-17

Stated in D.15.1.1 Biological Resources: "Because vegetation communities can be converted following fire, these changes in dominant vegetation communities can drastically affect plant and animal habitat and can affect the prevalence of special-status species." This can cause different species of non-native plants to grow quickly in the absence of the natural plants. These plants are more prone to fires than the native species. D19-18

Stated in D.15.1.1 Air Quality: "Wind, for instance, generally results in lower smoke concentrations because wind causes smoke to mix with a larger volume of air. Regional weather systems, such as the Santa Ana winds of Southern California, on the other hand, can spread fire quickly and result in numerous devastating impacts. The Santa Ana winds effectively work to reverse the typical onshore flow patterns and blow winds from dry, desert Great Basin areas westward toward the coast. As a result, coastal communities can be impacted by fires originating in inland areas (Lipsett 2008)." Impacts will affect both cities and back-country communities. D19-19

Stated in D.15.1.1 Firefighting in San Diego County *Bureau of Land Management*: "The Fire and Aviation Directorate Program is tasked with providing aerial firefighting support for fires occurring on BLM lands. Aircraft used by the BLM are BLM-owned and contracted." The nearest airports are located 60 miles away. Aerial firefighting is unreliable due to wind and weather conditions. In the document, BLM's economic opportunities are listed as a benefit to the communities. However, as can be seen by the recent down-grading of McCain Valley, Presidential directives can override anything that BLM promises or is currently participating in. There are no fire breaks in the communities and there has not been any community education in relation to fire safety and suppression. D19-20

Stated in D.15.1.1: "…CAL FIRE fire policy is to suppress all vegetation fires of 10 acres or less upon initial attack." Under power lines, turbines, or other dangerous structures, fighting the fire is left to the discretion of the firefighters' involved. These projects are contributing to many new obstacles that will make firefighting more difficult if not impossible. D19-21

Stated in D.15.1.1 United States Forest Service: "…USFS Firefighting Air Attack Base in Ramona (operated May through November)" Ramona is located 60 miles away from the represented communities. Electrical fires possibly started by these projects may or may not start during these months, since the elements that start these fires are not seasonal. D19-22

Helicopters, while definitely helpful, depend on weather conditions and the pilot's final decision on whether he'll fly in those conditions. D19-23

CAL FIRE's Interagency Command Center is located in El Cajon, also 60 miles away. D19-24

Stated in D.15.1.1 County of San Diego: "In addition, there are numerous Fire Safe Councils (including the Boulevard/Jacumba Fire Safe Council) that are volunteer groups that meet with fire agencies to assist with fuel-reduction strategies and fire safety education." The Boulevard/Jacumba/La Posta Fire Safe Council is the only fire safe council in the area of these projects. Our fire safe council is still under a year in development and is run completely by volunteers. There is no funding for the fire safe council and we are still researching ways to help our communities with fire safety and suppression.

There are only 15 rural fire agencies (mostly volunteer) to protect the 1.5 million acres of unincorporated parts of the county. Protection has been 'on-call' in a very limited or at very best 'part-time' capacity. 'Around the clock' protection which is promised by 2012, there will still be about 2 firefighters per station, an insufficient number for successful firefighting strategy. D19-25

Stated in D.15.-2 Topography: "…includes terrain that is favorable to wildfire spread including steep slopes, ravines, mountains, and valleys. The ECO Substation Project site slopes gently to the west with elevations ranging from approximately 2,800 to 3,900 feet amsl. The Tule Wind Project would be located in the In-Ko-Pah Mountains and in the McCain Valley area, which have moderate slopes and elevations between roughly 3,600 and 6,400 feet amsl. The ESJ Gen-Tie Project site is a gently sloping portion of the Jacumba Valley at an elevation of approximately 3,300 to 3,400 feet amsl." D19-26

Stated in D.15.-2 ECO Substation Project: "These projects components would be on primarily gently sloping to flat terrain and occurring within succulent scrub and/or chaparral vegetation. Chaparral vegetation represents a higher potential risk for ignition and spread than succulent scrub." This project is being set on property with a grove of 100-year old live oak trees. The trees will be taken down because of the project. On the west side of the project, the property is alongside a residential area. This will directly affect the homes and residents in the vicinity. It will increase their insurance as well as the likelihood of their homes being exposed to fire. D19-27

Stated in D.15 -2 Tule Wind Project: "…the potential for wildfire ignition and spread is higher than associated with the ECO Substation Project." The historic McCain Valley homestead is near this project. The road leading to Lark Canyon is one way in and out. If someone is camping or using the recreational facilities, an emergency may block the only way out. D19-28

Stated in Table D.15 -3 Project Components for Each Project Area Fire Environment Interface: The projects' permanent impacts could come to 682.75 acres. If some catastrophe hits the impacted areas, there are only four firefighters to cover that area, and that is if they are not already on an emergency call. This acreage does not include all the homes and other areas in the areas surrounding the impacted areas. D19-29

Stated on page D.15 -23 Assets at Risk: "Rural land uses are generally located between the communities of Jacumba and Boulevard, and tribal lands are located north and south of Interstate 8 (I-8) near Boulevard, North of I-8, …. The U.S. – Mexico border fence is a dominant feature on the landscape south of I-8 and is highly visible from the community of Jacumba and from ECO Substation and ESJ Gen-Tie Project components." These projects cover a vast amount of land and are in locations that are spread out over a large area. Firefighters are limited and cannot cover all these areas if something were to happen. D19-30

Stated on page D.15 -23 ECO Substation Project: "Based on the low density, rural land uses, and there are a relatively low number of potentially affected structures at risk within the immediate vicinity of the ECO Substation Project. There are a total of 20 residences/structures within approximately 1,000 feet (range from 115 to 950 feet) of the project's proposed substation and electrical transmission line." No mitigation for even *20* residences is unacceptable. The nearest structure is only 115 feet away from the project. The residents' safety is directly affected by this project. It will not only endanger the residents, but raise the cost of their home insurance and lower their property values. D19-31

Stated on page D.15 -24 ESJ Gen-Tie Project: "Land use in the vicinity of the ESJ Gen-Tie Project includes one trailer approximately 2,400 feet northwest of the gen-tie and a second trailer roughly 2,400 feet west of the proposed transmission line. The trailer to the northwest may be an illegal land use based on the lack of County permits." All structures, trailers or otherwise, should be considered with the same respect. Even if one of the trailers is illegal, the property is still at risk. An illegal trailer may actually increase the fire danger of the Project. D19-32

Stated on page D.15 -24 Regional Assets at Risk: "Assets at risk from wildfire include all structures within approximately 40 miles to the west of the project site, stretching from the Cleveland National Forest to the urbanized areas of Pine Valley, Alpine, El Cajon, Chula Vista, and some coastal cities . This area includes terrain, vegetation, and climate that has historically supported wildfire spreads. Some of the area has no recorded fire history, other areas haven't burned D19-33

for 40 years, since the Laguna Fire in 1970, indicating that fuels may be heavy and would readily spread fire. …. nearest community of Boulevard being listed as a federally recognized community at risk of wildfire. … As such, County fire estimates that over 2,000 residences (not including other structure) may be at risk of loss during a wind driven wildfire (Miller et al. 2009).” This Project will not only adversely affect the locals but everyone in the above listed areas. All these risks also affect Mexico should a wildfire cross the border. D19-33 Cont.

Stated in Federal Wildland Fire Management Policy: “Firefighter and public safety is the first priority in every fire management activity….Sound risk management is a foundation for all fire management activities…..Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives.” Stated in National Fire Plan: “The National Fire Plan was a Presidential directive in 2000 as a response to severe wildland fires that had burned throughout the U.S. The National Fire Plan focuses on reducing fire impacts on rural communities and assurance for sufficient firefighting capacity in the future. (National Park Service 2010)”. These projects are adding multiple new risks to the impacted communities. The projects are bringing in no new ways to counter these risks. D19-34

The National Electric Safety Code 1977, 2006 recommends the use of underground electric supply and communication lines. This code, however, is not applicable in the State of California as the state has adopted its own standard. The recommendation for underground should be considered carefully. D19-35

Stated in California Fire Plan: “Involve the community in the fire management planning process…. Assess public and private resources that could be damaged by wildfires…Develop pre-fire management solutions and implement cooperative programs to reduce community’s potential wildfire losses…pre-management solutions are fuels breaks…The Fire Plan does not contain any specific requirements or regulations. It acts as more of an assessment of current fire management practices and standards and makes recommendations on how best to improve the practices and standards in place.” None of this is being applied to any of the impacted communities. D19-36

Stated in California Public Utilities Commission General Order 95: Rules for Overhead Transmission Line Construction: “In addition, Rule 35 requires that dead or diseased trees that overhang or lean toward and may fall into a span be removed.” The spread of the Golden Spotted Oak Borer needs to be taken into D19-37

consideration. There have been no studies east of Pine Valley. Effected trees will have to be moved away from the lines too. D19-37 Cont.

Also stated in California Public Utilities Commission General Order 95: Rules for Overhead Transmission Line Construction: "…should be adopted to address disaster preparedness, including damage from Santa Ana wind-driven firestorms (CPUC and BLM 2008a) According to SDG&E, the petition requested that the CPUC consider several items, including the following: Operating rural electrical line differently during severe fire weather…Mitigating potential hazards associated with rural lines including undergrounding line, using steel poles in place of wood, and shortening spans between poles." SDG&E's only mitigation so far has been steel poles. They have only put the steel poles from Substation to Substation, approx. 7 miles. D19-38

Stated in CAL FIRE Civil Cost Recovery Program: "…taxpayers should not be responsible for costs associated with suppressing fires caused by an act of human carelessness." The developers of these projects should know that they are responsible for paying for the suppression of any fires caused by their projects. This is a fire prone area and according to the above statement, they will be held financially responsible for any fires caused by these projects. D19-39

Stated in D.15.2.3 Regional Policies/Plans Eastern San Diego County Resource Management Plan: "…applicable to the ECO Substation and Tule Wind projects: WFM-01 Protect human life (both firefighters and public) and communities, property, and the natural resources on which they depend. Firefighter and public safety are the highest priority in all fire management activities. WFM-02 Reduce hazardous fuels around communities at risk within the wildland-urban interface using mechanical, manual, biological, and prescribed fire treatments, where applicable." Stated in CAL FIRE San Diego Unit Pre-Fire Management Plan: "…all communities within the San Diego County are potentially at risk of wildland fire (CAL FIRE 2009) …. The identified assets at risk in San Diego County include water (soil erosion after wildfires damage water flumes and storage facilities), structures, wildlife, air quality, and power and communication infrastructure. ….fuel breaks, defensible parameters around communities, clearances around structures," Stated in County of San Diego General Plan Public Safety Element: "Policy 1: The County shall seek to reduce fire hazards to an acceptable level of risks. Policy 2: The County will consider constraints in terms of fire hazards in land use decisions. Within designated areas where population or building densities may be inappropriate to the hazards present, measures will be taken to mitigate the risk of life and property loss. Policy 3: The County will D19-40

support the planning and coordinate implementation of a countywide fuel break and fuel management system." As is clear in the above statements, from the local to the state levels, according to these fire safety plans, these projects should not be acceptable in our area of high risk. The safety measures don't even exist out here yet. There have been no efforts for fuel or fire break management in the impacted communities.

D19-40 Cont.

Stated in Title 9, Division 6, Chapter 1: County Fire Code (Section 96.1.4703): "…(the ECO Substation, Tule Wind, and ESJ Gen-Tie projects would be located primarily within a Very High Fire Hazard Severity Zone). The FPP, which requires that the topography, combustible vegetation , and fire history (among other factors) be considered during development of the plan, addresses water supply, vehicular and emergency apparatus access, travel time to the nearest fire station, structure setback from property lines, ignition-resistant building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management." Our communities do not have the manpower, the capabilities, the fire-suppression equipment or any of these listed factors. Our community's fire safety and suppression resources are limited when available.

D19-41

Stated in D.15.3.1 Definition and Use of the California Environmental Quality Act Significance Criteria/Indicators under the National Environmental Policy Act: "Activities associated with project construction, maintenance, or decommissioning (Tule) significantly increase the probability of a wildfire resulting in damaging impacts to communities, firefighter health and safety, and /or natural resources … The presence of the overhead transmission line significantly increases the probability of a wildfire resulting in damaging impacts to communities, firefighter health and safety and/or natural resources…The presence of the project creates obstructions to fire suppression efforts, resulting in damaging impacts to communities and/or natural resources…Activities associated with project constructions or maintenance result in a fuel vegetation matrix with an increased ignition potential and rate of fire spread. … 1. The project cannot demonstrate compliance with the following fire regulations: California Fire Code, CCR, County Fire Code, and the County Consolidated Fire Code. 2. A comprehensive FPP has been required, and the project is inconsistent with its recommendations including fuel modification. 3. The project cannot meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer Same Practical Effect." These projects have plans in place that are not sufficient for the high risk impacted communities. According to Table D.15-4: All projects are considered Class I: Significant – cannot be mitigated

D19-42

to a level that is less than significant. If the projects are decommissioned, the Class I impacts are once again increased during decommissioning. D19-42 Cont.

Stated in ECO Substation Project Construction: "…potentially aerial stringing (helicopter), refueling, and maintenance activities." Helicopters increase the fire danger risks every time they are put up. They are even more of a risk when working with performing a dangerous activity. D19-43 Stated in Operation and Maintenance: "Operation would include transmission of electric current through transmission lines and substation equipment. Operation of the ECO Substation Project may result in vegetation ignitions and wildfire from equipment failure (e.g., transformers, circuit breakers), transmission line arcing, bird or floating debris contact, or pole failure and subsequent line arcing." All these risks can be mitigated by undergrounding the lines. D19-44 "…Proposed ECO Substation Project, resulting in a trained staff ready to act should a controllable ignition occur." The local staff varies due to the volunteer status of our local fire departments. There are no more than two firefighters available each day. They are rarely the same firefighters. They are all from out of town and not familiar with the area. D19-45

Stated in Tule Wind: "…vehicles, moving wind-driven generators and related parts and increased activity in the area. Wind turbines in California annually result in 35 turbine generator related fires (IAEI 2010). Under worst case wind conditions, with wind gusts in excess of 50 mph, burning material (embers) may travel a mile or more, held aloft by the wind (Dudek 2010)." The increased fire dangers are extreme. This area was considered for an airport but due to the wind gusts exceeding 100 mph and unstable currents, it was deemed too dangerous for an airport. This relates both to the safety in relation with the helicopters used on the projects and the wind turbines. Embers cannot be predicted. D19-46

MM FF-5: Tule Wind does not yet have an operational fire suppression system built into their nacelles. In the document, it states: "the project will include fire suppression systems. Although these systems are not available in a tested, state or nationally approved package for wind turbines" They may not have this technology available by the time these wind turbines are installed. D19-47

One of the items listed under the ESJ Gen-Tie Project Construction as a possible fire ignition source is 'potentially discarded cigarettes'. These sites should be 'smoke-free' in order to prevent the fire danger that comes with discarded cigarettes. D19-48

The proposed projects, Campo, Manzanita, and Jordan wind energy, will also have a Class I designation. The construction of Sunrise Powerlink and the Border Patrol station have not been taken into consideration with the amount of risks the area is being subjected to. D19-49

Impact FF-2: These problems would be mitigated by undergrounding the overhead lines.

Stated in Electrical Transmission Line: "…overhead transmission lines present an ongoing source of potential wildfire ignitions for the life of the project." This can be mitigated by undergrounding the line, otherwise, the fire dangers will be more extreme than they already are. D19-50

Impact FF-3: ECO Substation Project: "…adequate fire access during a fire or medical emergency. Therefore, there is no impact associated with the substation with regards to effectiveness of firefighting (No Impact)." There is no manpower in the community. Without the stations being covered on a 24-hour basis, there is no guarantee of effectiveness of firefighting. There is an impact. D19-51

Transmission lines to the ECO Substation present many hazards. Some stated in the document: "Wildland firefighters working around energized transmission lines may be exposed to electrical shock hazards including the following: direct contact with downed power lines, contact with electrically charged materials and equipment due to broken lines, contact with smoke that can conduct electricity between lines, and the use of solid-stream water applications around energized lines. … the presence of the electrical transmission line may result in the decision to let a fire burn through the area before attacking with ground and aerial firefighting resources. A potential outcome of not providing immediate attack on a wildfire ignition is that it is able to build in size and intensity, especially under weather favorable to fire spread. ….This type of fire behavior significantly complicates fire containment." Lines should be undergrounded. D19-52

Transmission lines also affect aerial firefighting. Stated in the document: "The presence of the line represents various aerial fire attack hazards including increasing the risk of transmission line direct contact by aircraft or water buckets, resulting in a "no fly" zone or restricting aerial water or retardant drop effectiveness in areas with transmission lines. Limiting the effectiveness of aerial fire containments activities is considered significant since this form of fire attack has proven to be an especially effective means of slowing or containing fires, D19-53

particularly in areas where there is limited access or longer response times." This doesn't even take into consideration if there is no aircraft coverage, such as during high winds or at night. Undergrounding the lines is the only reasonable option. D19-53 Cont.

MM FF-6 Funding for FireSafe Council. While it is important to fund local organizations, one must remember that they are volunteer run and operated. There is no guarantee that the organization will be able to decrease the impacts to a reasonable level. As a local FireSafe Council, we recommend the options 'no projects' or underground all overhead transmission lines. D19-54

Stated in the document: "There is uncertainty in how Boulevard's volunteer fire and rescue department will be able to handle a fire or other emergency event at the top of new industrial turbines which now stand between 400 and 600 feet tall." Another point is that being 'volunteers', the firefighters change on an almost constant basis and the stations are not always manned. The communities would need a 24-hour, fully staffed station with firefighters that were properly trained for these scenarios. D19-55

Stated in the document: " "fires at an industrial wind energy facility represents a new and significant health and safety issue that needs to be fully and properly addressed" (County of San Diego 2010b)." D19-56

Stated in the document under Tule Wind: "though the project may impact firefighting effectiveness, it may benefit firefighting access to some remotes arras under specific conditions by providing a road network…. To coordinate the delivery of large-scale equipment trucks and cranes, so not to block or obstruct fire routes or equipment." At presentations, Tule Wind has stated that they would try to use helicopters as much as possible to avoid environmental damages. So, with this stating that there will still be large scale equipment and roads, this just adds to the amount of fire hazards, as well as obstruction of evacuation routes. D19-57

Transmission lines to the Tule Wind Project present many hazards. Some stated in the document: "Wildland firefighters working around energized transmission lines may be exposed to electrical shock hazards including the following: direct contact with downed power lines, contact with electrically charged materials and equipment due to broken lines, contact with smoke that can conduct electricity between lines, and the use of solid-stream water applications around energized lines. … the presence of the electrical transmission line may result in the decision to let a fire burn through the area before attacking with D19-58

ground and aerial firefighting resources. A potential outcome of not providing immediate attack on a wildfire ignition is that it is able to build in size and intensity, especially under weather favorable to fire spread. ….This type of fire behavior significantly complicates fire containment." Lines should be undergrounded.

Stated in the document about the ESJ Gen-Tie Project: "produce significant fire embers/brands, which would not be affected by the border wall. Interstate -8 may serve as a fire break to the north, assisting in the containment of wildfires not driven by Santa Ana winds." Fires create their own wind. The fact of the matter is that the fires are unpredictable.

D19-58 Cont.

Stated in the document about Proposed PROJECT: "Under CEQA, impacts would be significant and cannot be mitigated to a level that is considered less than significant (Class1)." Once again, the impacts are so significant that they cannot be mitigated.

D19-59

Stated in Impact FF-4, non-native plants which are more prone to ignition and carry wildfire due to their tendency to dry earlier will be replaced by native plantings, where appropriate. In a high desert area, it is hard to plant anything. Even native plants do not always take. There is also the issue with needing water to plant over these areas.

D19-60

Stated in MM FF-7 Preparation of Disturbed Area Revegetation Plan, Tule Wind, ESJ Gen-Tie Project, ECO substation, and the proposed projects all will disturb a large amount of acreage. Tule Wind alone will disturb a total of 762.5 acres, including 230 acres of temporary disturbance during construction. Each project's disturbance level is listed as Class II. If you consider the amount of native vegetation being disturbed and removed by all of these projects put together, the impacts are much more significant and together should be classified as Class I.

D19-61

As stated in table D .15–5, the ECO substation alternatives are still mainly Class I risks. The Fire Safe Council recommends that as much transmission line as possible be undergrounded.

As stated in table D.15–6, the Tule Wind project alternatives are all still mainly Class I risks.

D19-62

Stated in Impact TULE-FF-2: "The presence of over 100 wind turbines, electrical transmission lines, and overhead collectors presents an ongoing source of

D19-63

potential wildfire ignitions adjacent to wildland fuels.… Overhead transmission lines present an ongoing source of potential wildfire ignitions for the life of the project.… the presence of the project would significantly increase the likelihood of a catastrophic wildfire." And stated in Impact TULE-FF-3: "Despite the potential for increased firefighting access, the presence of turbines and overhead transmission lines affects firefighting operations, increases risk to firefighters, and has the potential for delaying initial attack capabilities." Our communities do not possess the ability to fight a catastrophic wildfire. The Fire Safe Council believes that any further risks to causing catastrophic wildfires should be prevented. D19-63 Cont.

Stated in D.15.5.5 Tule Wind Alternative 5, Reduction in Turbines Environmental Setting/Affected Environment: "Under this alternative the proposed Tule Wind project would be the same as that described in section B of this EIR/EIS with the exception that this alternative would remove specific turbine locations." Removing these turbines does not significantly decrease the fire danger. The project would still be considered Class I. D19-64

Stated in Impact ESJ-FF-3: “The undergrounding of transmission lines included in this alternative eliminates overhead transmission lines as a source of conflict with both aerial and ground-based firefighting efforts. Under CEQA, for this alternative, impact ESJ–FF–3 is considered less than significant (Class III).” This is the alternative the Fire Safe Council recommends. D19-65

The Fire Safe Council also approves D.15.7.3 No Project Alternative 3 – No Tule Wind Project and D.15.7.4 No Project Alternative – no ESJ Gen-Tie project. The Tule Wind Project’s fire plan is flawed and only has one signature from a fire official. Overall, the project puts the communities in more danger in an already highly wildfire potential area. The benefits the project could yield to the communities do not exceed the risk the communities are being put in. D19-66

Stated in table D. 15–8: "During Red Flag Warning events, as issued daily by the National Weather Service and state responsibility areas of (SRAs) and local responsibility areas (LRA), and when the U.S. Forest service (USFS) Project Activity Level (PAL) is Very High on the Cleveland National Forest (CNS) (as appropriate), all construction and maintenance activities shall cease." The construction and maintenance activities should cease any time the winds are strong and not just during Red Flag Warnings. D19-67

Stated in table D. 15 – 8 Mitigation Measure: "FF–6: Funding for FireSafe Council. Provide funding for locally-based Fire Safe Council (E.G., Campo/Lake D19-68

Moreno FireSafe Council) to prepare implement a Community Wildfire Protection Plan. The funding will be determined in conjunction with local fire authority's input, the specified fuel reduction project priorities identified by the FireSafe Council, and in consideration the funding amount provided under Mitigation Measure FF–3." Fire Safe Councils are run by volunteers and cannot be depended on for continuing to provide fire prevention methods. Also the funding must be given to the appropriate Fire Safe Councils in the affected communities. D19-68 Cont.

Stated in D.15.9 Residual Effects: "… present a potential obstacle for normal firefighting operations and strategies and even with training, firefighting effectiveness will be reduced by the presence of these facilities over a long time frame. Under CEQA, the following impacts be significant and cannot be mitigated to a level that is considered less than significant; therefore, impacts would yield residual effects." D19-69

Stated in table D. 15 –9 Significant and Unmitigable impacts: It is stated in this table that one of the greatest impacts are the overhead transmission lines. The Fire Safe Council requests that all overhead transmission lines be undergrounded. This will greatly reduce the fire danger and impacts on our area. It will also enable the firefighting agencies to fight the fires more effectively.

The Boulevard/Jacumba/La Posta Fire Safe Council's recommendation is that the projects either underground all overhead transmission lines or that there be no projects. Undergrounding the transmission lines will increase the safety of all three of our communities. Some of the eliminated impacts would be extra fire danger, visual impacts, noise impacts, accidents, helicopter impacts, environmental impacts, and less environmental footprint. Due to the impacts of these projects, appropriate amounts of mitigation will need to be taken in regards to fire safety. D19-70

The Boulevard/Jacumba/La Posta fire safe Council recommends of the following mitigation.

All Fire Departments in the communities of Boulevard, Jacumba, and La Posta need to have paid 4-0 staffing with supplemental local volunteer reservists, on a 24 hours, seven day a week, year round basis. The firefighting staff for these communities must be fully trained to cope with electrical, turbine, and other irregular fires and hazards. D19-71

Since the communities' only form of communication are telephones and cell phones, HAM radio operators must be trained and available in all communities. If the power should go out, the community members' telephones will not work. Cell phones have limited coverage in this area and interference with Mexican cell D19-72

towers so they are not reliable. The equipment for the Ham radios and the generators to run the radios must be provided. In alert system, such as the reverse 911, needs to be available in all three communities in working order even when the power is out. D19-72 Cont.

In all three communities, the Fire Departments must be provided with generators and the equipment to fight the fires. D19-73

The communities of Boulevard and La Posta depend on wells for their water, storage tanks for water need to be supplied for the community members' usage. Water needs to be kept in storage tanks. This water could be used for both fire suppression and potable water. Community members with livestock must have water available for their livestock. This water must be easily portable, stored on location, or delivered to these community members. D19-74

All three communities need a working evacuation plan. This evacuation plan must include a working plan for use of the roads during an evacuation. There must also be evacuation centers set up for both community members and their livestock. This is especially important during the construction phase of these projects. The construction phase of these projects will increase the traffic in these communities. The only roads accessible in these communities are two-lane roads. There are nine possible projects in the Boulevard/Jacumba/La Posta area. This will increase the communities' frequency of traffic collisions or accidents. D19-75

These projects must either guarantee that there will be no increase to the local residents' insurance costs or that they will either cover or provide the increase of these insurance costs. D19-76

All three communities require uninterrupted electrical service throughout the construction and maintenance of these projects. All three communities also require uninterrupted electrical service during high winds. D19-77

The local schools should be provided with education on safety and evacuation methods. D19-78

Our local fire departments call values will increase during the construction and life the projects, due to the increased amount of activity, people, and traffic.

Due to BLM opening for industry, there are more potential projects that could be added and therefore more potential impacts.

All funding for local Fire Departments and Fire Safe Councils should be provided by these projects, for the life and construction of the projects. D19-79

The Boulevard/Jacumba/La Posta Fire Safe Council requests that all of the above items listed as potential dangers and all listed mitigation be taken into deep consideration. The communities we represent are being deeply affected by these D19-80

projects. As the local Fire Safe Council, our concerns rest with our community members and keeping them safe from all possible fire dangers. D19-80

Boulevard/Jacumba/La Posta President, Kenneth Daubach

Boulevard/Jacumba/La Posta Vice-President, Robert Price

Comment Letter D20

BACKCOUNTRY AGAINST DUMPS

P.O. BOX 1275, BOULEVARD, CA 91905

California Public Utilities Commission
Attn: Ilan Fisher

March 3, 2011

BLM California Desert District Office
Attn: Greg Thomsen

Bureau of Indian Affairs
Attn: John Rydzik

c/o Dudek
605 Third Street
Encinitas, CA 92024
VIA Express Mail

RE: ECO Substation, Tule Wind, Energia Sierra Juarez Gen-tie Project DEIR/EIS / submission for the record.

Dear Mr. Fisher, Mr. Thomsen and Mr. Rydzik,

Please find and accept into the record for this project, the enclosed copy of the yellow bulk mailer with meeting flyer for the community meeting held in Boulevard on January 19, 2011, and the enclosed CD / video of that meeting. The subject of that meeting was:

INDUSTRIAL WIND TURBINES,

ADVERSE HEALTH EFFECTS, & PROPERTY DEVALUATION

As you will see from the flyer and the video, BAD distributed the flyer and meeting announcement as a public service to the community. Speakers included Carmen Krogh with the Society for Wind Vigilance and Michael McCann of McCann Appraisal, LLC, Bill Powers of Powers Engineering, Dave Elliott , member of the Manzanita Band, and myself. D20-1

The bulk mailer went to all those who receive their mail through the Boulevard and Jacumba Post Offices, this includes many, if not a majority of local tribal members from several tribal nations. We had an excellent turnout that filled the equipment bay of our volunteer Boulevard Fire Station with a standing room only crowd with overflow outside. We had very positive feedback including that from several elected tribal executive council members who are already suffering adverse impacts from the existing 25 Kumeyaay Wind turbines, along with many of their friends and neighbors.

This is only a small part of the comments we will be submitting for the record on this massive and destructive project.

Regards,
Donna Tisdale, President

619-766-4170

DONNA TISDALE
BACKCOUNTRY AGAINST DUMPS
PO BOX 1275
BOULEVARD, CA 91905

BULK RATE
US POSTAGE
PAID
PERMIT # 10
BOULEVARD, CA

RURAL RESIDENT
BOULEVARD, CA 91905

PLEASE READ ME AND COME TO THE COMMUNITY MEETING – WED. JAN. 19TH !!
LEARN ABOUT MORE WIND TURBINE PROJECTS CLOSER TO HOMES – ADVERSE HEALTH EFFECTS – PROPERTY VALUE IMPACTS – INCREASED FIRE RISK

D20-2

BIG-WIND ENERGY IS *NOT FREE CLEAN OR GREEN*

- ✓ Learn what SDG&E, Sempra, Iberdrola, Invenergy, Enel and their complicit cheerleaders, don't want you to know--like how turbines can cause harm.
- ✓ Learn how they are influencing decision makers to reduce turbine setbacks that are needed to protect public health and safety. (Smaller buffer zones =more turbines)
- ✓ Why are people and animals getting sick, and locals say that wildlife is disappearing around wind turbines, like the antelope around Willow Creek Wind farm?
- ✓ Why are some families abandoning their homes when wind turbines move in next door, and why do government agencies support industry over residents?
- ✓ Why do companies, *like Iberdrola*, oppose property value guarantee agreements *if* property values really *don't deflate* as they so misleadingly claim?
- ✓ Why do companies, *like Invenergy*, try to bribe impacted property owners with cash to shut up about *unacceptable* noise impacts, that make some people ill, and require gag orders for the *few* they do buy out?
- ✓ Why did one town councilman say his relationship with the wind company was like a relationship with the devil himself, and that their (Sheldon) wind farm was another example why industrial wind turbines don't belong anywhere near people?
- ✓ Why did SDG&E's Escondido substation explode in December? Can it happen here?

Join us at the community organized meeting & hear from those who know

7-9 PM, Wed. Jan 19, 2011 Boulevard Fire Station, 39919 Ribbonwood Road

Organized and co-hosted by the elected Boulevard Planning Group, Backcountry Against Dumps, The Protect Our Communities Foundation, the East County Community Action Coalition, and the Rural Economic Action League.

Seize the opportunity to learn the facts from those who have knowledge of, and experience with, industrial wind energy projects and their negative impacts on people's health, quality of life, and property values. Get information to use at upcoming public meetings to *discuss* Iberdrola's 200 MW Tule Wind project (134 turbines) in McCain Valley, with new power lines, substations, and access roads from Ribbonwood, across the Tule Creek 100-year flood plain, to McCain Valley Road; SDG&E's 60-acre ECO Substation near Jacumba with 13.3 miles of new 138 kV lines, and 2-acre Boulevard Substation, near Calexico Lodge; Sempra's 1,250 MW Energia Sierra Juarez (est. 625 turbines in Baja) projects that will transform our public lands, resources, quiet neighborhoods and stunning open views into subsidy and property - value sucking industrial energy zones with hundreds of massive turbines close to 500 feet tall (over 100 feet taller than the existing Kumeyaay turbines) and lots of new transmission lines criss-crossing our properties and neighborhoods, some using eminent domain. More turbine projects, with *more* 138 kV lines and new switchyards are planned in and around Boulevard with hundreds more planned near Jacumba and Ocotillo. We are not alone. Other communities around the nation and the globe are already dealing with the negative health and loss of property values from these projects.

These are adverse health effects we already know about--and that the wind industry argues:

- ✓ Wind turbines emit low frequency noise and infrasound which may be audible or inaudible. It is acknowledged that infrasound can induce annoyance, stress and sleep disturbance by disturbing people inside their homes through structural vibrations. Pets, livestock and wildlife are also affected.

D20-2
Cont.

- ✓ Humans must be protected from the adverse health effects of low frequency noise and infrasound exposure with minimum setbacks of 1.2-2 miles--*more in open terrain like ours where noise travels.*
- ✓ International research and media reports document people exposed to wind turbines reporting adverse health effect, including annoyance, stress, sleep disturbance, headaches, difficulty concentrating, irritability, fatigue, dizziness or vertigo, tinnitus and the sensation of ear pain /pressure.
- ✓ Based on current understanding of how low frequency sound is processed in the ear, and on reports indicating that wind turbine noise causes greater annoyance than other sounds of similar level and affects the quality of life in sensitive individuals, there is an urgent need for more research directly addressing the physiologic consequences of long-term, low level infrasound exposures on humans.
- ✓ Adverse health effects associated with low frequency noise and infrasound can be avoided with authoritative regulations that ensure protection is engineered into the design of wind turbine projects.
- ✓ Members of the wind energy industry oppose addressing wind turbine low frequency noise and infrasound. For example the Canadian Wind Energy Association has lobbied against the introduction of protective guidance designed to address wind turbine low frequency noise and infrasound and companies working in San Diego County have lobbied for more access to land with fewer restrictions.
- ✓ Wind turbine shadow flicker can stretch thousands of feet at certain times of day. That flicker can trigger seizures and create additional adverse effects for people and animals.

These nearly 500 feet tall wind turbines can and do start fires, throw blades, and even collapse. Come to the Jan 19th community meeting and see the evidence.

You already know about the dirty tricks and bad actions by SDG&E and Sempra , above and beyond their Sunrise Powerlink scam...if you don't, here is a link to website that tracks them and provides an interesting litany with the sources: http://truthsayer-esther.blogspot.com/p/schemes-between-cpuc-sempra-sdg.html

Iberdrola has already received close to $1 Billion in federal renewable energy grants *and they want more* of our tax dollars (at least 30% of project costs) to build Tule Wind *on PUBLIC land*--*inside* the Lark Canyon OHV Park, and *next to* the Lark Canyon and Cottonwood Campgrounds in the McCain Valley National Cooperative Land and Wildlife Management & Recreation Area--our main tourist attraction and local recreation area for lots of folks. If not for the stimulus money, Iberdrola said it would have chosen to invest abroad instead of in the United States. ***The stimulus money and state mandates for renewable energy are driving all these projects.*** Between direct cash payouts, federal loan guarantees, existing state tax credits and State Renewable Portfolio Standards policies, that assure premiums for renewable energy, wind developers get fat at the expense of tax and rate payers. ***Instead*--that money should go to public and private property owners (like us)to install solar panels and *small* wind turbines to produce energy where it is needed and to eliminate unnecessary and expensive power lines like Sunrise Powerlink!** Studies show that point of use generation, on new and existing structures, is the more cost-effective and least destructive way to go, *after* energy conservation through reduced consumption and weatherizing buildings.

COME AND SPEAK OUT AT THE PUC/BLM/COUNTY MEETINGS FOR THE JOINT DRAFT EIR/EIS FOR TULE WIND , ECO SUBSTATION & ENERGIA SIERRA JUAREZ: Staff will be present for questions.

January 26, 2011 at 7:00 PM: Jacumba Highland Center 44681 Old Highway 80, Jacumba

February 2, 2011 at 7:00 PM: Boulevard Volunteer Fire Department 39223 Highway 94, Boulevard

The County will be holding separate hearings on the Major Use Permits for issues under County control.

TELL THE PUC, BLM, the County, and tribal leaders that we need minimum buffer zones of at least 1.5-2 miles, *or more, to protect public health and safety.* Make them listen to your legitimate concerns!

D20-2 Cont.

We know that Iberdrola (Spain), SDG&E, Sempra, Invenergy (Chicago), Enel (Italy), and other major developers, industry and business groups will show up in full force, along with their political toadies, boot lickers, and those few locals who are willing to sell their very souls ***and your quality of life*** for the almighty dollar--regardless of who gets hurt or what is lost forever. They want to profit through millions/billions of dollars in subsidies and energy credits funded by our tax dollars, and increased utility rates, for building these unnecessary projects and destroying our communities, lives, and property values. They will make sure that lots of letters *supporting* these destructive projects will be sent in--mostly by people who *do not live here, or expect to profit from our loss*!! ***It is up to you to counter the unwarranted project support letters and comments with your own real concerns and personal knowledge of the area.***

JOINT DEIR/DEIS DOCUMENT & MAPS AVAILABLE AT THE FOLLOWING LOCATIONS:
Jacumba Public Library, Campo-Morena Village Branch Library and on the CPUC website at:
http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/ECOSUB.htm

GET YOUR WRITTEN COMMENTS IN BY FEBRUARY 16TH DEADLINE--YOUR LETTERS COULD HELP SUPPORT A FUTURE LAWSUIT TO BLOCK APROVAL / CONSTRUCTION: The CPUC/BLM must receive written comments on the DEIR/DEIS by the close of the public review period (February 16, 2011). Written comments must be postmarked and received no later than February 16, 2011. Comments can be submitted via:

Mail: Iain Fisher, CPUC/Greg Thomsen, BLM, c/o Dudek, 605 Third Street, Encinitas, CA 92024
Email: ecosub@dudek.com (CPUC) OR catulewind@blm.gov (BLM)
Fax: (800) 371-8854 (to send a fax, press "2")

The BLM says they will use the NEPA commenting process to satisfy the public involvement process of Section 106 of the National Historic Preservation Act and that Native American Tribal consultations are being conducted in accordance with policy. **The impacted project areas in McCain Valley, Jacumba, Bankhead Springs, Thing Valley, and elsewhere along the routes, contain significant cultural resources and Traditional Cultural Properties.** The cumulative destructive impacts from multiple projects, including the Sunrise Powerlink, ECO Substation, Energia Sierra Juarez, Ocotillo Express Wind and IV Solar are significant. The BLM is currently being sued by several tribal groups for failure to protect these important and irreplaceable resources as required by law, common decency, and respect.

The joint Tule, ECO, ESJ DEIR/EIS quietly states that the Environmentally Superior Alternative, under the California Environmental Quality Act, is the NO PROJECT Alternative based on significant Class I impacts to Air Quality, Noise, Biological Resources, Visual Character, and Fire and Fuels Management. However, the PUC /BLM ***preferred alternative*** is a much reduced project with 72 turbines instead of 134,undergrounding of some power lines and slightly moving two substation locations. The impacts stay about the same.***There are numerous other alternatives that are being carried forward, so if your property is not impacted with the current plan it could be impacted by another alternative that will not be announced until the Final EIR/EIS is released --just like the Sunrise Powerlink!***

Additional energy projects that will need new power lines to the new larger Boulevard Substation:

- **Invenery/SDG&E/Campo Nation** 160-300 MW (80-150 turbines) on Campo Reservation ridgelines
- **SDG&E/Manzanita Band** 57 MW (29 turbines) on Manzanita Reservation ridgelines
- **Enel Green Power** Jewel Valley Project 158 MW (79 turbines) and 10 MW solar on Lansing's Empire Ranch and Big Country Ranch. See project info at: www.jewelvalleyproject.com
- **Rough Acres Ranch** approximately 100 acre solar tracking project on McCain Valley Road (no details)
- **Concentrix Solar** tracking project in Jewel Valley (no details)
- **ECO Substation** ***expansions:*** Five 500 kV bays; Nine 239 kV bays; Nine 138 kV bays. The maximum amount of oil required for the transformers will be approximately 569,800 gallons.

This newsletter has been provided as a public service by Backcountry Against Dumps. For more information contact Donna Tisdale at 619-766-4170, tisdale.donna@gmail.com or go to: www.backcountryagainstdumps.org , www.protectourcommunties.org

D20-2
Cont.

AN ESTIMATED 400 ADDITIONAL NEW WIND TURBINES ARE PLANNED IN AND AROUND BOULEVARD - AND MANY MORE NEAR JACUMBA AND OCOTILLO

DON'T MISS THIS RARE OPPORTUNITY TO QUESTION THE EXPERTS ON THE CONNECTION BETWEEN

INDUSTRIAL WIND TURBINES, HEALTH IMPACTS & PROPERTY DEVALUATION

LEARN THE FACTS THAT WIND ENERGY DEVELOPERS WON'T TELL YOU

WHEN: 7 TO 9 PM, WEDNESDAY, JANUARY 19, 2011

WHERE: BOULEVARD FIRE & RESCUE DEPT.
(33919 Ribbonwood Road just south of the Boulevard exit from I-8)

FEATURED PANELISTS

DONNA TISDALE: BOULEVARD PLANNING GROUP, BACKCOUNTRY AGAINST DUMPS
Overview of multiple wind turbine/transmission projects & impacts.

BILL POWERS, P.E., POWERS ENGINEERING, ENERGY CONSULTANT
Energy expert with extensive knowledge and experience in energy generation, environmental engineering, air emissions control, regional energy planning, and distributed renewable energy generation.

CARMEN KROGH: PHARMACIST, INTERNATIONAL SOCIETY FOR WIND VIGILANCE
The Society for Wind vigilance is an international federation of physicians, acousticians and other professionals who are concerned about health risks. Carmen is a retired pharmacist with 40 years experience in medicine. She is in touch, globally, with many people who report symptoms from industrial wind turbines sited near their homes.

MICHAEL MCCANN, CRA: MCCANN APPRAISAL, LLC
Mike has been exclusively engaged in real estate appraisal since 1980, and is the owner of McCann Appraisal, LLC. His experience includes real estate zoning evaluations, property value impact studies, analysis of utility scale wind turbine generating facilities and gas-fired electric generating plants, as well as evaluation of eminent domain real estate acquisitions for property owners and condemning authorities.

Questions? Call Donna Tisdale at 619-766-4718

THIS COMMUNITY EDUCATION MEETING IS CO-HOSTED AS A PUBLIC SERVICE BY THE BOULEVARD PLANNING GROUP, BACKCOUNTRY AGAINST DUMPS (BAD), THE PROTECT OUR COMMUNITIES FOUNDATION (POC), THE EAST COUNTY COMMUNITY ACTION COALITION (ECCAC), AND THE RURAL ECONOMIC ACTION LEAGUE (REAL)

D20-2
Cont.

Comment Letter D21

From: Kelly McDonald <kmcdonald@spmcdonaldlaw.com>
Sent: Friday, March 04, 2011 3:54 PM
To: catulewind@blm.gov; ECOSUB
Cc: Dave Singleton; mwdonaldson@parks.ca.gov; nbrown@achp.gov; curtis.fossum@slc.ca.gov; cocotcsec@cocopah.com; culturalres@cocopah.com; qitenviron@aol.com; gthomsen@blm.gov; iain.fisher@cpuc.ca.gov; CourtCoyle@aol.com
Subject: Comment Letter re Tule Wind Project DEIS/DEIR
Attachments: Lucas Tule Wind Comment Ltr w Attachs 030311.pdf

Mr. Thomsen,

Attached please find a Comment Letter of March 3, 2011 by Courtney Ann Coyle on behalf of Carmen Lucas regarding the Tule Wind Project DEIS/DEIR. D21-1

Thank you,
Kelly McDonald
for
Courtney Ann Coyle
Attorney at Law

Kelly A. McDonald | 7855 Fay Ave., Ste. 250, La Jolla, CA 92037 | 858-551-1185 (ph)| 858-551-1186 (fax) | kmcdonald@spmcdonaldlaw.com

Please consider the environment before printing this email.

COURTNEY ANN COYLE
ATTORNEY AT LAW

HELD-PALMER HOUSE
1609 SOLEDAD AVENUE
LA JOLLA, CA USA 92037-3817

TELEPHONE: 858-454-8687 E-MAIL: COURTCOYLE@AOL.COM FACSIMILE: 858-454-8493

ATTN: Greg Thomsen
BLM California Desert District Office
22835 Calle San Juan de Los Lagos
Moreno Valley, CA 92553-9046

By Email: catulewind@blm.gov
March 3, 2011

Re: DEIS/DEIR for Iberdrola Renewable/Pacific Wind Development Tule Wind Project and SDG&E's East County Substation Project, San Diego County, CA

This comment letter is sent on behalf of our client Carmen Lucas, Kwaaymii Laguna Indian. Ms. Lucas continues to have serious concerns about this Project. As you know, Ms. Lucas has been working as a Native American Monitor in the San Diego and Imperial areas for twenty years. She also has provided information that has been used to support National Register nominations under Criterion A (tribal values), among her many involvements. My office has been assessing environmental documents for their legal adequacy under CEQA and NEPA in this geographical area for nearly twenty years.

D21-1 Cont.

These written comments supplement those already provided to BLM in person and in writing, and are timely submitted within the extended public comment period. We have reviewed the Draft EIS/EIR and are deeply disappointed to find that the concerns Ms. Lucas has voiced to the agencies and involved cultural resource management professionals have not been addressed in this joint document, or adequately mitigated, if mitigated at all.

Ms. Lucas' concerns include the following:

Tribal Cultural Landscape Unanalyzed and Unmitigated

As a whole, Ms. Lucas is very concerned that McCain Valley is in itself a largely intact tribal cultural landscape, and is part of an intact larger viewshed experience which includes the Lagunas and the desert below it. The issue of impacts to tribal cultural landscapes is not analyzed in the DEIS/DEIR (with the possible exception of rock features as scenic elements) and no mitigation is proposed. (See, DEIS/DEIR Section 3.5 Cultural and Paleontological Resources).

D21-2

The applicant or agencies might try to argue this issue is somehow covered in the Aesthetics/Visual Resources section. (See, DEIS/DEIR Section 3.2 Aesthetics and Visual Resources). They would be wrong. First, there is no discussion of tribal cultural values in this section. Neither is there a rationale for how the key observation points were selected or that they reflect tribal concerns. There is no discussion of whether the BLM Scenic Quality Class Ratings, Visual Contrast Ranges or Definitions of Visual Impacts, or that Viewer Sensitivity Levels or CEQA Criteria, as applied, reflect tribal concerns, heritage values and religious and cultural practices. Thus, tribal cultural landscapes have not been adequately analyzed or findings of insignificance substantiated.

Second, the DEIS/DEIR concludes that "No appropriate mitigation measure" has been identified for its substantial adverse impacts on scenic vistas or degradation of existing visual character and quality. (DEIS/DEIR ES-16). No definition of what constitutes an "appropriate" measure is provided in the

D21-3

DEIS/DEIR. Moreover, under CEQA, even if a mitigation measure may not *fully* or *completely* mitigate an adverse impact, if there are feasible mitigation measures, those feasible measures must still be considered and adopted. (California Public Resources Code section 21002). The DEIS/DEIR does not even discuss which measures might have been considered, but rejected. The DEIS/DEIR wholly lacks this analysis and required mitigation.

D21-3 Cont.

Cumulative Impacts to Tribal Cultural Resources Unanalyzed and Unmitigated

Ms. Lucas is very concerned about the individual and cumulative impacts of the Project with all the other proposed wind and solar projects in eastern San Diego County/Western Imperial County (Ocotillo Express, Imperial Valley Solar Project, etc.) in combination with the Sunrise Powerlink and other transmission facilities as well as other activities (i.e., the ongoing OHV destruction of tribal cultural resources and cremations at nearby Lark Valley). There was no adequate cumulative and indirect impacts analysis and mitigation for these impacts individually or taken together. Nor is there any cumulative impacts *analysis* or *mitigation* proposed in the Project DEIS/DEIR, instead there is merely a *listing*. (See, DEIS/DEIR page 3.5-43).

D21-4

Moreover, there have been no mitigations proposed to benefit area tribes who have had and will have their cultural resources and cultural landscapes cumulatively and adversely affected. For example, no mitigation for cumulative impacts to cultural resources is in this DEIS/DEIR; similarly no such analysis or mitigation has been offered in the Sunrise Powerlink Project environmental documents. Attempts at post-approval mitigation, such as providing for curation funds at the Imperial Valley Desert Museum and putting solar facilities on the Museum's rooftop, while both of arguable benefit to BLM staff, and the latter being ironic, do nothing to mitigate the cultural impacts of these renewable energy projects on tribal communities and practices. In the words of Ms. Lucas, "All of these projects collectively in the desert and back country, amount to nothing less than the blatant desecration of Southern California's Back Country and Deserts, and essence of place." A range of potential mitigation measures for such impacts can be found in the attached report from the recent Tribal Summit on Renewable Energy. The DEIS/DEIR must be revised.

Lack of Coordination between Agencies Regarding Environmental Review

Ms. Lucas is very concerned about a lack of coordination during environmental review between the Project and Sunrise Powerlink. When she was onsite during SDG&E testing, the monitors realized that SDG&E wanted to create many access roads. This would have harmed resources and attracted the public which in turn would cause additional impacts. The monitors requested no access roads and that materials be brought in with helicopters on the SDG&E project. Ms. Lucas makes the same recommendations for this Project, especially as the projects are geographically close together. (See statement at DEIS/DEIR, page 3.5-18, project footprints "overlap" in some places). Unless this recommendation is implemented, potentially unnecessary and unmitigated impacts will occur to cultural and visual resources.

D21-5

Need to Avoid and Minimize Impacts to Tribal Cultural Resources and Ancestral Human Remains

Ms. Lucas underscores her previous Project input that: 1) all tribal cultural resources and their areas be avoided, with avoidance including adequate buffers and long-term management measures, acceptable to local tribes, 2) qualified Native American Monitors that are capable of expressing themselves be *required* during all additional surveys and field verifications, ground disturbing activities, and future monitoring and maintenance efforts, 3) National Register evaluations and nominations be successfully completed with tribal input and consideration given to listing under Criterion A/1 (tribal values), 4) that research designs and data recovery be informed by Native American input and cultural values, 5) that all suspect bone be identified promptly by the Coroner and 6) that human remains, grave goods, ceremonial items and objects of patrimony, as defined by the affected tribe(s) be repatriated. None of these mitigation measures are presently included as Project mitigation. (See DEIS/DEIR ES-26 through ES-29).

D21-6

Without these, and possibly other, measures, the conclusions regarding reduction of impacts to cultural resources and human remains are unsubstantiated.

D21-6 Cont.

Lack of Analysis of Environmental Justice Impacts to Tribes and their Cultures

Proposed renewable energy projects in Eastern San Diego County and Western Imperial County, including the traditional territory of my client and other affected tribal peoples, will have a disproportional effect on the cultural resources and practices of such people. Yet, this critical aspect of environmental justice is not discussed in the DEIS/DEIR. (See, DEIS/DEIR Section 3.17 Socioeconomics and Environmental Justice). The DEIS/DEIR simply makes a general conclusion that no impacts were identified to environmental justice and therefore no mitigation measures are required. (DEIS/DEIR ES-36).

D21-7

Also absent from the environmental document is any discussion of the consistency of this Project with the United Nations Declaration on the Rights of Indigenous Peoples, adopted by the United States in December 2010. (See attached Declaration). Sections particularly relevant to this Project include those at Articles 5, 7, 8, 10, 12, 13, 14, 15, 18, 19, 25, 26, 27, 28, and 31. As this is a joint environmental document, without such discussion, impacts and mitigation have not been adequately addressed.

Need for Timely Consultation and NHPA Section 106 Review

On many renewable and other projects in the California Desert, BLM has taken an unfortunate approach to addressing consultation with tribes and conducting NHPA Section 106 review. In each case, BLM has a disturbing pattern and practice of commencing both late and failing to conclude either prior to making decisions on the projects. (See, for example, attached Order Granting Preliminary Injunction relative to the Imperial Valley Solar Project, December 15, 2010, particularly pages 4 -22). This Project makes the same legal error (DEIS/DEIR, see for example, pages F-85 (prehistoric/historic archaeological sites), F-86 (Native American human remains), and F-87 (Traditional Cultural Properties)).

The effect of this abuse is that tribal concerns are not given the level of consideration that is required under applicable statutes, policies, guidance and Executive Orders. Ms. Lucas therefore requests that formal eligibility recommendations/eligibility determinations be made *prior to* the agencies approving the Project, whenever possible, so that appropriate consideration of tribal cultural resources can occur at a meaningful time in the process, Project changes can be more readily made and enforceable mitigation measures adopted. Evaluations must be made with Criterion A/1 (tribal values) in mind, which do *not necessarily require* collection or excavation. Also, just because an archaeological site may be physically avoided, does not mean there are no indirect effects or impacts to that resource that themselves require mitigation. The environmental document must be revised accordingly. (See, particularly, DEIS/DEIR pages 3.5-34 through 3.5-35).

D21-8

This concern is underscored by the fact that BLM has a pattern and practice of approving substandard cultural resources Programmatic Agreements related to renewables and other utility projects in the California Desert (these include Topock Investigation and Final Remedy, Imperial Valley Solar, etc.). The DEIS/DEIR's Cultural Resource section admits that NHPA Section 106 consultation is incomplete and that a Programmatic Agreement is being "developed." (DEIS/DEIR, page 3.5-41). Again, impacts and effects to tribal cultural resources must be dealt with upfront in the environmental review process under both NHPA and CEQA - not deferred to after project approval - to be meaningful.

Summary

In the end, my client is deeply saddened that it has come to this and that BLM and other agencies have not yet taken effective actions to protect these sensitive and irreplaceable areas of our backcountry from adverse and permanent impacts and effects. Based on the issues above, and more, Ms. Lucas strongly feels that this area is not an appropriate location for large scale utility projects. Ms. Lucas hopes that there is still time to reassess the appropriateness of this action and related Projects to better respect the irreplaceable cultural and landscape values at stake.

D21-9

Please provide my office with two hard copies of the written responses to comments, any subsequent environmental documents, the Final EIS/EIR, staff reports, Statement of Overriding Considerations and Findings and notices, including the Notice of Determination.

D21-9
Cont.

Thank you for considering our comments.

Very truly yours,

Courtney Ann Coyle
Attorney at Law

Attachments:
Tribal Summit on Renewable Energy Report
UN Declaration on the Rights of Indigenous Peoples
Order Granting Preliminary Injunction, IVSP

Copies to:
Native American Heritage Commission
California SHPO
Advisory Council on Historic Preservation
State Lands Commission
County of San Diego
Kumeyaay Tribal Chairs
Cocopah Chair
Quechan Chair
Interested Parties
Client

The following material is considered Comment D21-10.

Tribal Summit on Renewable Energy
January 12-13, 2011
Palm Springs, California

The Advisory Council on Historic Preservation (ACHP) and National Association of Tribal Historic Preservation Officers (NATHPO) wish to extend their appreciation to those who participated in the Tribal Summit on Renewable Energy on January 11-13, 2011, in Palm Springs, California. Recognizing that renewable energy and its potential effects on historic properties remain areas of concern for Indian tribes, the summit brought together more than 150 tribal representatives and officials from federal, state, and local government and the private sector to share information and discuss local and national implications. The summit included an overview of upcoming federal renewable energy projects and highlighted issues of tribal concern related to past and proposed renewable energy development, such as consultation, timeframes, and indirect and cumulative effects to sites of religious and cultural significance.

The ACHP and NATHPO are committed to advancing the dialogue begun at Palm Springs and look forward to continued involvement with your organization moving forward. Plans are underway to host similar events in other regions so that Indian tribes and federal agencies can identify the full range of issues presented by the development and transmission of renewable energy and improve the consideration of historic preservation issues in these areas. The results of these discussions will be carried forward by the ACHP in its interaction with federal and non-federal stakeholders in a variety of energy-related working groups and inform our priorities for addressing the challenges these issues present to renewable energy development.

As promised at the Summit, a summary of the issues raised during our discussions in Palm Springs is provided below. We encourage you to share this summary with those who have a stake in this issue so that they might benefit from these findings, observations, and recommendations.

Summary of Key Issues

1. Trust responsibility – federal agencies must recognize their trust responsibilities to Indian tribes

2. Overwhelming nature of projects can complicate participation in Section 106 reviews
   - Volume, rate, and timeframes for commenting, as well as number of agencies involved present workload and logistical challenges
   - Large scale of projects presents strain on resources
   - Lack of funding for tribes/THPO programs

3. Ensuring appropriate and effective consultation
   - Federal agencies should consult Indian tribes early and often
   - Government to government consultation important; consultation through consultants inappropriate unless expressly authorized by Indian tribe
   - Formal communication is critical, in addition to emails and phone calls
   - More information about project parameters and time available is often needed to consult effectively
   - Federal agencies should consider ways to involve non-federally recognized Indian tribes
   - Agencies, consultants, and applicants should not assume they understand the concerns of native peoples without asking
   - Agencies should be proactive and reach out to Indian tribes instead of expecting Indian tribes to reach out to them
   - Consultation has to be meaningful, not just consultation for the sake of consultation
   - Consultation should begin before site selection and include site selection

- There remains a general need for more training in Section 106 process; many of these issues would be solved if agencies were better educated on the parameters of Section 106 reviews
- ACHP offers a handbook on consultation at http://www.achp.gov/regs-tribes2008.pdf; free online training developed by the Interagency Working Group on Indian Affairs entitled "Working Effectively With Tribal Governments" is also available at http://tribal.golearnportal.org; and NATHPO provides a consultation best practices document at http://www.nathpo.org/PDF/Tribal_Consultation.pdf
- Agencies are not consistently identifying clear points of contact on historic preservation issues
- Agencies should consider when it is appropriate to include Indian tribes as signatories to agreement documents
- Tribes would benefit from more training in Section 106, especially in developing agreement documents
- Agencies need to remember that providing information and project updates alone is not sufficient consultation
- Problems are created when not all parties agree on what consultation actually is and what it should "look like"
- Consultation is the building of a relationship
- Key individuals should be responsible for carrying out President Obama's executive order regarding consultation

4. Communication issues
   - Consider more regional working groups to keep everyone up to date (involve ACHP, SHPO, interested tribes, agencies, etc.), but recognize limited availability of tribal leaders who are already very busy
   - Use ACHP's list of federal contacts (http://achp.gov/docs/FederalAgencyContacts.pdf) to identify appropriate agencies and individuals to work with on energy issues
   - Indian tribes and agencies should update their contact lists regularly
   - If additional time is needed to review a document or finding, formal requests for an extension should be made
   - If a tribe is not getting a response from FPO, consider contacting a Deputy FPO
   - Agencies should consider using more Native American liaisons
   - Chronic problems with conducting Section 106 at a regional/district office of an agency may indicate that headquarters is not providing adequate oversight
   - Need more visual simulations and ground-proofing to help with effectively communicating and understanding a project's impacts

5. Being proactive
   - Federal agencies should directly address those comments from Indian tribes that are often repeated over time and from project to project to resolve them once and for all
   - BLM should consider permanent set-asides of land and use other lands to meet multiple use mandates
   - Federal agencies should identify areas important to tribes in advance and determine appropriate ways to advise applicants about these areas to inform alternative site selection
   - Recommend California Gov. Jerry Brown name tribal representatives to the CEC and Water Board and other commissions and boards

6. Resource identification and evaluation
   - Encourage applicants to fund survey work on broader level than project-by-project inventories
   - Phased inventory and site analysis can complicate matters by delaying the recognition of critical historic properties earlier on in planning when alternative locations could have been considered
   - Need to analyze resources at a "landscape" level
   - Large historic properties are sometimes inappropriately broken down into smaller units so that some areas can be found ineligible and therefore only small areas are found eligible and subject to mitigation
   - National Register criteria are not always adequate for addressing the significance of some properties

- It is critical that Indian tribes be involved in the identification and evaluation of traditional cultural properties of importance to them
- Consider whether the Secretary of Interior's qualification standards should be updated to reflect tribal expertise
- Agencies should respect tribal determinations that the treatment of some resources under NEPA may have implications for components of these resources that are also significant under Section 106
- Cultural resource assessments must go beyond identifying archaeological sites, and mitigation should be considered broadly for all resource types
- Idea of a comprehensive inventory is generally good, but stakeholders should not view such an inventory as a substitute for meaningful consultation that includes resource identification and evaluation

7. Impacts
   - Need to better assess long term impacts and those that may occur throughout the lifespan of projects, as well as regional, indirect, and cumulative impacts that may go beyond public lands
   - Need to realize impacts are not only on the land, they can also be on people and life ways
   - Disruption of use of lands for ceremonial purposes should be addressed

8. Alternatives
   - Predetermined project locations cut off meaningful consultation and do not allow for real consideration of alternatives
   - Federal agencies should provide clearer indication of their criteria for determining appropriate siting for such projects

9. Draft BLM PEIS and PA for solar installation locations
   - BLM should provide clear indication of the criteria used for identifying appropriate areas, including an assessment of why some areas with known significant resources are still under consideration
   - Many attendees remain unaware of BLM's efforts to consult under Section 106 for the PEIS; BLM reported that PEIS has been out for some time, 350 tribes were contacted and asked to comment, working with six SHPOs and ACHP/NCSHPO/NATHPO on PA, Section 106 process is being conducted parallel with NEPA process

10. Enforcement of agreement documents
    - Effective consultation is only one part of the process—ensuring that agencies implement agreed upon action is critical. Should be clearer repercussions for agencies not meeting their obligations either for consultation or implementing agreement documents
    - Participants want to understand what can be done when an agency believes it has consulted appropriately on the development of an agreement document but an Indian tribe disagrees with that assertion
      - SHPOs, who can play a role in ensuring these provisions are met, rely on agencies to be truthful, but they also talk to the tribes directly (at varying levels)
      - California SHPO requires agencies to include letters to and from tribes (and Native American Heritage Commission) and information on follow up communications (calls and emails) (goes beyond federally recognized tribes to all contacts provided by NAHC)
    - Consider the development of standards against which consultation can be measured

11. Mitigation
    - Many attendees expressed preference that avoidance be considered first, then minimizing impacts, then mitigation as a last resort. Participants also recognized that even if it is not possible to mitigate adverse effects, it is important to think creatively and not walk away from the table
    - Need to find better ways to deal with regional impacts
    - Consider giving equal weight to cultural resources in influencing project development as is given to biological resources. For example, if more than four desert tortoises are found in a certain area, a project may be relocated but similar consideration not given to cultural resources

- Share successful examples where projects were concluded with effective consideration of historic properties; acknowledge the positive benefits of recognizing good work
- Consider a broad array of potential mitigation measures that can be linked to varying levels and types of effects
    - Museum exhibits and other types of interpretation
    - Native language revitalization programs
    - Tribal member scholarship programs in order to create future cultural resource professionals within tribes
    - Restoration projects
    - Funding of ethnographic studies
    - Fund larger, regional studies to address cumulative impacts
    - Create fund endowments (model might be what is being decided for oil spill in the Gulf)
    - Fund expansion of tribal cultural resource departments to enhance capacity to keep up with projects
    - Land exchanges with tribes
    - Technology upgrades for tribes

12. General comments
    - Non-tribal people must respect the way native peoples feel about the land and their unique connection to it
    - Leadership on these issues must be demonstrated at a national level

United Nations Declaration on the Rights of Indigenous Peoples

Adopted by General Assembly Resolution 61/295 on 13 September 2007

The General Assembly,
Guided by the purposes and principles of the Charter of the United Nations, and good faith in the fulfilment of the obligations assumed by States in accordance with the Charter,

Affirming that indigenous peoples are equal to all other peoples, while recognizing the right of all peoples to be different, to consider themselves different, and to be respected as such,

Affirming also that all peoples contribute to the diversity and richness of civilizations and cultures, which constitute the common heritage of humankind,

Affirming further that all doctrines, policies and practices based on or advocating superiority of peoples or individuals on the basis of national origin or racial, religious, ethnic or cultural differences are racist, scientifically false, legally invalid, morally condemnable and socially unjust,

Reaffirming that indigenous peoples, in the exercise of their rights, should be free from discrimination of any kind,

Concerned that indigenous peoples have suffered from historic injustices as a result of, inter alia, their colonization and dispossession of their lands, territories and resources, thus preventing them from exercising, in particular, their right to development in accordance with their own needs and interests,

Recognizing the urgent need to respect and promote the inherent rights of indigenous peoples which derive from their political, economic and social structures and from their cultures, spiritual traditions, histories and philosophies, especially their rights to their lands, territories and resources,

Recognizing also the urgent need to respect and promote the rights of indigenous peoples affirmed in treaties, agreements and other constructive arrangements with States,

Welcoming the fact that indigenous peoples are organizing themselves for political, economic, social and cultural enhancement and in order to bring to an end all forms of discrimination and oppression wherever they occur,

Convinced that control by indigenous peoples over developments affecting them and their lands, territories and resources will enable them to maintain and strengthen their institutions, cultures and traditions, and to promote their development in accordance with their aspirations and needs,

Recognizing that respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment,

Emphasizing the contribution of the demilitarization of the lands and territories of indigenous peoples to peace, economic and social progress and development, understanding and friendly relations among nations and peoples of the world,

Recognizing in particular the right of indigenous families and communities to retain shared responsibility for the upbringing, training, education and well-being of their children, consistent with the rights of the child,

Considering that the rights affirmed in treaties, agreements and other constructive arrangements between States and indigenous peoples are, in some situations, matters of international concern, interest, responsibility and character,

Considering also that treaties, agreements and other constructive arrangements, and the relationship they represent, are the basis for a strengthened partnership between indigenous peoples and States,

Acknowledging that the Charter of the United Nations, the International Covenant on Economic, Social and Cultural Rights (2) and the International Covenant on Civil and Political Rights,2 as well as the Vienna Declaration and Programme of Action,(3) affirm the fundamental importance of the right to self-determination of all peoples, by virtue of which they freely determine their political status and freely pursue their economic, social and cultural development,

Bearing in mind that nothing in this Declaration may be used to deny any peoples their right to self-determination, exercised in conformity with international law,

Convinced that the recognition of the rights of indigenous peoples in this Declaration will enhance harmonious and cooperative relations between the State and indigenous peoples, based on principles of justice, democracy, respect for human rights, non-discrimination and good faith,

Encouraging States to comply with and effectively implement all their obligations as they apply to indigenous peoples under international instruments, in particular those related to human rights, in consultation and cooperation with the peoples concerned,

Emphasizing that the United Nations has an important and continuing role to play in promoting and protecting the rights of indigenous peoples,

Believing that this Declaration is a further important step forward for the recognition, promotion and protection of the rights and freedoms of indigenous peoples and in the development of relevant activities of the United Nations system in this field,

Recognizing and reaffirming that indigenous individuals are entitled without discrimination to all human rights recognized in international law, and that indigenous peoples possess collective rights which are indispensable for their existence, well-being and integral development as peoples,

Recognizing that the situation of indigenous peoples varies from region to region and from country to country and that the significance of national and regional particularities and various historical and cultural backgrounds should be taken into consideration,

Solemnly proclaims the following United Nations Declaration on the Rights of Indigenous Peoples as a standard of achievement to be pursued in a spirit of partnership and mutual respect:

Article 1
Indigenous peoples have the right to the full enjoyment, as a collective or as individuals, of all human rights and fundamental freedoms as recognized in the Charter of the United Nations, the Universal Declaration of Human Rights(4) and international human rights law.

Article 2
Indigenous peoples and individuals are free and equal to all other peoples and individuals and have the right to be free from any kind of discrimination, in the exercise of their rights, in particular that based on their indigenous origin or identity.

Article 3
Indigenous peoples have the right to self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development.

Article 4
Indigenous peoples, in exercising their right to self-determination, have the right to autonomy or self-government in matters relating to their internal and local affairs, as well as ways and means for financing their autonomous functions.

Article 5
Indigenous peoples have the right to maintain and strengthen their distinct political, legal, economic, social and cultural institutions, while retaining their right to participate fully, if they so choose, in the political, economic, social and cultural life of the State.

Article 6
Every indigenous individual has the right to a nationality.

Article 7
1. Indigenous individuals have the rights to life, physical and mental integrity, liberty and security of person.
2. Indigenous peoples have the collective right to live in freedom, peace and security as distinct peoples and shall not be subjected to any act of genocide or any other act of violence, including forcibly removing children of the group to another group.

Article 8
1. Indigenous peoples and individuals have the right not to be subjected to forced assimilation or destruction of their culture.
2. States shall provide effective mechanisms for prevention of, and redress for:
(a) Any action which has the aim or effect of depriving them of their integrity as distinct peoples, or of their cultural values or ethnic identities;
(b) Any action which has the aim or effect of dispossessing them of their lands, territories or resources;
(c) Any form of forced population transfer which has the aim or effect of violating or undermining any of their rights;
(d) Any form of forced assimilation or integration;
(e) Any form of propaganda designed to promote or incite racial or ethnic discrimination directed against them.

Article 9
Indigenous peoples and individuals have the right to belong to an indigenous community or nation, in accordance with the traditions and customs of the community or nation concerned. No discrimination of any kind may arise from the exercise of such a right.

Article 10
Indigenous peoples shall not be forcibly removed from their lands or territories. No relocation shall take place without the free, prior and informed consent of the indigenous peoples concerned and after agreement on just and fair compensation and, where possible, with the option of return.

Article 11
1. Indigenous peoples have the right to practise and revitalize their cultural traditions and customs. This includes the right to maintain, protect and develop the past, present and future manifestations of their cultures, such as archaeological and historical sites, artefacts, designs, ceremonies, technologies and visual and performing arts and literature.

2. States shall provide redress through effective mechanisms, which may include restitution, developed in conjunction with indigenous peoples, with respect to their cultural, intellectual, religious and spiritual property taken without their free, prior and informed consent or in violation of their laws, traditions and customs.

Article 12

1. Indigenous peoples have the right to manifest, practise, develop and teach their spiritual and religious traditions, customs and ceremonies; the right to maintain, protect, and have access in privacy to their religious and cultural sites; the right to the use and control of their ceremonial objects; and the right to the repatriation of their human remains.
2. States shall seek to enable the access and/or repatriation of ceremonial objects and human remains in their possession through fair, transparent and effective mechanisms developed in conjunction with indigenous peoples concerned.

Article 13

1. Indigenous peoples have the right to revitalize, use, develop and transmit to future generations their histories, languages, oral traditions, philosophies, writing systems and literatures, and to designate and retain their own names for communities, places and persons.
2. States shall take effective measures to ensure that this right is protected and also to ensure that indigenous peoples can understand and be understood in political, legal and administrative proceedings, where necessary through the provision of interpretation or by other appropriate means.

Article 14

1. Indigenous peoples have the right to establish and control their educational systems and institutions providing education in their own languages, in a manner appropriate to their cultural methods of teaching and learning.
2. Indigenous individuals, particularly children, have the right to all levels and forms of education of the State without discrimination.
3. States shall, in conjunction with indigenous peoples, take effective measures, in order for indigenous individuals, particularly children, including those living outside their communities, to have access, when possible, to an education in their own culture and provided in their own language.

Article 15

1. Indigenous peoples have the right to the dignity and diversity of their cultures, traditions, histories and aspirations which shall be appropriately reflected in education and public information.
2. States shall take effective measures, in consultation and cooperation with the indigenous peoples concerned, to combat prejudice and eliminate discrimination and to promote tolerance, understanding and good relations among indigenous peoples and all other segments of society.

Article 16

1. Indigenous peoples have the right to establish their own media in their own languages and to have access to all forms of non-indigenous media without discrimination.
2. States shall take effective measures to ensure that State-owned media duly reflect indigenous

cultural diversity. States, without prejudice to ensuring full freedom of expression, should encourage privately owned media to adequately reflect indigenous cultural diversity.

Article 17
1. Indigenous individuals and peoples have the right to enjoy fully all rights established under applicable international and domestic labour law.
2. States shall in consultation and cooperation with indigenous peoples take specific measures to protect indigenous children from economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development, taking into account their special vulnerability and the importance of education for their empowerment.
3. Indigenous individuals have the right not to be subjected to any discriminatory conditions of labour and, inter alia, employment or salary.

Article 18
Indigenous peoples have the right to participate in decision-making in matters which would affect their rights, through representatives chosen by themselves in accordance with their own procedures, as well as to maintain and develop their own indigenous decision-making institutions.

Article 19
States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them.

Article 20
1. Indigenous peoples have the right to maintain and develop their political, economic and social systems or institutions, to be secure in the enjoyment of their own means of subsistence and development, and to engage freely in all their traditional and other economic activities.
2. Indigenous peoples deprived of their means of subsistence and development are entitled to just and fair redress.

Article 21
1. Indigenous peoples have the right, without discrimination, to the improvement of their economic and social conditions, including, inter alia, in the areas of education, employment, vocational training and retraining, housing, sanitation, health and social security.
2. States shall take effective measures and, where appropriate, special measures to ensure continuing improvement of their economic and social conditions. Particular attention shall be paid to the rights and special needs of indigenous elders, women, youth, children and persons with disabilities.

Article 22
1. Particular attention shall be paid to the rights and special needs of indigenous elders, women, youth, children and persons with disabilities in the implementation of this Declaration.

2. States shall take measures, in conjunction with indigenous peoples, to ensure that indigenous women and children enjoy the full protection and guarantees against all forms of violence and discrimination.

Article 23
Indigenous peoples have the right to determine and develop priorities and strategies for exercising their right to development. In particular, indigenous peoples have the right to be actively involved in developing and determining health, housing and other economic and social programmes affecting them and, as far as possible, to administer such programmes through their own institutions.

Article 24
1. Indigenous peoples have the right to their traditional medicines and to maintain their health practices, including the conservation of their vital medicinal plants, animals and minerals. Indigenous individuals also have the right to access, without any discrimination, to all social and health services.
2. Indigenous individuals have an equal right to the enjoyment of the highest attainable standard of physical and mental health. States shall take the necessary steps with a view to achieving progressively the full realization of this right.

Article 25
Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard.

Article 26
1. Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired.
2. Indigenous peoples have the right to own, use, develop and control the lands, territories and resources that they possess by reason of traditional ownership or other traditional occupation or use, as well as those which they have otherwise acquired.
3. States shall give legal recognition and protection to these lands, territories and resources. Such recognition shall be conducted with due respect to the customs, traditions and land tenure systems of the indigenous peoples concerned.

Article 27
States shall establish and implement, in conjunction with indigenous peoples concerned, a fair, independent, impartial, open and transparent process, giving due recognition to indigenous peoples' laws, traditions, customs and land tenure systems, to recognize and adjudicate the rights of indigenous peoples pertaining to their lands, territories and resources, including those which were traditionally owned or otherwise occupied or used. Indigenous peoples shall have the right to participate in this process.

Article 28
1. Indigenous peoples have the right to redress, by means that can include restitution or, when this is not possible, just, fair and equitable compensation, for the lands, territories and resources which they have traditionally owned or otherwise occupied or used, and which have been confiscated, taken, occupied, used or damaged without their free, prior and informed consent.
2. Unless otherwise freely agreed upon by the peoples concerned, compensation shall take the form of lands, territories and resources equal in quality, size and legal status or of monetary compensation or other appropriate redress.

Article 29
1. Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. States shall establish and implement assistance programmes for indigenous peoples for such conservation and protection, without discrimination.
2. States shall take effective measures to ensure that no storage or disposal of hazardous materials shall take place in the lands or territories of indigenous peoples without their free, prior and informed consent.
3. States shall also take effective measures to ensure, as needed, that programmes for monitoring, maintaining and restoring the health of indigenous peoples, as developed and implemented by the peoples affected by such materials, are duly implemented.

Article 30
1. Military activities shall not take place in the lands or territories of indigenous peoples, unless justified by a relevant public interest or otherwise freely agreed with or requested by the indigenous peoples concerned.
2. States shall undertake effective consultations with the indigenous peoples concerned, through appropriate procedures and in particular through their representative institutions, prior to using their lands or territories for military activities.

Article 31
1. Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions.
2. In conjunction with indigenous peoples, States shall take effective measures to recognize and protect the exercise of these rights.

Article 32
1. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources.
2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources,

particularly in connection with the development, utilization or exploitation of mineral, water or other resources.
3. States shall provide effective mechanisms for just and fair redress for any such activities, and appropriate measures shall be taken to mitigate adverse environmental, economic, social, cultural or spiritual impact.

Article 33
1. Indigenous peoples have the right to determine their own identity or membership in accordance with their customs and traditions. This does not impair the right of indigenous individuals to obtain citizenship of the States in which they live.
2. Indigenous peoples have the right to determine the structures and to select the membership of their institutions in accordance with their own procedures.

Article 34
Indigenous peoples have the right to promote, develop and maintain their institutional structures and their distinctive customs, spirituality, traditions, procedures, practices and, in the cases where they exist, juridical systems or customs, in accordance with international human rights standards.

Article 35
Indigenous peoples have the right to determine the responsibilities of individuals to their communities.

Article 36
1. Indigenous peoples, in particular those divided by international borders, have the right to maintain and develop contacts, relations and cooperation, including activities for spiritual, cultural, political, economic and social purposes, with their own members as well as other peoples across borders.
2. States, in consultation and cooperation with indigenous peoples, shall take effective measures to facilitate the exercise and ensure the implementation of this right.

Article 37
1. Indigenous peoples have the right to the recognition, observance and enforcement of treaties, agreements and other constructive arrangements concluded with States or their successors and to have States honour and respect such treaties, agreements and other constructive arrangements.
2. Nothing in this Declaration may be interpreted as diminishing or eliminating the rights of indigenous peoples contained in treaties, agreements and other constructive arrangements.

Article 38
States in consultation and cooperation with indigenous peoples, shall take the appropriate measures, including legislative measures, to achieve the ends of this Declaration.

Article 39
Indigenous peoples have the right to have access to financial and technical assistance from States and through international cooperation, for the enjoyment of the rights contained in this Declaration.

Article 40
Indigenous peoples have the right to access to and prompt decision through just and fair procedures for the resolution of conflicts and disputes with States or other parties, as well as to effective remedies for all infringements of their individual and collective rights. Such a decision shall give due consideration to the customs, traditions, rules and legal systems of the indigenous peoples concerned and international human rights.

Article 41
The organs and specialized agencies of the United Nations system and other intergovernmental organizations shall contribute to the full realization of the provisions of this Declaration through the mobilization, inter alia, of financial cooperation and technical assistance. Ways and means of ensuring participation of indigenous peoples on issues affecting them shall be established.

Article 42
The United Nations, its bodies, including the Permanent Forum on Indigenous Issues, and specialized agencies, including at the country level, and States shall promote respect for and full application of the provisions of this Declaration and follow up the effectiveness of this Declaration.

Article 43
The rights recognized herein constitute the minimum standards for the survival, dignity and well-being of the indigenous peoples of the world.

Article 44
All the rights and freedoms recognized herein are equally guaranteed to male and female indigenous individuals.

Article 45
Nothing in this Declaration may be construed as diminishing or extinguishing the rights indigenous peoples have now or may acquire in the future.

Article 46
1. Nothing in this Declaration may be interpreted as implying for any State, people, group or person any right to engage in any activity or to perform any act contrary to the Charter of the United Nations or construed as authorizing or encouraging any action which would dismember or impair, totally or in part, the territorial integrity or political unity of sovereign and independent States.
2. In the exercise of the rights enunciated in the present Declaration, human rights and fundamental freedoms of all shall be respected. The exercise of the rights set forth in this Declaration shall be subject only to such limitations as are determined by law and in accordance with international human rights obligations. Any such limitations shall be non-discriminatory and strictly necessary solely for the purpose of securing due recognition and respect for the rights and freedoms of others and for meeting the just and most compelling requirements of a democratic society.

3. The provisions set forth in this Declaration shall be interpreted in accordance with the principles of justice, democracy, respect for human rights, equality, non-discrimination, good governance and good faith.

(2) See resolution 2200 A (XXI), annex.

(3) A/CONF.157/24 (Part I), chap. III.

(4) Resolution 217 A (III).

UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF CALIFORNIA

QUECHAN TRIBE OF THE FORT YUMA INDIAN RESERVATION, a federally recognized Indian Tribe,

Plaintiff,

vs.

UNITED STATES DEPARTMENT OF THE INTERIOR, et al.,

Defendants.

CASE NO. 10cv2241-LAB (CAB)

ORDER GRANTING PRELIMINARY INJUNCTION

On October 29, 2010, Plaintiff (the "Tribe") filed its complaint, alleging Defendants' decision to approve a solar energy project violated various provisions of federal law. On November 12, the Tribe filed a motion for preliminary injunction, asking the Court to issue an order to preserve the status quo by enjoining proceeding with the project, pending the outcome of this litigation. After the motion was filed, Imperial Valley Solar LLC intervened as a Defendant.

On Monday, December 13, the Court held a oral argument at which the parties appeared through counsel. After the parties were fully heard, the Court took the matter under submission, with the intent to rule within two days.

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Background

The Quechan Tribe is a federally-recognized Indian tribe whose reservation is located mostly in Imperial County, California and partly in Arizona. A large solar energy project is planned on 6500 acres of federally-owned land known as the California Desert Conservation Area ("CDCA"). The Department of the Interior, as directed by Congress, developed a binding management plan for this area.

The project is being managed by a company called Tessera Solar, LLC.[1] Tessera plans to install about 30,000 individual "suncatcher" solar collectors, expected to generate 709 megawatts when completed. The suncatchers will be about 40 feet high and 38 feet wide, and attached to pedestals about 18 feet high. Support buildings, roads, a pipeline, and a power line to support and service the network of collectors are also planned. Most of the project will be built on public lands. Tessera submitted an application to the state of California to develop the Imperial Valley Solar project. The project is planned in phases.

After communications among BLM, various agencies, the Tribe, and other Indian tribes, a series of agreements, decisions, and other documents was published. The final EIS was issued some time in July, 2010.[2] At the same time, a Proposed Resource Management Plan - Amendment, amending the Department of the interior's CDCA was also published. On September 14 and 15, certain federal and state officials, including BLM's field manager, executed a programmatic agreement (the "Programmatic Agreement") for management of the project.[3] The Tribe objected to this. On October 4, 2010, Director of the Bureau of Land Management Robert Abbey signed the Imperial Valley Record of Decision ("ROD")

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[1] Although the two entities are obviously related, the briefing doesn't explain the relationship between Tessera and Imperial Valley Solar, except to say that Tessera applied to develop the Imperial Valley Solar project.

[2] The final EIS, included as an exhibit to the Tribe's motion, includes the BLM's field manager's signature, the month and year, but no date. It was published in the July 28, 2010 Federal Register.

[3] This is included in the lodged partial administrative record, at PI 007347–007372. While the table of contents refers to "invited signatory parties" and "concurring parties," and lists various appendices, the Programmatic Agreement is cut off immediately after the signatures of federal and state officials.

approving the project, and the next day Secretary of the Interior Ken Salazar signed the ROD. The ROD notice was published on October 13, 2010.

The area where the project would be located has a history of extensive use by Native American groups. The parties agree 459 cultural resources have been identified within the project area. These include over 300 locations of prehistoric use or settlement, and ancient trails that traverse the site. The tribes in this area cremated their dead and buried the remains, so the area also appears to contain archaeological sites and human remains. The draft environmental impact statement ("EIS") prepared by the BLM indicated the project "may wholly or partially destroy all archaeological sites on the surface of the project area."

The Tribe believes the project would destroy hundreds of their ancient cultural sites including burial sites, religious sites, ancient trails, and probably buried artifacts. Secondarily, it argues the project would endanger the habitat of the flat-tailed horned lizard, which is under consideration for listing under the Endangered Species Act and which is culturally important to the Tribe. The Tribe maintains Defendants were required to comply with the National Environmental Policy Act (NEPA), the National Historical Preservation Act (NHPA), and the Federal Land Policy and Management Act of 1976 (FLPMA) by making certain analyses and taking certain factors into account deciding to go ahead with the project. The Tribe now seeks judicial intervention under the Administrative Procedures Act (APA).

Legal Standards

APA

The Court's review of agency action under NEPA, NHPA, or FLPMA is governed by the Administrative Procedures act. Under 5 U.S.C. § 706 the Court is directed to compel agency action that has been unlawfully withheld, (§ 706(1)), and hold unlawful and aside agency actions it finds to be "arbitrary, capricious, abuse of discretion, or otherwise not in accordance with law" (§ 706(2)(A)), or "without observance of procedure required by law" ((§ 706(2)(D)). The burden is on the Tribe to show any decision or action was arbitrary and capricious. *Kleppe v. Sierra Club*, 427 U.S. 390, 412 (1976).

Preliminary Injunctive Relief

The four-factor test for issuance of injunctive relief is set forth in *Winter v. Natural Resources Defense Council, Inc.*, 129 S.Ct. 365, 374 (2008):

> A plaintiff seeking a preliminary injunction must establish that he is likely to succeed on the merits, that he is likely to suffer irreparable harm in the absence of preliminary relief, that the balance of equities tips in his favor, and that an injunction is in the public interest.

Even after *Winter*, the Court may also use a "sliding scale" approach. As explained in *Alliance for Wild Rockies v. Cottrell*, F.3d 1045, 1049–50 (9th Cir. 2010), "'serious questions going to the merits' and a hardship balance that tips sharply toward the plaintiff can support issuance of an injunction, assuming the other two elements of the *Winter* test are also met."

Here, the merits question is the most complex, and was the primary focus of briefing and argument. The Court considers this question first.

Merits Discussion

The parties agree that, under NHPA Section 106 (16 U.S.C. § 470f) and its implementing regulations, the Bureau of Land Management (BLM) is required to consult with certain parties before spending money on or approving any federally-assisted undertaking such as the project at issue here, and that the Tribe is one of those parties. The Tribe maintains BLM didn't adequately or meaningfully consult with them, but instead approved the project before completing the required consultation. According to the Tribe, BLM simply didn't consider what the tribe had to say before approving the project.

The Court finds this to be the strongest basis for issuance of injunctive relief and therefore focuses on it.

NHPA Consultation Requirements

The NHPA's purpose is to preserve historic resources, and early consultation with tribes is encouraged "to ensure that all types of historic properties and all public interests in such properties are given due consideration . . . ." *Te-Moak Tribe v. U.S. Dept. of Interior*, 608 F.3d 592, 609 (9th Cir. 2010) (quoting 16 U.S.C. § 470a(d)(1)(A)). The consultation

process is governed by 36 C.F.R. § 800.2(c)(2), one of Section 106's implementing regulations. Under this regulation, "[c]onsultation should commence early in the planning process, in order to identify and discuss relevant preservation issues . . . ." § 800.2(c)(2)(ii)(A). The Ninth Circuit has emphasized that the timing of required review processes can affect the outcome and is to be discouraged. *Id*. (citing *Pit River Tribe v. U.S. Forest Serv.*, 469 F.3d 787, 785–86 (9th Cir. 2006). The consultation requirement is not an empty formality; rather, it "must recognize the government-to-government relationship between the Federal Government and Indian tribes" and is to be "conducted in a manner sensitive to the concerns and needs of the Indian tribe." § 800.2(c)(2)(ii)(C). A tribe may, if it wishes, designate representatives for the consultation. *Id*.

The Section 106 process is described in 36 C.F.R. §§ 800.2–800.6. After preliminary identification of the project and consulting parties, Section 106 requires identifying historic properties within a project's affected area, evaluating the project's potential effects on those properties, and resolving any adverse effects. The Tribe insists this consultation must be completed at least for Phase 1 of the project, before construction begins.

Throughout this process, the regulations require the agency to consult extensively with Indian tribes that fall within the definition of "consulting party," including here the Quechan Tribe.[4] Section 800.4 alone requires at least seven issues about which the Tribe, as a consulting party, is entitled to be consulted before the project was approved. Under § 800.4(a)(3), BLM is required to consult with the Tribe identify issues relating to the project's potential effects on historic properties. Under § 800.4(a)(4), BLM is required to gather information from the Tribe to assist in identifying properties which may be of religious and cultural significance to it. Under § 800.4(b), BLM is required to consult with the Tribe to take steps necessary to identify historic properties within the area of potential effects. Under § 800.4(b)(1), BLM's official is required to take into account any confidentiality concerns raised by tribes during the identification process. Under § 800.4(c)(1), BLM must consult

[4] The Tribe is a consulting party because it attaches religious and cultural significance to the historic properties that may be affected by the project. The fact that the properties are not on the Tribe's own land doesn't affect this status. 36 C.F.R. § 800.2(c)(2)(ii).

with the Tribe to apply National Register criteria to properties within the identified area, if they have not yet been evaluated for eligibility for listing in the National Register of Historic Places. Under § 800.4(c)(2), if the Tribe doesn't agree with the BLM's determination regarding National Register eligibility, it is entitled to ask for a determination. And under § 800.4(d)(1) and (2), if BLM determines no historic properties will be affected, it must give the Tribe a report and invite the Tribe to provide its views. Sections 800.5 and 800.6 require further consultation and review to resolve adverse effects and to deal with failure to resolve adverse effects.

Furthermore, under § 800.2, consulting parties that are Indian tribes are entitled to special consideration in the course of an agency's fulfillment of its consultation obligations. This is spelled out in extensive detail in § 800.2(c). Among other things, that section sets forth the following requirements:

> (A) The agency official shall ensure that consultation in the section 106 process provides the Indian tribe . . . a reasonable opportunity to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking's effects on such properties, and participate in the resolution of adverse effects. . . . **Consultation should commence early in the planning process, in order to identify and discuss relevant preservation issues and resolve concerns about the confidentiality of information on historic properties**.
>
> (B) The Federal Government has a unique legal relationship with Indian tribes set forth in the Constitution of the United States, treaties, statutes, and court decisions. **Consultation with Indian tribes should be conducted in a sensitive manner respectful of tribal sovereignty. . . .**
>
> (C) **Consultation with an Indian tribe must recognize the government-to-government relationship between the Federal Government and Indian tribes. The agency official shall consult with representatives designated or identified by the tribal government . . . . Consultation with Indian tribes . . . should be conducted in a manner sensitive to the concerns and needs of the Indian tribe . . . .**
>
> (D) When Indian tribes . . . attach religious and cultural significance to historic properties off tribal lands, section 101(d)(6)(B) of the act requires Federal agencies to consult with such Indian tribes. . . in the section 106 process. **Federal agencies should be aware that frequently historic properties of religious and cultural significance are located on ancestral, aboriginal, or ceded lands of Indian tribes . . . and should consider that when complying with the procedures in this part**.

36 C.F.R. § 800.2(c)(2)(ii)(A)–(D) (emphasis added). The Tribe points out the significance of the "confidentiality" provisions, citing *Pueblo of Sandia v. United States*, 50 F.3d 856, 861–62 (10th Cir. 1995) (noting that pueblo's reticence to share information about cultural and religious sites with outsiders was to be expected, and that federal government knew tribes would typically not answer general requests for information).

The Ninth Circuit has emphasized that federal agencies owe a fiduciary duty to all Indian tribes, and that at a minimum this means agencies must comply with general regulations and statutes. *Pit River Tribe v. U.S. Forest Serv.*, 469 F.3d 768, 788 (9th Cir. 2006). *See also* 36 C.F.R. § 800.2(c)(2)(ii)(B) (mentioning the "unique legal relationship" between federal government and Indian tribes). Violation of this fiduciary duty to comply with NHPA and NEPA requirements during the process of reviewing and approving projects vitiates the validity of that approval and may require that it be set aside. *Id*.

Defendants, citing 36 C.F.R. § 800.14(b)(1)(ii), argue that "the execution of a Programmatic Agreement completes the Section 106 process" (Opp'n to Mot. for Prelim. Inj., 22:11–17) and is an acceptable way to resolve adverse effects from complex projects "[w]hen effects on historic properties cannot be fully determined prior to approval of an undertaking." (*Id*. at 9:10–11.) But this is true only if "executing" means "carrying out;" merely entering into a programmatic agreement does not satisfy Section 106's consultation requirements. 36 C.F.R. § 800.14(b)(2)(iii) ("Compliance with the procedures established by an approved programmatic agreement satisfies the agency's section 106 responsibilities for all individual undertakings of the program covered by the agreement . . . .") The Tribe asks that consultation be completed at least for phase 1 before the project begins. That Defendants are resisting this suggests they are probably not prepared to do so.

The programmatic agreement must be negotiated in accordance with § 800.14(b), which itself requires an extensive consultation process. § 800.14(f). The Tribe has also argued a programmatic agreement is not authorized for this type of project.

Defendants are correct that under § 800.4(b)(2), identification of historic properties can be deferred if "specifically provided for" in a programmatic agreement negotiated

pursuant to § 800.14(b). But this deferral is not indefinite, and entering into an appropriately-negotiated programmatic agreement does not relieve the BLM of all responsibility. The second half of § 800.4(b)(2) contemplates consultation on historic properties as it becomes feasible:

> The process should establish the likely presence of historic properties within the area of potential effects for each alternative or inaccessible area through background research, consultation and an appropriate level of field investigation, taking into account the number of alternatives under consideration, the magnitude of the undertaking and its likely effects, and the views of . . . any other consulting parties. As specific aspects or locations of an alternative are refined or access is gained, the agency official shall proceed with the identification and evaluation of historic properties in accordance with paragraphs (b)(1) and (c) of this section.

In short, entering into an appropriately-negotiated programmatic agreement can result in deferral of the consulting process, but it would only allow a temporary delay in consultation, until it is feasible to identify and consult with the Tribe about the historic properties. *Compare Te-Moak*, 608 F.3d at 610 (explaining that assessment of impact on environmental resources could be deferred where drilling locations in mineral exploration project could not reasonably be determined at the time of approval, but where plan required assessment as drilling locations became known).

Communications and Documentary Evidence

The Tribe's Evidence and Arguments

In support of its point that Defendants failed to adequately consult, the Tribe cites its letter to BLM's Field Manager on February 4, 2010, in which it expressed concern that the schedule for issuance of the ROD didn't allow enough time for adequate consultation, and that the required consultation was being inappropriate deferred. (Somerville Decl. in Supp. of Mot. for Prelim. Inj., Ex. 5 at 273–75.) This letter says the Tribe had informally learned that a Programmatic Agreement was being developed, which BLM intended to approve by September, 2010. It also expressed the concern that, if the project were ultimately approved in spite of the presence of cultural resources, the quick schedule wouldn't allow enough time for BLM to consult with the tribe to develop a plan to avoid harming the sites.

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By itself, this letter suggests the Tribe was consulted late in the planning process, wasn't being consulted when it wrote the letter, and was concerned about the lack of consultation. It also suggests the time frame for consultation was compressed. The Tribe also cites other later documents, showing that it expressed its dissatisfaction to the Department.

At oral argument, the Tribe admitted BLM engaged in some communication and did some consulting, but described the purported consulting as cursory and inadequate, consisting mostly of informational meetings where the Tribe's opinions were not sought, rather than government-to-government consultation.

Defendants' Evidence and Arguments

In response, Defendants provide string citations to materials in the record which they say document "extensive consultation with tribes, including Plaintiff." (Opp'n to Mot. for Prelim. Inj. at 4:18–5:2. This description of the documents is general and cursory, and sheds little light on the degree to which BLM consulted with the Tribe, or whether the consultation was intended to comply with NEPA or NHPA. First, the documentation includes consultations with other tribes, agencies, and with the public. While this other consultation appears to be required and serves other important purposes, it doesn't substitute for the mandatory consultation with the Quechan Tribe. In other words, that BLM did a lot of consulting in general doesn't show that its consultation with the Tribe was adequate under the regulations. Indeed, Defendants' grouping tribes together (referring to consultation with "tribes") is unhelpful: Indian tribes aren't interchangeable, and consultation with one tribe doesn't relieve the BLM of its obligation to consult with any other tribe that may be a consulting party under NHPA. At oral argument, the Court inquired of Defendants about consultation, but they were unable to be any more specific than they were in their briefing.

The partial administrative record was provided to the Court on CD-ROM, with the documents numbered consecutively and also assigned page numbers (preceded by "PI"). To determine whether these documents show BLM properly engaged in NHPA-required consultation with the Tribe, the Court reviewed each of the documents Defendants cite. *See*

Opp'n at 4:18–5:2. But the Defendants should take note that as a matter of practice, it is incumbent on them to explain the significance of exhibits they cite, rather than just citing them with the expectation that the Court will sift through them.

Furthermore, a significant number of the cited exhibits are duplicates or inapt. By failing to weed out marginal, needless, or duplicate citations, Defendants create the impression they are padding the record—perhaps because the evidence doesn't favor them.

A final quibble. The briefing also mostly cites documents in the order they appear in the record Defendants prepared. This blurs the chronology, which is obviously a critical factor here. The documents are separately identified in a few instances, but in most cases only a page range is given. For purpose of convenience, this order will treat each undifferentiated citation to a page range as a single document, discuss the documents in the order they are cited, and discuss the chronology later.

Documents Cited to Show Consultation

The first document cited to show consultation (PI 009213–009541) was a log by URS Corporation, a private corporation Imperial Valley Solar, LLC retained to conduct environmental investigation of the proposed project site. *See* Opp'n at 2:16–18 (identifying URS). This doesn't constitute NHPA consultation at all.

The second document is an appendix to the ROD identifying "consultation" with various tribes. The subject matter of the consultation isn't identified, and in some cases the nature of the contact isn't clear. But this summary is helpful in the sense that it shows the chronology of BLM's consultation with the Tribe. Some of the listed contacts were with members of the Tribe, but these don't appear to be designated representatives and therefore consultation with them doesn't constitute consultation with the Tribe for NHPA purposes. Fourteen contacts with the Tribe's president are listed, as follows:

1) A letter from BLM to the Tribe's president on January 8, 2008

2) Another letter from BLM to the Tribe's president on November 11, 2008

3) A follow-up call to the Tribe's president on November 17, 2008

4) A follow-up call to the Tribe's president on December 12, 2008

5) A letter from BLM to the Tribe's president on November 6, 2009

6) A follow-up call or email from BLM to the Tribe's president sometime from November 21, 2009 to December 1, 2009

7) A letter from BLM to the Tribe's president on January 15, 2010

8) A response letter from the Tribe to BLM on February 4

9) A letter from BLM to the Tribe's president on March 11, 2010

10) A letter from BLM to the Tribe's president on March 29, 2010.

11) A letter from BLM to the Tribe's president on June 2, 2010

12) A letter from BLM to the Tribe's president on June 24, 2010

13) A letter in response from the Tribe on August 4, 2010

14) A letter from BLM to the Tribe on August 18, 2010.

(*Id*., PI 000379, 000386.) Many of the documents included in this summary are cited later, and this order discusses them below.

As part of this summary, thirty-one contacts with the Tribe's historic preservation officer are also recorded. (PI 000380, 000386.) The summary says this officer received the same letters and follow-up calls as did the Tribe's president, and had additional contact with BLM. There is no showing the Tribe designated her as a contact for NHPA purposes, though this summary counts her reply letters as replies from the Tribe.

This summary is significant because it shows BLM's early contact with the Tribe consisted of a letter in January, 2008, a second letter in November, 2008 (and follow-up calls), and a third letter (and follow-up calls) in December, 2009. The communication apparently began in earnest with the January, 2010 letter, which prompted the Tribe's response letter discussed above.

The third cited document is a letter to the Tribe's president and dated September 27, 2010. (PI 007345–007346.) This letter urges the Tribe to sign the Programmatic Agreement, but doesn't involve NHPA consultation.

The fourth cited document is actually two documents compressed together. First is a letter to the Tribe's president dated September 7, 2010. (PI 007374–007375.) It

discusses NEPA consultation, and also invites the Tribe to a public informational meeting to be held September 29, 2010. It also extends a general invitation: "The BLM would also be glad to meet with your Tribe about the project or the topics of this letter[.]" The second is a letter to the Tribe's president dated August 18, 2010, responding to a complaint from the Tribe. It outlines the dates it sent letters in the past, characterizes many of those letters as invitations to consult, and contends the Tribe has been fully heard: "As a result of the tribal consultation efforts for this project, BLM is fully aware of the Quechan Indian Tribe[']s issues and concerns and these are being considered in the decision process." (PI 007376.) It also requests an opportunity for an archaeologist on the BLM staff to meet with the tribal council. (PI 007377.)

The fifth cited document is a letter dated August 4, 2010 from the Tribe to Daniel Steward, whom it identifies as the BLM's "project lead." This letter complains that the consultation and review process is being rushed, and asks the BLM to arrange a time to meet with the tribal council after it has had time to review the reports and maps depicting the historical resources on the site.

The sixth cited document is a letter dated June 24, 2010 from the BLM to the Tribe's president. It invites consultation, invites the president to archaeological site visits led by "cultural resource consultants" scheduled for the week of July 26, 2010, and provides an update of a report by URS Corporation.[5] The letter also discusses a past meeting, and without further explanation informs the Tribe that the final Programmatic Agreement must be prepared before the ROD is issued in September, 2010. The letter acknowledges the Programmatic Agreement has been in preparation since December, 2009 and says all comments on the proposed Programmatic Agreement must be received by June 25, the day after the letter is dated.

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[5] The summary included in the letter says the cultural resources inventory report for the project has been "completed" and is included on a CD sent along with the letter. The summary says 446 archaeological resources were identified, including 365 archaeological sites and 81 isolated finds. This section also discusses a change to the project plan made in 2008, to alleviate cultural resource concerns.

The letter invites the Tribe's "assistance in identifying any places to which the Tribe may attach religious or cultural significance which could be affected by the proposed project as well as how the project may affect those places." (PI 008156.) It again invites the Tribe to contact the BLM's archaeologist or "point or contact."

The seventh cited document consists of multiple letters spanning 40 pages. The first is a letter to the Tribe's president dated March 29, 2010. It expresses the desire to "continue our efforts to inform and consult with your Tribe" pursuant to NHPA. It explains roughly where the project will be located, mentions that it may include construction of roads, building, a pipeline, and a transmission line, as well as installation of the solar collectors. The letter refers to a group meeting in December, 2009 at which it discussed the need to prepare the Programmatic Agreement. It informs the Tribe that the project might not be able to avoid all historic properties eligible for listing on the National Register, and asks the Tribe to review and offer its suggestions on the proposed Programmatic Agreement listed as an enclosure. It asks the Tribe to return comments by "May, 2009" [*sic*] and says another draft will be provided for the Tribe's review later. (PI 009656.) Finally, the letter invites the Tribe to participate in a meeting to discuss comments on the draft agreement.

The seventh document's second letter is addressed to the Tribe's president and is dated March 11, 2010. It includes much of the same information as was included in the March 29 letter, but primarily addresses the draft environmental impact statement ("DEIS"). It also invites the Tribe to a workshop and public meeting on the DEIS, and to a conference and hearing by the California Energy Commission. As part of the discussion of the DEIS, the letter represents that it includes preliminary results of the cultural resources studies, "with sufficient detail to identify the potential impacts that the proposed project would have on cultural resources." (PI 009687.) Finally, the letter invites consultation on the Programmatic Agreement, issues a general invitation "to initiate or continue government-to-government consultation for this project pursuant to all relevant laws including Section 106," and again invites the Tribe to call the BLM archaeologist or "point of contact" for information. (PI 009688.)

The seventh document's third letter, addressed to the Tribe's president, is dated January 15, 2010. This letter informs the Tribe that Tessera Solar has submitted an application for a right-of-way to develop the project. (This was apparently the Tribe's first notification that an application had been submitted.) The letter gives the same general description of the proposed project and invites the Tribe to a public informational meeting to follow up on the informational meeting it held in December, 2009. This letter also gives tentative dates for issuance of certain documents, including the final environmental impact statement. It tells the Tribe "we must have a finalized [Programmatic Agreement] before the Record of Decision is signed on the Solar Two[6] project. The Record of Decision is planned for September 2010." (PI. 009689.)

The seventh document's fourth letter is addressed to the Tribe's president and is dated November 6, 2009. It too makes general mention of the project and informs the Tribe that Tessera Solar has applied for a right-of-way to develop a solar energy facility. This letter invites the tribe to a "cultural resources information and Programmatic Agreement coordination meeting," and "once again extend[s] an invitation to initiate or continue government-to-government consultation and Section106 consultation pursuant to the *National Historic Preservation Act* and other applicable laws and regulations." (PI 009690.) The letter discusses environmental review, then goes on to discuss the requirements imposed by Section 106. It also gives a general warning:

> As the proposed project may not be able to avoid all historic properties, regulations implementing the *National Historic Preservation Act* require that the lead agency (i.e. BLM) prepare an agreement document in consultation with [certain tribes, agencies, and the public]. The Programmatic Agreement . . . will outline the manner in which the BLM will take into account the effects of the proposed project and conclude its responsibilities under Section 106.

(PI 009691.) The letter then invites the Tribe to participate in a "cultural resources information meeting and project site tour" on December 4, 2009. The letter says this meeting "will also provide an opportunity for the Tribe to participate as a consulting party in

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[6] "Solar Two" is defined in the letter cited next, the November 6, 2009 letter. It was apparently the working name for the project at issue here.

the development of the [Programmatic Agreement]." This letter includes maps showing the outlines of the project area.

The eighth document consists of two letters. The first is dated November 11, 2008 and is addressed to the Tribe's president. This letter informs the Tribe an application for a right-of-way has been submitted for a solar project, gives general information about the project, and invites the Tribe to a public informational meeting. Maps and general descriptions of the proposed project are attached. The second is dated January 8, 2008. It's similar to the November 11 letter, but includes less information. It invites the Tribe to contact the BLM's two "points of contact."

The ninth document consists of six letters from the Tribe's historical preservation officer and president to BLM. The first is a brief letter from the historic preservation officer dated February 19, 2008 informing BLM the project area is within the Tribe's historic use area, and requesting more information, a survey, and a meeting. The remaining letters are much more recent, The earliest is dated February 4, 2010. Like the letters that follow, it raises the Tribe's complaints about the review process. For example, the letters point to the limited schedule, request additional time, and object that a Programmatic Agreement isn't appropriate or provided for under applicable regulations. Later letters raise objections to the draft Programmatic Agreement, and insist that the BLM engage in the process outlined in 36 C.F.R. § 800.4 *et seq.* The letters also identify various legal authority the Tribe believes BLM is disobeying or undermining, and ask BLM to provide them with information about the project so they can review it before the BLM-imposed deadlines pass. The remaining letters are specific in their objections. The final letter in this series, dated August 4, 2010, complained that although the Tribe requested a copy of the cultural report in 2008, BLM only provided a copy in early July, 2010. The letter asks BLM to arrange a time to meet with the tribal council on the reservation, and says the required Section 106 consultation can't begin until the Tribe has time to review the report.

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Supplemental String Citations

After this, Defendants say "BLM's consultation with Plaintiff, in which URS assisted, included many letters, meetings (both with Plaintiff alone and including one or more other tribes), site visits and telephone conversations. Their brief provides a string cite to 32 separate page ranges without individual explanation. Many of the references are either repetitions of the earlier citations, or duplicates of those documents. The Court will discuss those documents below, but only the ones that are not repeat citations or duplicates.

The first non-duplicate supplemental citation (PI 009261) is a letter from URS to the Tribe's president, dated February 28, 2008, providing a map and requesting information about cultural resources that might be affected by the project.

The second (PI 009265) is a similar letter someone named Preston Arrow-weed but otherwise unidentified.

The third (PI 009273) is a letter from the Tribe's historic preservation officer, dated March 17, 2008, re-forwarding her letter of February 19th, 2008.

The fourth (PI 009327) is a letter from Preston Arrow-weed, who apparently is a member of the Tribe, to the Imperial County Board of Supervisors.

The fifth (PI 009476–009482) is a letter from the Tribe's historic preservation officer to the BLM's archaeologist, dated May 4, 2010 and objecting that the draft Programmatic Agreement is inconsistent with Section 106's consulting requirements. This letter also objects that the consultation up to that point has been inadequate and cites portions of Section 106 and its regulations the Tribe believes BLM has been failing to comply with. Finally, the letter includes specific comments on the draft Programmatic Agreement. This letter repeats many of the complaints raised in the other letters.

The sixth (PI 009508–009509) is a letter from BLM to the Tribe's president, dated June 2, 2010, inviting the Tribe to a general informational meeting. The revised Programmatic Agreement is listed as an enclosure, and the letter solicits comments on it. PI 009526–009527 is a letter from the Tribe's historic preservation officer to BLM's "point of contact," dated June 4, 2010. The letter says the officer attended an update meeting the day

before where she was told the cultural report for the project had not yet been completed. The letter complains that it is impossible for the Tribe to consult on cultural resources issues until it has been provided with basic information about what cultural resources the project might affect. The letter also reiterates the officer's request for a map showing where the cultural resources are located, and complains that the points out the number of cultural resources has fluctuated repeatedly. For example, the letter says the Tribe was told on May 25 there were 361 cultural resources in the project area, but the latest count (as of June 4) was 442. The letter asks BLM to revise the timeline to allow for adequate consultation and review.

The seventh (PI 009528–009533) is a letter from the Tribe's historic preservation officer to BLM's archaeologist, dated June 14, 2010, objecting to various points in the draft Programmatic Agreement.

The eighth (PI 010249–1010251) is a meeting summary for a group presentation to attendees from several tribes on September 29, 2010. Lorey Cachora, a member of the Tribe, is shown in attendance but no representatives from the Tribe's government. The minutes of the meeting show that the Programmatic Agreement had been signed by federal agencies and would be forwarded to tribes for their signatures, with the explanation that the tribes' assent would mean nothing more than that they wished to be consulted about the project.

The ninth (PI 010290–10293) is notes from a site visit on July 29 through 31, 2010. A person from the Tribe, Manfred Scott, was in attendance on July 29 but his role is not otherwise explained. The notes also show Preston Arrow-weed attended the visit on both the 29th and 30th, and was shown a map of all cultural sites along an ancient shoreline he inquired about.

The tenth (PI 010294–010312) is notes from a meeting on June 16, 2010. Several members of the Tribe and its historic preservation officer are shown as attending either in person or telephonically. The notes show tribal members complaining about inadequate

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notice of the meeting, the approval process being rushed, and the lack of a report. The notes also show discussion of some sites and archaeological finds.

The eleventh (PI 010313–010320) is notes from a meeting on May 18, 2010, at which the Tribe's historic preservation officer appeared telephonically. The meeting concerned drafting of the Programmatic Agreement.

The twelfth (PI 010321–010328) is notes from a meeting on May 4, 2010 at which the Tribe's historic preservation officer and two members of the Tribe appeared. This meeting appears to be a status update, and focuses on the development of the Programmatic Agreement. The notes show the cultural resources inventory hadn't been completed. Historical resources were discussed to some extent, and the number was set at 350. Some specifics about the projects and impact mitigation were discussed. Attendees also objected that they didn't have a map of the site, and complained that the informational meetings being held weren't consultation as required under Section 106.

The thirteenth (PI 010329–010337) is an agenda, sign-in sheet, and notes from a general meeting on December 4, 2009 at which several members of the Tribe attended. The record doesn't show any official representative of the Tribe attended.

The fourteenth (PI 010338–010340) is photocopied notes on a steno pad. The import of this is unclear but it seems to concern a meeting in August, 2008 with the Tribe's historic preservation officer.

The fifteenth (PI 010341–010342) is more photocopied notes on a steno pad, dated in July, 2009. Apparently it concerns some kind of meeting with members of the Tribe.

Finally, Defendants cite to paragraphs 6 through 10 of the declaration of Rebecca Apple in support of their opposition. This portion of her declaration attests to her preparation of certain reports, and meetings and visits with members of tribes generally Ms. Apple's only recorded meeting with designated representatives of the Tribe occurred on October 16, 2010.

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Analysis of Documentary Evidence

Preliminarily, several points bear noting. First, the sheer volume of documents is not meaningful. The number of letters, reports, meetings, etc. and the size of the various documents doesn't in itself show the NHPA-required consultation occurred.

Second, the BLM's communications are replete with recitals of law (including Section 106), professions of good intent, and solicitations to consult with the Tribe. But mere *pro forma* recitals do not, by themselves, show BLM actually complied with the law. As discussed below, documentation that might support a finding that true government-to-government consultation occurred is painfully thin.

At oral argument, the Tribe described the meetings as cursory information sessions and the reports and other communications as inadequate. Its briefing also argues that Defendants have confused "contact" with required "consultation." Defendants In response, Defendants argue that the Tribe "has been invited to government-to-government consultations since 2008" "BLM began informing the Tribe of proposed renewable energy projects within the California Desert District as early as 2007," and "[s]ince that time BLM has regularly updated the Tribe on the status of the [Imperial Valley Solar] project." (Opp'n, 5:26-6:3.)

The Tribe's first document contact with BLM was the tribal historical preservation officer's letter of February 19, 2008. That letter put BLM on notice that the historical and cultural sites within the project area would be considered important to the Tribe. It also asked BLM to provide a survey of the area and to meet with the Tribe's government, which would have constituted government-to-government consultation. BLM could not have provided the survey at that time, and apparently also didn't comply with the meeting request, because the historic preservation officer re-sent the letter the next month. In fact, the documentary evidence doesn't show BLM ever met with the Tribe's government until October 16, 2010, well after the project was approved. All available evidence tends to show BLM repeatedly said it would be glad to meet with the Tribe, but never did so.

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Although BLM invited the Tribe to attend public informational meetings about the project, the invitations do not appear to meet the requirements set forth in 36 C.F.R. § 800.2(c)(2)(ii). This is particularly true because the Tribe first requested a more private, closed meeting between BLM and its tribal council. In later communications, the Tribe continued to request that BLM meet with its tribal council on the Tribe's reservation. In addition, the Tribe repeatedly complained that the properties hadn't been identified, and asked for a map showing where the identified sites were, requests that apparently went unanswered at least as late as June, 2010. The Tribe's letter of August 4, 2010 apparently acknowledges receipt of maps, but asks for an extension of the deadline so it could review them before responding.

The documentary evidence also confirms the Tribe's contention that the number of identified sites continued to fluctuate. Compare, *e.g.*, PI 008155 (BLM letter dated June 24, 2010 setting number of cultural sites in the project area at 446) and PI 00993 (Final EIS, stating Class III inventory identified 459 cultural sites). And Defendants have admitted the evaluation of sites eligible for inclusion in the National Register hasn't yet been completed.

BLM's invitation to "consult," then, amounted to little more than a general request for the Tribe to gather its own information about all sites within the area and disclose it at public meetings. Because of the lack of information, it was impossible for the Tribe to have been consulted meaningful as required in applicable regulations. The documentary evidence also discloses almost no "government-to-government" consultation. While public informational meetings, consultations with individual tribal members, meetings with government staff or contracted investigators, and written updates are obviously a helpful and necessary part of the process, they don't amount to the type of "government-to-government" consultation contemplated by the regulations. This is particularly true because the Tribe's government's requests for information and meetings were frequently rebuffed or responses were extremely delayed as BLM-imposed deadlines loomed or passed.

No letters from the BLM ever initiate government-to-government contact between the Tribe and the United States or its designated representatives, the BLM field managers

Margaret Goodro, Vicki Wood, or acting field manager Daniel Steward. Rather, the Tribe was invited to attend public informational meetings or to consult with two members of her staff, an archaeologist and a person identified only as a "point of contact." The BLM in fact rebuffed the Tribe's August 4 request that the BLM meet with the tribal council on its reservation, proposing instead that the tribal council call BLM staff.

The Tribe also repeatedly protested it was not being given enough time or information to consider the Programmatic Agreement, a matter it was also entitled to be consulted about. The letters sent to the Tribe's president make clear BLM had determined a programmatic agreement would be used and would be entered into no later than September, 2010. The Tribe's letter of February 4, 2010 suggests the Tribe had discovered on its own that BLM was already drafting the Programmatic Agreement. Furthermore, BLM insisted that consulting parties send their suggestions in writing. The Tribe's requests to consult about the Programmatic Agreement were obviously not granted.

Defendants have emphasized the size, complexity, and expense of this project, as well as the time limits, and the facts are sympathetic. Tessera hoped to qualify for stimulus funds under the American Recovery and Reinvestment Act of 2009 by beginning construction no later than the end of this year, which is about two weeks away. To that end, BLM apparently imposed deadlines of its own choosing. Section 106's consulting requirements can be onerous, and would have been particularly so here. Because of the large number of consulting parties (including several tribes), the logistics and expense of consulting would have been incredibly difficult. None of this analysis is meant to suggest federal agencies must acquiesce to every tribal request.

That said, government agencies are not free to glide over requirements imposed by Congressionally-approved statues and duly adopted regulations. The required consultation must at least meet the standards set forth in 36 C.F.R. § 800.2(c)(2)(ii), and should begin early. The Tribe was entitled to be provided with adequate information and time, consistent with its status as a government that is entitled to be consulted. The Tribe's consulting rights should have been respected. It is clear that did not happen here.

The Court therefore determines the Tribe is likely to prevail at least on its claim that it was not adequately consulted as required under NHPA before the project was approved,. Because the project was approved "without observance of procedure required by law," the Tribe is entitled to have the BLM's actions set aside under 5 U.S.C. § 706(2)(D).

Merits Analysis of Other Claims

The evidence shows, and the parties do not dispute, that the planned project is extensive. The size and number of sun-catchers, not to mention roads, buildings, and other supporting infrastructure, ensures this will be a massive project. The undisputed evidence also shows the 459 historic properties extend from one end of the area to the other, so some type of impact on the properties is likely. In fact, phase 1 of the plan acknowledges that one such property will be adversely impacted; because of the property's size, power lines cannot span it, and one power pole must be installed on the property.

The Court therefore holds the FLPMA claim at least raises "serious questions" for purposes of injunctive relief.

The substance of the NEPA claim is less clear. Extensive environmental review has been conducted, so the chance that this project will harm the flat-tailed horned lizard appears to be reduced. At the same time, the Tribe was entitled to be consulted under NEPA as under NHPA, and its claims in this respect also raise "serious questions."

Remaining Injunctive Relief Analysis

Having determined that the Tribe is likely to succeed on the merits, at least as to its claim that required NHPA consulting must be completed before phase 1 of the project begins, the Court turns to the remaining *Winter* factors.

Irreparable Harm

To obtain preliminary injunctive relief, the Tribe must show it is likely to suffer irreparable harm in the absence of preliminary relief. *Winter*, 129 S.Ct. at 374. *Winter* emphasizes that the mere possibility of irreparable harm isn't enough; such harm must be likely. *Id*. at 375–76. This is the easiest and most straightforward part of the inquiry, because the Court finds it is very likely the Tribe will suffer irreparable harm.

The parties agree there are hundreds of known historical sites on the land, and the Tribe attaches cultural and religious significance to many if not most of these. Hundreds of these sites have been identified as prehistoric, and many contain human remains. Damage to or destruction of any of them would constitute irreparable harm in some degree. Second, if the tribe hasn't been adequately consulted and the project goes ahead anyway, this legally-protected procedural interest would effectively be lost. *See Save Strawberry Canyon v. Dep't of Energy*, 613 F. Supp. 2d 1177, 1187 (N.D.Cal.2009) (finding that, due to the alleged NEPA violations, the plaintiff was "virtually certain to suffer irreparable procedural injury absent an injunction") (citing *Lujan v. Defenders of Wildlife*, 504 U.S. 555, 572 & n.7 (1992)).

The briefing didn't focus extensively on the risk of specific damage, but the massive size of the project and the large number of historic properties and incomplete state of the evaluation virtually ensures some loss or damage. The Tribe has pointed out that the project would not avoid most of the 459 sites. (Reply to Opp'n, 9:22-24 (citing Defendants' declarations that only 4 of 73 sites in phase 1 and 39 of 203 sites in phase 2 would be avoided)). And, as discussed, phase 1 would involve damage to at least one known site.

The Court therefore finds this key requirement is easily met, and turns to the remaining two *Winter* factors.

Balance of Equities

To obtain injunctive relief under *Winter*, the Tribe must establish the balance of equities tips in its favor. 129 S.Ct. at 374. *Winter* also refers to this as the "balance of hardships" inquiry.

Here, Defendants held most of the power—including the power to control the timing of the project and the review process. Their briefing mentions that as early as 2007 they notified the Tribe of interest in developing the area for solar power generation, and the project was being planned at least as early as January, 2008. In February, 2008, BLM was put on notice it needed to consult with the Tribe. BLM imposed requirements deadlines on consulting parties, including the Tribes. For example, it determined unilaterally that a

programmatic agreement would be used, and would be adopted no later than September, 2010. BLM set deadlines and determined the timing and format of meetings. Defendants were therefore in the best position to work out scheduling problems, and the Tribe had almost no power in this respect.

The Ninth Circuit has emphasized that consultation with tribes must begin early, and that if consultation begins after other parties may have invested a great deal of time and money, the other parties may become entrenched and inflexible, and the government agency may be inclined to tolerate degradation it would otherwise have insisted be avoided. *Te-Moak Tribe*, 608 F.3d at 609. This appears to be happening here. While the Court is sympathetic to the problems Defendants face, the fact that they are now pressed for time and somewhat desperate after having invested a great deal of effort and money is a problem of their own making and does not weigh in their favor.

It bears considering, too, that two of the Defendants are Secretary of the Interior Salazar and BLM, who represent part of the United States government, and that Congress and the Department of the Interior created the requirements that Defendants are finding so onerous. Congress and, to a lesser extent, the Department of the Interior could have made these consulting requirements less stringent, but they didn't. Congress could also have exempted renewable energy projects such as this from the Section 106 review process, but didn't. Congress could also extend ARRA project deadlines for this project but hasn't, though, it was conceded at argument, Congress still might do so.

The Court is mindful that Defendants face hardships as well. For example, Imperial Valley Solar has already spent millions of dollars preparing this project, and faces difficulties obtaining investment and financing if the project is held up. Even so, the Court finds the balance of equities tips heavily in the Tribe's favor.

Public Interest

The final step in the *Winter* analysis requires the Court to consider whether a preliminary injunction is in the public interest. 129 S.Ct. at 374. Obviously there are many competing interests here. The interests the Tribe urges the Court to consider involve historic

and cultural preservation, in this case of hundreds of prehistoric sites and other sites whose significance has yet to be completely evaluated. The Tribe itself is a sovereign, and both it and its members have an interest in protecting their cultural patrimony. The culture and history of the Tribe and its members are also part of the culture and history of the United States more generally.

The value of a renewal energy project of this magnitude to the public is also great. It provides the public with a significant amount of power while reducing pollution and dependence on fossil fuels. As Defendants point out, it is a goal of the federal government and the state of California to promote the development of such projects. Current federal policy as embodied in ARRA also favors the undertaking of projects of this time, as a way of creating jobs and stimulating the economy.

That being said, the Court looks to the statutes enacted by Congress rather than to its own analysis of desirable priorities in the first instance. *See, e.g., Marshall v. Barlow's, Inc.*, 436 U.S. 307, 331 (1978) (refusing to question Congress' weighing of interests when enacting statute); *Salazar v. Buono*, 130 S.Ct. 1803, 1828 (2010) (Scalia, J., concurring in the judgment) ("Federal courts have no warrant to revisit [Congress' decision about what is in the public interest]—and to risk replacing the people's judgment with their own. . . ."). Here, in enacting NHPA Congress has adjudged the preservation of historic properties and the rights of Indian tribes to consultation to be in the public interest. Congress could have, but didn't, include exemptions for renewable energy projects such as this one. And, as pointed out, Congress could determine this particular project is in the public interest and sweep aside ARRA deadlines as well as requirements under NHPA, NEPA, and FLPMA to get it built. But because Congress didn't do that, and instead made the determination that preservation of historical properties takes priority here, the Court must adopt the same view.

Alternate Basis for Injunctive Relief

As an alternative basis for the Court's decision, *Alliance for Wild Rockies*, 622 F.3d at1049–50 authorizes the granting of preliminary injunctive relief on a showing of "'serious questions going to the merits' and a hardship balance that tips sharply toward the plaintiff

. . ., assuming the other two elements of the *Winter* test are also met." The "likelihood of irreparable harm" factor is required, and is particularly emphasized. *Id*. at 1052.

As noted, the procedural NEPA claim and the substantive claim under FLPMA raise "serious questions going to the merits." For the reasons just discussed, the Court also finds the hardship balance tips sharply towards the Tribe, and the other two *Winter* factors are also met. The most important of these factors, the likelihood of irreparable harm, is the clearest and most obvious. For these reasons, the Court holds either of these would also serve as an adequate basis for the grant of preliminary injunctive relief.

Conclusion and Order

For these reasons, the Tribe's motion for preliminary injunctive relief is **GRANTED**. No later than Friday, December 17, 2010, the Tribe shall lodge by email a proposed order temporarily enjoining the project. *See* Electronic Case Filing Administrative Policies and Procedures Manual for this District, § 2(h). The proposed order shall be in editable format and Defendants shall be copied on the email.

IT IS SO ORDERED.

DATED: December 15, 2010

HONORABLE LARRY ALAN BURNS
United States District Judge

Comment Letter D22

From: Brett Jolley <BJolley@herumcrabtree.com>
Sent: Thursday, March 03, 2011 4:01 PM
To: ECOSUB; catulewind@blm.gov
Cc: Laura Cummings
Subject: Comments of JAM Investments, Inc. re East Co. Substation, etc.
Attachments: image001.png; 20110303155039579.pdf

Dear Mr. Fisher and Mr. Thomsen:

Attached please find the comments of JAM Investments, Inc. re the East County Substation/Tule Wind/Energia Sierra Juarez project EIR/EIS. These comments will also be sent in hard copy via U.S. Mail. Please confirm receipt of this message and please feel free contact me with any questions about these comments. D22-1

Regards,

HERUM\CRABTREE
ATTORNEYS

BRETT S. JOLLEY

P: 209.472.7700 \ F: 209.472.7986
bjolley@herumcrabtree.com \ www.herumcrabtree.com

2291 W. March Lane \ Suite B100
Stockton, CA 95207

HERUM \ CRABTREE
ATTORNEYS

Brett S. Jolley
bjolley@herumcrabtree.com

March 3, 2011

VIA U.S. MAIL AND E-MAIL

Iain Fisher, CPUC/Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024
E-mail: ecosub@dudek.com
E-mail: catulewind@blm.gov

Re: Comments of JAM Investments, Inc. on East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects Joint DEIR/DEIS

Dear Mr. Fisher and Mr. Thomsen:

This office represents JAM Investments, Inc. ("JAM") which is beneficially interested in the proposed San Diego Gas & Electric Co. ("SDG&E") ECO Substation/Tule Wind Project ("Project"). Specifically, JAM owns several adjoining parcels in San Diego County (the "Property") shown on **Exhibit A** (original proposed BCD Alternative route for SDG&E Sunrise Powerlink Project) which could be directly affected by the Project.

The purpose of this letter is to comment on the Joint Draft Environmental Impact Report/Draft Environmental Impact Statement ("DEIR/DEIS") for the ECO Substation/Tule Wind/Energia Sierra Juarez Gen Tie Projects. JAM previously submitted comments on the ECO Substation/Tule Wind Project NOP/NOI on February 3, 2010. JAM hereby incorporates those previous comments on the NOP/NOI into its comments on the DEIR/DEIS – which comments to do not appear to be addressed in the DEIR/DEIS.

D22-1 Cont.

Sunrise Powerlink Project Mitigation for JAM Property

As JAM previously pointed out, CPUC/BLM adopted Mitigation Measure WR-2a for the SDG&E Sunrise Powerlink Project. MM WR-2a mitigates significant impacts to wilderness and recreation resources (and avoids unnecessary condemnation of private property). The mitigation measure shortens the overall Sunrise Powerlink project route by 0.56 miles and avoids the Property as follows:

D22-2

> **WR-2a. Develop a reroute for the BCD Alternative Revision to reduce effects on recreation.** SDG&E shall relocate the overhead 500 kV transmission line along the southern boundary of JAM properties as shown in Figure E.2.1-1b to shorten the route and minimize effects on BLM land, Forest land, and private property. This reroute and its ground-disturbing components shall avoid Back Country Non-Motorized land use zones of the Cleveland National Forest, while also minimizing towers and disturbance on private property. SDG&E shall submit a memo to the CPUC for review and approval that documents its attempts to fine-tune the location of the BCD Alternative Revision, as well as the submittal of final construction plans for review and approval at least 120 days prior to the start of construction.[1]

D22-2 Cont.

See, Final Mitigation Monitoring, Reporting, and Compliance Program for the Sunrise Powerlink Transmission Project dated November 10, 2009, at p. 99[2] and BLM Record of Decision for the Sunrise Powerlink Transmission Project at Appendix A p. D-35, incorporated herein by reference.[3]

The proposed re-route submitted by SDG&E as part of the Sunrise Powerlink Project approval accomplished this task by re-routing the power lines to the south of the JAM Property. See excerpt contained at **Exhibit B**. And Figure E.2.1-1b of the Sunrise Powerlink Final EIR showing this re-route (identified as MM WR-2b re-route) is attached hereto as **Exhibit C**. This mitigation has been implemented as shown on the Sunrise Powerlink Project Segments Map dated November 2009.[4] This document is found in full at **Exhibit D** and an enlarged excerpt showing the MM WR-12a re-route south of the JAM Property is shown at **Exhibit E**.

Relationship of Mitigation Measure WR-2a to the DEIR/DEIS

D22-3

According to the Project Location Map published by CPUC[5] the Tule Wind project boundaries will abut the JAM Property and may overlap the MM WR-2a re-route. The DEIR/DEIS prepared for the Project identifies Impact WR-1 (Construction

[1] The Final EIR for the Sunrise Powerlink Project includes a typographical error, referring to this mitigation as Mitigation Measure WR-2b. But the decisions and Mitigation Monitoring Plans identify the mitigation as Mitigation Measure WR-2a. Therefore, the Sunrise Powerlink EIR's discussion of Mitigation Measure WR-2b is apt and relevant to understanding adopted MM WR-2a.

[2] http://www.cpuc.ca.gov/environment/info/aspen/sunrise/mmcrp/mmcrp_main.pdf

[3] http://www.cpuc.ca.gov/environment/info/aspen/sunrise/rod.pdf

[4] http://www.cpuc.ca.gov/environment/info/aspen/sunrise/mmcrp/att_A_project_segments_map.pdf

[5] http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/ProjectLocationMap.pdf

activities would temporarily reduce access and visitation to wilderness or recreation areas) and Impact WR-2 (Presence of a project component would permanently preclude recreational activities). There is no specific discussion in the DEIR/DEIS as to how Impacts WR-1 and WR-2 may affect the JAM Property or MM WR-2a.

Accordingly, the EIR/EIS must address the Project's relationship to and cumulative impacts with the Sunrise Powerlink Project, as well as sufficiently mitigate impacts to the JAM Property consistent with the Sunrise Powerlink Final EIR and Mitigation Measure MM WR-2a. This analysis should do more than state whether or not Project facilities would be located on JAM property. Rather the Project should expressly incorporate Sunrise Powerlink Project Mitigation Measure WR-2a to reduce impacts to the JAM Property, and should confirm that the Project will not adversely affect or modify the Sunrise Powerlink Project mitigation measures already in place to reduce impacts to the JAM Property.

D22-3 Cont.

Request for Notice

JAM also respectfully reiterates its request for timely notice of any and all public hearings related to this Project be sent to the undersigned, as well as any staff reports prepared for those hearings. Moreover, Pursuant to Public Resources Code Section 21092.2, please provide the undersigned with copies of any "notices required pursuant to Sections 21080.4 [notice of determination], 21083.9 [scoping meeting], 21092 [notice of any public hearings regarding a negative declaration or EIR], 21108 [notice of determination filed by state agency], and 21152 [notices filed with county clerk including notices of determination and notices of exemption]", as well as any other notices for this Project. Finally, please provide notice of any decisions, determinations, permits, or approvals for the Project not otherwise covered above.

D22-4

Very truly yours,

BRETT S. JOLLEY
Attorney-at-Law

cc: Client

The following material is considered Comment D22-5.

EXHIBIT A

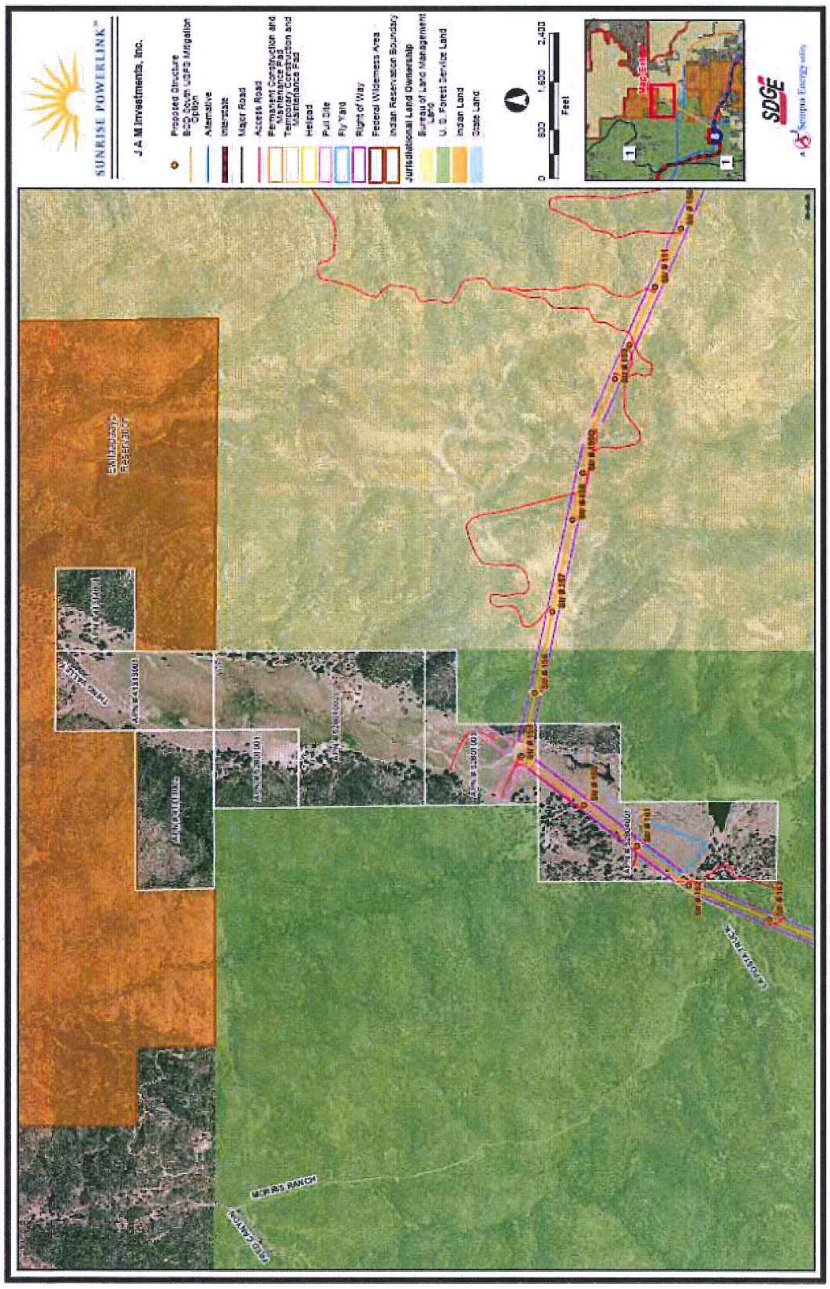
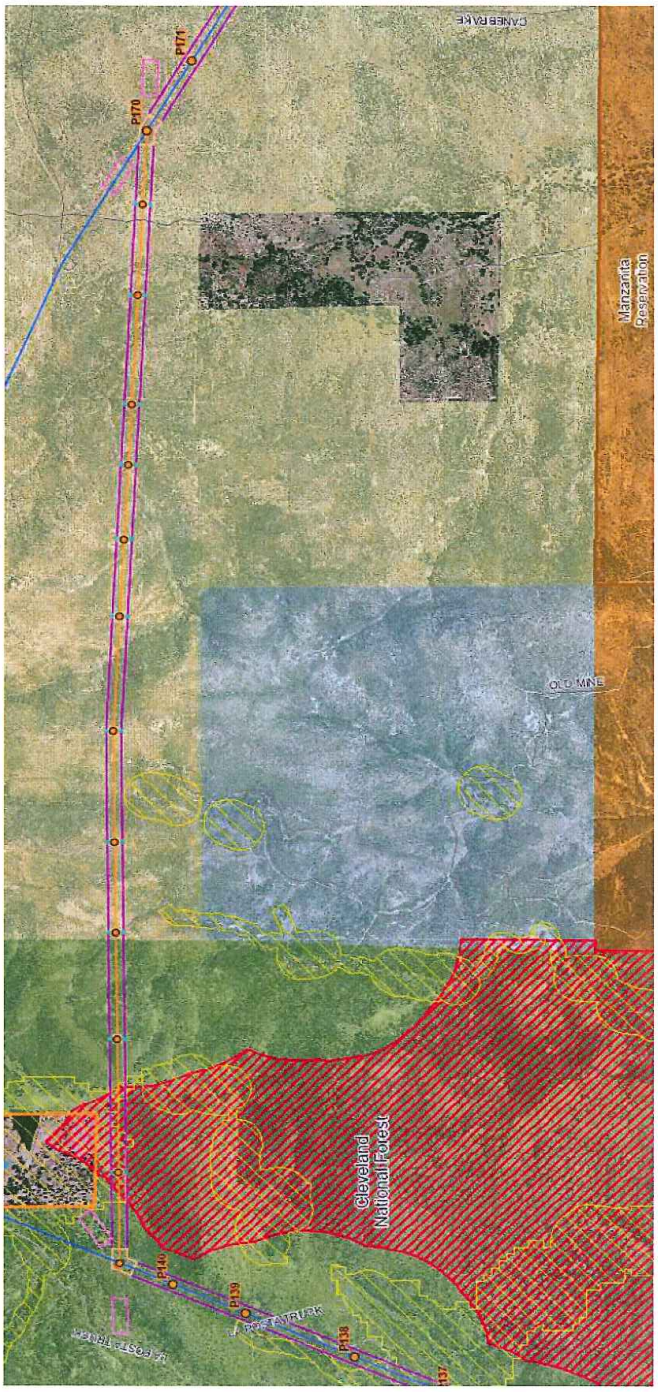
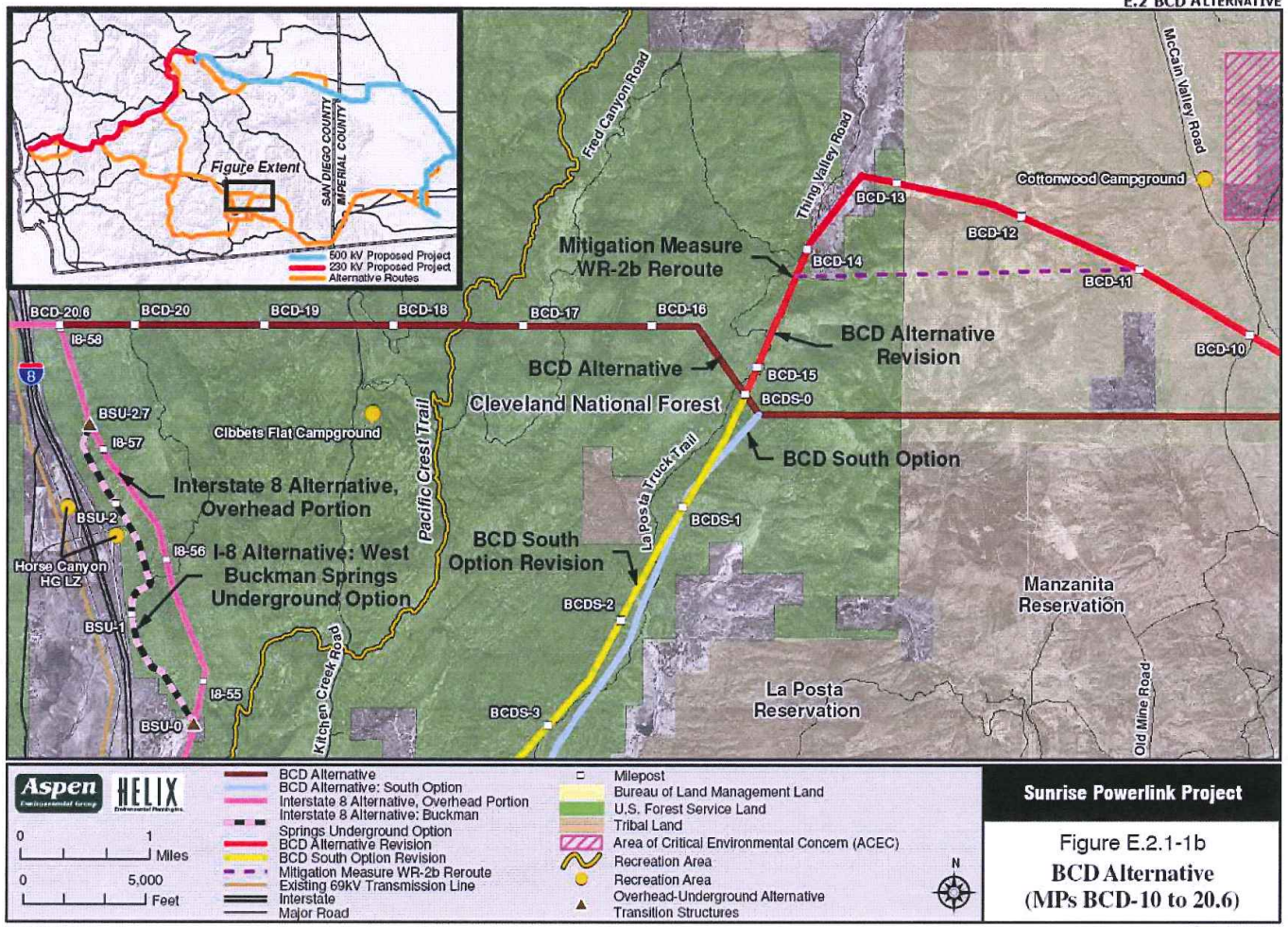

SUNRISE POWERLINK
J A M Investments, Inc.
Proposed Structure
Big Basin Valley Mitigation Option
Alternative
Interstate
Major Road
Access Road
Permanent Construction and Maintenance Pad
Temporary Construction and Maintenance Pad
Helipad
Pull Site
Pig Yard
Right of Way
Federal Wilderness Area
Indian Reservation Boundary
Jurisdictional Land Ownership
Bureau of Land Management Land
U. S. Forest Service Land
Indian Land
State Land
0
820
1,620
2,430
Feet
SDGE
Sempra Energy utility
MORRIS RANCH
MORRIS RANCH

EXHIBIT B


P171
P170
Manzanita Reservation
OLD MINE
Cleveland National Forest
P140
P139
P138
P137

Sunrise Powerlink Project
E.2 BCD ALTERNATIVE



Sunrise Powerlink Project

Figure E.2.1-1b
BCD Alternative
(MPs BCD-10 to 20.6)

October 2008

Final EIR/EIS

EXHIBIT C

EXHIBIT D

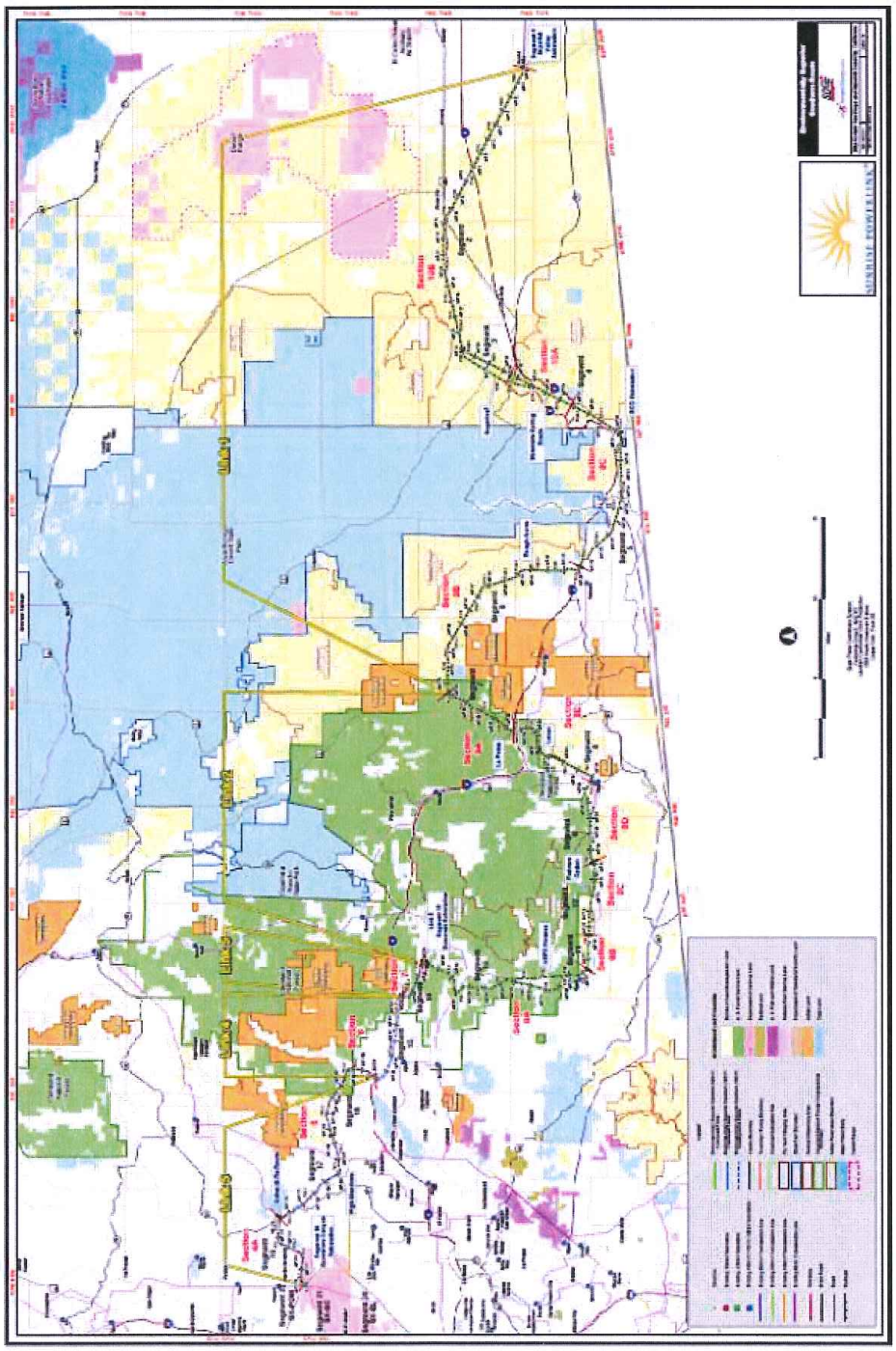
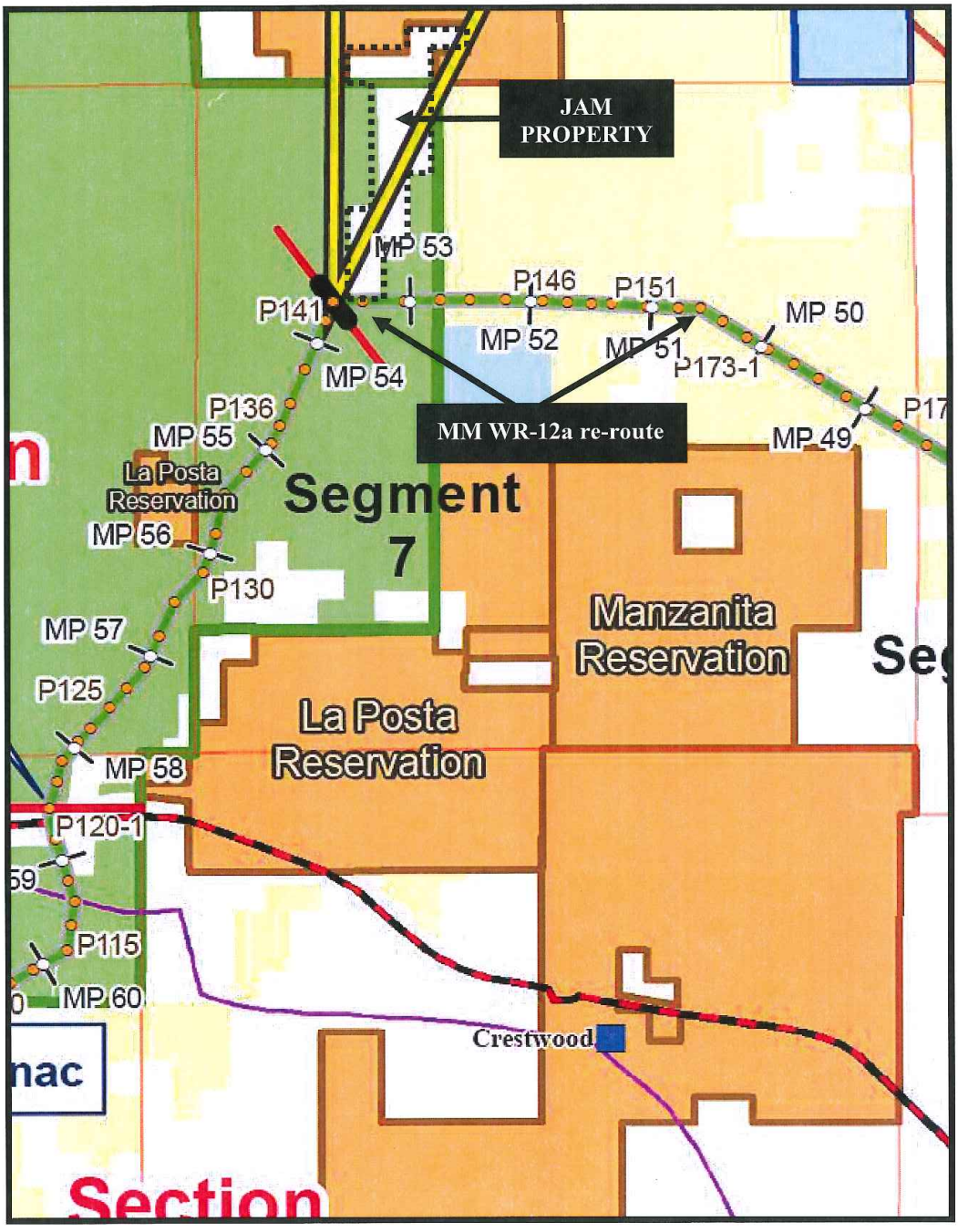


EXHIBIT E


JAM PROPERTY
MP 53
P146
P151
P141
MP 50
MP 52
MP 51
P173-1
MP 54
MM WR-12a re-route
P136
MP 55
MP 49
La Posta Reservation
Segment 7
MP 56
P130
Manzanita Reservation
MP 57
P125
La Posta Reservation
MP 58
P120-1
P115
MP 60
Crestwood
Section

Comment Letter D23

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CLIFFORD C. CALDWELL

PATRICK M. PACE

CHARLES A. PINNEY, JR.
Deceased

March 3, 2011

Mr. Iain Fisher, CPUC
Mr. Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024

Re: Draft EIR-EIS Comments / Opposition: Tule Wind, ECO Substation, Energia Sierra Juarez

Dear Mr. Fisher and Mr. Thomsen:

We are writing you to express our opposition and insure that it is documented in the record for the large wind turbine, substation, and power line projects that your agencies are reviewing as the Proposed Project, alternative projects and cumulative projects. As such, we may have to join in filing of future lawsuits for damages related to nuisance, loss of property value, quality of life, loss of the use and enjoyment of our property, and other potential adverse effects to ourselves and our properties.

We reside to the West of Ribbonwood Road North of I-8 in Boulevard, CA in the neighborhood directly adjacent to one of the proposed projects. We purchased approximately 10 acres at 2754 Ribbonwood Road back in 1997 because it was a beautiful and quiet place to live which we could enjoy with our friends and family and have worked hard on keeping it up. We also have a number of large oak trees on the property. We are concerned for the future of our properties, our neighbors and the local animals and wildlife. We have deer, bob cats, mountain lions, nesting pairs of hawks, owls, woodpeckers and numerous other types of wildlife on our property.

D23-1

Back in April of 2005 we purchased the adjacent property of approximately 92 aces which contains a large pond, a large population of oak trees, and an old church camp which we have cleaned up and used for gatherings of church groups and family outings, sometimes in excess of two (200) hundred individuals. In addition, we have also used the properties for viewing the stars through small and large telescopes that we own. At night we listen to the croaking frogs, the owls and the coyotes. In other words, we have a beautiful secluded location.

We are impacted by the existing Kumeyaay wind turbines on the Campo Reservation less than one (1) mile to the west of us. The whooping of the giant blades and the lights on the towers creates a nuisance at times. D23-2

The local state and federal agencies should limit any further industrial wind turbine projects unless and until there has been a satisfactory review of the effects on the health of the individual property owners, indigenous bird and animals, and on the local property values. We would ask you whether there has been any study of the effects of the proposed projects on the values of the adjacent properties in the area? Will the proposed projects depress the values of the adjacent properties and will the projects depress the potential growth of our local property values as these projects increase in the future. How do the proponents of said projects intend to protect the adjacent property owners if their projects are detrimental to our property values? Will they indemnify the adjacent property owners if they suffer any detrimental effects? We don't begrudge these companies from profiting from their projects, but we do if it is at our expense. Is the Boulevard area going to become a dumping ground for such projects because we can least afford to put up a fight in order to protect our properties? D23-3

We also have concerns about the increased risk of fire, increases in our fire insurance rates, noise pollution from industrial wind turbines (and their effect on people and local birds and animals), pollution by the surrounding electrical fields, shadow flicker from adjacent wind turbines, use of local water sources, and the effect of these projects on the quality and quantity of our water supplies. D23-4

We support and encourage the efforts of Backcountry Against Dumps to protect and defend our rural community from invasive commercial industrial projects (including energy projects) that tend at our expense to degrade our environment, our community and our property values.

Sincerely,

Clifford C. Caldwell and Concepcion G. Caldwell
Owners of 2750 Ribbonwood Road (APN 611-010-09-00),
and 2754 Ribbonwood Road (APN 611-010-08-00)
Boulevard, CA 91905

cc: Donna Tisdale
P. O. Box 1275
Boulevard, CA 91905

Comment Letter D24

LAW OFFICES
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P.O. BOX 710
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CLIFFORD C. CALDWELL

PATRICK M. PACE

CHARLES A. PINNEY, JR.
Deceased

March 3, 2011

Mr. Iain Fisher, CPUC
Mr. Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024

Re: Draft EIR-EIS Comments / Opposition: Tule Wind, ECO Substation, Energia Sierra Juarez

Dear Mr. Fisher and Mr. Thomsen:

This office is writing you on behalf of Trustee of the Walapai Properties Retirement Plan Trust to express the trustee's opposition and insure that it is documented in the record for the large wind turbine, substation, and power line projects that your agencies are reviewing as the Proposed Project, alternative projects and cumulative projects. As such, the trustee may have to join in filing of future lawsuits for damages related to nuisance, loss of property value, quality of life, loss of the use and enjoyment of the trust property, and other potential adverse effects to the trust property.

The Trustee of the Walapai Properties Retirement Plan Trust owns property to the West of Ribbonwood Road North of I-8 in Boulevard, CA in the neighborhood directly adjacent to one of the proposed projects. The Trustees of said trust (one trustee recently died) originally invested in approximately 80 acres at 2782 Ribbonwood Road back in the 1990's because it was a beautiful and quiet place and they worked hard on keeping it up. The surviving Trustee is concerned for the future of the trust property, the neighbors and the local animals and wildlife. There are deer, bobcats, mountain lions, hawks, owls, woodpeckers and numerous other types of wildlife on the trust property. In addition, the property has had a natural spring on the southern portion of the property. The property is impacted by the existing Kumeyaay wind turbines on the Campo Reservation less than two (2) miles to the west of it.

D24-1

The local state and federal agencies should limit any further industrial wind turbine projects unless and until there has been a satisfactory review of the effects on the health of the individual property owners, indigenous bird and animals, and on the

D24-2

local property values. The trustee would ask you whether there has been any study of the effects of the proposed projects on the values of the adjacent properties in the area? Will the proposed projects depress the values of the adjacent properties and will the projects depress the potential growth of the local property values as these projects increase in the future. How do the proponents of said projects intend to protect the adjacent property owners if their projects are detrimental to the property values? Will they indemnify the adjacent property owners if they suffer any detrimental effects?

D24-2 Cont.

The Trustee also has concerns about the increased risk of fire, increases in the trust's fire insurance rates, noise pollution from industrial wind turbines (and their effect on people and local birds and animals), pollution by the surrounding electrical fields, shadow flicker from adjacent wind turbines, use of local water sources, and the effect of these projects on the quality and quantity of the water supplies. These items could substantially affect the value of the trust property.

The Trustee supports and encourages the efforts of Backcountry Against Dumps to protect and defend the rural community from invasive commercial industrial projects (including energy projects) that tend at its expense to degrade the environment, the community and the value of the trust property.

D24-3

Sincerely

Clifford C. Caldwell,
Pinney, Caldwell & Pace, A Professional Corporation
Attorneys for the Trustee of the Walapai Properties Retirement Plan Trust
The Owner of 2782 Ribbonwood Road, Boulevard, CA 91905 (APN 611-050-19-00)

cc: Donna Tisdale
P. O. Box 1275
Boulevard, CA 91905

Comment Letter D25

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CLIFFORD C. CALDWELL

PATRICK M. PACE

CHARLES A. PINNEY, JR.
Deceased

March 3, 2011

Mr. Iain Fisher, CPUC
Mr. Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024

Re: Draft EIR-EIS Comments / Opposition: Tule Wind, ECO Substation, Energia Sierra Juarez

Dear Mr. Fisher and Mr. Thomsen:

This office is writing you on behalf of Trustee of the Walapai Trust to express the trustee's opposition and insure that it is documented in the record for the large wind turbine, substation, and power line projects that your agencies are reviewing as the Proposed Project, alternative projects and cumulative projects. As such, the trustee may have to join in filing of future lawsuits for damages related to nuisance, loss of property value, quality of life, loss of the use and enjoyment of the trust property, and other potential adverse effects to the trust property.

The Trustee of the Walapai Trust owns property to the West of Ribbonwood Road North of I-8 in Boulevard, CA in the neighborhood directly adjacent to one of the proposed projects. The Trustees of said trust (one trustee recently died) originally invested in approximately 10 acres to the West of Ribbonwood Road and to the North of Opalocka Road back in the 1990's because it was a beautiful and quiet place and they worked hard on keeping it up. The surviving Trustee is concerned for the future of the trust property, the neighbors and the local animals and wildlife. There are deer, bobcats, mountain lions, hawks, owls, woodpeckers and numerous other types of wildlife on the trust property. The property is impacted by the existing Kumeyaay wind turbines on the Campo Reservation less than two (2) miles to the west of it.

D25-1

The local state and federal agencies should limit any further industrial wind turbine projects unless and until there has been a satisfactory review of the effects on the health of the individual property owners, indigenous bird and animals, and on the local property values. The trustee would ask you whether there has been any study of the effects of the proposed projects on the values of the adjacent properties in the

D25-2

area? Will the proposed projects depress the values of the adjacent properties and will the projects depress the potential growth of the local property values as these projects increase in the future. How do the proponents of said projects intend to protect the adjacent property owners if their projects are detrimental to the property values? Will they indemnify the adjacent property owners if they suffer any detrimental effects?

D25-2 Cont.

The Trustee also has concerns about the increased risk of fire, increases in the trust's fire insurance rates, noise pollution from industrial wind turbines (and their effect on people and local birds and animals), pollution by the surrounding electrical fields, shadow flicker from adjacent wind turbines, use of local water sources, and the effect of these projects on the quality and quantity of the water supplies. These items could substantially affect the uses and the value of the trust property.

The Trustee supports and encourages the efforts of Backcountry Against Dumps to protect and defend the rural community from invasive commercial industrial projects (including energy projects) that tend at its expense to degrade the environment, the community and the value of the trust property.

D25-3

Sincerely

Clifford C. Caldwell,
Pinney, Caldwell & Pace, A Professional Corporation
Attorneys for the Trustee of the Walapai Trust
The Owner of property located to the North of Opalocka Road and West of Ribbonwood Road, Boulevard, CA (APN 611-050-15-00)

cc: Donna Tisdale
P. O. Box 1275
Boulevard, CA 91905

Comment Letter D26

From: Carol Horton <CHorton@adamsbroadwell.com>
Sent: Friday, March 04, 2011 2:37 PM
To: ECOSUB; catulewind@blm.gov
Cc: Robyn C. Purchia
Subject: Comments DEIS and DEIR: East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects
Attachments: 2269-008d ABJC Comments on ESJ Gen-Tie _3-4-11_.pdf; Att A - The Zoological Society of San Diego Map of Condor Flight.pdf; Att B - Presence and Movement of California Condors Near Proposed Wind Turbines.pdf; Att C - San Diego Audobon Letter.pdf; Att D - USFWS and CDFG Letter.pdf; Att E - San Diego County Letter.pdf; Att F - Photographs of Penisular bighorn sheep.pdf; Att G - European Guideline - Wind turbines fire protection guideline.pdf

Good Afternoon Mr. Fischer and Mr. Thomsen,

Attached please find our comment letter and attachments on the Draft Environmental Impact Statement and Draft Environmental Impact Report for the East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects. We are also sending a hard copy via overnight delivery.

D26-1

Should either of you have any questions or comments, please direct them to Robyn C. Purchia.

Carol Horton
Assistant to Robyn C. Purchia

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March 4, 2011

BY EMAIL AND OVERNIGHT MAIL

Mr. Iain Fischer, CPUC and
Mr. Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024
Email: ecosub@dudek.com
catulewind@blm.gov

Re: Comments on the Draft Environmental Impact Statement and Draft Environmental Impact Report for the East County Substation/ Tule Wind/ Energia Sierra Juarez Gen-Tie Projects

Dear Mr. Fischer and Mr. Thomsen:

We are writing on behalf of the International Brotherhood of Electrical Workers, Local 569 ("Local 569") and its members to comment on the Energia Sierra Juarez Gen-Tie ("ESJ Gen-Tie") and connected Energia Sierra Juarez Wind Farms ("ESJ Wind Farms") portion of the East County ("ECO") Substation, Tule Wind and ESJ Gen-Tie Draft Environmental Impact Statement and Draft Environmental Impact Report ("Draft EIS/EIR"). The ESJ Gen-Tie and the ESJ Wind Farms together are referred to in this letter as the "Project."

D26-1

The ESJ Gen-Tie requires a Presidential Use Permit from the Department of Energy ("DOE") and a Major Use Permit from San Diego County to connect the ESJ Wind Farms in northern Baja California, Mexico to the existing Southwest Power Link Transmission Line through the ECO Substation.[1] The ESJ Wind Farms were granted a conditional approval from Mexico's environmental ministry, Secretaria de Medio Ambiente y Recursos Naturales ("SEMARNAT"). SEMARNAT's approval of the ESJ Wind Farms may still be challenged administratively.

[1] Dudek, Environmental Impact Report/Environmental Impact Statement for East County Substation, Tule Wind, and Energia Sierra Juarez Gen-Tie Projects (Dec. 2010), pp. A-13, A-19, A-20, B-9 (hereafter Draft EIS/EIR).

Local 569 has an interest in enforcing environmental laws that encourage sustainable development and ensure a safe working environment for its members. Environmentally detrimental projects can jeopardize future jobs by making it more difficult and more expensive for business and industry to expand in the region, and by making it less desirable for businesses to locate and people to live there. Indeed, continued degradation can, and has, caused construction moratoriums and other restrictions on growth that, in turn, reduce future employment opportunities. In this case, the Project would also cause significant adverse socioeconomic impacts to Imperial and San Diego Counties and the southern California regional economy by facilitating the development of large-scale renewable energy projects in Mexico. These socioeconomic impacts, including the loss of employment opportunities, would in turn result in physical changes to the environment, such as urban decay and blight. D26-2

As explained more fully below, the Draft EIS/EIR does not comply with the National Environmental Policy Act ("NEPA") or the California Environmental Quality Act ("CEQA"). A Draft EIS/EIR must include a description and analysis of connected actions that are part of the whole of the action. The ESJ Wind Farms are connected to and part of the ESJ Gen-Tie Project. Nevertheless, the Bureau of Land Management ("BLM") and California Public Utilities Commission ("CPUC") did not describe the ESJ Wind Farms in the Draft EIS/EIR, and, therefore, failed to alert the public and decision makers of the Wind Farms' environmental consequences before they occur. D26-3

The BLM and the CPUC also failed to take a hard look or adequately analyze all of the potential impacts to the United States of the Project, as required by NEPA and CEQA. The Project may have significant impacts on biological resources, hazards associated with wildfires and socioeconomics in the United States that have not been disclosed or mitigated in the Draft EIS/EIR. D26-4

Finally, San Diego County and the DOE must rely on a single document to support their approvals of a Major Use Permit and Presidential Permit for the ESJ Gen-Tie. San Diego County's reliance on the Draft EIS/EIR prepared by the BLM and CPUC and the DOE's separate reliance on its own Draft EIS violates the express guidance of NEPA and CEQA. NEPA and CEQA strongly encourage State and federal agencies to prepare a single document to avoid duplication of materials and resources, as well as unnecessary delay. D26-5

In this case, the separate environmental documents prepared for the Project demonstrate the need for a single analysis and illustrate the rationale for the NEPA and CEQA policies in favor of a single document. The Draft EIS/EIR prepared by the BLM and CPUC and the Draft EIS prepared by the DOE contain numerous inconsistencies and conflicting information and analysis. San Diego County and the DOE are not only duplicating resources and causing unnecessary delay, but potentially relying on inconsistent and conflicting alternatives and mitigation measures to minimize the ESJ Gen Tie's environmental impacts. This approach precludes a meaningful analysis of alternatives, impairs the enforceability of mitigation measures and undermines public disclosure and informed decision making.

D26-5 Cont.

For these reasons, the BLM and CPUC may not certify the Draft EIS/EIR without describing the ESJ Wind Farms, fully assessing all impacts of the proposed Project and recirculating a Revised Draft EIS/EIR to the public. San Diego County also may not rely on a deficient and inconsistent document to support its approval of a Major Use Permit for the ESJ Gen-Tie Project.

D26-6

I. THE DRAFT EIS/EIR DOES NOT COMPLY WITH NEPA OR CEQA BECAUSE IT DOES NOT INCLUDE A COMPLETE DESCRIPTION OF THE ESJ WIND FARMS

To comply fully with NEPA and CEQA, the CPUC and BLM must describe the ESJ Wind Farms and disclose all potential impacts to the United States in a re-circulated EIS/EIR. Because the ESJ Wind Farms are "connected actions" to the ESJ Gen-Tie and part of the "whole of the action" under review, the CPUC and BLM have a legal duty to include a complete and accurate description of the ESJ Wind Farms component of the Project and to disclose and evaluate all potential impacts so that decision makers and the public are fully informed before harm is done to the environment.

D26-7

A. The ESJ Wind Farms are "connected actions" and part of the "whole of the action" within the meaning of NEPA and CEQA

Under NEPA, proposals that are so closely related that they are, in effect, a single course of action must be reviewed in the same NEPA document.[2] Federal

[2] 40 C.F.R. 1502.4, subd. (a).

agencies may not chop or segment connected actions into small pieces to avoid application of NEPA, or avoid a more detailed assessment of a project's environmental impacts.[3]

Similarly, under CEQA, a "project" is defined broadly to encompass the "whole of an action."[4] As the Guidelines state, "the term 'project' has been interpreted to mean far more than the ordinary dictionary definition of the term."[5] Any activity "which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment" constitutes a "project" or the "whole of the action."[6] This includes, but is not limited to, "later phases of the project, and any secondary, support, or off-site features necessary for its implementation."[7]

In this case, the ESJ Gen-Tie is dependent on and connected to implementation of the ESJ Wind Farms in Mexico. The Draft EIS/EIR specifically states that the "primary objective" of the ESJ Gen-Tie is "to transmit approximately 1,200 MW of renewable energy from a wind farm project in northern Baja California, Mexico."[8] There is no other stated purpose for the ESJ Gen-Tie except to carry renewable energy generated in Mexico to the United States. Indeed, the BLM and CPUC expressly acknowledge the obligation to analyze impacts of the ESJ Wind Farms because they are connected to the proposed actions and part of the whole of the action.[9]

D26-7 Cont.

B. Because the ESJ Wind Farms are "connected actions" and part of the "whole of the action," the Draft EIS/EIR must include an accurate and complete description of the ESJ Wind Farms

D26-8

An accurate, complete and consistent project description is necessary for the public and decision makers to understand the effects of the proposed action and its

[3] 40 C.F.R. 1508.25, subd. (a).
[4] Pub. Resources Code, §§ 21065, 21080, subd. (a); 14 Cal. Code Regs. (hereinafter "CEQA Guidelines"), §§ 15002, subd. (d), 15003, subd. (h), 15165, 15378, Appendix G.
[5] CEQA Guidelines, § 15002, subd. (d).
[6] Pub. Resources Code, § 21065.
[7] CEQA Guidelines, Appendix G.
[8] Draft EIS/EIR, p. A-13.
[9] *Id.* at p. ES-11.

alternatives.[10] "A clear description results in more focused and meaningful public input and [CPUC and] BLM participation, a more complete identification of issues, development of reasonable alternatives, sound analysis and interpretation of effects, focused analysis and a sound and supportable decision."[11] "Only through an accurate view of the project may affected outsiders and public decision-makers balance the proposal's benefit against its environmental cost . . . ."[12]

The courts interpreting NEPA have held that "[w]here the information in the initial EIS was so incomplete or misleading that the decisionmaker and the public could not make an informed comparison of the alternatives, revision of an EIS [was] necessary to provide a reasonable, good faith, and objective presentation of the subjects required by NEPA."[13] Similarly, courts applying CEQA requirements have repeatedly held that "[a]n accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR."[14]

D26-8
Cont.

The Draft EIS/EIR at issue here contains a cryptic and extremely generalized description of the ESJ Wind Farms. It simply states that ESJ U.S. Transmission, LLC, is proposing "several phases" of wind projects with buildout anticipated to generate approximately 1,250 MW.[15] In addition, the Draft EIS/EIR discloses that the ESJ Wind Farms are planned to interconnect with the ECO Substation through the ESJ Gen-Tie.[16] This vague description does not provide the public or decision makers with any of the information necessary to assess the Projects' impacts. There is no information regarding the location of the ESJ Wind Farms, the height of the turbines, the design of the wind farms and mitigation measures that have been imposed by the Mexican government.

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[10] See 40 C.F.R. §§ 1502.4, 1502.15; see also *Laguna Greenbelt v. U.S. Dept. of Transportation* (1994) 42 F.3d 517, 528-29 (reviewing plaintiff's claim that inconsistent definition resulted in misleading analysis of project's positive and negative effects).
[11] Bur. of Land Management, National Environmental Policy Act Handbook, Jan. 2008, p. 43 (hereafter NEPA Handbook); see *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 192-93.
[12] *County of Inyo v. City of Los Angeles*, *supra*, 71 Cal.App.3d at 193.
[13] *Natural Resources Defense Council v. U.S. Forest Service* (9th Cir. 2005) 421 F.3d 797, 811 (citing *Animal Defense Council v. Hodel* (9th Cir. 1988) 840 F.2d 1432, 1439).
[14] *County of Inyo v. City of Los Angeles*, *supra*, 71 Cal.App.3d at 193.
[15] Draft EIS/EIR, p. F-5.
[16] *Id.* at pp. A-13, B-9.

A more complete description of the ESJ Wind Farms is contained in the Recirculated Draft EIR/Supplemental Draft EIS ("RDEIR/SDEIS") for the Sunrise Powerlink Project, even though the ESJ Wind Farms project was in an early planning stage at the time of the October 2008 Sunrise Powerlink document.[17] The Sunrise document stated that the ESJ Wind Farms would be installed on 7,500 acres along the eastern side of the Sierra de Juarez Mountains.[18] In addition, Ricardo Moreno, the Director of International Public Relations of Sempra Energy Mexico, stated the wind project would use 2.5 MW turbines for its first phase.[19] Because the ESJ Wind Farms project was in an early stage, however, the size and location of subsequent phases of the project had not been determined, nor had the specific design of the first phase been established.[20]

D26-8 Cont.

Because the ESJ Wind Farms have undergone environmental review and approval by SEMARNAT, more information regarding subsequent phases and the specific design of the Wind Farms should be available and must be included in the Draft EIS/EIR. Without information regarding the size and location of subsequent phases, as well as the specific design of the Wind Farms, the environmental impacts to sensitive biological resources, hazards related to wildfires and socioeconomics in the United States cannot be meaningfully assessed.

C. The BLM and CPUC must describe the ESJ Wind Farms so that the public and decision makers can meaningfully assess all of the Project's impacts

D26-9

An EIS and EIR are intended to inform decision makers and the public about the potential, significant environmental impacts of a project before harm is done to the environment.[21] Under CEQA, an EIR has been described as "an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return."[22]

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[17] Cal. Public Utilities Com. and Bur. of Land Management, Recirculated Draft EIR/Supplemental Draft EIS Sunrise Powerlink Project, Oct. 2008, p. 2-4 (hereafter Sunrise Powerlink RDEIR/SDEIS).
[18] *Ibid*.
[19] *Ibid*.
[20] *Id.* at p. 2-8.
[21] CEQA Guidelines, § 15002, subd. (a)(1); *Berkeley Keep Jets Over the Bay Com. v. Bd. of Port Comrs. of the City of Oakland* (2001) 91 Cal.App.4th 1344, 1354 (hereafter *Berkeley Jets*); *County of Inyo v. Yorty* (1973) 32 Cal.App.3d 795, 810; *Robertson v. Methow Valley Citizens Council* (1989) 490 U.S. 332, 350; *Dubois v. U.S. Dept. of Agriculture* (1996) 102 F.3d 1273, 1284.
[22] *County of Inyo v. Yorty*, *supra*, 32 Cal.App.3d 795 at p. 810.

Similarly, under NEPA, an EIS serves as a means of assessing "the environmental impact of proposed agency actions, rather than justifying decisions already made."[23] To fulfill these functions, the discussion of impacts in a Draft EIS/EIR must be detailed, complete and reflect "a good faith effort at full disclosure."[24]

The BLM and CPUC must provide an accurate and complete description of the ESJ Wind Farms component of the Project and must disclose all impacts associated with the ESJ Wind Farms if the agencies are to meet their legal obligation to consider the whole of the action under review. As discussed below, development of the ESJ Wind Farms may have numerous significant effects on sensitive biological species, impacts associated with wildfire hazards and socioeconomics in the United States that have not been adequately addressed.

D26-9 Cont.

II. THE DRAFT EIS/EIR DOES NOT CONTAIN A HARD LOOK OR ADEQUATELY ANALYZE ALL POTENTIAL PROJECT IMPACTS AS REQUIRED BY NEPA AND CEQA AND PROPOSE APPROPRIATE AND FEASIBLE MITIGATION MEASURES

A meaningful analysis and evaluation of all potentially significant environmental effects of a project is central to the purposes behind NEPA and CEQA. NEPA requires that agencies take a "hard look" at the environmental consequences of a proposed action.[25] A hard look is defined as a "reasoned analysis containing quantitative or detailed qualitative information."[26]

D26-10

An EIS must provide a full and fair discussion of every significant impact, as well as inform decision makers and the public of reasonable alternatives which would avoid or minimize adverse impacts.[27] It should be "concise, clear, to the point, and supported by evidence that the agency has made the necessary environmental analyses."[28] A concise and clear EIS that is supported by evidence ensures that federal agencies are informed of environmental consequences *before* making decisions and that the information is available to the public.[29] As the

[23] 40 C.F.R. 1502.2, subd. (g).
[24] CEQA Guidelines, § 15151; 40 C.F.R. 1502.1.
[25] *Robertson v. Methow Valley Citizens Council*, *supra*, 490 U.S. at 350; *Dubois v. U.S. Dept. of Agriculture*, *supra*, 102 F.3d at 1284;.
[26] NEPA Handbook, p. 55.
[27] 40 C.F.R. § 1502.1.
[28] *Ibid.*
[29] *Inland Empire Public Lands Council v. U.S. Forest Service* (1996) 88 F.3d 754, 758.

Council on Environmental Quality explains in its regulations, "[e]nvironmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made."[30]

CEQA is also designed to inform decision makers and the public about the potential, significant environmental effects of a project.[31] To fulfill this function, the discussion of impacts in an EIR must be detailed, complete and "reflect a good faith effort at full disclosure."[32] An adequate EIR must contain facts and analysis, not just an agency's conclusions.[33] CEQA requires an EIR to disclose all potential direct and indirect, significant environmental impacts of a project.[34]

D26-10 Cont.

As discussed in detail below, the analysis presented by the Draft EIS/EIR fails to meet NEPA and CEQA legal standards. The Draft EIS/EIR fails to disclose and evaluate all potentially significant environmental impacts of the Project. Specifically, the Draft EIS/EIR fails to analyze the impacts the ESJ Wind Farms may have on sensitive biological resources, risks associated with wildfires and socioeconomics in the United States.

A. The Project may have significant impacts on sensitive biological resources in the United States

1. The Project may have significant impacts to California condors in the United States

D26-11

The California condor is both a federal and State-listed endangered species, a California fully-protected species and is protected under the Migratory Bird Treaty Act.[35] Prohibitions under the Migratory Bird Treaty Act apply to birds in Mexico under international conventions between the United States and Mexico. The BLM and CPUC have failed to assess the Project's impacts to this highly-protected species and ensure compliance with the Endangered Species Act, the California Endangered Species Act and the Migratory Bird Treaty Act.

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[30] 40 C.F.R. § 1502.2, subd. (g).
[31] CEQA Guidelines, § 15002, subd. (a)(1).
[32] CEQA Guidelines, § 15151; *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 721-22.
[33] *Citizens of Goleta Valley v. Bd. of Supervisors* (1990) 52 Cal.3d 553, 568.
[34] Pub. Resources Code, § 21100, subd. (b)(1); CEQA Guidelines, § 15126.2, subd. (a).
[35] See Draft EIS/EIR, p. D.2-51.

Development of the Project may impact California condors migrating to the United States from Baja California, Mexico. The Zoological Society of San Diego released a satellite map indicating the location fixes of a three-year-old female condor that was tracked moving north from the Baja release site across the United States/Mexico border.[36] The female condor was tracked in the area around La Rumorosa where the ESJ Wind Farms would be located, and entered the United States near the site of the ESJ Gen-Tie. This was the first record of a condor entering the United States from Baja California, and the first wild condor seen in San Diego County since 1910.[37]

Historically, California condors were found from British Columbia in the north to Baja California in the south.[38] As of March 31, 2010, there were only 169 California condors recorded in the wild.[39] If the population of California condors increases – as is the hope – the species could forage over the site during the lifetime of the ESJ Wind Farms. Operation of the ESJ Wind Farms and the ESJ Gen-Tie, however, may impede California condor viability.

Studies have shown that California condors may be vulnerable to turbine strikes.[40] California condors exhibit behavior and physical features that may put them at high risk for wind turbine-related mortality. For example, condors' flapping flight is very clumsy making them less maneuverable around objects on the landscape.[41] In addition, because California condors are scavengers, they exhibit pronounced curiosity for novel objects in their environment and may, therefore, be attracted to wind turbines.[42] The San Diego Audubon Society has stated that "there is a concern that these wind and transmission line projects would kill condors that are and will be re-colonizing the area."[43]

D26-11
Cont.

[36] The Zoological Society of San Diego, 2008 (Attachment A).
[37] Draft EIS/DIER, p. D.2-52.
[38] H.T. Harvey and Associates, Presence and Movement of California Condors Near Proposed Wind Turbines, Ventana Wildlife Society, Nov. 15, 2007, p. 4 (hereafter HT Harvey and Associates, 2007) (Attachment B).
[39] Draft EIS/DEIR, p. D.2-52.
[40] HT Harvey and Associates, p. 5.
[41] *Ibid*.
[42] *Id*. at pp. 5-6.
[43] Letter from Shannon Dougherty, Conservation Chair, San Diego Audubon Society, to Dr. Jerry Pell, NEPA Document Manager, Office of Electricity Delivery and Energy Reliability, p. 2 (Attachment C).

Despite the sensitivity of the species and its recorded occurrence over the sites of the ESJ Wind Farms and ESJ Gen-Tie, the Draft EIS/EIR does not contain any analysis of the Project's potential impacts, nor does it propose any specific mitigation measures for the species. In addition, there is no indication that the Mexican government has proposed any measures to avoid or mitigate impacts to California condors.

The CPUC and BLM must describe the location and design of the ESJ Wind Farms so that impacts to California condors may be disclosed and assessed by the public and decision makers. If SEMARNAT has imposed any mitigation measures during its approval process, this must also be disclosed in the Draft EIS/EIR. Currently, there is no information in the record to ensure that impacts from the Project to California condors will not be significant, or that the CPUC and BLM's approval of the Draft EIS/EIR for the ESJ Gen-Tie will comply with federal and State law. The BLM and CPUC must take a hard look at the ESJ Wind Farms' impacts to the California condor in a Revised Draft EIS/EIR.

D26-11 Cont.

2. The Project may have significant impacts to Peninsular bighorn sheep in the United States

As the Draft EIS/EIR recognizes, Peninsular bighorn sheep are a federally-endangered and California State-threatened and fully-protected species.[44] The BLM and CPUC's failure to describe ESJ Wind Farms in the Draft EIS/EIR has led to a failure to assess the overall Project's impacts to Peninsular bighorn sheep moving between Baja California, Mexico and the United States.

D26-12

According to the United States Fish & Wildlife Service and California Department of Fish and Game ("CDFG"), Peninsular bighorn sheep are known to occur in the Sierra de Juarez mountains where the ESJ Wind Farms would be located.[45] San Diego County has also stated that while the U.S. Border Fence is normally a barrier for wildlife movement, a portion of the Project parcels are located in the mountainous terrain where the border fence is not present. Thus, according to the County, this area "could be considered a wildlife corridor for Peninsular

[44] Draft EIS/DEIR, p. D.2-56.

[45] Letter from Karen Goebel, Assistant Field Supervisor, U.S. Fish and Wildlife Service and Helen R. Birss, Environmental Program Manager, Cal. Dept. of Fish and Game, to Billie Blanchard, Cal. Public Utilities Com. and Lynda Kastoll, Bur. of Land Management, Aug. 25, 2008, Enclosure (Attachment D).

Bighorn Sheep movement between the United States and Mexico."[46] The Draft EIS/EIR itself acknowledges that Peninsular bighorn sheep migrate across the border to breed with other populations.[47]

Despite the clear evidence that Peninsular bighorn sheep may move from areas affected by the Project to the United States and the Draft EIS/EIR's own recognition of that fact, the document fails to analyze all potential impacts on bighorn sheep, or propose any alternatives or measures that would mitigate such impacts. The Draft EIS/EIR must indicate what conditions SEMARNAT has imposed to reduce impacts to bighorn sheep from the ESJ Wind Farms component. Potential mitigation measures could include limiting construction activities outside of the lambing season and period of greatest water need.[48] The Draft EIS/EIR must also describe fencing on the ESJ Wind Farms site that could funnel or impede Peninsular bighorn sheep movement.

D26-12 Cont.

3. The Project may have significant impacts to Barefoot banded geckos in the United States

The Barefoot banded gecko is a California-threatened species, as well as a BLM designated sensitive species.[49] This species is secretive and is not easily detected; however, it is known from the eastern edge of the Peninsular Ranges from Palms to Pines Highway State Route 74 to the Baja California, Mexico border.[50] While the Draft EIS/EIR states that the Barefoot banded gecko has low potential to occur on the ESJ Gen-Tie site, the species may occur on the ESJ Wind Farms site and migrate to the United States. For example, the Sunrise Powerlink Project RDEIR/SDEIS assumes that the Barefoot banded gecko is present on the ESJ Wind Farms site.[51]

D26-13

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[46] Letter from Eric Gibson, Director, Dept. of Planning and Land Use, San Diego County, to Dr. Jerry Pell, Office of Electricity Deliverability and Energy Reliability, U.S. Dept. of Energy, Nov. 24, 2010, Attachment A, p. 3 (Attachment E); see also photographs of Bighorn sheep crossing rocky terrain in Attachment F.

[47] Draft EIS/EIR, p. D.2-59.

[48] See Sunrise Powerlink RDEIR/DEIS, Response to Comment Set F0006, F0006-2.

[49] See Draft EIS/EIR, p. D.2-40; Bur. of Land Management, Special Status Animals in Cal., Including BLM Designated Special Status Species <http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pa/wildlife.Par.13499.File.dat/BLM%20Sensitive%20Animal%20Update%20SEP2006.pdf> (as of Mar. 3, 2011).

[50] Draft EIS/EIR, pp. D.2-40, D.2-148.

[51] Sunrise Powerlink Project, RDEIR/SDEIS, p. 2-30.

If Barefoot banded gecko are indeed present on the ESJ Wind Farms site, they could cross the border in the mountainous terrain that is not occupied by the border fence and move into the United States. The Draft EIS/EIR must, therefore, evaluate whether Project conditions on the ESJ Wind Farms site will impact the Barefoot banded gecko and impede cross-border movement. This evaluation may only be conducted, however, once a full description of the ESJ Wind Farms has been provided.

D26-13 Cont.

4. The Project may have significant impacts to Golden eagles in the United States

The Golden eagle is a State fully-protected species, a CDFG-listed sensitive species and on the CDFG watch list, and protected under the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act and the Lacey Act.[52] Sempra Energy contracted San Diego Zoo Conservation Research to conduct a full-scale survey and analysis of Golden eagle population characteristics, habitat use and movement behaviors throughout the planned ESJ Wind Farms site.[53] Researchers from San Diego Zoo Conservation Research surveyed the area for three days via helicopter.[54] During the survey four nests were observed along with several Golden eagles.[55]

D26-14

Because Golden eagles and nests were observed on the ESJ Wind Farms site, development of the ESJ Wind Farm may significantly impact Golden eagles in Mexico, as well as Golden eagles that may forage over land in the United States. As the Draft EIS/EIR recognizes, it is unlikely that Golden eagles would nest within the immediate vicinity of wind turbines.[56] Construction of the ESJ Wind Farms could, therefore, lead to nest abandonment.

Construction of the wind turbines may also lead to direct mortality of Golden eagles. The propensity of Golden eagles to seek out strong winds to gain elevation without expending much flying effort can bring the birds into proximity with wind

[52] See Draft EIS/EIR, p. D.2-149.
[53] James Sheppard, *Golden Eagle Helicopter Survey* (Mar. 23, 2009) <http://blogarchives.sandiegozoo.org/blog/2009/03/23/golden-eagle-helicopter-survey/> (as of Mar. 3, 2011) (hereafter Sheppard, 2009).
[54] *Ibid*.
[55] *Ibid*.
[56] Draft EIS/EIR, p. D.2-175.

turbines.[57] Finally, because Golden eagles can range hundreds of miles while foraging for their food, nest abandonment and mortality caused by development of the ESJ Wind Farms, could impact Golden eagles that normally forage over the United States.[58]

It is unclear whether Sempra has released the findings of the Golden Eagle Helicopter Survey to the public and decision makers. A search of documents on the DOE, CPUC and Sempra Web sites did not reveal the Survey. It is also unclear whether SEMARNAT has imposed any conditions on the Applicant to reduce impacts to Golden eagles. This information must be provided in a Revised Draft EIS/EIR that is released to the public. The current Draft EIS/EIR prepared by BLM and the CPUC fails to adequately analyze the potential impacts to this species of the ESJ Wind Farms and the ESJ Gen-Tie.

D26-14 Cont.

5. The Project may have significant impacts to the Quino checkerspot butterfly in the United States

The Quino checkerspot butterfly is a federally-listed endangered species.[59] Although it is unclear whether focused, protocol-level surveys for this species were conducted on the ESJ Wind Farms site, the Sunrise Powerlink RDEIR/SDEIS concluded that Quino checkerspot butterfly may occur on the site.[60] In comments on the Sunrise Powerlink, the Center for Biological Diversity and the Sierra Club stated that the Quino checkerspot butterfly population in the United States is linked to the population in Mexico and may depend on it for its health.[61] Thus, impacts to Quino checkerspot butterfly populations in Mexico may indirectly impact populations in the United States. The Draft EIS/EIR must describe the ESJ Wind Farms and assess the likelihood that Quino checkerspot butterfly may occur on the site so that the public and decision makers can assess the impacts.

D26-15

[57] Sheppard, 2009.
[58] See *ibid*.
[59] Draft EIS/EIR, p. D.2-39.
[60] Sunrise Powerlink RDEIR/DEIS, p. 2-15.
[61] Letter from Steven Siegel, Staff Attorney, Center for Biological Diversity and Justin Augustine, Staff Attorney, Center for Biological Diversity, to CPUC/BLM re Recirculated draft environmental impact report/supplemental draft environmental impact statement for the Sunrise powerlink transmission project, Aug. 25, 2008, p. 4-810.

6. The Project may have significant impacts on the goals of *Las Californias Binational Reserve Conservation Initiative*

The Nature Conservancy, the Conservation of Biology Institute and Pronatura prepared *Las Californias Binational Conservation Initiative* in 2004 to foster a shared conservation vision for the United States/Mexico border.[62] The border region is home to more than 400 endangered, threatened and sensitive species.[63] This sensitive area is being rapidly destroyed, however, by urbanization of the San Diego, Tijuana and Tecate regions and their adjacent suburbs.[64]

D26-16

The *Initiative* and the importance of the area to biodiversity are not mentioned in the Draft EIS/EIR. Unchecked development of the Project may undermine the goals of *Las Californias Binational Conservation Initiative* and destroy biological resources in both the United States and Mexico. The BLM and CPUC must include a complete description of the Project and take a hard look at its potential impacts so that a complete picture of the Project's impacts to biodiversity can be understood.

B. The Project may have potentially significant impacts to the United States associated with wildfire hazards

The Draft EIS/EIR recognizes that wildfires caused by the wind turbines in Mexico could have significant impacts on resources in the United States.[65] It fails to describe, however, the location of the wind turbines and measures that will be taken to reduce potential fire risks from the turbines. The lack of information contained in the Draft EIS/EIR undermines a meaningful analysis of the Wind Farms' impacts.

D26-17

There is a high risk of fire from wind turbine power generation. The Confederation of Fire Protection Associations ("CFPA") in Europe developed Guidelines to protect against wind turbine fires. In the Guidelines, CFPA states

[62] See Pronatura, Conservation Biology Institute and the Nature Conservancy, *Las Californias Binational Conservation Initiative: A Vision for Habitat Conservation in the Border Region of California and Baja California*, Sept. 2004 (hereafter Las Californias Binational Conservation Initiative).
[63] *Id.* at p. 1.
[64] *Id.* at p. 3.
[65] Draft EIS/EIR, p. A-4.

that fire damage may be caused by machinery breakdowns, electrical installations and resonant circuits.[66] The most frequent causes of wind turbine fires, however, are lightening strikes.[67] The risk of lightning strikes is elevated due to the exposed locations (often at a higher altitude) and the large height of the turbines.[68] If a turbine is struck by lightning it may cause damage to the turbine itself, secondary fires on the ground where the turbine is located and service interruption exposure.[69]

The ESJ Wind Farms would also be located in an area of high wildfire risk. In Mexico, wildfires can spread rapidly to the west and south, all the way to the Mexican coastal communities.[70] Despite the high risk of fire associated with the turbines themselves and due to the location of the ESJ Wind Farms, the Draft EIS/EIR only considers the impacts to Mexico from ignition caused by the Tule Wind turbines.[71] The Draft EIS/EIR does not assess whether ignition caused by the ESJ Wind Farms or other Project components could include loss of personal property, injury, or loss of life as well as environmental impacts in the United States.

D26-17 Cont.

The Draft EIS/EIR must describe the location of the turbines, any fire safety measures that have been imposed by SEMARNAT and any emergency response plans that are in place to avoid catastrophic wildfires. Without this information the BLM and CPUC cannot adequately analyze all impacts of the ESJ Wind Farms to the United States.

C. Transmitting energy from the ESJ Wind Farms through the ESJ Gen-Tie may have potentially significant socioeconomic impacts to the United States

D26-18

The Draft EIS/EIR fails to address the socioeconomic impacts of developing large-scale renewable energy projects in Mexico rather than in the United States. The Draft EIS/EIR also fails to address the related socioeconomic effects caused by the ESJ Gen-Tie and East County Substation's facilitation of future renewable energy projects in Mexico, as opposed to development of this important burgeoning

[66] CFPA Europe, European Guideline, Wind turbines fire protection guideline, Guideline No. 22:2010F, Apr. 19, 2010, pp. 7-9 (hereafter Wind Turbine Fire Guidelines) (Attachment G).
[67] *Id.* at p. 10.
[68] *Ibid.*
[69] *Id.* at pp. 6-7.
[70] Draft EIS/EIR, p. D.15-24.
[71] *Id.* at pp. D.15-24 to 25.

industry in Southern California. The BLM and CPUC must revise the socioeconomic impact analysis in a Draft EIR/EIS that is recirculated to the public.

Under CEQA, an EIR must identify and focus on the significant environmental impacts of a project. Specifically, the "[d]irect and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects."[72] Both direct and "reasonably foreseeable" indirect consequences must be considered when determining the significance of a project's environmental effect.[73] When the economic or social effects of a project cause a physical change, this change is to be regarded as a significant effect in the same manner as any other physical change resulting from the project.[74]

NEPA's requirement for analyzing socioeconomic impacts is similar to CEQA's. Under NEPA, the federal agency preparing an EIS must analyze social and economic impacts if they are interrelated with physical impacts.[75] Federal agencies have the additional responsibility to analyze a project's effects with respect to environmental justice.[76] Further, a Presidential Permit required for transmission must be "consistent with the public interest."[77] Thus, federal agencies have a heightened duty to consider the socioeconomic impacts that would be caused by a proposed project.

D26-18
Cont.

Renewable energy development in Mexico may supplant renewable energy development in the United States. Because renewable energy jobs are critical to the health of San Diego and Imperial Counties' economies, facilitating renewable energy development in northern Mexico may cause adverse physical changes to the environment in the United States, such as urban decay and blight. Because urban

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[72] CEQA Guidelines, § 15126.2, subd. (a).
[73] CEQA Guidelines, § 15064, subd. (d).
[74] CEQA Guidelines, § 15064, subd. (e); *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1205.
[75] See 40 C.F.R. § 1508.14; see also, e.g., *Rochester v. U.S. Postal Service* (1976) 541 F.2d 967 (placing postal service center outside urban core could cause increased commuting, loss of inner-city jobs and moving to suburbs, leading to economic and physical downtown deterioration and downtown post office abandonment, all contributing to urban decay and blight).
[76] See Exec. Order No. 12898, 59 Fed. Reg. 7629 (Feb. 16, 1994); see also Dept. of Justice, *Guidance Concerning Environmental Justice* <http://www.justice.gov/archive/enrd/ejguide.html> (as of Mar. 3, 2011).
[77] Exec. Order No. 10485, § 1, 18 Fed. Reg. 5397 (Sept. 3, 1953) (as amended by Exec. Order No. 12114, 44 Fed. Reg. 1957 (Jan. 4, 1979)).

decay is a potentially significant physical change to the environment, the CPUC and BLM must analyze the socioeconomic impacts and propose any necessary mitigation measures. D26-18 Cont.

1. Renewable energy development in northern Mexico may supplant development in California

Both the federal government and California have adopted polices, provided incentives and established goals to increase renewable energy development in the United States. One of the purposes behind the push for renewable energy generation in the United States is to foster economic growth and create employment opportunities in the United States. Federally, renewable energy generation is facilitated through federal tax credits and the American Recovery and Reinvestment Act.

In California, the Renewables Portfolio Standard ("RPS") sets some of the most ambitious renewable energy standards in the country. The RPS program, administered by the CPUC, the California Energy Commission and Air Resources Board, requires investor-owned utilities, electric service providers, publicly owned utilities and community choice aggregators to increase procurement from eligible renewable energy resources. In 2002, the Legislature established the original goal of 20% RPS by 2020 and in 2006 accelerated that goal. Since then, Governor Schwarzenegger increased that goal by Executive Order to 33% RPS by 2020. If enacted, pending legislation would codify the 33% RPS standard.[78] D26-19

Despite the federal incentives and State mandates, facilitating renewable energy development in Mexico may supplant renewable energy development in the United States. First, on average, renewable energy is significantly more expensive to generate than energy derived from conventional fossil-fuel production.[79] Utilities, therefore, only procure the renewable energy capacity they are required to by law. In California, the RPS allows utilities to pass the increased costs of

[78] See Sen. Bill No. x1 2, as introduced Feb. 1, 2011 < http://www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0001-0050/sbx1_2_bill_20110201_introduced.html> (as of Mar. 3, 2011); see also Sen. Bill No. 23, as introduced Dec. 6, 2010 <http://www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0001-0050/sb_23_bill_20101206_introduced.pdf> (as of March 3, 2011).

[79] See Div. of Ratepayer Advocates, *Green Rush: Investor-Owned Utilities' Compliance with the Renewables Portfolio Standard* (Feb. 2011), p. 7 <http://www.dra.ca.gov/NR/rdonlyres/0CB0B986-E93B-462A-BA62-804EDAE43B82/0/DRAReportPUBLICVERSIONFeb2011.pdf> (as of March 3, 2011).

renewable energy along to retail consumers. Retailers do not have an incentive to procure renewable energy beyond the amount required to fulfill their RPS target. In this zero-sum game, the more renewable energy projects in Mexico deliver electricity to satisfy California's RPS, the less demand there will be for renewable energy development in California.

Further, transmission capacity in Southern California and in the Project area is limited, even with the recently approved Sunrise Powerlink. Thus, if more renewable and conventional energy projects built in Mexico use transmission in the United States, there will be less available transmission capacity for renewable energy development in the United States. The loss of domestic jobs to Mexico will adversely affect the regional economy in Imperial County and San Diego County.

D26-19 Cont.

2. Renewable energy jobs are critical to the future health of San Diego County and especially Imperial County

As of December 2010, El Centro had the highest unemployment rate among American cities, at 28.3%.[80] Unemployment rates for Imperial County as a whole are similarly well above State and national averages.

Renewable energy development presents one of the few areas of opportunity for economic development in Imperial County. The CPUC has recognized the tremendous potential for renewable energy projects in Imperial County and has adopted multiple orders intended to facilitate that development.[81]

D26-20

Developing renewable energy projects in Imperial County has great potential to address the demand for renewable energy created by the RPS goals.[82] The ESJ Wind Farms in Mexico and approval of the ESJ Gen-Tie threaten this development by facilitating renewable energy projects in Mexico, where less stringent and

[80] See U.S. Bur. of Labor Statistics *Unemployment Rates for Metropolitan Areas* (Dec. 7, 2010) <http://www.bls.gov/web/metro/laummtrk.htm> (as of Mar. 3, 2011).
[81] See, e.g., Cal. Public Utilities Com., In the Matter of the Application of San Diego Gas & Electric Company (U 902 E) for a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project. Decision 08-12-058, pp. 63-68; see also Cal. Public Utilities Com., Decision Conditionally Accepting Procurement Plans for 2009 Renewables Portfolio Standard Solicitations and Integrated Resource Plan Supplements, Decision 09-06-018, §§ 4.1-4.2, 6.3.
[82] See Summit Blue Consulting, LLC, *Renewable Energy Feasibility Study* (Apr. 2008), pp. 14, 19-20, 22, 25 <http://www.ivedc.com/CMS/Media/IIDRenewableEnergyStudy_08.pdf> (as of March 3, 2011).

protective environmental and labor standards may attract developers seeking to minimize costs.

D26-20 Cont.

3. These adverse economic effects will result in blight and other physical changes in the environment

Developing the ESJ Wind Farms and approving the ESJ Gen-Tie may well lead to a downward economic spiral in the United States. Investment in a region rich in solar and wind resources can be expected to continue as long as there is an expectation that renewable energy projects will continue to be proposed in the area. In addition, renewable energy development would indirectly stimulate local economies through the "economic multiplier effect."[83]

D26-21

If the ESJ Gen-Tie is approved and renewable energy development emerges in northern Mexico instead, market expectations will shift and investment may drop off sharply. With prolonged and potentially deepening economic conditions, city and county governments would receive less tax revenue with which to fund infrastructure maintenance and improvements and government services. Further, property values would continue to fall, among other economic impacts. These impacts would result in physical impacts, such as deteriorating roads, vacant neighborhoods and urban decay. The Draft EIR/EIS is required to consider these indirect physical changes that would result from the Project.

D. The BLM and CPUC must develop and impose appropriate and feasible mitigation measures to reduce or avoid the Project's impacts

D26-22

Both NEPA and CEQA require that lead agencies address all potentially significant impacts through the enforceability of alternatives and mitigation measures that will avoid or minimize such impacts. An EIS must provide a full and fair discussion of every significant impact, as well as inform decision makers and the public of reasonable alternatives which would avoid or minimize adverse impacts.[84] Under CEQA, an EIR must not only discuss measures to avoid or minimize adverse impacts, but must ensure that mitigation conditions are fully enforceable through permit conditions, agreements or other legally binding

[83] *See id.* at pp. 26, 91.
[84] 40 C.F.R. § 1502.1.

instruments.[85] A CEQA lead agency is precluded from making the required CEQA findings unless the record shows that all uncertainties regarding the mitigation of impacts have been resolved; an agency may not rely on mitigation measures of uncertain efficacy or feasibility.[86] This approach helps "insure the integrity of the process of decision by precluding stubborn problems or serious criticism from being swept under the rug."[87]

As discussed above, the failure of the BLM and CPUC to describe the ESJ Wind Farms in the Draft EIS/EIR precluded a meaningful analysis of all of the Project's impacts. The BLM and CPUC failed to take a hard look and appropriately analyze all of the Project's impacts to biological resources, hazards associated with wildfires and socioeconomics in the United States. The Project's impacts to the United States may be significant.

The BLM and CPUC must, therefore, identify all potentially significant impacts of the Project and impose measures to reduce or avoid the Project's impacts to resources in the United States.

D26-22 Cont.

III. SAN DIEGO COUNTY AND THE DEPARTMENT OF ENERGY MUST RELY ON A JOINT ENVIRONMENTAL REVIEW DOCUMENT THAT SATISFIES THE REQUIREMENTS OF BOTH NEPA AND CEQA TO SUPPORT THEIR APPROVALS OF THE ESJ GEN-TIE PROJECT

Under NEPA, if a project requires state approval, the federal agency must cooperate with state and local agencies "to the fullest extent possible to reduce duplication between NEPA and state and local requirements."[88] This includes the preparation of a joint federal and state environmental review document so that one document will comply with all applicable laws.[89] Similarly, under CEQA, State and local agencies are encouraged to use a federal EIS, if the previously prepared EIS complies with CEQA.[90]

D26-23

[85] CEQA Guidelines, § 15126.4, subd. (a)(2).
[86] *Kings County Farm Bur. v. County of Hanford* (1990) 221 Cal.App.3d 692, 727-28 (groundwater purchase agreement found to be inadequate mitigation because there was no record evidence that replacement water was available.)
[87] *Concerned Citizens of Costa Mesa, Inc. v. 32nd Dist. Agricultural Assn.* (1986) 42 Cal.3d 929, 935.
[88] 40 C.F.R. § 1506.2, subd. (b).
[89] 40 C.F.R. § 1506.2, subd. (c).
[90] CEQA Guidelines, § 15221, subd. (a).

The CPUC and San Diego County must ensure that DOE's Draft EIS incorporates CEQA's requirements so that one document will comply with all applicable laws. Preparation of a single Draft EIS/EIR is essential because the alternatives and mitigation measures proposed by the DOE's Draft EIS and BLM/CPUC's Draft EIS/EIR are inconsistent and in conflict. The inconsistencies between the two documents undermine the public review process because it is not apparent how the differences between the two documents will be reconciled. The CPUC/San Diego County and DOE may select for approval two conflicting alternatives or impose conflicting mitigation measures.

D26-23 Cont.

1. The alternatives for the ESJ Gen-Tie proposed by the BLM and CPUC in the Draft EIS/EIR are inconsistent and contrary to the alternatives proposed by the DOE in its Draft EIS

The BLM/CPUC and the DOE have proposed inconsistent and contrary alternatives to the proposed ESJ Gen-Tie. Under NEPA, the alternatives analysis is considered the "heart" of the EIS.[91] CEQA also requires that an EIR provide a discussion of project alternatives that allow meaningful analysis and informed public participation.[92] Evaluation of alternatives should present the proposed action and all the alternatives in comparative form, clearly define the issues and provide a clear basis for choice among the options.

D26-24

Because the alternatives analyses at issue here are inconsistent, the public cannot meaningfully evaluate the various alternatives or understand the basis of the agencies' choices. San Diego County must work with the DOE to revise the proposed alternatives so that agency decision making is based on a single, consistent document. The County may not support its Major Use Permit for the ESJ Gen-Tie based on an analysis that is in conflict with DOE's review.

DOE only considered two action alternatives in its Draft EIS: a double-circuit 230-kV transmission line and a single-circuit 500-kV transmission line.[93] It dismissed an alternative transmission route from further analysis because the proposed location of the ECO Substation would make the distance of the route

[91] 40 C.F.R. § 1502.14.
[92] *Laurel Heights Improvement Assn. v. Regents of Univ. of California* (1988) 47 Cal.3d 376, 403-04.
[93] U.S. Dept. of Energy, Energia Sierra Juarez U.S. Transmission Line Project, Draft Environmental Impact Statement, Aug. 2010, p. S-4 to S-6 (hereafter DOE DEIS).

infeasible and impractical.[94] It also dismissed an underground transmission line alternative based on its determination that an underground failure can be more difficult to locate and repair, construction of an underground alternative would require greater ground disturbance and be more expensive and EMF exposure may be greater.[95] The 230-kV transmission line was identified as the preferred alternative.

The Draft EIS/EIR prepared by the BLM and CPUC proposed four alternatives, two of which included an underground transmission line and two of which included an overhead alternate route.[96] The overhead alternate route alternative was designated as the "environmentally superior alternative."[97] The BLM-Preferred Alternative, however, was an underground alternate route alternative.[98]

D26-24 Cont.

The Draft EIS/EIR's alternatives are alternatives that were expressly dismissed from further consideration by the DOE. In addition, each agency – San Diego County, the BLM and the DOE -- selected a potentially conflicting alternative. For example, it is possible that San Diego County could select a 500-kV overhead alternate alignment, the BLM could select a 500-kV underground alignment and the DOE could select a 230-kV overhead line. Because the DOE released the Draft EIS months before the BLM and CPUC released the Draft EIS/EIR, the agencies should have been on notice that these alternatives were considered infeasible by the DOE. Nowhere in the Draft EIS/EIR, however, is the inconsistency between the two alternatives analyses explained.

It is impossible for the public to assess whether the alternatives to the ESJ Gen-Tie proposed in the Draft EIS/EIR are actually feasible. It is also impossible for the public to understand the basis behind San Diego County, the BLM and the DOE's choice of a preferred alternative. Because an adequate alternatives analysis is so critical to both a NEPA and CEQA analysis, the DOE and San Diego County must coordinate to produce a single alternatives analysis that will allow the public and decision makers to meaningfully evaluate alternatives to the proposed action.

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[94] *Id*. at p. S-11.
[95] *Id*. at pp. S-11 to 12.
[96] Draft EIS/EIR, p. C-26 to 27.
[97] *Id*. at pp. E-30, E-32.
[98] *Id.* at p. E-34.

2. The Mitigation Measures proposed by the BLM and CPUC in the Draft EIS/EIR are inconsistent and in conflict with the Mitigation Measures proposed by the DOE in its Draft EIS

The BLM/CPUC and the DOE have proposed inconsistent and contrary mitigation measures in their environmental documents. Under NEPA, a Draft EIS must include a discussion of the "means to mitigate adverse environmental impacts."[99] Mitigation measures must be discussed for all impacts, even those that by themselves would not be considered significant.[100] While NEPA does not require agencies to actually adopt these mitigation measures, CEQA does mandate that agencies adopt feasible mitigation measures to lessen or avoid otherwise significant adverse impacts.[101]

D26-25

The mitigation measures discussed by the BLM and CPUC in the Draft EIS/EIR are inconsistent with the mitigation measures discussed by the DOE in its Draft EIS. As a result of the inconsistencies, it is impossible for the public to conclude which mitigation measure will be adopted for the ESJ Gen-Tie. San Diego County must work with the DOE to revise the proposed mitigation measures so that the agencies rely on a single, consistent document to support their actions. The possibility that the DOE and the County may both rely on inconsistent measures to mitigate the Project's impacts creates a question about the enforceability of the measures. Under CEQA, a California agency may not rely on mitigation measures of questionable enforceability.

For example, while both the Draft EIS prepared by the DOE and the Draft EIS/EIR prepared by the BLM and CPUC propose acquisition of compensation land, the requirements for compensation land differs. The DOE states that to compensate for the loss of native scrub habitat that would be disturbed during construction, the Applicant would place a portion of the Project site under a conservation easement for preservation. According to the Draft EIS, the Applicant has proposed placing the easement on a portion of its property east of the

[99] 40 C.F.R. § 1502.16, subd. (h).
[100] Council on Environmental Quality, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, Question 19(a).
[101] Pub. Resources Code, §§ 21002, 21081, subd. (a); CEQA Guidelines, §§ 15002, subd. (a)(3), 15021, subd. (a)(2), 15091, subd. (a)(1).

transmission line that could be up to 15 acres in size.[102] The BLM and CPUC, however, state that to compensate for all permanent impacts to vegetation, combination habitat and restoration is required at a minimum of a 1:1 ratio or as required by the permitting agencies. The Draft EIS/EIR also requires that all habitat compensation and restoration on private lands include long-term management and legal protection assurances.[103]

From these two mitigation measures, it is clear that the Applicant must compensate for permanent impacts to native vegetation. It is not clear, however, whether the Applicant must compensate for impacts that only occur during construction or all permanent impacts, or where and how much land would be put into easement. There is also no provision in the Draft EIS prepared by the DOE that the compensation land will have long-term management and legal protection assurances.

Because CEQA requires agencies to rely on specific enforceable mitigation measures in their environmental review documents, San Diego County may not rely on these inconsistent mitigation measures to support its Major Use Permit. The Applicant and the public cannot know how much land must be compensated for if DOE only requires compensation land for construction impacts, but the BLM and CPUC require compensation land for all impacts. In addition, the Applicant cannot know whether to compensate land up to 15 acres or at a ratio of 1:1. If the Applicant's duties to mitigate are unclear, the public and the decision makers cannot meaningfully assess whether impacts to native vegetation have indeed been mitigated.

San Diego and the DOE must work together to produce a single document that properly lays out mitigation measures to reduce and avoid the impacts associated with the ESJ Gen-Tie.

D26-25 Cont.

IV. CONCLUSION

The BLM and CPUC have failed to produce an environmental review document that complies with NEPA and CEQA. The Draft EIS/EIR undermines public disclosure and informed decision making by failing to provide an accurate and complete description of the Project. The EIS/EIR also failed to take a hard look

D26-26

[102] DOE DEIS, p. S-20.
[103] Draft EIS/EIR, pp. D.2-129 to 130.

or adequately analyze all of the Project's potential impacts to the United States and impose all feasible and appropriate mitigation measures. In addition, the inconsistencies between the Draft EIS/EIR prepared by the BLM and CPUC and the Draft EIS prepared by the DOE preclude a meaningful analysis. A revised Draft EIS/EIR must be prepared to correct these deficiencies and recirculated for public comment.

D26-26 Cont.

Local 569 and its members appreciate this opportunity to comment and appreciate the BLM and the CPUC considering our views.

Sincerely,

Robyn C. Purchia

RCP:cnh

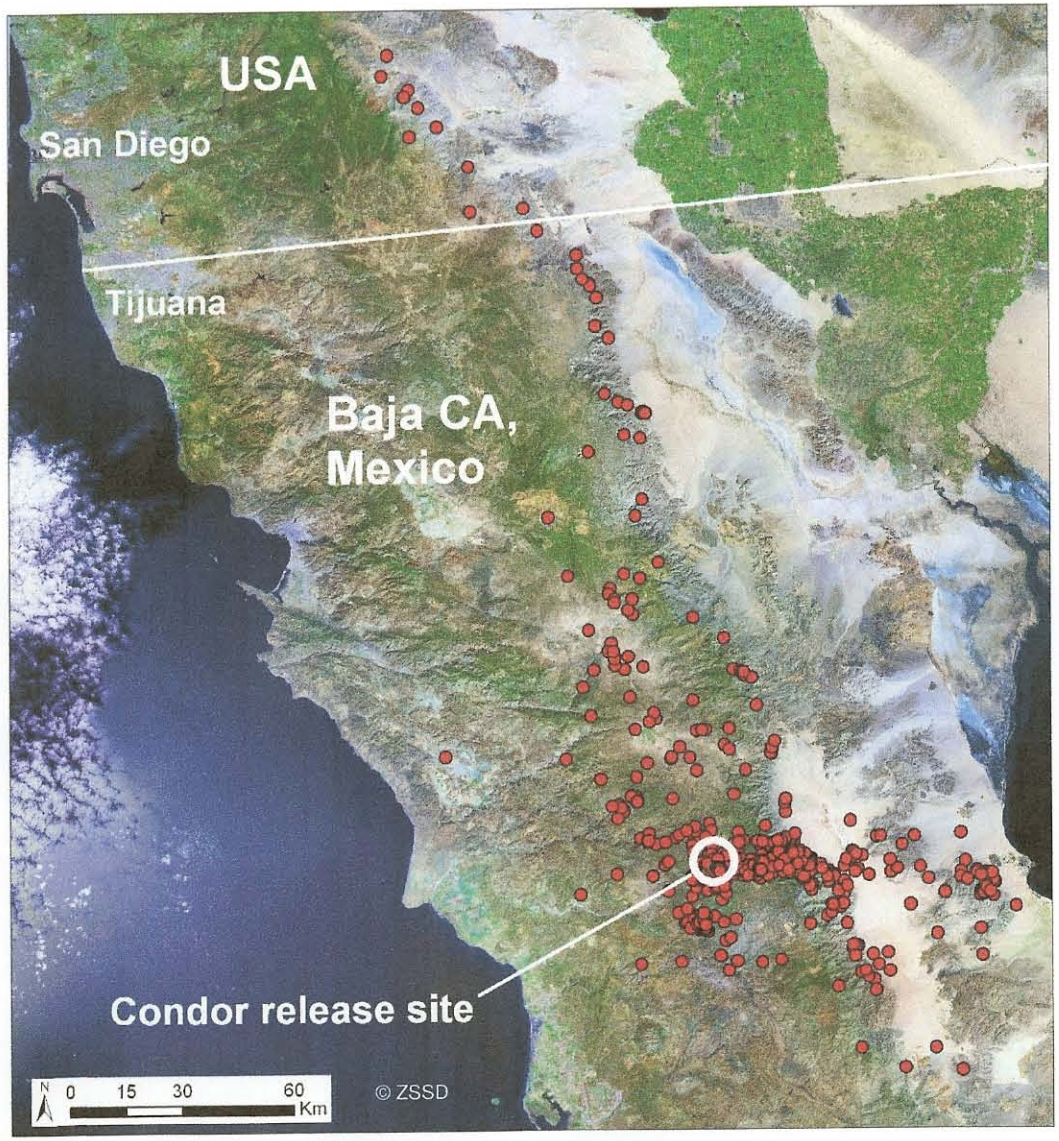
Attachments:

Attachment A:	The Zoological Society of San Diego Map of Condor Flight
Attachment B:	Presence and Movement of California Condors Near Proposed Wind Turbines
Attachment C:	San Diego Audubon Letter
Attachment D:	USFWS and CDFG Letter
Attachment E:	San Diego County Letter
Attachment F:	Photographs of Peninsular bighorn sheep
Attachment G:	European Guideline: Wind turbines fire protection guideline

The following material is considered Comment D26-27.

PLANET ACTION
Spot the impacts, engage in action

Managing the conservation of the California condor and its ecosystem in a changing climate



Satellite map indicating the location of the condor reintroduction site in the Sierra San Pedro Martir region of Baja California, Mexico. The red dots indicate the GPS location fixes of a three-year-old female condor that was tracked making a large-scale exploratory return flight of 200 km, north from the Baja release site across the USA/Mexico border in April 2007 (each dot represents a separate location fix acquired from the bird). The GPS fixes indicate that the condor made intensive use of core areas within close proximity to the release site. High-resolution satellite imagery provided by Planet Action enables researchers to build an accurate picture of condor habitat use and preference. This valuable ecological information will allow managers to tailor the reintroduction programs to the specific habitat requirements of the birds and to predict and mitigate the effects of climate change on this important ecosystem.

PRESENCE AND MOVEMENTS OF CALIFORNIA CONDORS NEAR PROPOSED WIND TURBINES

FINAL REPORT PREPARED FOR
HT HARVEY AND ASSOCIATES
15 November 2007

VENTANA WILDLIFE SOCIETY

Prepared by Nellie Thorngate
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TABLE OF CONTENTS

TABLE OF FIGURES

EXECUTIVE SUMMARY

Wind energy poses particular hazards to birds with high wing loadings, large bodies and clumsy flight. California Condors, *Gymnogyps californianus*, a critically endangered species currently being reintroduced to central coastal California, may be at risk from wind turbines within their foraging range. In 2007, HT Harvey and Associates contracted the Ventana Wildlife Society to map the presence and movement patterns of California Condors near two proposed wind turbines at a winery near Gonzales CA, and to make recommendations regarding the potential risk posed to California Condors by the proposed turbines. Despite the proximity of Pinnacles National Monument, a rearing and release site for California Condors, only 417 detections occurred within a 25 km radius of the proposed wind turbines. No detections occurred closer than 3 km to the proposed wind turbine locations. Mean flight speed was 45.7 kph. Using flight speeds of 0 to 5 as our definition of perched birds, we determined that 151 detections were of perching events within 25 km of the proposed wind turbines. Condor flight headings were predominantly westerly within 25 km of the proposed wind area. Condor detections occurred most frequently over 31 to 40 degree slopes, and over northern and northwestern landscape aspects. The proximity of the Pinnacles rearing and release site indicates a potential risk situation for Condors in the vicinity of the proposed wind turbines, but given that the proposed project only calls for the installation of two turbines, and measures are taken to monitor and remove large carcasses in the area the proposed wind turbines pose only a minor risk to Condors in the area.

BACKGROUND

Wind energy poses substantial risks to avian wildlife under certain circumstances (Drewitt and Langston 2006, Barrios and Rodriguez 2004, Erikson et al 2001). Birds with high wing loadings, clumsy flight patterns, and foraging habits that draw them into the vicinity of wind turbines are all at high risk for turbine-related injuries and mortalities (Barrios and Rodriguez 2004). Risk is also increased where wind energy projects intersect with migratory pathways, daily flight paths, and foraging and roosting grounds (Dewitt and Langston 2006). While many studies have found that overall turbine-related avian mortality is low compared to other anthropogenic sources of mortality, even low levels of mortality could significantly impact species with low productivity that take years to reach reproductive maturity (Dewitt and Langston 2006). Because many at-risk birds are endangered, threatened, or otherwise protected by federal laws, it is important that new wind energy projects of any scale assess the potential threats to wildlife, and minimize the risks posed by turbines and associated structures.

Parts of central coastal California are ideal for the production of wind energy at many different scales, but the central coast is also home to a growing population of reintroduced California Condors (*Gymnogyps californianus*), a critically endangered species since 1967 (Kiff et al. 1996). Historically, California Condors ranged from British Columbia in the north to Baja California in the south and were found as far east as the western slope of the Sierra Nevada (Snyder and Schmitt 2002), but were nearly

extirpated by the mid-1980's due to hunting, poisoning and habitat loss (Snyder and Schmitt 2002). In 1987 the remaining wild population was captured and housed in captive rearing facilities in southern California to act as a breeding population for the planned species recovery and reintroduction program. Condors were released back in to the wild in southern California starting in 1994 and in central coastal California starting in 1997. The first rearing and release facility on the central coast was located in the Ventana Wilderness on the western slope of the Santa Lucia Mountains near Big Sur, and has been active since the inception of the central California recovery effort in 1997. In 2003, a second central California rearing and release site was established at Pinnacles National Monument in the Gabilan Mountains. As of September 30, 2007, the total population of California Condors was 305, with 157 of those in captivity at Los Angeles Zoo, San Diego Wild Animal Park, Boise World Center for Birds of Prey, Oregon Zoo, Mexico Zoo, Mentor Birds in field pens, and pre-release birds in field pens. Of wild birds (148), there are currently 72 in California, 16 in Baja California, and 60 in Arizona. The free-flying population in the central California area currently totals 39 free-flying birds, with 27 birds in the Big Sur population and 12 birds in the Pinnacles population. The eldest birds in the Big Sur flock established two successful nests in 2007, and it is expected that the eldest birds in the Pinnacles flock will begin breeding in 2010-2012. Meanwhile, annual additions of captive-raised Condors continue to bolster both flocks, and the ultimate goal of the central coast reintroduction program is a flock of 75 free-flying birds.

Little is known about the susceptibility of California Condors to wind turbine-induced mortality. Studies of Griffon Vultures (*Gyps fulvus*), a European species ecologically similar to California Condors (Snyder and Schmitt 2002), have shown that in high concentrations, the birds are quite vulnerable to turbine strikes (Barrios and Rodriguez 2004). Raptors such as Red-tailed Hawks (*Buteo jamaicensis*), who rely on topographic features to generate preferred flight conditions and who forage in the types of habitat that characterize many wind turbines, also experience high mortality rates due to wind turbines (Hoover and Morrison 2005). Flight characteristics of Turkey Vultures (*Cathartes aura*) in the Altamont Pass Wind Turbines indicate that scavenging birds frequently fly within the height range of wind turbines used for large-scale power production, although the location of the turbines with respect to wind direction and slope curvature are important factors in determining mortality risk (Smallwood and Neher 2004). The possible impact of smaller-scale wind resource projects, including isolated towers powering small facilities, is largely unknown.

In conjunction with site-specific habitat features, behaviorally and physiologically, California Condors exhibit many features that may put them at a high risk for wind turbine-related mortality: (1) high wing loading; (2) social foraging; (3) curiosity for novel objects; (4) k-selected reproductive strategy; and (5) foraging preference for sloped grassland sites. Condors have extremely high wing loading, and their flapping flight is clumsy, making them less maneuverable around objects on the landscape. Condors routinely forage and roost in social groups, so that the presence of a single bird near wind turbines increases the risk of mortality not only for that individual, but for other individuals that may follow it. Because they are scavengers, Condors exhibit pronounced

curiosity for novel objects in their environment (J. Burnett, pers. comm.) such that the presence of new turbines might increase overall Condor activity at a site. Condors raise one chick every 2 years with significant parental investment, thus losses of even a few individuals have large impacts on the total population. In the case of Condors, a closely managed, primarily captive-bred species, losses are also costly.

In 2007, HT Harvey and Associates contracted the Ventana Wildlife Society to map the presence and movement patterns of California Condors within 25 km of two proposed wind turbines on a winery near Gonzales CA (figure 1), and to assess the potential risk posed to California Condors by the proposed turbines. This report presents presence, associated landscape characteristics, flight characteristics, and home ranges of California Condors detected within 25 km of the proposed wind turbines, and presents recommendations for wind turbine installation based on those findings.

METHODS

Condor locations and movements

Twenty-seven free-flying, captive-reared Condors were tracked in central coastal California using solar powered, GPS Patagial PTT-100 transmitters (Microwave Telemetry, Inc., Columbia, MD) between 2 December 2003 and 31 March 2007. Transceivers were affixed directly to each bird's patagium in conjunction with an identification tag. The GPS receivers were programmed to collect a location fix (referred to as a "detection" in this report) every hour, 16 hours daily. In general, transceivers provide an average of 12 location fixes per day (16 possible) within 16 meters of the actual location, or, average location fixes 92% of the time. The built-in PTT transceivers transmitted stored GPS location data to Service ARGOS satellites each day.

Location data were downloaded daily via the Automatic Distribution Service administered by Service ARGOS. Data were then imported into a Microsoft Access database. Condor location fixes totaling 103,395 data points were examined for movement patterns and proximity to the two proposed wind turbines near Gonzales, CA. Error rates for flight speed (used to determine if a bird was perched or in flight when detected) were ± 1 km/hr at speeds above 40 km/hr (Microwave Telemetry, Inc, Columbia, MD). For the purposes of analysis, detections exhibiting flight speeds of greater than 5 kph, while detections exhibiting flight speeds of 0 through 5 were considered perching events.

Mapping

Condor location data including decimal-degree coordinates, speed, time and date were imported into an ArcGIS geodatabase. Each location fix, or data point, is referred to as a detection. The Condor data points, a Digital Elevation Model downloaded from the USGS Continuous Data Distribution Service, and an x,y data layer estimating the location of the two proposed wind turbines were plotted on a hillshade map of California.

ArcGIS Spatial Analyst tools were used to assess the proximity of Condor locations to the proposed wind turbines; landscape slope and aspect associated with Condor detections within the study area; and the flight behavior ("perched" or "flying") of Condor detections within 25 km, 20 km, 10 km and 5 km of the proposed wind turbines. MCP home ranges of individual Condors were calculated using Hawth's Tools, a free ArcGIS extension for assessing animal populations.

Statistical Methods

Distribution of flight speed categories, flight headings, slope categories and landscape aspects associated with detections were assessed for divergence from expected values using Pearson χ^2 analysis (Zar 1999).

RESULTS

Proximity to Proposed Wind Turbines

417 Condor detections representing 13 individual birds occurred within 25 km of the proposed wind turbines from 2 December 2003 to 31 March 2007. 130 detections were within 20 km of the proposed wind turbines, 33 were within 15 km, 11 were within 10 km, and 3 were within 5 km (see Figure 2). No Condor detections occurred closer than 3 km to the proposed wind turbine locations. The detections within 5 km of the proposed wind turbines were attributable to 3 different individual Condors.

Movement Patterns

266 flying bird detections occurred within 25 km of the proposed wind turbines; 88 flying birds were located within 20 km; 31 flying birds occurred within 15 km; 10 flying birds were located within 10 km; and 2 flying birds were located within 5 km (see Figure 3). The mean speed of flight within 25 km of the proposed wind turbines was 45.7 kph. The distribution of flight speeds within 25 km of the proposed wind area was significantly different from a random distribution ($\chi^2 = 116.7$, df = 61, P=0.000). The most frequently occurring flight speeds were between 31 and 40 kph (see Figure 4).

We used flight speed to identify perched birds: birds with flight speeds of 0 through 5 kph were designated as perched birds, while birds moving at 6 kph or faster were considered to be flying (see Figure 5). 151 perching events were located within 25 km of the proposed wind turbines; 42 perching events were located within 20 km; 2 perching events occurred within 15 km; 2 perching events were located within 10 km; and 1 perching event was located within 5 km (see Figure 6).

Within the 25 km study area, the distribution of flight headings was not significantly different from random, but detections that indicate a westerly orientation (44) were most frequent and detections with southerly orientation (20) were fewest.

Landscape Associations

While visualization of the slope data indicated that slopes were fairly evenly distributed within 25 km of the proposed wind turbines (figure 7), the distribution of Condor detections over different landscape slope categories was significantly different than expected ($\chi^2 = 279.8$, df = 69, P=0.000). Within the 25 km study area, condor detections were most frequent over landscapes with 51 to 60 degree slopes, and detections were fewest over landscapes with slopes less than 20 degrees (see Figure 8).

The landscape was evenly distributed across all aspect categories (see Figure 9), but the distribution of Condor detections over different landscape aspects within 25 km of the proposed wind turbines was significantly different than random ($\chi^2 = 36.9$, df = 7, P = 0.000). More detections (138) occurred over landscapes with northern and northwestern aspects than over any other aspect. The fewest detections (24) occurred over the eastern aspect (figure 10).

Home Ranges

Four individual Condors were determined to have home ranges encompassing the proposed wind turbine locations using the Minimum Convex Polygon technique (see Figure 11).

IMPLICATIONS

- The proximity of the Pinnacles National Monument Condor release facility to the proposed wind turbines means that Condor activity is high throughout the Salinas Valley and across both slopes of the Coast Ranges and the Gabilan Mountains. This indicates a potential risk situation for Condors because the proposed wind turbines are within range of regular foraging flights for all members of the Pinnacles flock, as well as exploratory flights of some of the older Big Sur Condors who may be expanding their foraging range or looking for nesting locations. The proposed turbine locations also fall within the calculated home ranges of 4 Pinnacles Condors. However, the low overall detections indicate that the actual risk is low, since Condors do not appear to be using the area near the proposed wind turbines frequently.

- The low number of detections of perching events within 25 km of the proposed wind turbines indicates that the area has not provided constant or frequent foraging or roosting opportunities. Thus, the risk posed to Condors perching or taking flight near the proposed turbines is low.

- Because the proposed wind turbines are located in suitable foraging habitat for Condors, clearing carcasses within 5 km of the proposed wind turbines when detected could reduce the potential risk to Condors foraging in the area.

- The Condors represented in this report represent only a subset of the entire central coast Condor population. This is because not all of the Condors have GPS transmitters. Most of the Pinnacles flock is GPS-tagged, but a much smaller

proportion of the Big Sur flock is tracked using GPS. The values enumerated in the report, therefore, are likely smaller than actuality.

- Given that the proposed project only calls for the installation of two turbines and measures are taken to monitor and remove large carcasses in the area, the proposed wind turbines pose a minor risk to Condors in the area.

- Because this is a small, managed population of 35 individuals with a k-selected reproductive strategy in addition to being listed as endangered, any risk associated with their population should be given careful consideration.

LITERATURE CITED

Barrios, L. and A. Rodriguez. 2004. Behavioral and environmental correlates of soaring-bird mortality at on-shore wind turbines. J. Appl. Ecol. 41:72-81

Drewitt, A.L. and R.H.W. Langston. 2006. Assessing the impacts of wind farms on birds. Ibis 148: 29-42

Erikson, W. P., G. D. Johnson, M. D. Strickland, D. P. Young, JR., K. J. Sernka, and R. E. Good. 2001. Avian collisions with wind turbines: a summary of existing studies and comparisons to other sources of avian collision mortality in the United States. National Wind Coordinating Committee, Washington, D.C., USA.

Hoover, S.L. and M.L. Morrison. 2005. Behavior of Red-tailed Hawks in a wind turbine environment. J. Wildl. Manag. 69(1): 150-159

Kiff, L. F., R. I. Mesta, and M. P. Wallace. 1996. California Condor Recovery Plan. US Fish and Wildlife Service, Portland, Oregon.

Microwave Telemetry, Inc. 2006. Argos/GPS PTT-100 Field Manual. Columbia, MD.

Smallwood, K. S., and L. Neher. 2004. Repowering the APWRA: Forecasting and minimizing avian mortality without significant loss of power generation. California Energy Commission, PIER Energy Related Environmental Research. CEC-500-2005-005.

Smallwood, K.S. & Thelander, C.G. 2004. Developing methods to reduce bird mortality in the Altamont Pass Wind Turbines. Final report by to the California Energy Commission. Public Interest Energy Research-Environmental Area, Contract no. 500-01-019. California: BioResource Consultants.

Snyder, N. F. R., and N. J. Schmitt. 2002. California Condor (*Gymnogyps californianus*). *In* The Birds of North America, No. 610 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Zar, J.H. 1999. Biostatistical Analysis. Fourth Edition. Prentice Hall, NJ: Upper Saddle River. P. 488

PERSONAL COMMUNICATIONS

Burnett, J. May 1, 2007. Senior Wildlife Biologist, Ventana Wildlife Society. 19045 Portola Dr., Ste F-1, Salinas, CA 93908, joeburnett@ventanaws.org

Figure 1. Proposed wind turbines near Gonzales in Monterey County, CA, and the project study area, defined by a 25 km radius around the proposed turbines.

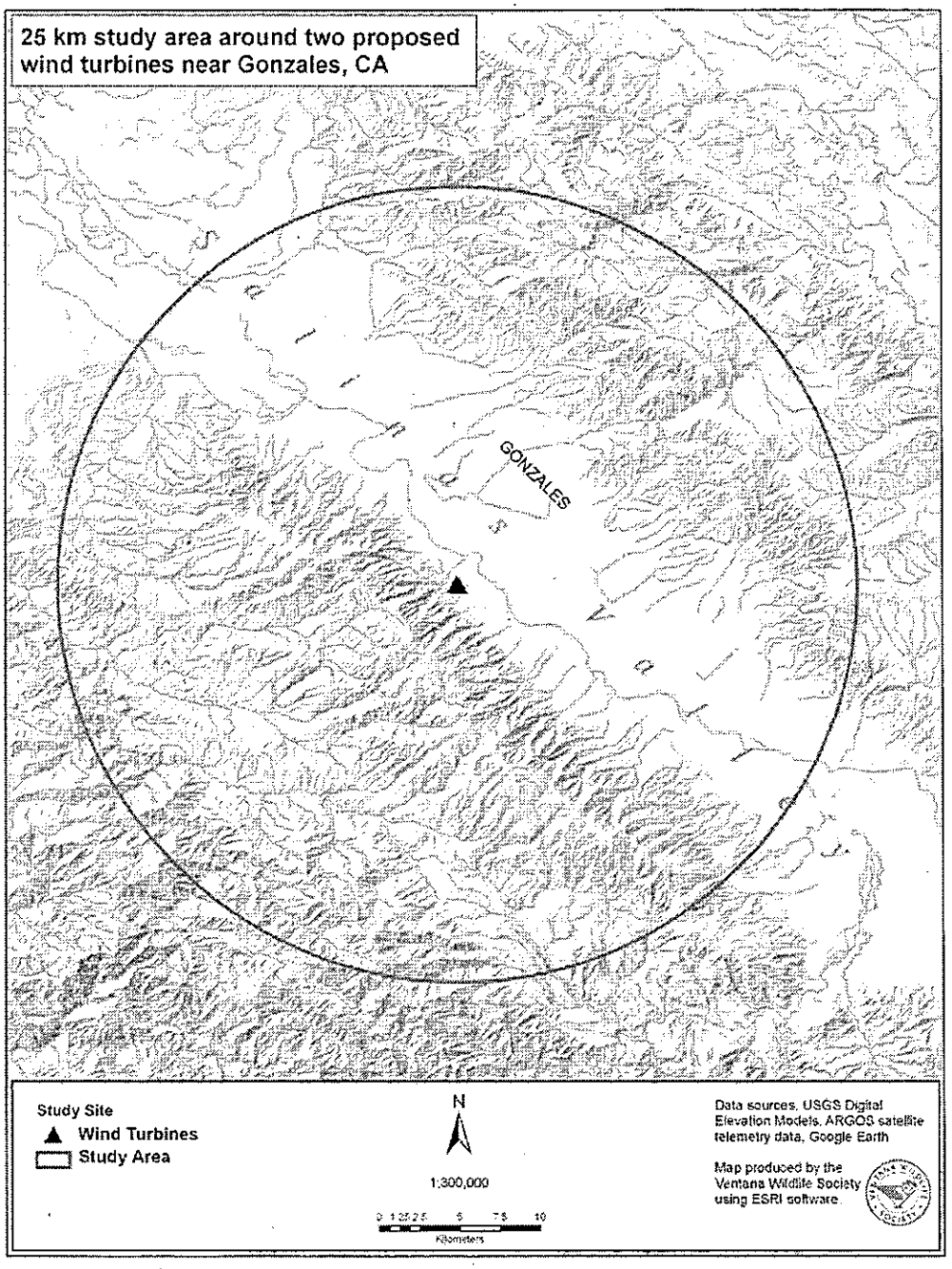

Figure 2. Proximity of Condor detections to the proposed wind turbines, Monterey County, CA, 2003-2007

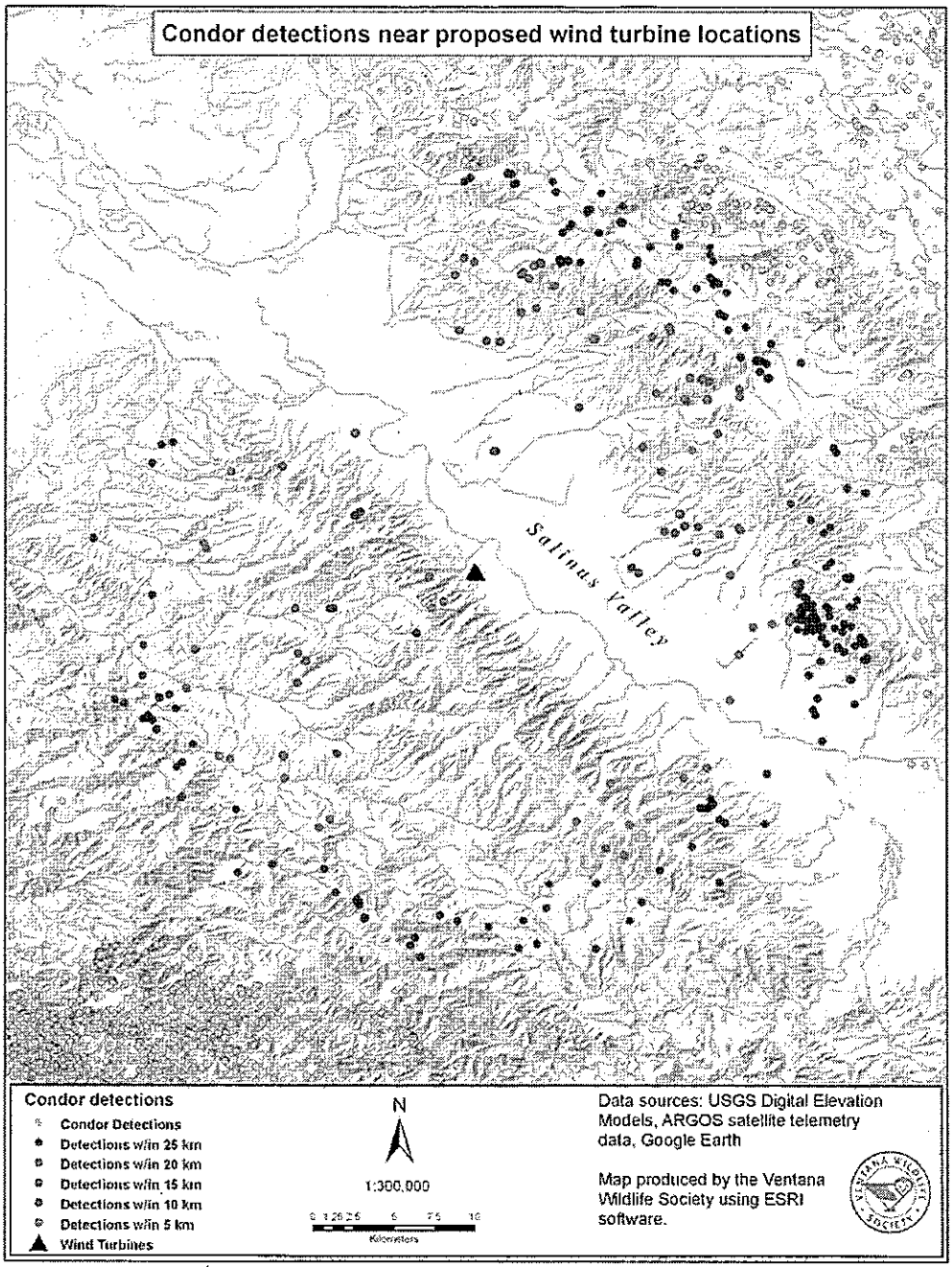

Figure 3. Proximity of in-flight Condor detections to the proposed wind turbines, Monterey County, CA, 2003-2007

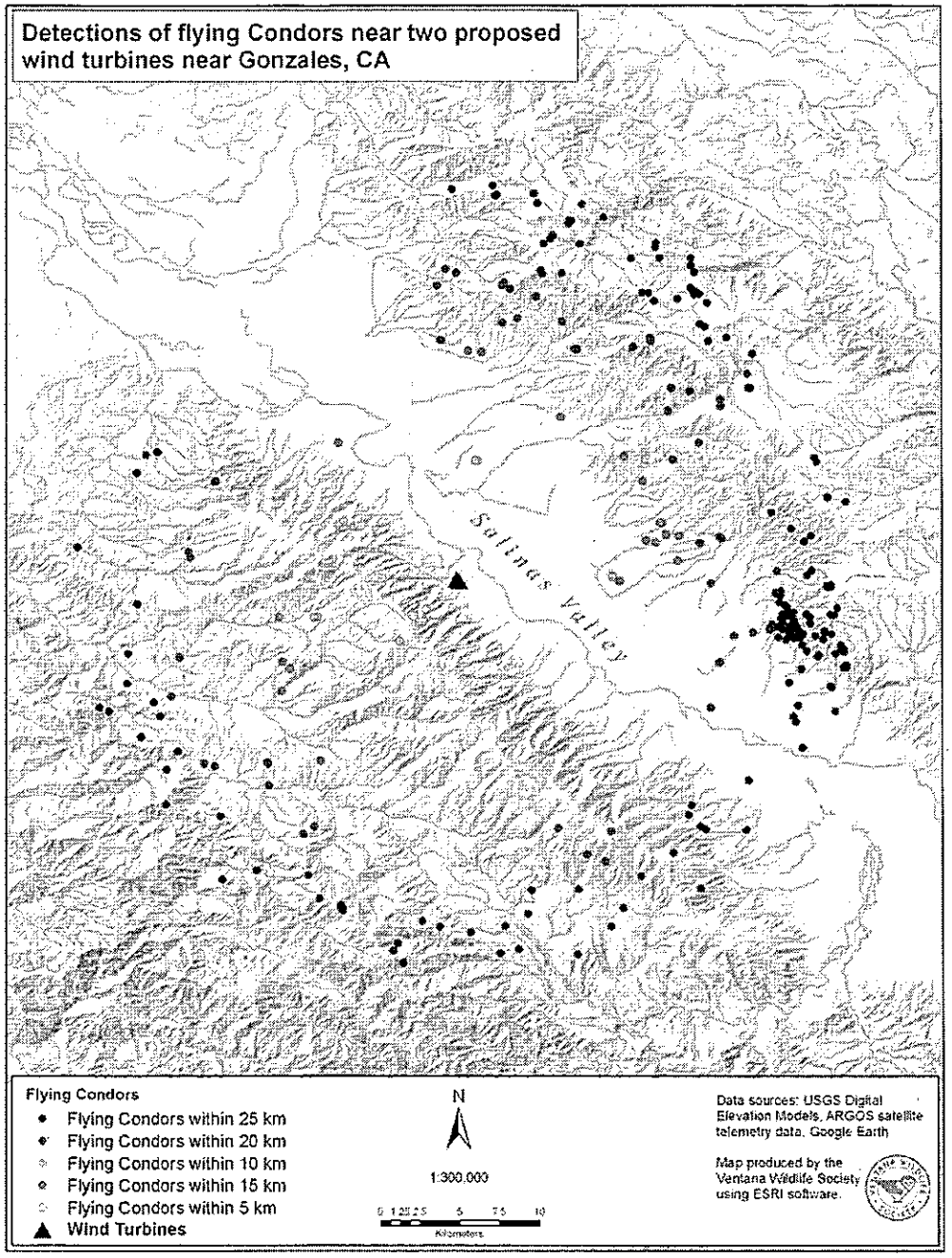

Figure 4. Frequency distribution of flight speeds of Condors detected within 25 km of the proposed wind turbines, Monterey County, CA, 2003-2007

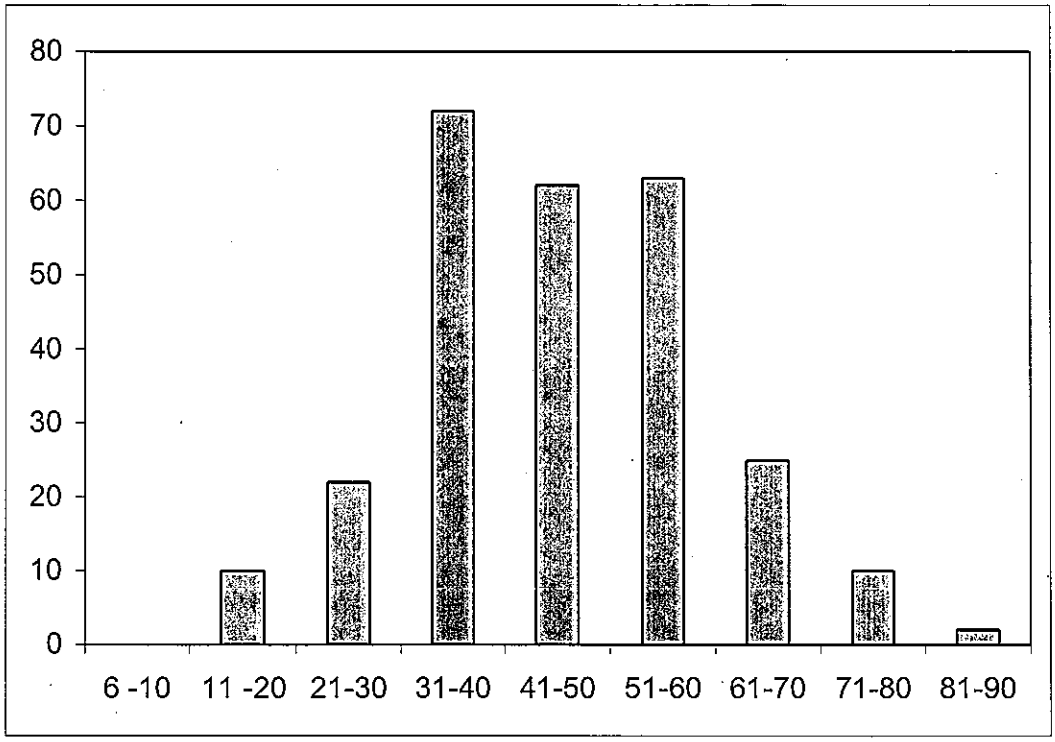

Figure 5. Detections of flying and perched Condors within 25 km of the proposed wind turbines, Monterey County, CA, 2003-2007

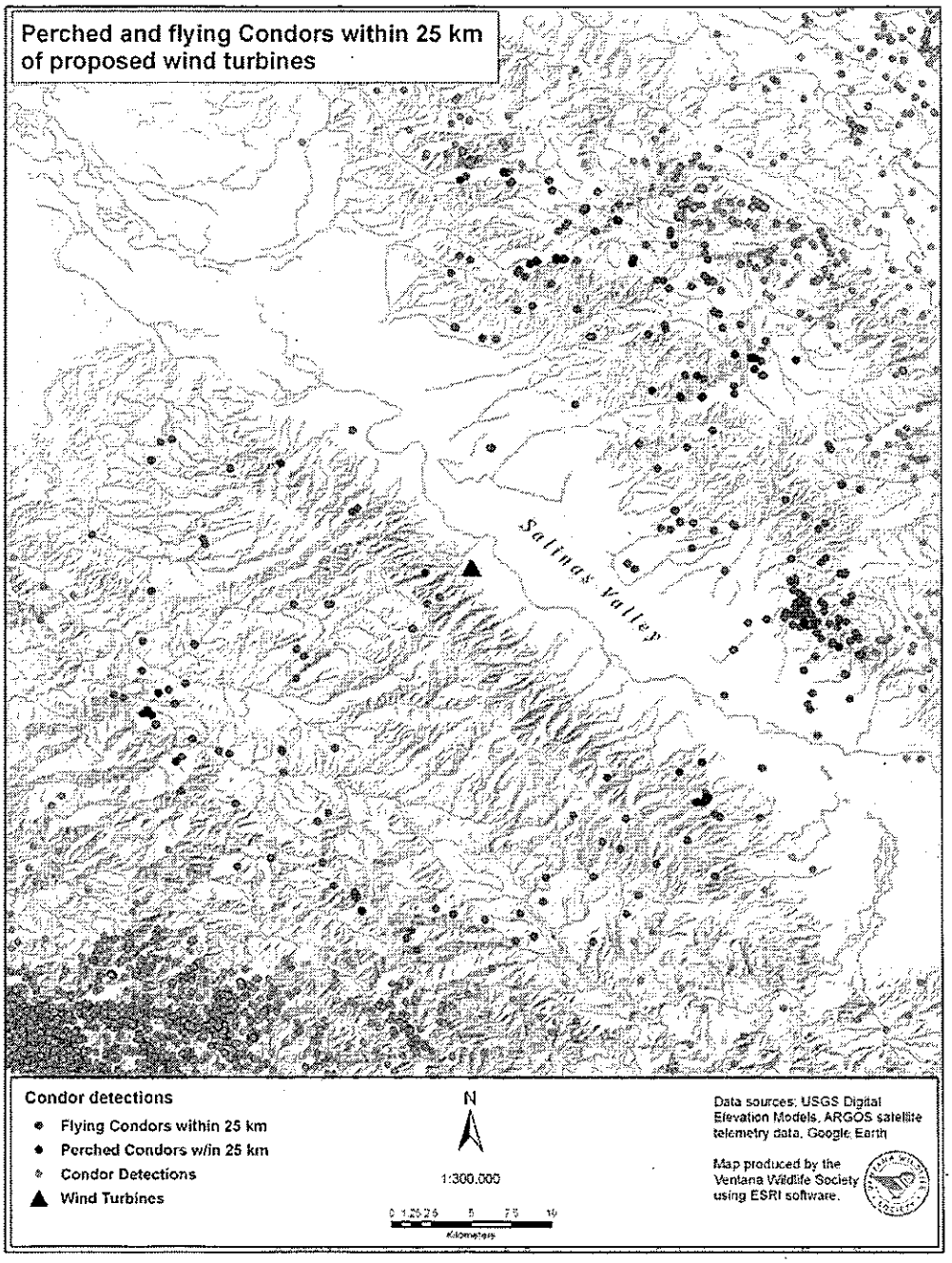

Figure 6. Proximity of perched Condor detections to the proposed wind turbines, Monterey County, CA, 2003-2007

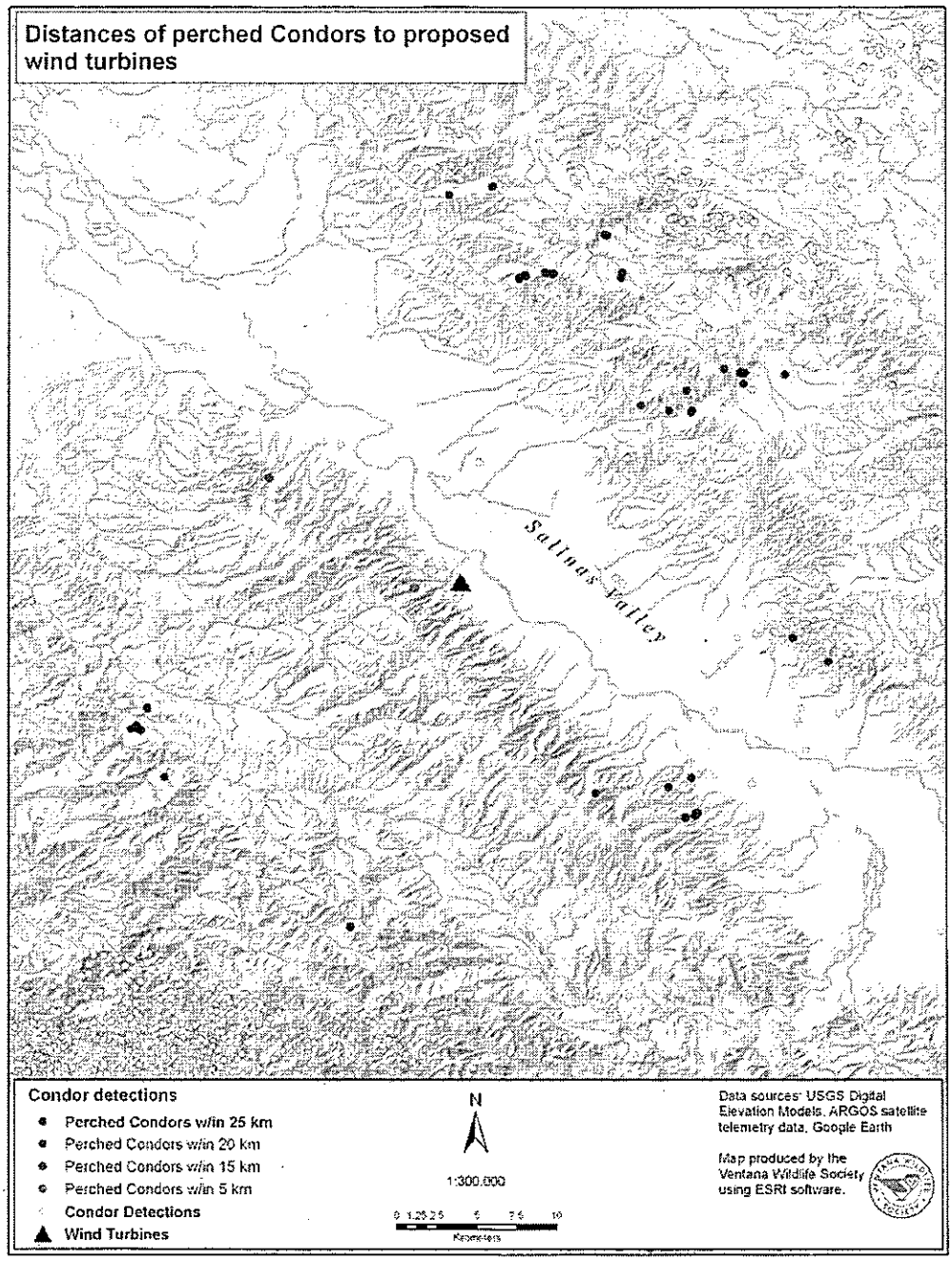

Figure 7. Landscape slopes associated with Condor detections within 25 km of the proposed wind turbines, Monterey County, CA, 2003-2007

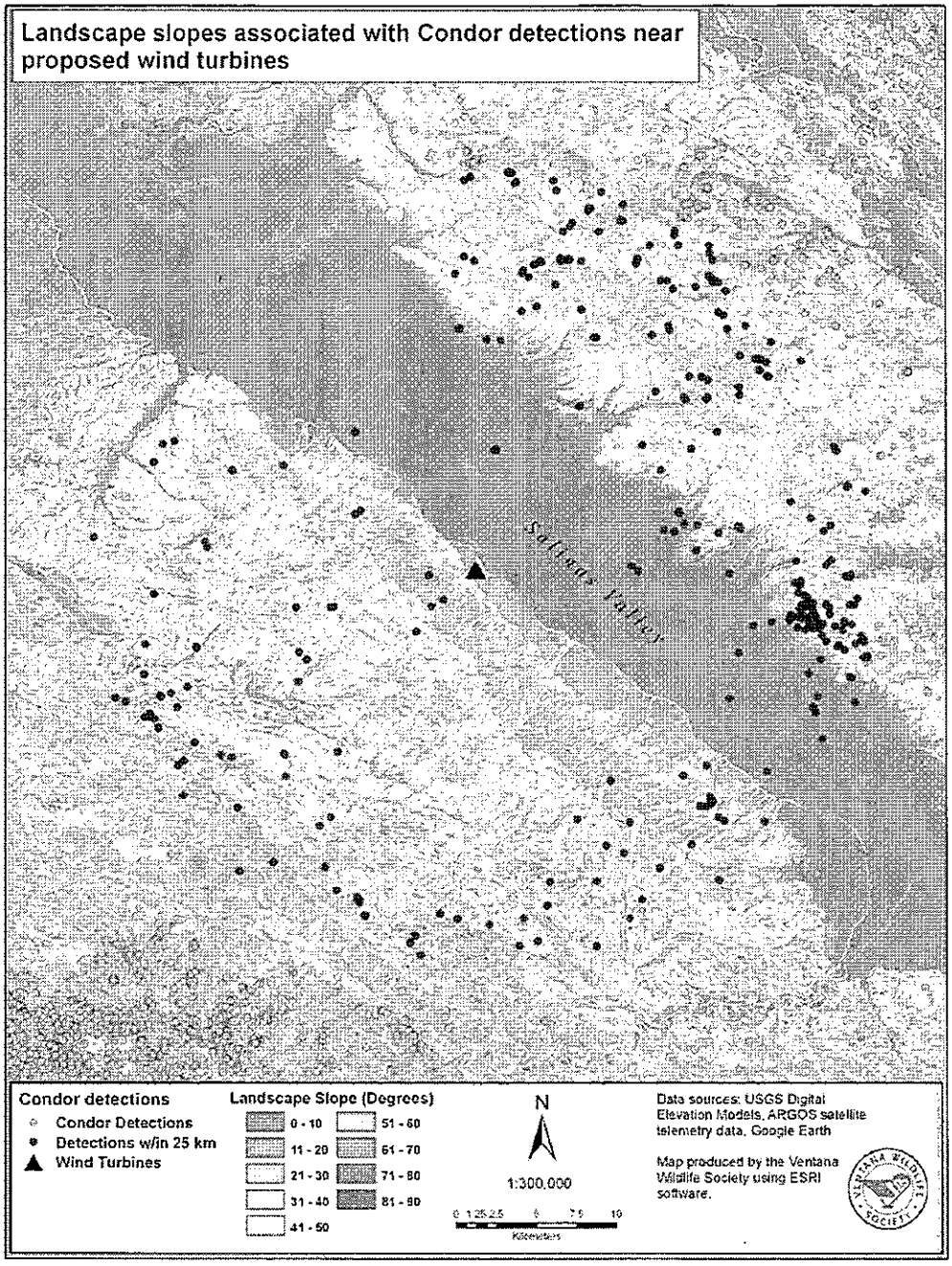

Figure 8. Distribution of landscape slope categories associated with Condor detections within 25 km of the proposed wind turbines, Monterey County, CA, 2003-2007

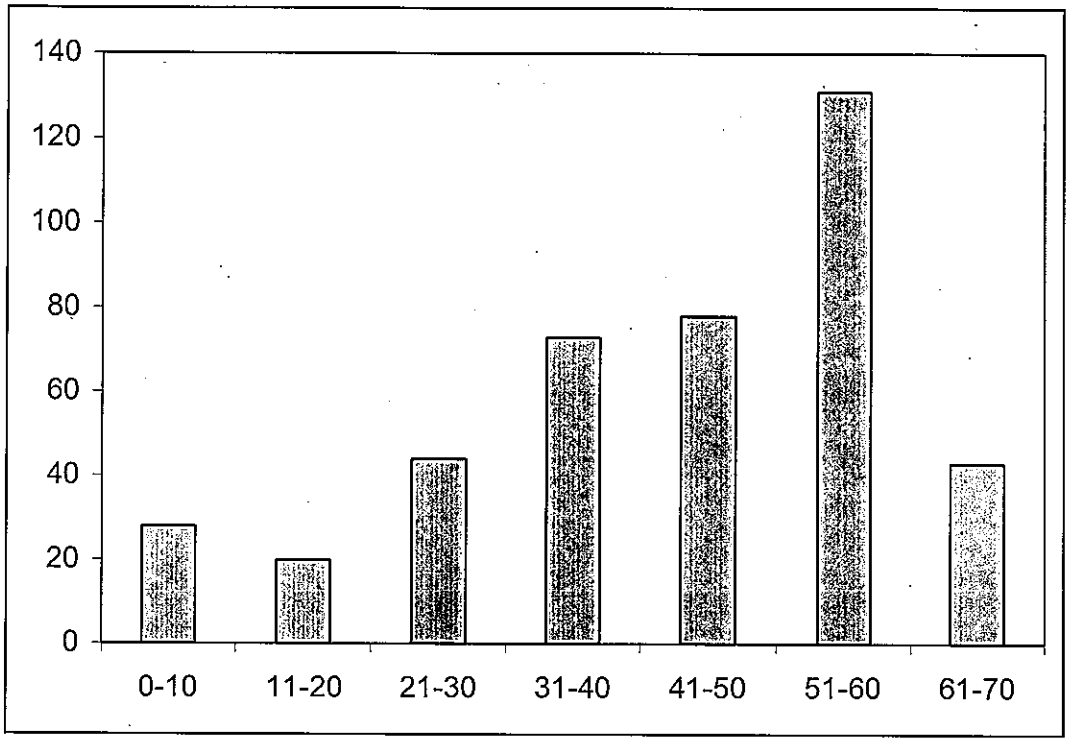

Figure 9. Landscape aspects associated with Condor detections within 25 km of the proposed wind turbines, Monterey County, CA, 2003-2007

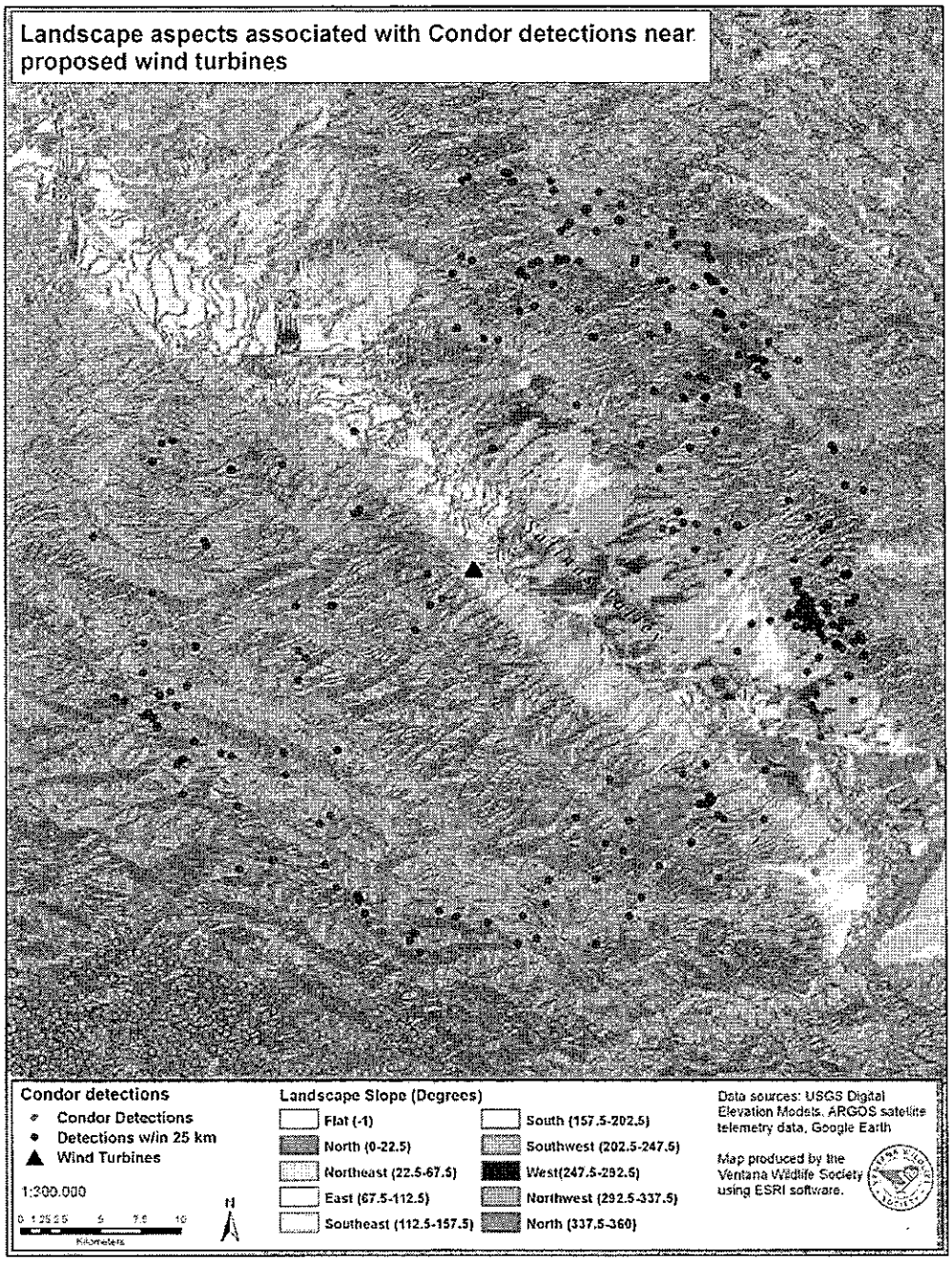

Figure 10. Distribution of landscape aspects associated with Condor detections within 25 km of the proposed wind turbines, Monterey County, CA, 2003-2007

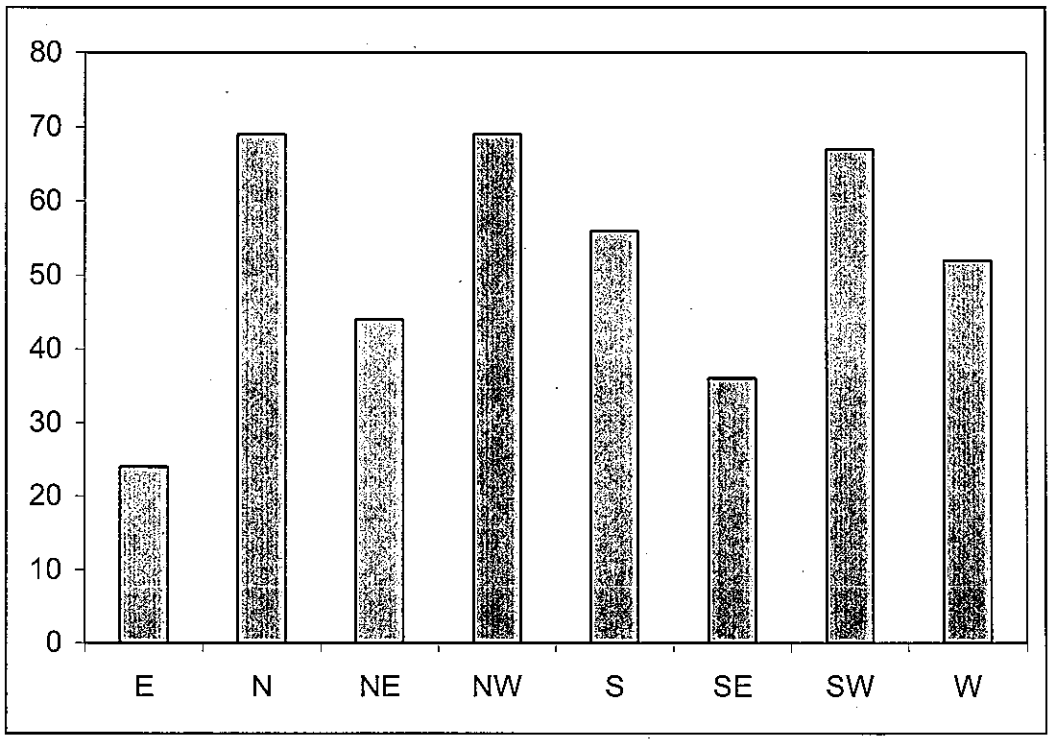

Figure 11. Condor Minimum Convex Polygon home ranges that encompass the proposed wind turbine locations, Monterey, CA

Dr. Jerry Pell, NEPA Document Manager
Office of Electricity Delivery and Energy Reliability, OE-20
U.S. Department of Energy
Washington, DC 20585

Via email: Jerry.Pell@hq.doe.gov

Dear Dr. Pell,

SUBJECT: Comments on Energia Sierra Juarez U.S. Transmission Line Project DEIS (DOE/EIS-0414)

The San Diego Audubon Society is supportive of the intention to increase the use of alternative energy sources such as solar and wind, but is concerned that the proposed project does not adequately consider impacts to wildlife as well as the cumulative impacts resulting from the various energy projects listed in Section 5 of the Draft Environmental Impact Statement. Specifically, we are concerned about impacts to migratory birds including raptors, neo-tropic migrants, and winter season avian visitors that may result from the construction of this transmission line and the construction and operation of the wind power facilities and power lines in Mexico that will be facilitated by this transmission line.

Insufficient Biological Data

We would like to see information detailing the survey methodology included in the final EIS and expect that a comprehensive survey approach is utilized including radar monitoring to assess nighttime migration and monitoring at different times of the year and day to capture seasonal variability in avian populations.

There is also a concern that this project site is located within an inland avian flyway. Because the transmission line project site is located between two important bird areas (Laguna Mountains and the Sierra de Juarez) that are characterized by high ridgelines, foraging raptors and other migrants may be severely impacted. Indeed, the project location is a potential and presumed avian corridor of birds moving from north to south along the cross-border ridgeline. In fact, according to observations by local ornithologists (SD Birds Yahoo Group), Jacumba and In-ko-pah villages are locally recognized migrant traps due to the presence of seasonal water resources, agricultural influences, and springtime wildflowers. For these reasons, we'd like the data that informed the determination that the project site is not located within a known migratory corridor or flyway to be made available in the Final EIS.

Impacts to Golden Eagles & Other Raptors

We are concerned with impacts to raptors and specifically, Golden Eagles, since this project site is located within a known wintering location and is immediately adjacent (located within one mile) to at least one confirmed breeding location for this species (Unitt, 2004, San Diego County Bird Atlas). The Golden Eagle has the largest territory and the lowest population density of any San Diego County bird. Currently, electrocution on power lines is the largest source of mortality for this species. This project also encroaches onto foraging habitat and results in the loss of ten acres of foraging habitat that will not be re-vegetated after construction. Furthermore, this habitat loss will directly impact San Diego black-tailed jackrabbit populations, the principal prey of the eagles and whose numbers are already suppressed due to drought. Impacts to the Golden Eagle and appropriate mitigation are not mentioned in this document and we would therefore like to see detailed information on how these impacts will be mitigated in the final review document.

Connected Actions & Impacts to Migrating Wildlife

We consider the Energia Sierra Juarez wind project to be an indirect impact of this project. We are concerned that construction of the proposed ESJ wind project and the associated transmission line will result in large numbers of deaths of raptors and migratory birds in Mexico. These birds migrate and/or forage on both sides of the border. Thus these losses in Mexico are likely to significantly impact local populations. For instance, studies show that Golden Eagle and Condor juveniles are often attracted to novel items placed in their range. Once these birds reach maturity their hunting patterns are fixed, but they are more likely to roam into unknown areas when they're young. For these reasons among others, the USFWS has recommended a minimum 6-mile buffer between Golden Eagle nests and turbines (USFWS Comments on Summit Ridge Wind project).

The transmission line project and the connected Energia Sierra Juarez wind project may impede use by Condors, who may re-colonize the area. According to the San Diego County Bird Atlas (Unitt, 2004), Condors could be seen regularly in San Diego County in the 1800s and nested in the County's foothills and mountains. The transmission line and the wind power projects are located within the historical breeding and foraging range of the California Condor and so there is a concern that these wind and transmission line projects would kill Condors that are and will be re-colonizing the area.

Cumulative Impacts Need to be Addressed

The ESJ Transmission Line Project is one of seven (this number includes the ESJ wind project which is not included in this cumulative analysis but should be since it is a connected action that will have a significant effect on migratory wildlife) energy projects that have been developed or are proposed for development in the region of influence for migratory birds. This fact, coupled with the fact that we are still learning about the real

costs and impacts to wildlife that are caused by these industrial-scaled energy projects, necessitates the need for a rigorous analysis, monitoring program, and information sharing mechanism among projects. Therefore, we would like to see a protocol in place that would facilitate the sharing of monitoring data among projects considered in the cumulative effects analysis so that any cumulative impacts can be identified and addressed in a timely and effective manner. We are very concerned with the inadequate analysis that is being performed for the wind project on the Mexican side. Since the projects are interdependent, analysis of those impacts need to be fully identified as Indirect and Cumulative impacts of this project.

Mitigation

Mitigation measures for biological resources are inadequate and inadequately described in the draft review document. A worker training that includes "protection measures for sensitive resources" will be carried out, but the DEIR does not identify what these measures of protection are – an implementation plan for these protection measures needs to be included in a final review document. Also, this document solely addresses mitigation measures to be taken during the construction phase and does not include any measures that would be taken during the operational phase of the project. For instance, if the line is found to significantly negatively impact raptors and other avian populations in the area, how will these impacts be reduced? A plan for minimizing risks to wildlife and biological resources throughout the life span of this project must be added to this document. There must be a protocol in place that monitors and identifies losses and ensures additional and adaptive mitigation measures will be devised and implemented should avian and other wildlife populations be negatively impacted during project operations. Quantitative thresholds should be identified for implementing those measures, reducing operations, or for removing the project if those thresholds cannot be met.

Alternatives

Lastly, we urge that the Department of Energy fully considered the array of project alternatives that exist, on both sides of the border. It may make more sense economically, environmentally, and politically to re-string the Mexican 'Path 45' transmission line that runs from Mexicali to Tijuana with sufficient capacity to support current demands.

We also urge that the location of the wind turbines in Mexico be based on minimizing impacts to wildlife during construction and operation and not just on wind speed and ease of construction.

While we are very much in favor of alternative energy projects that lessen our dependence on fossil fuel sources and reduce greenhouse gas emissions, we are not supportive of fast-track projects that place our wildlife and shared natural heritage at risk.

We hope that the final EIR will more fully consider these risks and if approved, utilize this project as a model for minimizing risks to wildlife.

Sincerely,

Shannon Dougherty

Shannon Dougherty
Conservation Coordinator

Comment Set F0006
U.S. Fish & Wildlife Service and California Department of Fish & Game

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In Reply Refer To:
FWS/CDFG-2008B0423/2008TA0847

AUG 2 5 2008

Billie Blanchard, CPUC/Lynda Kastoll, BLM
c/o Aspen Environmental Group
235 Montgomery Street, Suite 935
San Francisco, California 94104-3106

Subject: Comments on the Recirculated Draft Environmental Impact Report/ Environmental Impact Statement for the Sunrise Powerlink Project, San Diego and Imperial Counties, California (SCH No. 2006091071)

Dear Ms. Blanchard and Ms. Kastoll:

F0006-1

The California Department of Fish and Game (Department) and U.S. Fish and Wildlife Service (Service), collectively the Wildlife Agencies, have reviewed the above-referenced recirculated draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed Sunrise Powerlink (SRPL) Project. The comments provided herein are based on the information provided in the recirculated draft EIR/EIS, the original SRPL Project draft EIR/EIS, the Wildlife Agencies' knowledge of sensitive and declining vegetative communities, and our participation in regional conservation planning efforts. The Wildlife Agencies provided extensive comments on the initial Draft EIR/EIS in a letter dated April 11, 2008. All of our concerns addressed in that letter regarding potential "unmitigable" adverse impacts to federally and/or State-listed species, sensitive vegetation communities, and regional conservation plans remain.

The Department is a Trustee Agency and a Responsible Agency pursuant to the California Environmental Quality Act (CEQA), Sections 15386 and 15381 respectively. The Department is responsible for the conservation, protection, and management of the State's biological resources, including rare, threatened, and endangered plant and animal species, pursuant to the California Endangered Species Act (CESA), and administers the Natural Community Conservation Planning Program (NCCP). The primary concern and mandate of the Service is the protection of public fish and wildlife resources and their habitats. The Service has legal responsibility for the welfare of migratory birds, anadromous fish, and endangered animals and plants occurring in the United States. The Service is also responsible for administering the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). The Proposed Project is the construction and operation of a 150-mile electric transmission line between the El Centro area of Imperial County and northwestern San Diego County.

Alternatives considered included alternative route alignments and other transmission alternatives, alternatives that could replace the Proposed Project as a whole, Non-Wire Alternatives, and the No Project/No Action Alternative.

TAKE PRIDE IN AMERICA

Comment Set F0006, cont.
U.S. Fish & Wildlife Service and California Department of Fish & Game

F0006-1 cont.

Additionally, there are four projects that are so closely related to the SRPL as to be considered "connected actions" under NEPA. These four projects are the Stirling Energy Systems solar facility, two components of the Imperial Irrigation District (IID) 230 kV transmission system upgrades, the Esmeralda–San Felipe Geothermal Project, and the Jacumba 230/500 kV Substation. One additional project, a wind project in northern Mexico's La Rumorosa area, under contract to meet Southern California Edison's renewable requirements, is defined in the Recirculated draft EIR/EIS as an "indirect effect" of the SRPL. The La Rumorosa wind project is being evaluated in the draft EIR/EIS because of the agreement that was signed between Sempra Generation and Southern California Edison in which Sempra Generation has agreed to sell SCE up to 250 MW of power from the La Rumorosa wind power facility under development, and the SRPL would be used to transmit the energy generated at the wind farm.

This letter provides comments regarding the components identified in the recirculated draft EIR/EIS dated July 2008. These components include a new and revised analysis of the La Rumorosa Wind Energy Project (RWEP) wind farm and transmission line route revisions. The RWEP has several project components, which include the following; a double circuit 230 kV or single circuit 500 kV transmission line from Mexico to the U.S., a 500/230/69 kV substation located east of the town of Jacumba (i.e., Jacumba substation), a 13.4 mile 69 kV transmission line connecting the Jacumba and Boulevard Substations, a 0.5 acre expansion of the Boulevard substation, and a communication facility. We offer recommendations and comments in the enclosure to further assist in avoidance and minimization of impacts to biological resources, and to ensure that the project is consistent with ongoing regional habitat conservation planning efforts.

We remain concerned the Proposed Project (and many of the alternatives) would have "unmitigable," significant impacts to listed plant and animal species. Because the Wildlife Agencies are mandated to protect and recover these resources, we recommend an alternative that can avoid and minimize significant adverse impacts to rare and sensitive biological resources, similar to the In-Area Renewable Generation Alternative but with additional localized generation capacity (e.g., commercial and residential rooftop solar systems) to eliminate or minimize the need to transport electricity from remote locations. If you have questions or comments regarding the contents of this letter, please contact Paul Schlitt of the Department at (858) 637-5510 or Felicia Sirchia of the Service at (760) 431-9440.

Sincerely,

Karen Goebel
Assistant Field Supervisor
U.S. Fish and Wildlife Service

Helen R. Birss
Environmental Program Manager
California Department of Fish and Game

Comment Set F0006, cont.
U.S. Fish & Wildlife Service and California Department of Fish & Game

ENCLOSURE
WILDLIFE AGENCY
COMMENTS AND RECOMMENDATIONS
ON THE RECIRCULATED DRAFT ENVIRONMENTAL IMPACT
REPORT/ENVIRONMENTAL IMPACT STATEMENT
FOR THE SUNRISE POWERLINK PROJECT

Sempra La Rumorosa Wind Energy Project Wind Farm

1. The recirculated draft EIR/EIS concludes that impacts to wildlife movement from the Sempra La Rumorosa Wind Energy Project (RWEP) wind farm would be considered adverse but less than significant (page 2-54). However, an analysis of the biological impacts concerning general wildlife movement patterns through the (RWEP) wind farm site has not been conducted. Therefore, this impact should be adequately assessed in the final EIR/EIS, or the final EIR/EIS should acknowledge this deficiency in the analysis for impacts to wildlife movement. In addition, Peninsular bighorn sheep (PBS) are known to occur in the Sierra de Juarez mountains. However, there is no discussion on how the RWEP may impact PBS movement at that site. The final EIR/EIS should address this potential impact to PBS and provide a discussion as to how the applicant can avoid and minimize any impacts that are identified. F0006-2

2. The recirculated draft EIR/EIS discusses the presence of PBS designated critical habitat (February 1, 2001) in the project area (U.S. portion only). However, although it does not appear that this portion of the project is within PBS proposed revised critical habitat (October 10, 2007), the presence of PBS proposed revised critical habitat in the vicinity of the project area should be discussed in the final EIR/EIS to ensure that potential edge effects (e.g., increased non-natives, fire, etc.) from the transmission line will not adversely affect the primary constituent elements in the adjacent critical habitat. F0006-3

3. The draft EIR/EIS lacks the information necessary to accurately quantify the potential direct and indirect impacts of each project component on listed species and their habitat. The final EIR/EIS should include a series of maps that depict such features as the locations of the proposed temporary and permanent project components including associated facilities, construction roads, access roads, towers, transmission lines, and staging areas. These maps should, at a minimum, also include vegetation-type; federally-listed and candidate species known to occur or potentially occur in the project areas; and proposed and/or designated critical habitat areas. Information on vegetation types and species locations and potential habitat within the project areas should be based on best available database information as well as recent habitat and species surveys conducted by qualified and or permitted biologists. F0006-4

   Additionally, acreage impacts associated with the construction of each project component should be included in the baseline impact analysis. Impacts to sensitive vegetation F0006-5

Comment Set F0006, cont.
U.S. Fish & Wildlife Service and California Department of Fish & Game

communities and special status plant and animal species should be quantified and adequately disclosed in the final EIR/EIS. This analysis should be provided in revised summary tables/and or a consolidated matrix per guidance that was provided in the Wildlife Agencies comment letter, dated April 11, 2008. This would facilitate comparison of the proposed project to the alternative designs allowing for the identification of a biologically preferred alternative, in accordance with CEQA mandates (CEQA Guideline §15126.6(b).

F0006-5 cont.

4. The recirculated draft EIR/EIS states that vegetation and plant species data is based on County of San Diego and CNDDB records, respectively, and subsequently states that no listed plant species occur in the project areas. However, information on vegetation types and plant species locations and potential habitat within the project area in the U.S. should be based on best available database information as well as recent habitat and species evaluations conducted by a qualified biologist/botanist familiar with local plant species in the project areas.

F0006-6

5. The final EIR/EIS should provide additional information concerning the preliminary site assessment surveys that were conducted during site selection of the RWEP wind farm. There is limited information provided in the recirculated draft EIR/EIS regarding the development of pre-permitting monitoring protocols that were considered to address bird and bat mortality (and that resulted in NEPA/CEQA baseline and impact determination in the recirculated EIR/EIS). It is important to use the pre-permitting impact assessment to determine the operations monitoring protocols that would be used to substantiate impact estimates. Furthermore, the final EIR/EIS needs to provide a discussion on the evaluation given between the level of anticipated impacts (i.e., bird and bat collisions with wind turbines) and the amount of compensatory mitigation proposed. In considering potential fatalities and risk to individual species and populations, the priority should be avoidance of impacts, and if that is not possible, minimization and mitigation measures should be developed that are effective in reducing and/or offsetting bird/bat fatalities. Additionally, although operational fatalities cannot be forecasted with certainty, more comprehensive baseline data should be collected and provided in the final EIR/EIS.

F0006-7

6. Table D.2.7 of the final EIR/EIS should be amended to reflect acreage impacts and corresponding mitigation acreage for the RWEP wind farm, Sempra Baja Wind Transmission Line, SDG&E Jacumba Substation, and SDG&E 69 kV transmission line.

F0006-8

7. Page 2-22, Section 2.2.1, Special Status Wildlife Species, states that, "Protocol-level surveys for QCB were conducted at the ECO Substation site (i.e., Jacumba substation) and surrounding areas in April 2008 (SDG&E, 2008a)." However, a copy of the survey report has not been received by the Service. We recommend that protocol-levels surveys for the Quino be conducted in all project areas within the Service's recommended survey area for Quino and reports be submitted in a timely manner so that we may determine if they are adequate and impacts have been assessed correctly.

F0006-9

Comment Set F0006, cont.
U.S. Fish & Wildlife Service and California Department of Fish & Game

Ms. Blanchard and Ms. Kastoll (FWS-SD/CDFG-2008B0423/2008TA0847) 3

8. The recirculated draft EIR/EIS discusses the potential presence of PBS, Quino, and Quino designated critical habitat along the 69kV Transmission Line. However, it appears that some portions of this project are also within Quino proposed revised critical habitat (January 17, 2008). Therefore, the potential impacts to Quino proposed revised critical habitat should be discussed in the final EIR/EIS. Additionally, it is not clear from the draft EIR/EIS if protocol-levels surveys have been conducted along this transmission line and adjacent areas. If so, a copy of the survey report has not been received by the Service. F0006-10

9. The recirculated draft EIR/EIS states that the Boulevard Substation Expansion and Communication Facility are expected to occur on land that is already developed. However, it is not clear if "developed" means that these areas no longer contain any vegetation. Therefore, the term "developed" should be defined in the final EIR/EIS. Additionally, because these proposed projects are located within the U.S. Fish and Wildlife Service's Quino Survey Area 1, Quino may use these areas to move between adjacent habitat patches. Therefore, protocol-level surveys should be conducted in the project areas to determine if Quino are present. F0006-11

10. It is premature to identify mitigation ratios for jurisdictional areas when formal jurisdictional delineation has not been completed. For projects with impacts to jurisdictional lakes or streambeds, the Department emphasizes that alternatives and mitigation measures be addressed in CEQA certified documents prior to submittal of an application of a Streambed Alteration Agreement (SAA). Any information which is supplied to the Department after the CEQA process is complete will not have been subject to the public review requirements of CEQA. Therefore, please ensure all impacts to jurisdictional waters are described in the final EIR/EIS. F0006-12

11. The Biological Resources section in the final EIR/EIS should include a discussion of any riparian habitat occurring in the project areas and whether or not arroyo toad, southwestern willow flycatcher, and least Bell's vireo habitat may occur in those project areas. F0006-13

Proposed and Alternative Transmission Line Routes

1. The impact analysis for the 13 reroute proposals mentions that reroutes would either result in no effect or an increase/decrease of impacts to sensitive vegetation communities (e.g., "This reroute would result in greater impacts to the same types of sensitive vegetation communities"), without quantifying the extent of the impact. The final EIR/EIS should include revisions to all the corresponding tables that quantify impacts to vegetation communities for each alternative route proposed (e.g., a revision should be made to Table E.2.2-2 to correspond with an increase or decrease in permanent and temporary impacts associated with a reroute proposal identified in the recirculated draft EIR/EIS). F0006-14

2. Section 3.3.4.6 mentions that the Highway 67 Hansen Quarry Reroute would shift the transmission line route to the east from Hansen Aggregate property onto land owned by the F0006-15

Comment Set F0006, cont.
U.S. Fish & Wildlife Service and California Department of Fish & Game

Ms. Blanchard and Ms. Kastoll (FWS-SD/CDFG-2008B0423/2008TA0847) 4

City of San Diego. This reroute would encroach into City of San Diego's Multiple Species Conservation Program cornerstone land holdings. A discussion regarding effects on land use impacts should be provided in the final EIR/EIS to address these concerns. F0006-15 cont.

3. Impacts to vegetation communities that will result from additional workspace needs for the Interstate 8 Alternative (Table 4.1 of the recirculated draft EIR/EIS) should be incorporated in the Table E.1.2-4 of the final EIR/EIS. F0006-16

ERIC GIBSON
DIRECTOR

County of San Diego

DEPARTMENT OF PLANNING AND LAND USE

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November 24, 2010

Dr. Jerry Pell
Office of Electricity Delivery and Energy Reliability (OE-20)
U.S. Department of Energy
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Washington, DC 20585
email: Jerry.Pell@hq.doe.gov
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Energia Sierra Juarez Transmission Line Environmental Impact Statement Comments (DOE/EIS-0414)

Dear Dr. Pell:

The County of San Diego (County) has reviewed the Draft Environmental Impact Statement (EIS) published September 17, 2010 in the Federal Register. The County appreciates the Department of Energy's (DOE) request to participate as a Cooperating Agency and this opportunity to provide comments and make specific requests regarding the proposed development and environmental review. As you are aware, the County has a separate discretionary permitting and environmental review process currently underway that will address the specific issues of concern with the components of the project we have land use jurisdiction over. The comments provided in the attachment to this letter address the comments made by the County in previous letters, general deficiencies of the EIS, and potential conflicts with the ongoing environmental review that the County is partaking with the California Public Utilities Commission (CPUC), related to this project.

The Energía Sierra Juarez U.S. Transmission Line Project (ESJ) is required to comply with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), for the issuance of the County Major Use Permits and the DOE Presidential Permit. In accordance with CEQA Section 15221, the County should use this Environmental Impact Statement (EIS) in-lieu of preparing its own Environmental Impact Report (EIR). In order for this document to be adequate for the County to rely on for its discretionary actions, this EIS would have to comply with the

provisions of the State and County CEQA Guidelines. Because NEPA does not require separate discussion of mitigation measures or growth inducing impacts, these points of analysis would need to be added, supplemented, or identified before this EIS could be utilized by the County as an equivalent to an EIR.

The County of San Diego appreciates the opportunity to participate in the environmental review process for this project. We look forward to receiving future environmental documents related to this project or providing additional assistance at your request. If you have any questions regarding these comments, please contact the County Project Manager Patrick Brown at (858) 694-3011 or e-mail Patrick.Brown@sdcounty.ca.gov.

Sincerely,

for

ERIC GIBSON
Director, Department of Planning and Land Use

Attachments: EIS Comment Spreadsheet

Email cc:

Alberto Abreu, Director Project Development, Sempra Generation, 101 Ash Street, HQ14A San Diego, CA 92101
Jeff, Murphy, Deputy Director, Department of Planning and Land Use M.S.O650
Patrick Brown, Project Manager, Department of Planning and Land Use, M.S. O650
LeAnn Carmichael, Planning Manager, Department of Planning and Land Use, M.S. O650

	Section	Subsection, Paragraph, Sentence	Comment or Issue
1	Introduction	1.3 Pg. 1-8	The project objectives should be updated as follows, " stated objective is for the proposed transmission line is to transport only renewable electrical power generate by the ESJ Wind Power project in Mexico..."
2	General		As communicated during the NOI process, the County of San Diego, Land Use and Environmental Group, has developed Guidelines for Determining Significance (Guidelines) that are used to assist in determining environmental impacts in the unincorporated portions of the County. The current EIS incorporates these guidelines for only one resource area - Visual Resources. The County recommends the EIS utilize the Guidelines for each applicable resource area in order to adequately evaluate and mitigate for environmental impacts to the unincorporated County or County facilities.
3	Introduction	Pg. 1-13 and 14:	Sunrise Powerlink (SRPL) as a Connected Action: The response provided by Sempra doesn't answer the technical question as to how the project could be connected without the SRPL. The letter provided by Sempra makes unsubstantiated conclusion without any technical backup. The applicant should discuss the technical logic behind "Special Protection Schemes" and "Low Cost Incremental Generation," as it relates to the projects ability to interconnect to the existing Southwest Powerlink (SWPL).
4	Introduction	Pg. 1-13 and 14:	The EIS does not describe the Sempra Application for the Groundwater Extraction Major Use Permit in any detail. The Groundwater project is a connected action and should be fully discussed within this EIS.
5	Range of Alternatives	Pg. 2-1	The EIS does not present a reasonable range of alternatives. Pursuant to NEPA, a reasonable range would include alternatives, aside from the proposed action, that would both satisfy the purpose and need and avoid or minimize significant environmental impacts. The ESJ EIS includes three alternatives: Alternative 1, No Action Alternative; Alternative 2, Double Circuit 230-KV Transmission Line (designated as the Applicant's preferred project); and Alternative 3, Single-Circuit 500-KV Transmission Line. The EIS is flawed in that it treats the double circuit and the single circuit transmission lines as both an option under the proposed action and as alternatives to the proposed action. The Single-Circuit 500-KV Transmission Line Alternative does not meet the reasonable range standard as it is more impactive and would therefore have increased impacts over the Applicant's preferred project, the Double Circuit 230-KV Transmission Line. A reasonable range of alternatives would put forth alternatives that would *reduce* impacts rather than increase impacts under the proposed action (*Roosevelt Campobello International Park Commission v. EPA*, 684 F 2d 1041 (1st Cir. 1982).
6	Range of Alternatives	Section 2.4-5 Pg. 2-1	CFR 1502.14 Alternatives including the proposed action: DOE is required to rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives, which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated. The EIS does not evaluate a reasonable range of alternatives, nor does the EIS provide a reasonable amount of alternatives that have been screened out. The EIS only screen out one alternative (The Undergrounding). The EIS should consider more alternatives and should provide a list of feasibility factors based on cost, logistics, technology, social, environmental, and legal factors. Also, the EIS does not include reasonable alternatives not within the jurisdiction of the lead agency DOE.

Section		Subsection, Paragraph, Sentence	Comment or Issue
7	Range of Alternatives	Section 2.4-5 Pg. 2-1	NEPA guidelines require the consideration of a reasonable range of alternatives, defined as alternatives that are realistic (not speculative) that may be feasibly carried out based on technical, economic, and environmental factors (40 CFR 1502.1 et seq.). NEPA requires that the EIS fully considered any alternative that has the potential to avoid or substantially lessen any of the significant environmental effects of the project. The following are alternatives that should be considered. The County is willing to work with DOE to consider the following Alternatives and a possible screening criteria. 1. No Project Alternative: 2. Monopole Alternative: No reductions to visual • 230kV Double Circuit, 500 kV Single Circuit 3. Lattice Tower Alternative: Reduces Visual impacts. • 230kV Double Circuit, 500kV Single Circuit 4. Underground Alternative: Reduces Fire, Biological, and Visual impacts • 230kV Double Circuit, 500kV Single Circuit 5. Alternative Locations: Unknown reductions • Mexico Reroute using existing infrastructure possibly an alternate location along US Mexico Border 6. ECO-Substation Shift 700' East: Reduces Cultural Resources • Same as indicated in alternatives 2-4
8	Alternatives Considered but Dismissed	Subsection S.7.2, page S-11	Underground Transmission Line. The EIS concludes the construction of an underground transmission line to not be a reasonable alternative and provides no further analysis. However, given the substantial benefit that would result from underground transmission lines to areas of public health and safety, community character, aesthetics, and fire and fuels management, the County requests a NEPA level cost-benefit analysis of this potential alternative. The EIS should not consider costs when evaluating impacts. The County would like DOE to reconsider the underground alternative.
9	General: CEQA Compliance	NA	The ESJ project is required to comply with CEQA and NEPA for the issuance of the Major Use Permits and the Presidential Permit. In accordance with CEQA Section 15221, the County should use this EIS if it were certified before the East County Substation EIR/EIS. In order for this document to be adequate for the County to use for its discretionary actions, this EIS would have to comply with the provisions of the State and County CEQA Guidelines. Because NEPA does not require separate discussion of mitigation measures or growth inducing impacts, these points of analysis will need to be added, supplemented, or identified before this EIS could be used by the County as an EIR. The County does not intend to use the DOE EIS for its discretionary actions, but it appears that this EIS may be completed substantially sooner than the aforementioned East County Substation EIR/EIS. DOE and the applicant may consider revising or supplementing this EIS as mentioned, so the County could use the document. The County's comments in this letter do not construe the necessary changes that would be required to comply with CEQA Section 15221. A separate review and comment period would need to be provided to the County to complete such review.
10	Mitigation Measures	NA	To ensure that environmental effects of the proposed action are fairly assessed, the EIS should discuss the probability of the mitigation measures being implemented by the Cooperating Agency (NEPA Section 1502.16(h). The enforceability of mitigation measures is questionable. For example, the Air Quality mitigation measures described in Section 3.10.3 Air Quality # 3 is an inadequate mitigation measure because it is not a specific, tangible item that could be implemented. To encourage carpooling is to "strive" to achieve rather than actually resulting in a physical change. Revise all the mitigation measures to be adequate and feasible.

Section		Subsection, Paragraph, Sentence	Comment or Issue
11	Project Operations	Section 2.4.3, page 2-10	The County recommends the EIS rectify the recommendations regarding the installation of lighting for the proposed towers. While the FAA has determined the height of the towers to be acceptable and would not require lighting, the EIS also states the U.S. Border Patrol may request lighting to be installed. The placement and use of lighting on the towers would potentially cause indirect impacts to wildlife. However, if lighting is not proposed, the towers may cause potential hazards to the U.S. Border Patrol operations. The EIS must clearly state and analyze whether or not the proposed towers would include lighting.
12	Biological Resources	Section 3.1.1.6 Special Status Wildlife Species	The County observed evidence and testimony in the Public Hearings that there is a potential for the Peninsular Bighorn Sheep, which is a federally-listed endangered and state-listed threatened/fully protected species to be present within the project site and area. The DOE should request US Fish and Wildlife Service to re-evaluate the possibility that the species' critical habitat may be shifting, the potential for presence on the project site, and any additional direct or indirect impacts this species.
13	Biological Resources	Section 3.1.1.7 Special Status Wildlife Species	The US Border Fence is a barrier for wildlife movement. A portion of the project parcels are located in the mountainous terrain that is not occupied by the border fence. Therefore, this area could be considered a wildlife corridor for Peninsular Bighorn Sheep movement between the United States and Mexico. The EIS should reevaluate the occurrence and movement of the species within the project area.
14	Biological Resources	Section 3.1.2, Environmental Impacts	The EIS does not adequately analyze impacts to avian species. The EIS based the lack of presence of major migration corridors on the general characteristics of the landforms and the absence of extensive wetlands and riparian areas. The presence of avian species and potential impacts to them should be based on accepted biological survey methods rather than assumptions regarding topography. Nonetheless, the EIS concluded the project would result in "direct mortality of cross-border migratory birds due to collisions with transmission lines and wind turbines" without providing potential mitigation measures. The EIS goes on to describe potential environmental protection measures under the authority of the Mexican government (the requirement of avian and bat monitoring studies). Merely performing studies does not reduce the effects of the project. The EIS should identify specific mitigation measures that would reduce the potential effects to the Migratory Birds and raptors. DOE should ensure that these measures are adequate and/or feasible.
15	Biological Resources	Section 3.1.3 Mitigation Measures	The following Biological Mitigation needs to be added to the project as indicated in the Biological Resource report provided by the County: (1) Provide for Mitigation of the direct biological impacts by either habitat compensation or conservation for the permanent impacts to native vegetation communities. (2) Conduct pre-construction nesting bird surveys, for the California Horned Lark and Loggerhead shrike, or any bother bird subject to the MBTA. Implement all appropriate avoidance measures for identified nesting birds.
16	Visual	Section 3-58	Summary: The use of the lattice tower is preferable over a monopole design. The County prefers the lattice tower design. This design should be the preferred alternative for the DOE Records of Decision.
17	Visual	Section 3.2.3 Mitigation Measures	The lattice or monopole towers should be painted a light tan or desert color to blend with the topography better. This has been done on other desert transmission lines that can be seen from Interstate 15 north between Riverside and Barstow, CA.

Section		Subsection, Paragraph, Sentence	Comment or Issue
18	Land Use	Section 3.3.2.3 Pg. 3-66-70	Zoning and Planning Consistency: The General Plan Land Use Policy 2.4, Multiple Rural Use (18) states, "...that a **public** improvement project may be approved even when there are identified adverse environmental impacts if the County of San Diego decision-makers adopt findings that demonstrate that the adverse impacts have been mitigated to the greatest extent feasible and that the project is necessary to protect the public health and safety." The ESJ Project is not a Public Utility nor is it considered to be a public project. Sempra is a private entity. Adverse environmental impacts have been analyzed in the EIS; therefore the project is not consistent with this policy. Because the EIS identifies a conflict with land use plan or policies, then the lead agency must determine the significance of the conflict. Unless specifically precluded by other laws from causing or contributing to a conflict with this particular policy, the lead agency may proceed with the proposed action despite the potential conflict. However, the Record of Decision should reflect the issue, discuss the availability of mitigation measures (demonstrate mitigation has been proposed to the greatest extent feasible) and explain the lead agency's decision to override the land use plans or policies for the area.
19	Land Use	Section 3.3	The Land Use Section does not discuss the County of San Diego General Plan Update, which has since been to the Board of Supervisors for two public hearings, and has been continued to December 8, 2010. The County requests that the Land Use Section incorporate an analysis of the General Plan Update to provide the DOE decisions makers a broad view of the proposed land use policies that may supersede the existing plan goals and policies. The General Plan Update may be in affect before the Record of Decision is made public.
20	Cultural Resources	Section 3.5.3 Mitigation Measures	The EIS should require a cultural resource construction grading monitoring and potential data recovery program to be conducted by a County of San Diego Qualified consultant. The construction crew should not be responsible for monitoring for potential sensitive cultural resources. See the County of San Diego Guidelines for Determining Significance and the Report Format and Content requirements. http://www.sdcounty.ca.gov/dplu/docs/Cultural_Report_Format.pdf. and http://www.sdcounty.ca.gov/dplu/docs/Cultural_Guidelines.pdf
21	Noise	Section 3.6.2.2 Environmental Impacts Pg. 3-97	The Project does not analyze the potential impacts to the US from the Wind Turbine modulation and low frequency noise. The nearest sensitive receptor is .75 miles away from the nearest turbine located within the US. The EIR/EIS should provide noise analysis and quantifiable data to demonstrate that low frequency noise will not create a noise impact on existing sensitive receptors. The Following paper should be considered as a methodology for determining the impacts from the Baja Wind Project: ("The 'How To' Guide to sitting Wind Turbines to Prevent Health Risks From Sound" Version 2.1 dated October 28, 2008 prepared by George W. Kamperman and Richard R. James). Additionally the American Wind Energy Association Method may be calculated in addition to the Kamperman Method.
22	Transportation and Traffic	Section 3.7	The EIS should include the Traffic Control Plan (TCP) as an APM.
23	Transportation Air Traffic Safety	Section 3.7 Pg. 3-107	The EIS mitigation T-1 should also include coordination with CALFIRE (The San Diego Rural Fire Protection District).
24	Air Traffic Safety	Section 3.7	The EIS should address the potential impact from the wind tower/turbines built to up to 431 feet to airport operations in the U.S. Currently, the EIS addresses aviation impacts due to the development of the transmission lines, however is silent regarding impacts in the U.S. from related activities in Mexico (development of wind towers). Potential impacts could be the effects of the wind turbines on military and civilian radar or potential flight paths.
25	Fire Safety	Section 3.9.2	The conclusions in the EIS that the introduction of the project would only be a minor to moderate impact on Fire Safety is not accurate. The portion of the unincorporated county that the project is proposed is considered to be Very High Fire hazard designation. The fire fighting infrastructure and man power is relatively low in comparison to other areas within the county. The introduction of this use within this high fire hazard area makes the risk to human life and safety an unavoidable major and permanent impact. Although mitigation has been proposed, the County does not agree that it lowers the level and significance of the effect.

Section		Subsection, Paragraph, Sentence	Comment or Issue
26	Fire Safety	Section 3.9.3 Mitigation	The EIS should require as a mitigation measure, a Fire Service Development Agreement with the Rural Fire Protection District. This mitigation measure would ensure that the fire services would be available to adequately serve the project.
27	Air Quality and Climate Change	Section 3.10	Use of the Proposed Transmission Line for Non-Renewable Energy Projects: The applicant "Sempra Generation" indicated at the public hearings that they provided documentation to DOE that the proposed transmission line would only be used for transmitting renewable energy. The County concurs with Sempra that the lines should only be used for such purpose because it is foreseeable that the ESJ transmission line could be utilized to transport energy from other nonrenewable resources, such as natural gas. The Presidential Permit Record of Decision should specifically be conditioned to only be used for renewable energy, specifically wind energy from Northern Baja because all practicable means to avoid or minimize environmental harm should be considered (40 CFR 1505.2.c).
28	Air Quality and Climate Change	Section 10.2.3	The measures mention in this section should be made a mitigation measure to reduce the impacts from fugitive dust. Also, any soil stabilizer needs to be a permeable material.
29	Air Quality and Climate Change	Section 3.11	The EIS concludes the project would have a quantifiable positive effect on the environment over the long-term since greenhouse gas (GHG) and criteria emissions from fuel combustion would be avoided because the project would only transmit clean renewable energy (EIS, page 3-146). The EIS should identify that the project is to only transmit renewable energy as a mitigation measure. This would ensure that the GHG emissions would be mitigated by avoidance in accordance with 40 CFR 1508.20. Failure to implement this mitigation measure would not meet the objectives of the EIS and could result in increased impacts to the unincorporated county because the emissions from potential additional fossil fuel power plants in Mexico could increase greenhouse gas emissions, affect climate change, and adversely impact air quality and resources in the San Diego County. If not mitigated, the EIS should evaluate the resulting GHG emissions that could be created by a maximum of 1250 megawatts of fossil fuel based generation.
30	Water Resources	Section 3.11	Surface and groundwater hydrologic features do not cease at the international border. The Hydromodification Analysis should include the entire international drainage area to adequately analyze runoff and storm water flows from grading and construction in both the US and Mexico (see EIS Figure 3.11-1). Furthermore, the conclusions on page 3-158 (Impacts in the U.S. due to Related Activities in Mexico), do not account for potential impacts of flooding or flash flooding due to development of the proposed action in Mexico. The EIS states that "no surface water features traverse the U.S. Mexico border in the project area." However, there is no evidence that surveys were conducted across the border for development of the proposed action in Mexico. Figure 3.11-2 illustrates the survey boundaries, the extent of which end approximately 100 feet into Mexico.
31	Water Resources	3.11.1.2	The groundwater analysis does not analyze the direct effects to the Jacumba Valley Aquifer and groundwater basin because it does not consider the Groundwater extraction Major Use Permit (Connected Action) that the County is concurrently processing. The County can provide the groundwater investigation reports that conclude that there would be no impact to a minor impact to the water basis in Jacumba.
32	Minor Editorial Comment	Page 2-15	EIS inconsistently states the frequency of required fire clearing as both once per year and twice per year. The County recommends clarifying that this would occur twice per year as required by the Rural Fire Protection District, which is consistent with recommendations from the FPP letter report.
33	Minor Editorial Comment	Page 2-24	The EIS incorrectly references Figure 2-8 as providing a simulated view of the ECO Substation. Figure 2-8 does not provide a simulated view of the ECO Substation nor is there such a view in the EIS. The EIS should be corrected accordingly.
34	Minor Editorial Comment	Page 2-27	The EIS incorrectly references Figure 2-7 as providing a simulated view of the proposed wind towers.

Section		Subsection, Paragraph, Sentence	Comment or Issue
35	Cumulative Projects	NA	The DOE should update the project cumulative project list within the Counties of San Diego and Imperial. The cumulative list should also include all proposed renewable energy projects that are within the Bureau of Lands Management (BLM) jurisdiction. The County will provide an updated list to DOE.

European Guideline

CFPA-E No 22:2010 F

Wind turbines fire protection guideline

CFPAEUROPE

European Guideline

FOREWORD

The European fire protection associations have decided to produce common guidelines in order to achieve similar interpretation in European countries and to give examples of acceptable solutions, concepts and models. The Confederation of Fire Protection Associations in Europe (CFPA E) has the aim to facilitate and support fire protection work in European countries.

The market imposes new demands for quality and safety. Today, fire protection forms an integral part of a modern strategy for survival and competitiveness.

This guideline is primarily intended for those responsible for safety in companies and organisations. It is also addressed to the rescue services, consultants, safety companies etc. so that, in course of their work, they may be able to help companies and organisations to increase the levels of fire safety.

The proposals within this guideline have been produced by VdS Schadenverhütung and the author is Hardy Rusch from Germany.

This Guideline has been compiled by Guidelines Commission and adopted by all fire protection associations in the Confederation of Fire Protection Associations Europe.

These guidelines reflect best practice developed by the countries of CFPA Europe. Where the guidelines and national requirement conflict, national requirements must apply.

Zurich, 19 April 2010
CFPA Europe

Dr. Hubert Rüegg
Chairman

Stockholm, 19 April 2010
Guidelines Commission

Tommy Arvidsson
Chairman

European Guideline

Contents

European Guideline

1 Introduction

With the politically declared objective to support renewable energy sources and to increase their share in the overall energy supply significantly, wind turbines have developed rapidly over the last few years. In addition to the expansion of locations, the development is characterized by a constant increase of wind turbines' dimensions (hub height, rotor diameter). and a constant performance increase to up to 6 MW today

The value increase coming along with the performance increase of wind turbines, and increasing requirements with respect to the availability of wind turbines as well as loss experiences made over the last few years have caused

- the German Insurance Association (GDV) and
- Germanischer Lloyd Industrial Services GmbH, Business Segment Wind Energy (GL Wind)

to prepare a VdS-guideline (VdS 3523) on fire protection for wind turbines. This guideline is used as the basis of the following CFPA-Guideline on the same topic.

This guideline will describe typical risks of fire given under the special conditions of the operation of wind turbines. Measures for loss prevention will be suggested as a result of the fire risk analysis. The objective is to minimize the incidence rate and the scope of a potential loss by fire at wind turbines. In addition to special fire protection measures for detecting, fighting and preventing fires, procedural safety measures and comprehensive control technologies/systems for monitoring procedural operations and conditions are required. It must be ensured that the wind turbine is being transferred to a safe state as a result of early detection of malfunctions of the system.

Note: *Measures, which are in responsibility of the operator during operation of a wind turbine and other important facts for the operator, are marked in grey.*

2 Scope of application

The present guideline refers to the planning and operation of wind turbines constructed as lattice mast or tower. The fire protection concept applies to individual wind turbines as well as to wind farms designed as onshore or off-shore installations.

Fire protection requirements on wind turbines refer to the overall system and take into account the system-specific main areas of risk at the rotor blades, in the nacelle (machine house), in the tower, or at the premises. Depending on the kind of risk, different fire protection measures might be required.

Fire protection measures are specifically designed for the operation and for servicing and maintenance activities resulting from the operational process. All fire protection measures should be ready for operation by the time the operation starts at the latest. Fire protection measures mentioned in this guideline do not take into account the assembly period.

This guideline basically applies to turbines that will be newly built. Existing turbines should be adjusted to the fire protection measures mentioned in this guideline as far as is feasible.

European Guideline

3 Risks

Wind turbines differ from traditional power generation systems in terms of the basically existing risk of total loss of the nacelle as a result of initial fire. Main features of risk include:

- High concentration of values within the nacelle
- Concentration of potential ignition sources within the nacelle, and increased risk of lightning strikes
- Unmanned operation
- No possibility of fighting the fire by fire brigades be-cause it is too high
- Remote, sometimes difficult to reach locations of the wind turbines, which is the case with offshore installations in particular

The expenses for wind turbines and their components as well as the restoration costs after a fire increase with the increase of the installed capacity. In addition, the loss caused by service interruption increases with increasing capacity.

3.1 Damage to property and follow-up costs

According to the insurers' loss experience, fires at wind turbines can cause significant damage to property and very high follow-up costs – as shown in the following examples – amongst others due to the downtime of the wind turbine and liability claims, etc.

3.1.1 Property risk

Loss by fire in wind turbines may occur

- in the nacelle,
- in the tower,
- in the electric power substation of the wind turbine or the wind farm.

Today, in most new wind turbines,

- switchgear, inverter, control cabinets and
- transformer

are placed in the nacelle. Thus, the risk of fire increases significantly there. Due to the high density of technical equipment and combustible material in the nacelle, fire can spread rapidly. Moreover, there is the danger that the upper tower segment will also be damaged addition. In case of a total loss of the nacelle, the restoration costs may well reach the original value of the wind turbine.

With respect to offshore wind turbines, significantly higher costs for required special ships, e.g., floating cranes or cable layers are to be expected. In the case of partial loss, in particular, this can significantly increase the overall loss expenses.

3.1.2 Service interruption exposure

Experience has shown that where wind turbines are damaged, service interruptions usually take some time. Interruptions of several months are not unusual. In the case of total damage to the nacelle, the time of service interruption may well last 9 to 12 months. Components with the longest delivery time include, amongst others, gearbox, generators, and transformers. In case of damages to offshore wind turbines, the dependency on the weather when trying to reach the turbines and the dependency on the availability of a crane/service ship cause additional difficulties.

If the damage is so severe that it would be sensible in economic terms to rebuild the turbine, the operator is subject to official obligations. The notice of approval for erecting a wind turbine usually specifies the type of the wind turbine. The operator does not have any possibility to erect a modified turbine at the site of the damaged wind turbine if

- the notice of approval does not apply any longer or
- there is no approval for repowering.

In both cases a new approval procedure is necessary, which might extend the time of service interruption.

If a wind farm's central electric power substation is damaged by fire, all connected plants are disconnected from the public power supply system at the same time. The loss of profits increases proportionally with the number of disconnected wind turbines. Central electric power substations of offshore wind farms represent a particularly high risk of service interruption since they

- comprise a large number of individual turbines each,
- are particularly efficient, which usually results in longer delivery times in case replacements are required, and
- might be difficult or impossible to reach at some times and depend on the availability of crane/service ships, like offshore wind turbines.

3.1.3 Forest fires

A fire in a wind turbine can lead to the situation, that burning elements, which fall down, can cause a secondary fire on the ground where the tower is located. These circumstances can result in a forest fire, difficult in some cases to be extinguished. Very often long distances between the wind energy plant and the fire station and the strong wind prevailing in these places are both factors that can promote the quickly spreading of forest fires.

In these cases the losses not only concern the direct costs for the burned forest, but more the unrecoverable damage to the environment.

3.2 Examples of damages

3.2.1 Fire damage caused by lightning strike

During a heavy summer thunderstorm, the blade of a 2 MW wind turbine was struck by lightning. The turbine was shut down automatically and the blades were pitched out of the wind.

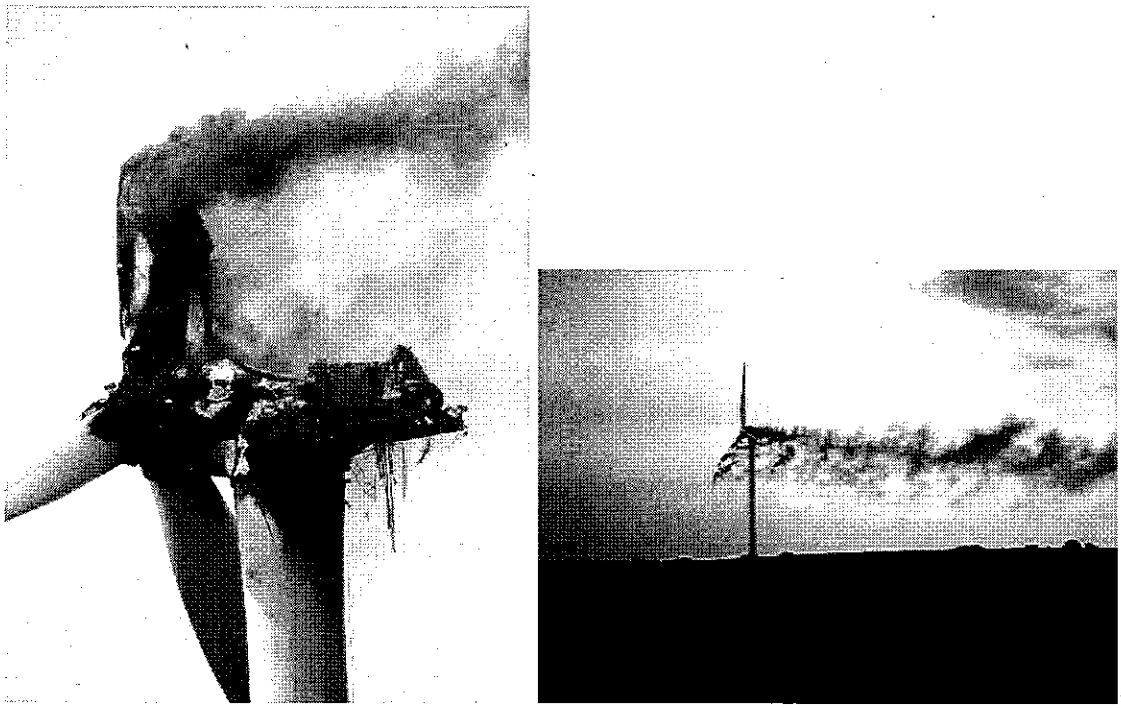


Fig. 1a+b: Fire after lightning struck a 2 MW wind turbine in 2004 (Image source: HDI/Gerling)

The burning blade stopped at an upright position and burned off completely little by little. Burning parts of the blades that fell down caused a secondary fire in the nacelle.

Investigation of the cause of the loss showed that the fire in the blade was caused by a bolted connection of the lightning protection system that was not correctly fixed. The electric arc between the arrester cable and the connection point led to fusion at the cable lug and to the ignition of residues of hydraulic oil in the rotor blades. The nacelle, including the rotor blades, had to be referred to as a total loss. The upper part of the tower had also been destroyed due to the high temperature.

Operations were interrupted for approximately 150 days; the total loss amounted to approximately EUR 2 million. Deficient lightning arrester installations in the rotor blades of wind turbines have already caused several fires.

3.2.2 Fire damage caused by machinery breakdown

The nacelle of a 1.5 MW wind turbine completely burned out after the slip ring fan of the double-fed induction generator had broken. Sparks that were generated by the rotating fan impeller first set the filter pad of the filter cabinet on fire and then the hood insulation. The damage to property amounted to EUR 800,000.

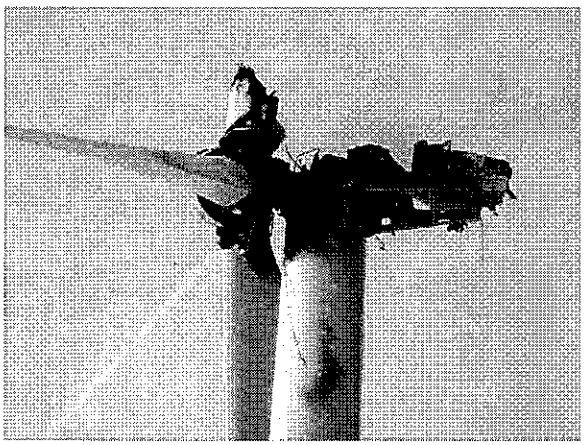


Fig. 2: Burnt down nacelle of a 1.5 MW wind turbine (Image source: Allianz)

3.2.3 Fire damage caused by failure in electrical installations

Low voltage switchgear was installed within the nacelle of a 1 MW wind turbine. The bolted connection at one of the input contacts of the low-voltage power switch was not sufficiently tightened. The high contact resistance resulted in a significant temperature increase at the junction and in the ignition of adjacent combustible material in the switchgear cabinet. The fuses situated in front did not respond until the thermal damage by the fire was very severe. Control, inverter and switchgear cabinets that were arranged next to each other suffered a total loss. The interior of the nacelle was full of soot. Despite the enormous heat in the area of the seat of fire, the fire was unable to spread across the metal nacelle casing. The damage to property amounted to EUR 500,000.

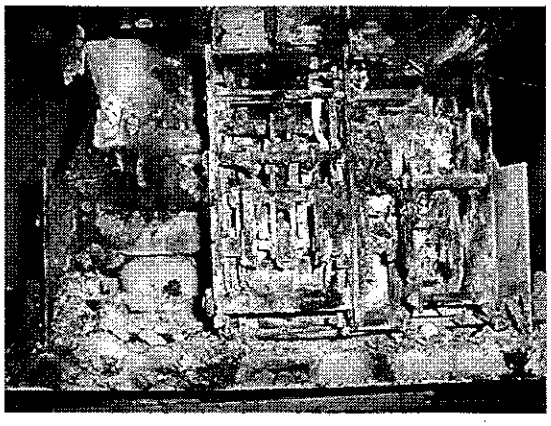


Fig. 3: Power switch of a 1 MW wind turbine – destroyed by fire (Image source: Allianz)

3.2.4 Fire damage caused by resonant circuits

Several areas of damage were caused by parallel resonant circuits existing of capacitors (reactive power compensation or line filters) and inductances (generator, turbine transformer, energy supply companies, power chokes, etc.) which had not been taken into account when designing the turbine. The resonant circuits were activated by harmonics. Resonance phenomena generated high currents which damaged capacitors. Breakdowns in the dielectric of the already damaged capacitors – usually caused by overvoltage events – resulted in an increase of power loss and in some cases in the bursting of the capacitor containers. The resulting fires caused total loss to the reactive power compensation or to the inverter. Protective circuits through discharge resistors and choking were not available in these cases.

Fig. 4: Burst pressure vessel of a line filter capacitor (Image source: Allianz)

3.3 Causes of loss by fire

Based on loss experiences of insurers, the following paragraphs will provide an overview of typical causes of an outbreak and spread of fire.
The causes of loss by fire are basically the same with offshore wind turbines and with onshore wind turbines. However, due to stronger exposure to environmental conditions and currently still quite limited experiences, the probability of technical defects and thus the risk of fire are probably higher with offshore wind turbines than with onshore wind turbines.

3.3.1 Increased risk of an outbreak of fire caused by lightning strike

A large number of cases of loss have shown that lightning strikes are among the most frequent causes of fire at wind turbines. The special risk of lightning strikes arises from the exposed locations (often located at a higher altitude) and the large height of the structure, amongst others.

The risk of fire increases particularly when the lightning protection system is not implemented and maintained properly. If the contact resistance of the lightning conductor path is too high, thermal damage is almost inevitable in case of lightning strike.

3.3.2 Electrical installations

Besides lightning strikes, failures in electrical installations of wind turbines are among the most common causes of fire. Fire is caused by overheating following overloading, earth fault/short circuit as well as arcs. Typical failures include the following:

- Technical defects or components in the power electronics (e.g., switchgear cabinet, inverter cabinet, transformer) that have the wrong dimensions
- Failure of power switches
- Failure of control electronics
- High contact resistance due to insufficient contacts with electrical connections, e.g., with bolted connections at contact bars
- Insufficient electrical protection concept with respect to the identification of insulation defects and selectivity of switch-off units
- No or no all-pole disconnection of the generator in case of failure/switch-off of the turbine
- Missing surge protection at the mean voltage side of the transformer
- Resonances within RC (resistor-capacitor) circuits (line filter, reactive power compensations)

3.3.3 Hot surfaces

If all aerodynamic brakes fail, mechanical brakes, which slow down the rotor, can reach temperatures that result in an ignition of combustible material. In case of such an emergency braking, flying sparks that are caused by mechanical brakes without covers also pose a high risk since flying sparks might also ignite combustible material that is further away. Defects at turbines or parts thereof, e.g., leakage of the oil systems and dirt, increase the risk of fire.

Other risks exist in case of overloading and poor lubrication of generator and gearbox mountings. In these cases the mountings get too hot. Combustible material and lubricants can ignite when they get in contact with hot surfaces. For example, if a failure at the mounting leads to rubbing of rotating components, the flying sparks resulting might cause a fire.

3.3.4 Work involving fire hazards

Work involving fire hazards relating to repair, assembling and disassembling work, e.g., welding, abrasive cutting, soldering and flame cutting, are a frequent cause of fire. Due to the high temperatures that occur during these activities, combustible material that is in the close or further environment of the working site may get on fire. Welding, cutting and grinding sparks are particularly dangerous since they can ignite combustible material that is at a distance of 10 m and more from the working site. Many fires break out several hours after the completion of work involving fire hazards.

3.3.5 Fire load

A wide variety of combustible materials that can cause an outbreak of fire and result in a fast spread of fire are being applied in the nacelles of wind turbines, e.g.,

- internal foam sound insulation of the nacelle, in parts contaminated by oil-containing deposits,
- plastic housing of the nacelle (e.g., GRP),
- oil in the hydraulic systems, e.g., for pitch adjustments, braking systems; if there are any damages or if the temperature is very high, high pressure in the hydraulic pipes can cause the hydraulic oil to escape finely nebulized, and this can cause an explosive spread of the fire,
- gearbox oil and other lubricants, e.g., for the generator bearings,
- transformer oil,
- electrical installations, cables, etc.

Hydraulic oils, oil-containing waste that has not been removed, and lubricants, which are stored in the nacelle are additional fire loads and not only increase the general risk of fire unnecessarily, but also increase the risk of a spread of fire.

3.3.6 Strongly limited accessibility for fire fighting

With the currently available means, fire brigades do not have any chance to fight a fire at wind turbines if the nacelles or rotors are affected. The fire brigade's turntable ladders do not reach the necessary height. Therefore, a nacelle that is on fire cannot be reached from the outside. The way towards the nacelle via ladder or elevator of a burning turbine is also perilous for fire fighters, and therefore, this is also not an option. Fire fighters are exposed to the risk of getting hurt by burning parts falling down even on the ground in the surroundings of the turbine. Due to the fact that there is an increasing trend to integrate transformers into the nacelle, fire fighters also have to pay attention to high-voltage power lines.

With respect to the fires that have occurred so far, the fire fighters' work has been restricted to the protection of the location of the fire and the prevention of secondary fires on the ground or at adjacent installations.

In case offshore wind turbines are affected by fire, manual fire fighting from the outside is not to be expected.

3.3.7 Restrictions with respect to maintenance (servicing, inspection and repair)

Due to the cramped confines in wind turbines and the limited accessibility of the turbines' components it is very difficult for the maintenance staff to conduct maintenance work appropriately and professionally. The quality of work might suffer from the difficult conditions.

4 Protection targets and protection concept

Experience has shown that in order to ensure the required fire safety it is always sensible to prepare a fire protection concept after consulting with all parties involved, the insurer in particular. According to this concept, all structural, turbine-specific and organizational protection measures shall supplement each other in terms of risk and protection targets, and any kind of mutual impairment of protection functions shall be excluded. The risks of an outbreak of fire shall be limited effectively by the following, amongst others:

- Use of non-combustible or difficult to ignite materials
- Early fire detection with automatic fire detection/alarm systems
- Frequent as well as professional maintenance
- Automatic switch-off of the turbines and complete disconnection from the power supply system in the case of fire risks being identified
- Training of employees with respect to handling dangerous situations, and in-house regulations with respect to work involving fire hazards, e.g., welding permit procedure.

In order to limit the risks of fire spread,

- early fire detection with automatic fire detection/alarm systems and
- fire fighting with automatic fire extinguishing systems

have proven to be effective in addition to the use of fire resistant components and shall be installed.

Moreover, an emergency plan in order to limit potential damages shall be prepared. The plan must be kept updated. Implementation of this plan should be ensured by means of staff training that take place on a regular basis.

Highly acknowledged rules of technology have been prepared for planning, implementation and operation of these fire precautions as well as for assuring their quality. The present European Guidelines shall be used, harmonised on the special boundary conditions of wind turbines (e.g. climate and temperatures in and outside of the nacelle, etc.).

In addition, changes of the conditions in the power train can be detected early on by means of condition monitoring systems (CMS), and thus the risk of an outbreak of fire due to such changes can be prevented (see also Germanischer Lloyd (GL), guideline for the certification of condition monitoring systems for wind turbines).

In case existing wind turbines shall be revised in terms of fire protection according to this guideline, it should be clarified in advance with authorities, the manufacturer of the turbine, the certifying body of the turbine, and the insurer, amongst others, whether a renewal of the official approval and certification of the turbines might be required due to retrofitting. It is generally sensible to grade the required scope of protection depending on the risk parameters. In doing so, the following have to be taken into account, e.g.,

- loss experiences with different types and components of turbines,
- capacity of the turbine in MW,
- structure of the wind turbine and arrangement of risk components,
- location of the turbine (onshore or offshore),
- amount insured, and
- amount of deductibles.

The required scope of protection for wind turbines may vary depending on the object-specific risk and the risks to be insured, which can also significantly determine the insurability according to the insurers' experience.

Table 1 shows an example of the grading of protection measures by means of so-called protection levels (independent from e.g. the location or capacity of the wind turbine because of the low influence out of that). It is possible to agree upon a different grading of protection measures after consulting with the insurer. Lightning and surge protection according to paragraph 5.1.1 as well as general electrical protection measures according to paragraph 5.1.2 are generally implied.

Thinking about losses due to business interruption, the protection level of a wind energy plant can vary depending on the fact, if the plant is part of wind energy park or if it is a single plant.

Moreover, in case the automatic early fire detection system which serves to monitor the installation is activated, the wind turbine shall be automatically shut down and disconnected completely from the power supply system.

Table 1: Examples of protection levels

Protection measures as modules	Protection levels			
	0	1	2	3
Fire detection system – installation and room monitoring	x	x	x	x
Fire extinguishing systems - installation protection				
Control, inverter and switchgear cabinets (LV/MV)		x	x	x
Transformer			x	x
Hydraulic system				x
Slip ring housing of the generator				x
Fire extinguishing systems - room protection				
Raised floors with oil sump and cable and electrical installation			x	x
Nacelle with generator, transformer, hydraulic systems, gearbox, brake, azimuth drive				x
Hub with pitch drive and generator, if applicable				x
Tower base/platform with existing installations, if applicable				x

Evidence of the effectiveness and reliability of turbine-specific fire precautions can be provided through use of components and systems approved by an independent third party certification body.

The overall fire protection concept for wind turbines shall be checked by an independent, acknowledged body after consultation with the insurer, if applicable, with respect to whether an adequate protection against risk is ensured for the respective wind turbine.

5 Protection measures

The following explanations represent an instruction for specifying fire precautions in the framework of a turbine-specific fire protection concept.

5.1 Reducing the risks of an outbreak of fire

Potential risks of fire and explosions should be identified and important aspects of fire protection should be taken into account during the planning and construction phase.

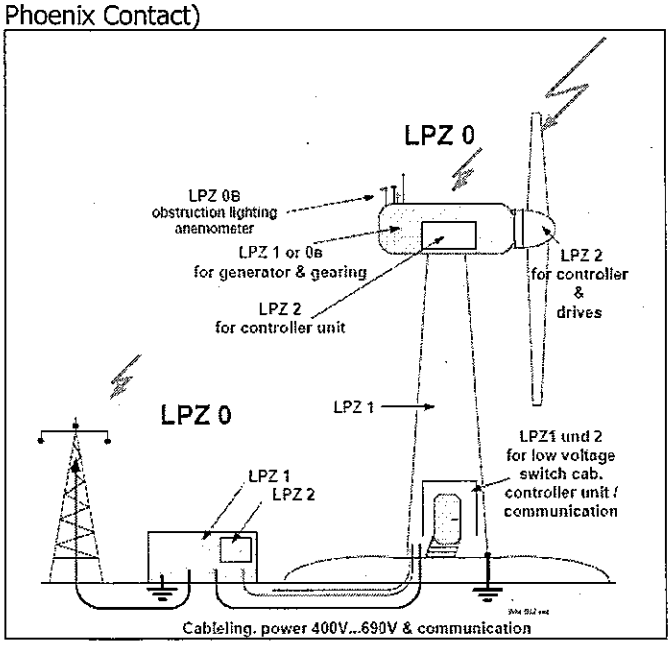
5.1.1 Lightning and surge protection

Wind turbines have to be equipped with comprehensive lightning and surge protection that is adjusted to the individual type of turbine. Systems for lightning and surge protection have to be planned, build and operated like other components of the wind turbine according to the acknowledged rules of technology.

In order to plan systems for the purpose of lightning and surge protection it is necessary to do a risk evaluation or to assume the highest possible risk according to IEC 62305 (lightning protection level I = LPL I). When evaluating the risk, the possible lightning paths, e.g., from the rotor blade via hub, nacelle and tower to the foundation, have to be recorded and observed exactly.

Lightning and surge protection have to cover the nacelle and rotor blades, in particular, as well as any kind of electrical installations or equipment, including cable lines that are relevant for the operation and safety.

Fig. 5: Allocation of lightning protection zones (LPZ) at wind turbines with metal nacelle (Source: Phoenix Contact)



Attention has to be paid to the allocation of the wind turbines' components to individual lightning protection zones depending on the disturbance variable through partial lightning currents and switching surges that may be expected.

In order to design the turbines' components for lightning protection, the relevant protection level of the turbines has to be defined. In doing so, at least protection level II should be chosen for a comprehensive lightning protection system for wind turbines.

However, as is the case with high towers, low current lightning also poses a challenge to wind turbines. "Therefore, protection areas at the tower, nacelle, hub and rotors – also rotating – should be identified by means of the so-called rolling sphere method.

5.1.2 Minimizing the risk of electrical systems

The protection technology, which comprises any electrical installations as well as measures for identifying power system faults and other abnormal operating conditions at wind turbines and the associated peripheral systems, shall be state of the art and comply with current national standards. Its main task is to identify flaws selectively and to switch off faulty parts of the power system or individual electrical equipment, e.g., transformer, line, generator, immediately. There is currently no sufficient protection in most of the older wind turbines.

Graded protection concepts which create mutual reserve protection through the integration of the protection systems of adjacent equipment provide the best possible protection against fire. This applies to the overall system planned by the plant's manufacturer and the wind farm developer and for components which the planner creates on his own according to the plant manufacturer's requirements. For example, with the respective configuration, the risk of fire arising from an arc in a low-voltage switchgear can be prevented despite failure of the power switch. Appropriate arcing fault protection systems detect the fault and open the medium-voltage switch at the transformer's high-voltage side. Thus, the faulty component is being selectively disconnected from the power system. The same goes for high-resistance earth faults which emerge between low-voltage power switch and transformer.

The protection systems have to ensure immediate, controlled shutdown of the wind turbine with subsequent all-pole (medium-voltage side) disconnection from the power system. The activating of protection systems shall send a fault message to the remote control.

5.1.3 Minimizing combustible material

Hydraulic and lubricant oils should be chosen according to the following characteristics: in addition to their technical features required, they should preferably be non-combustible or have a high flash point which is significantly above the operating temperatures of the systems.

The application of combustible material, e.g., foamed plastics such as PUR (polyurethane) or PS (polystyrene) as insulating material or GRP (glass-reinforced plastics) for coverings and other components shall be avoided for fire protection reasons.

If the application of non-combustible material is impossible in individual cases, the material used shall at least be of low flammability. Moreover, closed-cell material with washable surface shall be used in order to avoid intrusion of impurities, oil leakage, etc., which otherwise would increase the risk of fire in the course of the operating time.

Cables and lines shall be used that preferably

- produce only slightly poisonous and corrosive decomposition products,
- do not cause much smoke and cause only little pollution of the rooms and content,
- do not support fire spread

when they burn.

When working with components that contain flammable liquids or oils, it must be made sure that leaking fluids are collected safely, e.g., by installing trays or be applying non-combustible oil binding agents. Leakages are to be removed immediately.

After the work has been completed, the collected fluids must be disposed properly, and contaminated oil binding agents must be removed from the system.

Combustible materials as well as auxiliary materials and operating materials are not allowed to be stored within the wind turbine.

5.1.4 Avoidance of possible ignition sources

Possible ignition sources include, e.g.:

- Lightning current
- Flying sparks occurring during the brake application of a mechanical brake
- Short circuit and arc as well as resonant circuits with electrical devices and systems
- Hot surfaces, e.g., bearings, brake disk
- Spontaneous ignition through dirty cleaning cloths (e.g., oil, solvents).

Components and the before mentioned possible ignition sources must be arranged and executed so that combustible material is not set on fire during normal operation or in case of malfunctions. In order to ensure this it is necessary to install coverings, baffle plates or the like that are made of non-combustible material. Electrical equipments shall be secluded.

Dirty cleaning cloths must be disposed when leaving the wind turbine.

5.1.5 Work involving fire hazards

Work involving fire hazards relating to repair, assembling or disassembling work shall be avoided. If this is impossible it must be checked whether so-called cold procedures (sawing, screwing, cold bonding, etc.) can be used instead.

If work involving fire hazards cannot be avoided it is mandatory to take fire precautions prior, during and after the work in order to avoid an outbreak of fire or to detect a fire early on, and to fight it effectively.

For more information on hot works see CFPA Guideline No 12:2006

5.1.6 Maintenance (servicing, inspection and repair) of mechanical and electrical systems

Fires caused by technical defects at electrical and mechanical systems represent the most frequent causes of loss. Means to reduce such kind of loss include regular maintenance according to the manufacturer's instructions (maintenance manual) and inspections of the systems as well as timely repair of identified deficiencies.

One tool serving this purpose, which is already available at many wind turbines, is systems that automatically monitor important operating parameters such as the pressure and temperature of mechanical and electrical systems such as transformer, generator winding, gearboxes, hydraulic

systems or bearings. If the limiting value is exceeded or is not reached, there must be some kind of alarm and finally an automatic shutdown of the wind turbine. In the course of type testing and certification processes of wind turbines, the monitoring of operating parameters is usually taken into account.

Electrical installations and monitoring systems in wind turbines have to be examined by experts on site on a regular basis. At least every five years the gas and oil of the transformer insulation liquid has to be analyzed.

The analysis allows drawing a conclusion on the quality of the insulating oil and provides insights with respect to possible electrical defects, thermal overloads of the transformer, and the condition of the paper dielectric. If there are any defects in the active component of oil transformers, there is the risk of an explosion due to large electrical currents in connection with the insulating oil as fire load resulting from rapidly increasing internal pressure in the boiler. With respect to drytype transformers, the surface has to be controlled annually, and it has to be cleaned if necessary. Additional safety is provided by installations that serve the optical detection of partial discharge (spark switch).

Recurring inspections of electrical installations shall take place every two years.

In addition to these inspections, thermography at the electrical installations shall be examined on a regular basis, e.g., in the following areas:

- Connection areas and, if possible, contacts of the LV HRC fuse switch disconnectors
- Clamping devices and terminal strips, respectively, in distribution boards as well as switch terminal blocks and control terminal blocks
- Connection areas and, if possible, contacts of bus bars, contactors, capacitors, etc.
- Connection areas and surfaces of transformers, converters, and engines
- Power cable and cable bundles, respectively
- Surfaces of equipment which may pose a risk in case of heating.

Thermography inspections must be conducted by an approved expert (or comparable for countries, where no certifying system exists) who disposes of the technical qualification and the required measuring instruments. For more information on thermography experts see CFPA Guideline No 3:2003.

Mobile devices which are applied in the course of maintenance and repair have to be inspected on a regular basis according to national requirements. Basically the recommended period is for that is semi-annually; with an unique annually period in maximum in between.

Lightning protection systems have to be inspected by an approved expert at regular intervals, the recommended period is in minimum annually. The inspection of the operability and condition of the lightning protection system includes a visual inspection of all air terminals and down conductors as well as measuring the contact resistance of the conduction path from the air terminals in the rotor blades to the ground terminal lug and measuring the ground resistance of the foundation.

The ground resistance of the foundation according to EN 62305-3 has to be measured in addition in the course of this recurring inspection.

The result of any maintenance activities must be documented in written form, e.g., in a maintenance specification sheet or a report book. Deficiencies that have been identified during maintenance or testing shall be fixed immediately. The correction of deficiencies has to be documented and reviewed.

5.1.7 No smoking

The entire area of the wind turbine must be declared a non-smoking area.

In order to ensure compliance with the ban on smoking, employees and external companies, if applicable, must be instructed accordingly, and sanctions shall be imposed in case of violation of the ban. "No Smoking" signs have to be put up clearly and permanently right at the entry areas of the wind turbine.

5.1.8 Training

Service staff and authorized external companies, if applicable, are to be instructed on the risks of fire at the wind turbine on a regular basis. Instructions may include, amongst others:

- Preventing risks of fire
- Functionality of fire protection systems and installations installed as well as how to handle them
- Correct behaviour in case of fire, e.g., alerting assisting bodies
- Correct use of fire extinguishers

It is recommended to conduct fire protection training, e.g., fire alarm tests, rehearsals for implementation of the emergency plan and evacuation of the nacelle, at regular intervals, and to involve the local fire brigade (for onshore wind turbines) into this training.

5.1.9 Prevention of forest fires

The possibility of the occurrence of a forest fire due to a fire in a wind turbine can be easily prevented by adopting the measures to clean up the area where the tower is located, so that its surroundings are free of all scrub and low bush that can contribute to the spread of fire in a strip of 25 m.

5.2 Fire detection and fire fighting

Operating conditions, first of all environmental and weather conditions, for fire protection systems at wind turbines may vary significantly. The following, in particular, has to be taken into account, e.g.,

- effects of atmospheres containing salt (offshore wind turbines),
- significant fluctuations of temperature due to the change of day and night, e.g., cooling down significantly at night and intensive sun shining at day,
- vibrations,
- oil deposits,
- air change und flow conditions in the nacelle.
-

Moreover, increased humidity, e.g., due to the location, and construction of the wind turbine may have an impact on the functionality of the turbine's technology.

Therefore, effects that may have an impact on the effectiveness and reliability of the fire protection technology have to be taken into account already in the planning phase of the turbine, and they have to be adjusted to the different techniques and constructions applied at wind turbines.

5.2.1 Fire detection

In order to effectively limit fire and consequential loss, fires at wind turbines shall also be detected early on by automatic fire detection systems, in particular, since wind turbines are usually operated without any on-site staff. Distinction is basically made between room and installation monitoring.

On the one hand, automatic fire detection serves to inform the control unit, and on the other hand, it serves to activate the extinguishing devices automatically plus to shut down the wind turbine automatically, if necessary.

Room monitoring

The nacelle and parts of the tower in which the wind turbine technology is installed as well as external transformer and electric power substations are to be monitored by an automatic fire detection system.

Raised floors and ceiling voids or the like with fire loads, e.g., cables and other lines, have to be included in the monitoring.

Fire detectors have to be qualified for the area to be monitored and for the fire characteristics to be expected. Special environmental conditions, e.g., temperature, humidity, and vibrations, have to be taken into account when selecting and operating fire detectors; detector heating may be applied, if applicable. Fire detectors with the characteristic "smoke" should preferably be applied for the monitoring in wind turbines.

Installation monitoring

Applications which are operated, e.g.,

- encapsulated,
- forced-air-cooled and
- in rooms with high air change rate,

e.g., switchgear and inverter cabinets, monitoring of installations is required in addition to the monitoring of rooms. Also for the monitoring of installations, "smoke" should preferably be used as fire characteristic.

The fire detectors' qualification is to be reviewed for each individual turbine depending on the respective operating conditions at the wind turbine and after consulting with the system's owner (manufacturer). Attention is to be paid to optimal fire detection and limitation of false alarms or nuisance alarms, in particular.

Mineral oil transformers shall be protected with so called "Buchholz" relays (pre-alarm and main alarm with shutdown) in addition to room monitoring fire detection and temperature monitoring.

Automatic early fire detection only makes sense if at least the following reactions are triggered in case of activation:

- Fire alarm with alarm signal being forwarded to a continuously manned post
- Shutdown of the wind turbine and complete disconnection from the power supply system

- Activation of the installation and room protection extinguishing system with two-detector dependency (according to EN 54, type B)

Detection systems that allow different alarm thresholds offer the possibility to induce gradual reactions depending on the alarm thresholds, e.g., pre-alarm, main alarm, etc..

When selecting a fire detection system it is important to pay attention to the fact that the maintenance required can be ensured in a feasible way given the location and the little space in the nacelle.

Table 2: Support information on the selection of fire detectors for monitoring rooms and installations

Type of detector / Room/Installation	Smoke detector			Heat detector (index "R" according to DIN EN 54-5)		Flame detector		Multi-sensor smoke detector	
	Point-shaped	Multi-point-shaped	Linear	Point-shaped	Linear	IR	UV	Smoke and heat	Smoke and CO
	Scat-tered light	Aspirat-ing	Light beam						
Nacelle with transformer, including hub and raised floors	-	+	-	-	-	-	-	-	-
Central electric power substation, switch cabinet rooms	+	+	+	+	+	-	-	+	+
Tower base/platform with available installations, if applicable	-	+	-	+	-	-	-	-	-
Switchgear cabinets	+	+	-	-	-	-	-	+	-
Hydraulic systems	-	+	-	+	-	-	-	-	-
Transformer	-	+	-	Buchholz relay		-	-	-	-

+ basically suitable - not likely suitable

The data in this table refers to the basic suitability of several types of detectors with respect to functionality and general application conditions in the respective area of the wind turbine's system; it serves as orientation guide and does not replace the required proof of suitability as well as the object-specific technical planning by appropriate specialist planners, e.g., certified installers. Type-specific characteristics of wind turbines and fire detection systems have to be taken into account after consulting with the insurer (e.g., Insurer engineering department) as well as the certifying body for wind turbines, if applicable (for more information on detection systems see also CEA-Specifications for the planning and installation of fire detection systems at www.cea.eu).

5.2.2 Fire fighting

Due to the fact that wind turbines are usually operated without any on-site staff and due to the time-consuming accessibility (in case of offshore wind turbines, in particular) and the strongly limited accessibility for fire fighters, effective fire fighting and thus limitation of loss can be ensured by automatic fire extinguishing systems.

Fire extinguishing systems

For the purpose of effective fire protection of wind turbines, automatic, stationary fire extinguishing systems shall be installed. Gas extinguishing systems as well as fine water spray systems are suitable (taking into account the special conditions given and the personal safety for the staff). These fire extinguishing systems can be used as installation- or room protection systems or as a combination of both. Installation protection systems have a selective effect on the device or component to be protected.

Before the fire extinguishing system is activated, the air-conditioning or ventilation system must be switched off automatically.

With respect to the application at wind turbines, extinguishing agents that are as residue-free, non-corrosive and non-electro conductive as possible, and which are suitable with respect to the prevalent environmental conditions at wind turbines (temperature, weather, impermeability of the installations and rooms to be protected) and the fire loads would be desirable. The following systems can be applied at wind turbines, depending on the intended type of application:

- Carbon dioxide (CO_2) fire extinguishing systems
- Inert gas extinguishing systems
- Fine water spray systems (water mist systems)
- Water spray systems (transformer and electric power substation, respectively).

Foam extinguishing systems can be used with every allowed kind of foam expansion.

Powder extinguishing systems as well as aerosol extinguishing systems cannot be recommended for application at wind turbines since they may cause consequential loss.

Suitability of automatic fire extinguishing systems for the purpose of room and installation protection is to be reviewed for each individual turbine by taking into account the respective operating conditions at the wind turbine and by consulting with the manufacturer. The following aspects, in particular, have to be taken into account:

- Effectiveness of extinguishing
    - Required extinguishing gas concentration and impingement of water, respectively
    - Application (residence) time for gas extinguishing systems (taking into account possible reignition)
    - Operating time of water extinguishing systems (taking into account an effective extinguishing success)
    - Impermeability of the room/pressure relief
- Storing of extinguishing agents (required quantity, weight, etc.)

- Volume/Required space
- Installation/Approval, implementation
- Maintenance
- Reliability (robustness of the systems with respect to susceptibility to failure in order to limit maintenance and inspection intervals)
- Cost

In order to ensure the effectiveness of gas extinguishing systems it is necessary to pay special attention to the planning requirements in connection with the pressure relief openings that will have to be provided. Moreover, attention should be paid to the required protection regulations with respect to the safety of persons when applying gas extinguishing systems.

Each extinguishing system has certain limits of applicability or advantages and disadvantages, respectively. Therefore, the suitability of the chosen extinguishing system has to be reviewed for each individual application because of the large number of possible parameters and the given conditions that are to be adhered to in order to ensure the effectiveness of extinguishing.

Fire detection, alarm, alarm control, triggering of a fire extinguishing system and its monitoring is usually done by a fire detection system approved for this purpose (see paragraph 5.2.1).

Fire extinguishers
In order to fight initial fires it is necessary to provide a sufficient number of appropriate and operational fire extinguishers in accordance with national standards. They shall be available in all rooms in which a fire may occur, amongst others in the nacelle, in the tower base and in the electric power substation which might be arranged externally.

The extinguishing agent is to be adjusted to the existing fire loads. Due to the negative impacts of extinguishing powder on electrical and electronic equipment it is recommended to refrain from using powder extinguishers if possible.

At least one 6 kg CO_2 fire extinguisher and one 9 l foam fire extinguisher must be installed in the nacelle (paying attention to the risk of frost). And at least one 6 kg CO2 fire extinguisher must be installed at the intermediate levels and at the tower base in the area of the electrical installations each.

Fire extinguishers have to be inspected by an expert at regular intervals, at least every two years. In case the extinguisher is subject to high stress, e.g., due to environmental impacts, shorter time intervals might be required as determined by a risk assessment.

European Guideline

Table 3: Support information on the selection of fire extinguishing systems for room and installation protection

Extinguishing systems (extinguishing agents) / Room/Installation wind turbine	Gas extinguishing systems		Water extinguishing systems				Other extinguishing systems	
	CO_2 (high pressure)	Inert gases	Sprinkler	Water spray	Fine spray	Foam	Powder	Aerosol[1)]
Room protection, e.g.,								
Nacelle with generator, transformer, hydraulic systems, gearbox, brake, azimuth drive	+	+	+	+	+	-	-	-
Hub with pitch drive and generator, if applicable	+	+	+	+	+	-	-	-
Raised floors with oil sump and cable and electrical installations	+	-	+	+	+	+	-	-
Central electric power substation, switchgear rooms (without transformer)	+	+	-	-	+	-	-	-
Tower base/platform with available installations, if applicable	+	+	+	+	+	-	-	-
Installation protection, e.g.,								
Control, inverter, switchgear cabinets (LV/MV), closed	+	+	-	-	+	-	-	-
Transformer	+	-	-	+	+	-	-	-
Control, inverter, switchgear cabinets (LV/MV), open	+	-	-	-	+	-	-	-
Hydraulic system, open	+	-	+	+	+	+	-	-

+ basically suitable - not likely suitable

The data in this table refers to the basic suitability of several fire extinguishing systems with respect to their functionality and general application conditions in the respective area of the wind turbine's system; it serves as a first orientation guide and does not replace the required proof of suitability as well as the object-specific technical planning by appropriate specialist planners, e.g., certified installers. Type-specific characteristics of wind turbines and fire extinguishing systems have to be taken into account after consulting with the insurer (e.g., Insurer engineering department) as well as the certifying body for wind turbines, if applicable (for more information on fire fighting systems see also CEA-Specifications for the planning and installation of the respective fire extinguishing systems at www.cea.eu).

1) There is currently no empirical information available on the reliability and effectiveness concerning the application of aerosol extinguishing systems

5.2.3 Fault monitoring

Fire detection systems and fire extinguishing systems have to be monitored constantly in order to ensure their operational reliability.

Failures with traditional fire protection systems, e.g., failure of individual fire detectors or leakage at the extinguishing agent stock or shrinkage of the extinguishing agent supply will be displayed directly at the fire protection system by means of an error message. Due to the operation without on-site staff and the remote location of wind turbines and the resulting non-identification of possible failures at the fire protection system on site, forwarding of all error messages to a permanently manned post (control post) is required. This control post will then initiate immediate recovery of the unlimited operational readiness of the fire protection system.

Any events have to be documented in the report book.

5.2.4 Deactivation of safety installations

Fire protection systems may only be deactivated for a short period of time after consulting with the persons in charge in case of compelling requirements.

When deactivating a fire protection system it must always be checked whether there is any obligation to inform the insurer because of the increase of risk.

Sufficient backup measures must be provided for the duration of the deactivation, e.g.,

- ensuring fire alarm/call,
- providing suitable fire fighting equipment (see also paragraph 5.2.2).

After completion of the work all safety and fire protection installations that had been deactivated have to be set in operation again. The operating condition of the systems must be visible at the entrance area of the wind turbine and at the primary control unit.

5.3 Measures for limiting loss

Experience has shown that it is sensible to prepare an emergency plan for the case of fire. This plan shall in particular include the following specifications:

- Determination of the personnel that is on standby in the internal work schedule for the existing wind turbines (ensuring "twenty-four-seven" standby of the control post)
- Preparation and introduction of an internal, written schedule in case of fire in which any immediate measures to be taken by the employee in charge are included. The schedule should include the following issues:
  - Provision of local emergency telephone codes
  - Notification of fire brigade and police
  - On-site support by fire brigade and police
  - Shutdown of the wind turbine and disconnection from the power supply system, if required
  - Reporting fire damage immediately to the insurer

- Preparation of an emergency plan for the case of fire after consulting with fire brigades and police offices in charge and with the insurer, if applicable. The following issues should be included in an emergency concept:
  - Leave internal standby schedule and a respective standby telephone number with the police and fire brigade
  - Information and briefing, if applicable, of the competent rescue forces (fire brigade, police) on:
    - Structure of the wind turbine
    - High-voltage components and combustible materials within the wind turbine
    - Route description and access to the wind turbine
  - Specification of immediate measures that have to be taken in case of a fire alarm/call, e.g., disconnection of the wind turbine from the power supply system
  - Information on the preparation of an emergency concept in case of fire for each wind turbine, e.g., appropriate emergency vehicles and necessary protective clothing as well as protection zone around the wind turbine affected

The following information shall be easily accessible by everyone at the wind turbine:

- Identification number and emergency telephone number
- Code of conduct in case of fire at the wind turbine, e.g., notification of the fire brigade and seeking shelter as well as observing other safety instructions.

With respect to offshore wind farms alternative or supplementary measures might be required for emergency planning due to special conditions.

5.4 Quality assurance

Experience has shown that the functions of technical installations, of safety-related installations, in particular, can be ensured for their period of operation or service life if appropriate measures for the purpose of quality assurance have been taken with respect to planning, installation and operation. This includes, amongst others:

- Generally accepted standards of technology as fundamentals of planning
- Application of products and systems with proven quality, which might be subject to internal controls and external monitoring, if applicable
- Qualification of specialist planners and installation experts
- Acceptance inspection and recurring inspections by approved experts
- Regular and proper maintenance by specialist companies and trained in-house specialized staff, respectively
- Documentation and monitoring of the maintenance to be performed

These measures shall also be considered and reviewed in the course of type testing or certification of the wind turbine by independent approval bodies.

European Guideline

6 Guidelines

Guideline No 1:2002 F - Internal fire protection control
Guideline No 2:2007 F - Panic & emergency exit devices
Guideline No 3:2003 F - Certification of thermographers
Guideline No 4:2003 F - Introduction to qualitative fire risk assessment
Guideline No 5:2003 F - Guidance signs, emergency lighting and general lighting
Guideline No 6:2004 F - Fire safety in residential homes for the elderly
Guideline No 7:2005 F - Safety distance between waste containers and buildings
Guideline No 8:2004 F - Preventing arson – information to young people
Guideline No 9:2005 F - Fire safety in restaurants
Guideline No 10:2008 F - Smoke alarms in the home
Guideline No 11:2005 F - Recommended numbers of fire protection trained staff
Guideline No 12:2006 F - Fire safety basics for hot work operatives
Guideline No 13:2006 F - Fire protection documentation
Guideline No 14:2007 F - Fire protection in information technology facilities
Guideline No 15:2010 F - Fire safety in guest harbours and marinas
Guideline No 16:2008 F - Fire protection in offices
Guideline No 17:2008 F - Fire safety in farm buildings
Guideline No 18:2008 F - Fire protection on chemical manufacturing sites
Guideline No 19:2008 F - Fire safety engineering concerning evacuation from buildings
Guideline No 20:2009 F - Fire safety in camping sites
Guideline No 21:2010 F - Fire prevention on construction sites
Guideline No 22:2010 F - Wind turbines – Fire protection guideline
Guideline No 23:2010 F - Securing the operational readiness of fire control system
Guideline No 24:2010 F - Fire safe homes

Comment Letter D27

BACKCOUNTRY AGAINST DUMPS

P.O. BOX 1275, BOULEVARD, CA 91905

California Public Utilities Commission
Attn: Iian Fisher

March 4, 2011

BLM California Desert District Office
Attn: Greg Thomsen

Bureau of Indian Affairs
Attn: John Rydzik

c/o Dudek
605 Third Street
Encinitas, CA 92024

VIA: ecosub@dudek.com

RE: Comments on the PUC/BLM DEIR/ EIS ECO Substation, Tule Wind, Energia Sierra Juarez Gen-tie Project DEIR/EIS

Dear Mr. Fisher, Mr. Thomsen, and Mr. Rydzik,

This comment letter is being submitted in addition to the comments submitted by the Law Offices of Stephan C Volker, and those submitted by others, on behalf of our small public benefit non-profit all-volunteer group. D27-1

For the record, we hereby incorporate, by reference, the comments submitted today, March 4, 2011, by the Boulevard Planning Group, and all previous comments submitted on all three related projects, by both our non-profit group and the Boulevard Planning Group. D27-2

Please take note, that a CD version of the video recording of our January 19th community meeting was mailed yesterday to Dudek via express mail, with a cover letter requesting that the CD become part of the record for this joint DEIR/EIS review process. Our group organized the meeting, that was co-hosted by several other groups, and arranged for the speakers to make presentations on the adverse effects from industrial wind turbines on public health and safety, property values, and significant cultural resources. There was also a presentation on the lack of need for these projects and viable alternatives. The meeting was held in the equipment bay of the Boulevard Fire & Rescue Department. Please call me with any questions: 619-766-4170 D27-3

Regards,

/s/

Comment Letter D28

BOULEVARD PLANNING GROUP

PO BOX 1272, BOULEVARD, CA 91905

California Public Utilities Commission
Attn: Ian Fisher
c/o Dudek
605 Third Street
Encinitas, CA 92024

March 4 , 2011

BLM California Desert District Office
Attn: Greg Thomsen
22835 Calle San Juan de Los Lagos
Moreno Valley, CA 92553-9046

Bureau of Indian Affairs
Attn: John Rydzik
2800 Cottage Way
Sacramento, CA

VIA E-MAIL: ecosub@dudek.com

RE: DEIR/EIS COMMENTS / ECO SUBSTATION, TULE WIND & ENERGIA SIERRA JUAREZ (ESJ)

THE *NO PROJECT ALTERNATIVE* IS OUR PREFERRED ALTERNATIVE TO AVOID SIGNIFICANT CUMULATIVE CLASS I IMPACTS TO NUMEROUS AT RISK AND IRREPLACEABLE RESOURCES INCLUDING LOCAL RESIDENTS D28-1

A subset of society should not be forced to bear the cost of an alleged benefit for the larger society--especially when the so-called benefit has been proven to be a harmful detriment. D28-2

Dear Mr. Fisher, Mr. Thomsen, and Mr. Rydzik,

By unanimous vote, taken at our regular monthly meeting on February 3rd, these comments are submitted on behalf of the Boulevard Planning Group, an elected advisory land use group for the County of San Diego and their various departments. D28-3

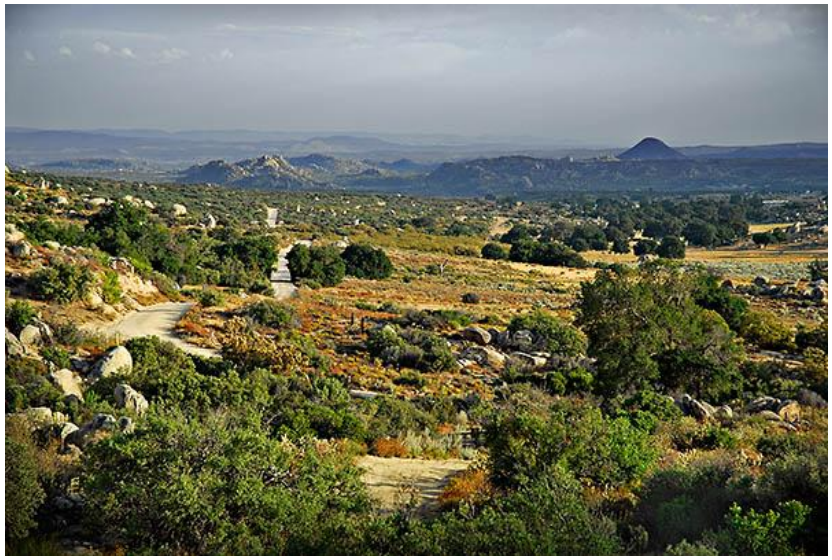
The massive scale, scope, and number of energy and transmission projects that are being foisted upon us are unprecedented. It is very difficult for average citizen volunteers, with no paid staff or government funding to find the time necessary to review and respond to these complex and complicated projects. Especially so, in this case when there are 3 large main projects and multiple cumulative projects. Having to skip back and forth for the different impacts for each and then the cumulative project impacts is virtually overwhelming. We give it our best shot but we needed much more time to do a thorough review and response. D28-4

The cumulative Class I Significant adverse effects to Air Quality; Noise; Biological Resources (Golden Eagles, Bighorn Sheep and more); Visual Character (stunning and vast views) ; Fire Fuels (High fire severity zone) ; Cultural Resources (under surveyed high density, incredibly rich and complex sites), and more, as represented by the proposed project (and cumulative projects) cannot be justified, rationalized, or mitigated. Nor can the similar impacts represented by the Agency Preferred reduced project alternative. We therefore, support the NO PROJECT Alternative, identified at page ES-24 as the top ranked alternative under CEQA and reject any project alternatives that do not further reduce adverse impacts in a compelling and significant manner. Even the DEIR/EIS admits that , "no other feasible mitigation measures or alternatives have been identified that would further reduce project impacts." (ES-25)

D28-5

The agency preferred alternative, for a reduced project and removal of 62 of the proposed 134 wind turbines, and the undergrounding of some lines, still represents unacceptable adverse impacts and risks to our constituents, community as a whole, and to important irreplaceable and priceless resources, such as this view of McCain Valley. The 500kV Sunrise Powerlink will trample along the left side of McCain Valley Road with the Tule Wind 138 kV next to it. The Tule Wind Substation is proposed for the open pasture area near the center of the photo on land we believe was purchased for that undisclosed purpose by the Hamann Companies.

D28-6



We hereby incorporate. by reference, all previous comments submitted on each of these three projects, including our scoping comments on this DEIR/EIS, dated February 15, 2010, all the other comments referenced within that scoping comment document, all previous comments on the DOE's EIS for ESJ, our comments on the San Diego County Wind Energy Ordinance Amendments dated October 10, 2010 (attached), and our comments on the Administrative Permit Applications for the Brucci and Enel Jewel Valley MET tower (also attached).

D28-7

Our community has elected us through multiple election cycles on the same platform to guide local development in a manner that will protect and defend local residents, resources, and the quiet rural quality of life, with vast open vistas and star-studded dark skies, that attracts residents and visitors alike. As previously stated, we strongly resist current wrong-headed and unwarranted political agendas and policies, PROMOTED BY OUR OWN GOVERNMENT AGENCIES AT OUR EXPENSE, to transform our quiet rural and natural communities, public wildlands, scenic vistas and recreation resources, into rural sacrifice blighted industrial energy zones--especially when better, cheaper, and less destructive alternatives are available, viable, and economically competitive--as they indeed are.

D28-8

PARTIAL LIST OF MAJOR AREAS OF CONTROVERSY:

- Need / Request for moratorium on wind turbine project approvals until legitimate 3rd party studies are conducted --and accepted as valid--to determine turbine setbacks that are adequate to protect public health and safety , and to protect livestock and sensitive wildlife.

D28-9

- Need for a CPCN with cost/benefit analysis and cost cap. Where are the consumer watch dogs like DRA and UCAN?

- Lack of evidence for alleged need for these projects / failure to address reduced energy demands that triggered SDG&E request for rate increase / better less expensive and destructive alternatives.

D28-10

- Lack of evidence regarding claims of reduced GHG emissions with wind turbine operations. In the UK, wind companies had to retract false claims that were challenged under truth in advertising laws.

- Lack of evidence of fossil fuel plants shut-down based on proposed renewable energy projects / SDG&E and others have increased the number of new efficient gas-fired power plants in the region with more in the planning / review process.

D28-11

- Potential for above market referent price Power Purchase Agreements for intermittent and unreliable wind energy. SDG&E has a history of this. They do not have to pay the higher price--the ratepayers do. Enel (Jordan/Jewel Valley) actually advertise their success at securing above MRP.

D28-12

- Lack of response from Secretary of Interior to our request to investigate catastrophic failure at Kumeyaay Wind facility / cause of failure / adverse effects and more/ prior to more turbines being approved on adjacent federal lands.

D28-13

- Need for unbiased third party blind health surveys, and testing for noise, low frequency noise, infrasound, and stray voltage within a 2-3 mile radius of the existing 25 Kumeyaay Wind Turbine facility and related substations. We have received numerous complaints

D28-14

and reports of illness, sleep deprivation, anxiety, vertigo, heart issues, at least two suspicious cancer cases at tribal residences near the Kumeyaay Substations, and more, that all started about the time the turbines went into operation. It was also reported that much relief was felt when those turbines were offline for almost 4 months after the December 2009 catastrophic failure occurred.

D28-14 Cont.

- Massive dominating Commercial / Industrial scale wind turbine and infrastructure projects ***do not comply*** with the rural community character, open space and viewshed protections, and ***total lack*** of industrial zoning, in the either the current or draft Boulevard Community Plan or the San Diego County General Plan.

D28-15

- WE strongly disagree that the proposed projects comply with local land use plans are requesting NEPA coordination with local agencies, as required by law *for Productive Harmony*. **There must be actual coordination not just cooperation- 40 CFR 1502.16(c)** requires that the DEIR/EIS discuss: "Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local land use plans, policies and controls for the area concerned."**- 40 CFR 1506.2(d)** requires: "To better integrate environmental impact statements into State or local planning processes, statements shall discuss any inconsistency of a proposed action with any approved State or local plan and laws. Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law."

D28-16

- D.10-7 states that Clover Flat Elementary is 1.25 miles from the Boulevard Substation and the new 138kV line for Tule Wind however, SDG&E has an existing easement just to the south of the school property that could potentially be used for several new 138 kv lines to serve SDG&E's proposed Campo Wind and Manzanita

D28-17

- The DEIR/EIS inexplicably limits Class I Noise impacts to "Short-term construction noise associated with ECO Substation and Tule Wind" (ES-25). Documented Noise / adverse impacts from all the operation and maintenance of an estimated total of up to or beyond 392 industrial wind turbines, related power lines, substations, transformers, inverters, traffic, etc, for the Proposed Project / Alternative Projects / Cumulative projects, need to be recognized, analyzed and addressed in a re-circulated Draft EIR/EIR.

D28-18

- The DEIR/EIS inexplicably discounts public health and safety issues (some already occurring here with Kumeyaay Wind), including but not limited to: adverse health effects, increased turbine related wildfire ignition, noise, low frequency noise, infrasound, vibrations, blade shedding and throw, shadow flicker, tower collapse, potential for wide-spread debris fields from self destructing turbine failures (measured over 2,000 feet or more, up to a mile in the 1980's at Buckeye Wind Farm in Boulevard). *Where are the peer-reviewed studies showing that there are no adverse health effects as the wind industry so falsely claims?*

D28-19

- Growth inducing / ECO Substation being designed so that it will ultimately be expanded to include components for five 500kV lines / 4,480 MW. New Boulevard Substation designed for up to 4 more 138 kV lines. Where will all that energy be produced and where will all those lines be routed? This is part of the "whole of the project" and must be fully analyzed. Our low-income rural communities will be surrounded and overwhelmed by these massive projects and tangled web of power lines and substations. D28-20

- Importing energy exports jobs and violates many stated goals and policies. D28-21

- Energy imported from Mexico, with initial grid tie in California (ECO Substation), is treated as California energy for Renewable Portfolio and Renewable Energy Credits programs (CEC Out of State RPS Guidelines Jan 2011) D28-22

- Energy projects built out of country, that connect to the California grid, must be built in full compliance with CEQA. But who can oversee or assure that compliance in Mexico. D28-23

- Sempra, the parent of Sempra Generation, is reportedly under investigation by the SEC, the FBI and the US Attorney. Investigations have been called for in the last few months, / weeks by the San Diego County Board of Supervisors and the Mexican Congress. News agencies have repeatedly reported that allegations have been made that certain project permits and authorizations were secured through bribery. Sempra denies these allegations but the jury is still out so to say. D28-24

- Significant and cumulative adverse impacts to natural environment, intact habitat and wildlife resources--all totally unnecessary. D28-25

- Significant and cumulative adverse impacts to Visual Resources, historic, cultural and recreational resources --that cannot be mitigated to any acceptable degree.

- Under reporting of very high density of significant and complex cultural resources throughout the area , especially so in McCain Valley and Jacumba, including Traditional Cultural Properties, landscapes, sacred sites, village sites, ceremonial sites, gathering sites, and more. These irreplaceable resources must be protected and preserved through designation of National Monument status, with preservation of existing legal uses. D28-26

- Significant, cumulative, and irreversible adverse impacts to rural community character, quality of life, peaceful enjoyment of one's home and property. D28-27

- Adverse impacts to surface and sole source groundwater resources (including impacts to the blue line Tule Creek and 100 year floodplain and La Posta Creek watershed, groundwater quality and quantity). D28-28

- Significant and cumulative adverse impacts to Property values, increased utility and insurance rates. The DEIR/EIS and project applicants disingenuously tout the much discredited ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY (LBNL) Study "Impact of Wind Power Projects on Residential Property Values in the United States". That report is not worth the paper it is written on. Our community deserves better.

- Need for Property Value Guarantee Agreements similar to those that have been proposed or recommended by Michael McCann of McCann Appraisal, LLC. Iberdrola has informed us that they do not "DO" those! If there is no lost value as they claim, then they should not have a problem providing them to the impacted property owners.

D28-29

- Adverse impacts to tourism and recreation that help support the local economy and businesses that serve the local community and visitors alike.

D28-30

- **Adverse socio-economic impacts to Low income rural communities / Environmental Justice issues. It has been falsely stated that the locally impacted US communities of Jacumba and Boulevard *are too white, are not low income, and there are no environmental justice issues.*** According to information found at www.greatschools.org, Jacumba Elementary with grades K-2 has 50 students with 62% participating in free or reduced-price lunch program. The state average is 51%. 28% are English learners. The state average is 24%. Clover Flat Elementary in Boulevard with grades 3-6 has 84 students with 91 % participating in free or reduced lunch program. The state average is 51%. English learners are 23% with State average at 24%. We have a higher number of Native American students with 8% at Jacumba Elementary and 12% at Clover Flat. The state average is less than 1%. One would assume that a majority of students on the Mexican side at Jacume and La Rumorosa are of Mexican or other indigenous heritage.

D28-31

- Adverse impacts to established aviation routes of travel, training and operations, communications, surveillance, and search and rescue activities, for our military , the Department of Homeland Security, and emergency services, including fire fighters -- safe operations and personnel safety are at risk.

D28-32

- Questions, and need for full disclosure, over Rough Acres Ranch property ownership of various parcels involved in Tule Wind Project: Hamann Companies / Hamann family members / various charities and foundations (some registered out-of-state) / and how the ownership of project parcels relates to reduced or avoided income taxes and / or property taxes that could in turn result in a lower tax base and lower fees / payments that would otherwise benefit Boulevard Volunteer Fire and Rescue, and other infrastructure. What purpose do the various charities serve? What is their source of income? Who benefits? Are they audited?

D28-33

- Cumulative impacts from 4 major Rough Acres Ranch projects with MUPs. Projects and are being segmented and stalled so they don't have to analyzed as cumulative impacts.

D28-34

As stated in our previous scoping comments for these projects, our group has been actively involved in the public review process for this and other related energy and transmission projects proposed for, and through, our planning area since 2004-05 when Pacific Wind (PPM Energy / Iberdrola) received a categorical exclusion from the BLM El Centro office for their first MET Towers--which we objected to. When Kumeyaay Wind was proposed in 2004 or so, we were not notified in a timely manner and were only made aware of the project when the EA and FONSI were issued. That project went on line in 2005 and triggered problems with brown outs and surges during the previously undisclosed use of emergency generators while our single 69 kV was upgraded to accommodate the 50 MW of new wind energy.

We were also involved in the process where the BLM unlawfully downgraded the highly scenic and culturally and biologically rich McCain Valley Resource Conservation and Recreation Area, through their Notice of Significant Change to the proposed Final EIS for the Eastern San Diego County Resource Management Plan--***based on one single protest from PPM Energy/ Iberdrola***. Copies of that single protest can be provided. See the map copied below (dated June 2008). We have voted unanimously, on numerous occasions, to oppose each of these projects based on the significant and cumulative adverse impacts that they represent to this unique area and the impacted human and natural communities and scientifically identified globally significant and rare resources and vanishing wildlife corridors. Where will the big cats prowl and the Golden Eagles soar when these large intact habitats are chopped up and rendered useless to sustain these large predators?

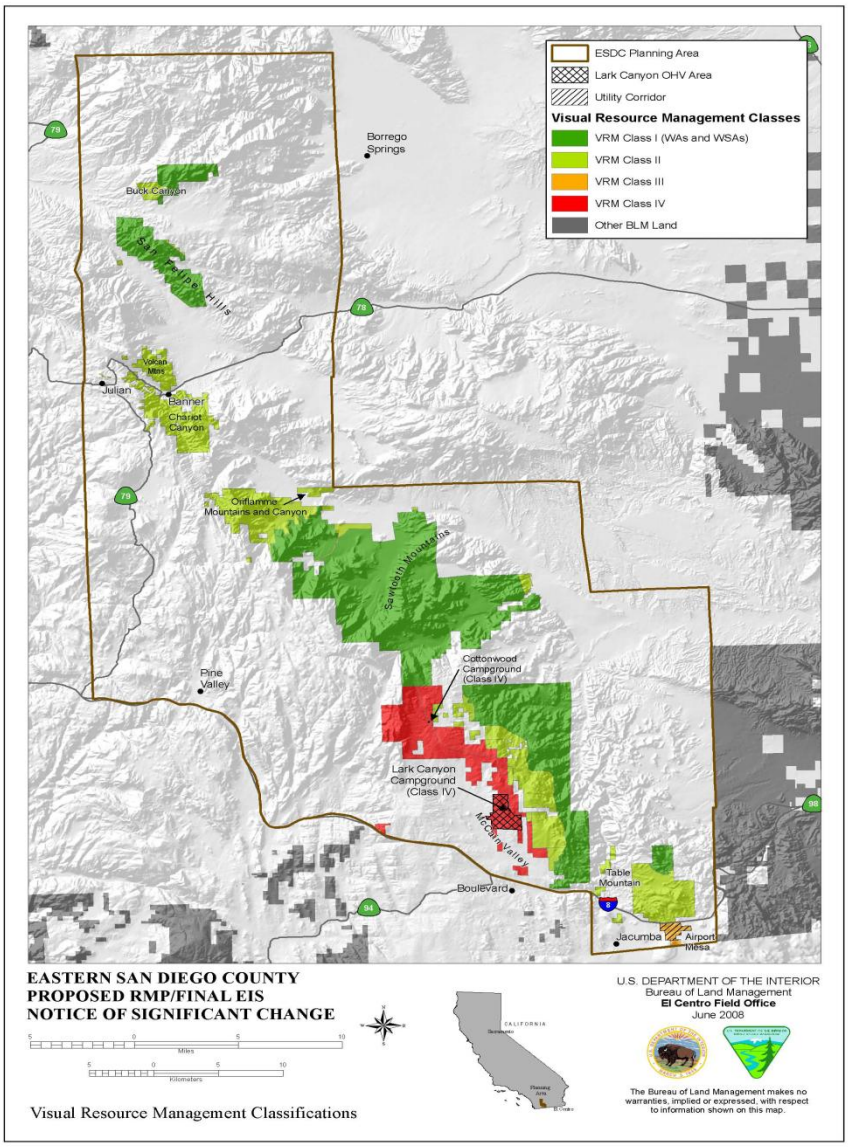
D28-35

The heavily impacted rural East County is extremely fire prone, as well as environmentally, biologically and culturally sensitive. These massive energy projects not only represent adverse impacts to current residents, if not properly sited, they can also impact, damage, and destroy ancient Native American village and camp sites, human remains, graves, grave goods, artifacts, religious and ceremonial sites, traditional cultural properties and landscapes in and around traditional Kumeyaay / Kamia territory. Once destroyed, these critical resources, and the amazing heritage they represent, that should be protected for the benefit of current and future generations, under both state and federal law, cannot be replaced at any price

D28-36

BLM Map, below, shows in red the drastic result of intense lobbying by PPM Energy / Iberdrola. Their one protest to a Final EIS resulted into what we understand was the first Finding of Significant Change to a Final EIS --without a recirculation of that EIR/EIS for public comment on the devastating downgrade.

D28-37



D28-37 Cont.

FIRE:

- We support, endorse, and incorporate by reference, the comments made on this DEIR/EIS by the Boulevard / Jacumba / La Posta Fire Safe Council and Jacumba resident and retired fire fighter, Mark Ostrander.

D28-38

- Figure D-15.1 vividly documents the location of all but a small section of the ECO 138 kV line as a Very High Fire Hazard Severity Zone.

D28-39

- The subject DEIR/EIS and that for the Sunrise Powerlink both ranked the increased risk of fire and interference with fire fighting as adverse Significant Class I and unmitigable.

- The fire impacts ranked as Class I and unmitigable for the proposed and reduced project do **not** fully or adequately address turbine sparked fires, that are a valid concern based on photographic evidence of malfunctioning and flaming turbines, regardless of proposed clearing proposed around the base of each turbine that will be useless during high winds. There are also reliability issues with the proposed self dousing fire suppression systems that Iberdrola has proposed using.

- Tall metal turbine structures and energy fields surrounding them can attract lightning strikes that further increase the risk of fire.

- Many property owners lost their homes in the 2003 or 2007 fire storms that raged through East County. Some were reportedly sparked by SDG&E's infrastructure and poor maintenance. We don't need more powerlines, substations, transformers or inverters here.

- A recent SDG&E Substation fire in Escondido took two days to extinguish. Attempts to contact the CPSD of the PUC, to determine the status of the investigation into the substation fire, were not responded to.

- The introduction of more turbines, transmission lines and substations in underserved rural areas is counter intuitive.

- The cumulative impacts from all these projects on increased fire risk are reason enough to deny both the proposed project and any alternative other than the NO Project Alternative

D28-40

CULTURAL RESOURCES:

- Rural East County and Western Imperial County contain some of the most well preserved and extensive complex cultural sites and resources in the US--at they are being lost on a daily basis for totally unnecessary and unjustified development.

D28-41

- Significant and cumulative impacts to all the cultural resources listed above, and more, from multiple projects identified in the Cumulative Projects list, including the Sunrise Powerlink, are unacceptable. D28-42

- Native American monitors have informed us at Planning Group meetings, and elsewhere. that there are many discrepancies between what has been reported for the proposed project and what the actual physical impacts are on the ground. D28-43

- It has also been reported that developers for all aspects of the proposed project have been less than cooperative and have failed to uphold previous agreements to provide up to 300 feet of flex to avoid significant cultural resources. D28-44

- It is our understanding that there are still outstanding and unresolved siting issues regarding impacted Traditional Cultural Properties, graves, grave goods, ceremonial and camp sites, villages, plant foods, and artifacts, especially in the McCain Valley and Jacumba areas. D28-45

- We have also been advised that artifacts have gone missing once identified and marked for project surveys, and that one project team member was allegedly caught in a theft. D28-46

- Concerns have also been expressed that the proposed destination of collected artifacts at the museum in Ocotillo is objected to and that a better alternative is needed. D28-47

- In the event some form of the proposed project moves forward, a potential mitigation measure would be for the funding, construction, and operation of a Kumeyaay Museum to be jointly owned and operated by the Kumeyaay member nations who so choose to participate. Local tribal members have expressed tentative support for this idea when raised at several planning group meetings. D28-48

- Conservation easements are needed to protect these valuable resources. Those that qualify for the National Historic Register should be so designated ASAP. Designating McCain Valley as a National Monument while preserving current legal uses would be a good start of showing goof faith to impacted Native American tribal members. D28-49

NEPA/CEQA COMPLAINCE:

- The apparent double standard for compliance with state and federal laws and regulations, with large-scale so-called green energy projects getting a virtual waiver, is D28-50

unacceptable, especially when much less destructive projects have been denied outright.

- No double standards should be allowed for renewable energy projects proposed for tribal lands as was recently proposed.

- It is our understanding that SDG&E is / was negotiating with the Campo Reservation Fire Department to install a helipad as part of their Sunrise Powerlink project or this project. It was also alleged that SDG&E openly stated that they wanted to avoid NEPA and CEQA review and expense of that helipad.

D28-50 Cont.

- The conversion of previously protected public lands and resources, designated recreation areas, and open space into for-profit commercial industrial energy zones is neither necessary nor acceptable.

D28-51

- The BLM's down zoning for the Eastern San Diego Resource Management Plan (2008), that changed the zoning from protected to industrial use is the subject of ongoing litigation as part of the federal lawsuit: Case No. 3:10-CV-01222-MMA (BGS): Backcountry Against Dumps, the Protect Our Communities Foundation, the East County Community Action Coalition and Donna Tisdale v BLM, DOI & FWS

D28-52

- The proposed project relies on the Sunrise Powelrink that is the subject of the same litigation noted above. It is also the subject of second federal suit filed against the US Forest Service alleging similar noncompliance with NEPA, ESA, NHPA, FLPMA and more.

D28-53

- The BLM's rushed approval of the Sunrise Powerlink, Imperial Valley Solar, and 5 other large scale ARRA fast-tracked solar projects, with alleged lack of compliance with adequate Section 106 consultation, NHPA NEPA, ESA, and FLPMA has resulted in two lawsuits filed by several Native American Groups with more pending.

D28-54

ARRA Section 1603 grant funding should be denied and the program revoked:

- The United States government recently passed a dubious milestone with debt topping $14 trillion — $45,300 for each and everyone in the country.
- In a period of deep deficits and strained revenues, spending priorities need to be carefully weighed and prioritized

D28-55

- Iberdrola Renewables, a Spanish Corporation, has already benefitted significantly from a reported $ 1 billion in ARRA grants.
- Any ARRA grants applications for Iberdrola's Tule Wind, DFG&E's ECO Substation and/ or Sempra's ESJ should be denied outright based on the lack of need and cumulative Class I significant impacts to critically important resources.
- If wind turbines are being approved on public lands, and portrayed as safe, why was another $745,000 ARRA (2009) grant given to Dow Corning to develop a lifetime lubricant for gearboxes used on wind turbines (to reduce overheating and fires), with the Michigan Aerospace Corp. in Ann Arbor receiving a $748,002 grant for a turbine reliability study and the University of Michigan in Ann Arbor receiving a grant for $413,534 to study voltage control and transient stability. http://blog.mlive.com/mid-michigan business_impact/print.html?entry=/2009/07/dow_corning_to_get_745000_for.html
- **Supersubsidy upon Subsidy** Following the collapse of Lehman Brothers in September 2008, tax-based policy incentives lost much of their effectiveness as the number of tax equity investors declined. Provisions under ARRA were designed to fill the void by reducing, and essentially eliminating, the need for tax advantaged investors. The Section 1603 cash grant program enabled developers to secure direct monetary outlays from the Federal government to cover 30 percent of a project's qualifying cost. (Greenwire October 14). The criteria for receiving the grant were not onerous and the Treasury Department was prohibited by law from ranking the projects before distributing the funds. **Spanish energy giant Iberdrola Renewables, Inc., which received nearly a billion dollars in cash grants alone, argued the money was crucial to promote jobs and economic opportunity (as if the money spent elsewhere would not have done the same .).** But a preliminary evaluation of the grant outlays published last year found that 61% of the grant money distributed through to March 2010 "likely would have deployed under the PTC [production tax credit] if the grant did not exist." In many cases, money went to projects that were already under construction, and in some cases already producing electricity. **Comparing the Subsidies** Around the time ARRA was passed, researchers at Lawrence Berkeley National Laboratory provided an academic comparison between the production tax credit and the ITC/cash grant from the perspective of a project developer/owner. The authors claim that the programs are — at least in theory — equivalent but offer a quantitative financial analysis to determine which program might provide the better financial option based on project characteristics. The study looked at total installed project costs ($/kilowatt) and net capacity factor and calculated the difference between the two subsidies. Tables 2 and 5 from the report show the net value of the ITC/cash grant for wind and geothermal respectively. For wind, the report concluded that "under most capacity factor assumptions, projects that cost $1,500/kW or less are likely to receive more value from the PTC, while projects that cost more than $2,500/kW are likely to be better off with the ITC [cash grants]." For geothermal the report found "the PTC provides more value in nearly all cost and capacity factor combinations

D28-55 Cont.

examined." While we do not doubt the arithmetic used, the range of project costs considered do not reflect the market and leave the reader with a sense that the PTC is an equal or better benefit than the cash grant. For example, wind project costs were assumed to range between $1500/kW and $2500/kW, yet most onshore wind projects built since 2009 are at least $2200/kW and many cost more than $2500/kW. Offshore projects are double at $5000/kW. The authors placed geothermal project costs at under $6000/kW, but typical project costs now start at $6000/kW. Net capacity factors for wind ranged from 25% to 45%, representing generation levels much higher than actual and forecasted for the projects we reviewed, including offshore wind. There are other qualitative benefits under the cash program which shift the rewards to wind and geothermal developers while laying project debt and risks at the feet of American taxpayers. For example, the production tax credit is dependent on project performance; the cash grant is not. This has the effect of eliminating performance risks for the developer. If a project's net capacity factor is marginal the public still grants the cash and projects that would normally not meet financial threshold requirements are apt to get built anyway. The Section 1603 program substitutes government payments for private investments after which the government just walks away. **An Addicted Industry** Upfront cash grants have only served to grow the industry's dependency on federal subsidies and in return, developers have minimal incentive to negotiate lower prices with suppliers and no financial obligation to meet claimed capacity factors. The speed at which the industry became reliant on this new stimulus should not surprise anyone. However, there are cheaper, much more effective opportunities for achieving clean energy goals. Instead, we have succeeded in adopting a policy that drives up construction and energy costs while at the same time eliminating any incentive to build projects that can meet the highest performance standards. In fact, the more expensive a project is to construct the better for vendors, contractors and developers. It doesn't stop there. For intermittent resources, higher construction and operational costs also push up energy prices since there are fewer hours of operation to spread the inflated costs over. Power purchase agreements for onshore wind are at least two times higher than traditional sources of generation. Offshore wind agreements are priced at four times energy market rates....*We wish to thank Mr. William Short for co-authoring our editorial this week. Mr. Short is an independent consultant with a practice that specializes in renewable energy in the New England states.* ----

[1] The federal production tax credit (PTC) was authorized by the Energy Policy Act of 1992 and amended over time. The subsidy provides a 10-year, inflation-adjusted production tax credit for power generated by certain types of renewable energy projects, including wind, biomass, geothermal, and other renewable fuels excluding solar. The inflation-adjusted credit is currently at $21/MWh. To qualify for the PTC, the power must be sold to an unrelated party. The cash grant program under ARRA creates a new subsidy, administered by the Treasury. The program provides grants covering up to 30% of the cost basis of qualified renewable energy projects that are placed in service in 2009-11, or that commence construction during 2009-11 and are placed in service prior to 2013 for wind, 2017 for solar, and 2014 for other qualified technologies. The Treasury is required to make payments within 60 days after an application is received or the project is placed in service, whichever is later. http://www.windaction.org/faqs/30959

D28-55 Cont.

VISUAL RESOURCES

- Eastern San Diego County's much-loved rural character and wide open vistas should be preserved and protected, as they were before the BLM and US Forest Service unacceptably gutted their limited use zoning and visual resource protections to allow a new unplanned utility corridor for Sunrise Powerlink and the industrial zoning needed for Tule Wind. Both those actions are the subject of unresolved federal lawsuits.
- A **premium view** adds value to local private properties. Loss of that view results in a loss in value.
- Loss / degradation of visual resources and premium views also negatively impacts the outdoor / wilderness experience that most people seek when they visit McCain Valley and other impacted public lands in the area.

D28-56

- Most if not all of the visual simulations of the proposed project and alternatives, inexplicably leave out the 500 kV Sunrise Powerlink lines that represents significant and cumulative impacts for a significant portion of the ROW for the Tule Wind turbines and 138 KV line, and the ECO / Boulevard Substation 128 kV line. (D.3 Visual). This needs to be corrected as it does not represent the visual and other impacts as we know them.

D28-57

- Figure D.3-17 C shows the proposed 138 kV line for Tule Wind AT THE ENTRANCE TO MCCAIN RECREATION AREA and MCCAIN VALLEY NATIONAL COOPERATIVE LAND AND WILDLIFE MANAGEMENT AREA, but it does not include the Surnise Powerlink that is proposed to run in that very same location. This is a significant misrepresentation and needs to be corrected.

D28-58

- The visual simulation of the view of the proposed Boulevard Substation from adjacent homes is missing and should be included. Only the current view is shown.(D.3-14a)

D28-59

- The KOPs for ECO Substation do not show any views from elevated locations north of I-8 where a new off-the-grid custom home is located at the base of Table Mountain, or from the top of Table Mountain, located within the ACEC, where stunning unobstructed vast vistas reach far into Mexico and every other direction.

D28-60

PUBLIC HEALTH & SAFETY:

- See comments above on Noise and Fire., and elsewhere in these comments

D28-61

- The DEIR/EIS is missing adequate turbine setbacks from private property lines and residences, public roads, campgrounds, OHV , hiking and riding trails, and power lines. This is a matter of public health and safety.

D28-62

- How can this DEIR/EIS rank potential turbine blade throw and tower collapse as NO IMPACT when the turbines are placed within and immediately adjacent to the Lark Canyon OHV Park and Campground, the Cottonwood Campground, throughout Boulevard

D28-63

- Iberdrola has informed us that turbines are within 300-500 feet of the Sunrise Powerlink. This presents and unnecessary threat of blade throw or turbine collapse

D28-64

taking out the powerlink and /or sparking a catastrophic fire storm. More setback should be mandated.

D28-64 Cont.

Recreation

- Figure D.5-2 shows the significant and cumulative adverse impacts to the BLM's Boulevard/Jacumba Destination Special Recreation Management Areas and Zones. D28-65
- This impact should be ranked as significant and cumulative with Sunrise Powerlink and all the other recognized cumulative impact projects. D28-66
- Figure F-2 shows 16 turbines proposed **within** the Lark Canyon OHV Park and adjacent to the Lark Canyon Campground
- Figure F-2 also shows 9 turbines in very close proximity to the Cottonwood Campground at the north end of McCain Valley Road D28-67
- The proposed locations of all or part of the planned Tule Wind and Energia Sierra Juarez wind turbines will be highly visible from many destination recreation, Widlerness, and ACEC areas resulting in significant and cumulative adverse impacts. D28-68
- Table D.5-1: Reduced / precluded access and/or visitation to these areas, ranked in the top 4 of 10 most visited places within the BLM El Centro's boundaries, will have adverse and cumulative impacts on local businesses who currently enjoy that business. D28-69
- Lost and reduced access to these recreation areas, as stated in the DEIR/EIS will be an adverse impact that cannot be mitigated by posting notices 30 days in advance. Visits to these areas are often spontaneous. D28-70
- Cumulative and significant loss of access and use of BLM lands across the southwest related to these massive renewable energy projects, including the BLM's approval of the 6,500 acre Imperial Valley Solar project on land zoned as Limited Use with numerous open routes and campsites, and the proposed Ocotillo Express Wind ,is wholly unnecessary and unacceptable. D28-71

Socio-Economic:

- **Table D.16-7 admits that, "*the proposed project construction and operation would cause a decrease property value".* But then classifies that impact as *"Not Adverse"!***
- Please explain why reduction of property values for local residents is not adverse, especially when our tax dollars and increased utility rates will be supporting increased profits for Iberdrola, SDG&E and Sempra. D28-72
- The same table claims that the property tax revenues and/or fees from the project presence would substantially benefit public agencies.

- Where is the accounting of any benefits that would flow back into the impacted communities and those property owners whose suffer decreased property value, borrowing power, potential loss of property sales, and quality of life?
- In other impacted communities, where turbines have been placed too close to homes, some property owners have had to abandon their homes due to adverse health effects and lack of interested buyers.
- The project developers should be required to enter into legitimate and enforceable Property Value Protection Agreements to ensure against the total property losses that can be expected as evidenced in other communities impacted by the proliferation of industrial wind turbines too close to homes, along with all the related transmission infrastructure.

D28-72 Cont.

- According to information found at www.greatschools.org, Jacumba Elementary with grades K-2 has 50 students with 62% participating in free or reduced-price lunch program. The state average is 51%. 28% are English learners. The state average is 24%. Clover Flat Elementary in Boulevard with grades 3-6 has 84 students with 91 % participating in free or reduced lunch program. The state average is 51%. English learners are 23% with State average at 24%. We have a higher number of Native American students with 8% at Jacumba Elementary and 12% at Clover Flat. The state average is less than 1%. One would assume that a majority of students on the Mexican side at Jacume and La Rumorosa are of Mexican or other indigenous heritage.

D28-73

Traffic:

- Cumulative traffic impacts to Boulevard and Jacumba's limited access routes and residents, from Sunrise Powerlink, Tule Wind, ECO Substation, Energia Sierra Juarez, the Enel Jewel Valley wind project, the proposed new Campo and Manzanita wind projects, and the new $30 million Boulevard Border Patrol Station, have not been adequately recognized or addressed.
- Complaints are already been received regarding hundreds of sand and gravel trucks heading daily to SDG&E's Rough Acres Ranch construction yard, and numerous near misses with local property owners trying to enter and leave their properties along Ribbonwood Road and Historic Rt 80.
- Construction traffic has been reported to start as early as 5 AM.

D28-74

Mitigation:

- No amount of mitigation can or will reduce the adverse impacts on rural communities. irreplaceable, priceless resources, public health and safety and quality of life.

D28-75

- Developers for all proposed wind turbine projects (on and off-tribal land) should be required to fund a unbiased third party hiring of an independent qualified specialist to conduct pre-construction ambient noise levels with full spectrum weighting at all property lines and homes, within a 1-mile minimum. D28-76

- Legitimate and enforceable monitoring and complaint resolution needs to be part of any project approvals / contractual agreements. D28-77

- The project developers should be required to enter into legitimate and enforceable Property Value Protection Agreements to ensure against the total property losses that can be expected as evidenced in other communities impacted by the proliferation of industrial wind turbines too close to homes, along with all the related transmission infrastructure. D28-78

- In the event the project/reduced project is approved, over justified objections, adequate funding should be required of project developers and committed to new Boulevard and Jacumba fire stations with necessary equipment to attack fires on 500' tall wind turbines, along miles of new transmission lines, and at remote 5-60 acre substations, along with funding for 24/7 staffing and equipment, and station maintenance and operation, with upgrades for the life / lease of the project(s). D28-79

- Any fire mitigation agreements should be required to be negotiated with full disclosure and legally noticed public review and comment, **prior** to any such approvals.

- Additional funding to address the increased fire risk should also be provided through the Jacumba/Boulevard/La Posta Fire Safe Council.

- To prevent future adverse industrial development of the McCain Valley Resource Conservation Area / McCain Valley National Cooperative Land and Wildlife Management Area, I propose revoking the previous changes made to the East County Resource Management Area and support for a new McCain National Monument, with preservation of all currently existing and authorized uses. D28-80

- The most impacted communities of Boulevard and Jacumba should receive the vast majority of mitigation funding rather than less impacted communities like Campo that is much more removed from the cumulative adverse impacts. D28-81

- Boulevard has no real community center, no library, no clinic, no emergency or evacuation center. Our community deserves to have a multi-purpose facility on a lot large enough to accommodate future expansions, and or recreation facilities. D28-82

- Any mitigation funds should go to public entities, not private property owners or their related charities / foundations that do not serve the local community in any real manner.

D28-82 Cont.

FIND OUT WHAT HAPPENED AT KUMEYAAY WIND BEFORE BUILDING APPROVING MORE INDUSTRIAL WIND TURBINES HERE

San Diego Union Tribune photo of Kumeyaay turbines under repair

Prior to consideration of approving any additional wind turbine projects in this area, Secretary Salazar needs to respond to our previous Boulevard Planning Group letter, dated May 21, 2010, asking for an investigation into the cause of the catastrophic failure (December 2009) and several accidents at the Kumeyaay Wind facility located on lands leased from the Campo Kumeyaay Nation, that resulted in the project being off-line for 3-4 months, and the need to replace all 75 turbine blades and other components. Several local residents (tribal and non-tribal) witnessed the blue light ball that arced out to all 25 turbines during a snow storm, and the alleged brake failure, we have heard that over $ 8 million has reportedly been spent so far trying to repair that damage. Discarded blades and other components still litter the ground, one year later. They also report there is ongoing lawsuit between the turbine manufacturer and the project operator over liability for the catastrophic failure.

D28-83

If the explosive electronic failure at Kumeyaay Wind had occurred during dry Santa Ana winds, or a similar one occurs in the future at any one of these existing or proposed project, the outcome may not be isolated to the immediate area of the turbines, and a catastrophic wild fire could be sparked. There is no benefit in that--for anyone. The local community deserves a full investigation and disclosure on this issue and a full accounting of which agencies have oversight and authority over these large scale projects.

D28-83
Cont.

The two photos above, and one below (showing leaking oil) are part of the attached power point document that shown to Congressman Bob Filner at a community meeting held on February 24, 2011 in Ocotillo, CA. They were taken at the Kumeyaay Wind facility on property leased from the Campo Kumeyaay Nation. The photographer was reportedly unaware that they were actually trespassing at the time.

D28-83
Cont.

Wind-farm worker, two others injured by electrical shocks

By Onell R. Soto

ORIGINALLY PUBLISHED APRIL 19, 2010 AT 3:52 P.M., UPDATED APRIL 19, 2010 AT 7:10 P.M.

A semi tractor trailer travels westbound on I-8, passing the wind farm on the Campo Indian Reservation, back in October 2009. Lightning struck the power towers during a fierce storm on Monday, Dec. 07, 2009, causing some damage. (John Gibbins/Union-Tribune)

CAMPO INDIAN RESERVATION — A wind-farm worker who suffered an electrical shock while working about noon Monday was airlifted to safety from the Campo Indian Reservation, authorities said.

Two other men were hurt. One was taken to a hospital by ambulance, and the other sought help on his own.

The three were injured by electrical shocks, but it's unclear exactly how that happened, said Capt. James Williams of the Campo Reservation Fire Protection District.

David Smith, chief operating officer for Bluarc Management, which runs the Kumeyaay Wind farm, said an investigation into the incident is continuing.

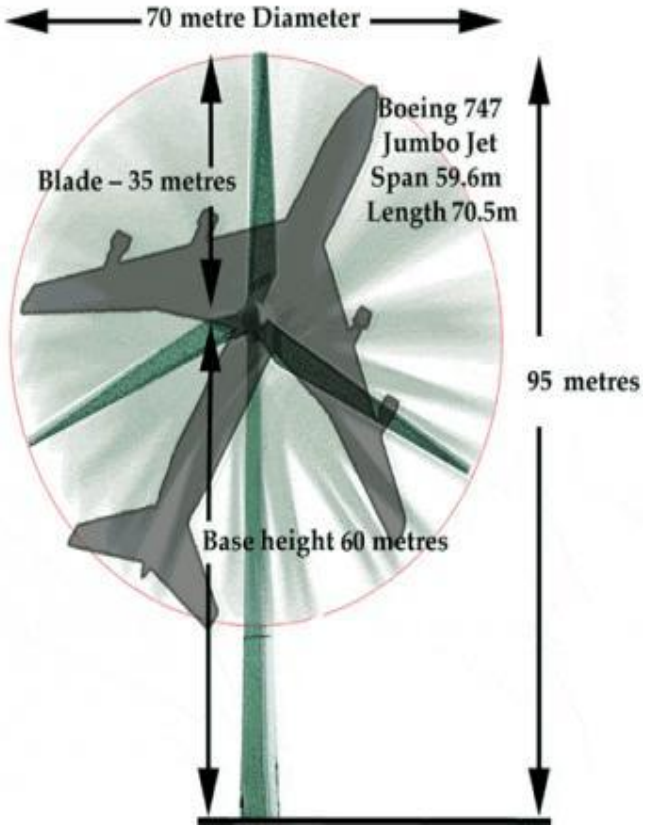
The 25-turbine facility, which generates power for San Diego Gas & Electric, was shut down at noon as a result of the incident.

The wind farm has just recently begun producing power again after the blades on its turbines were replaced following wind damage suffered during a Dec. 7 storm, Smith said.

http://www.signonsandiego.com/news/2010/apr/19/electrocuted-wind-farm-worker-airlifted-to/

D28-83 Cont.

The diagram below, gives an idea of the massive size and intrusion these industrial wind turbines represent, especially when placed on our uncluttered ridgelines that ring our community and residential neighborhoods.



Credits: Naturstrom-Euphorie

D28-83 Cont.

ECO SUBSTATION ISSUES / CONCERNS

The ECO Substation Project includes the following major components:

- Construction of a 500/230/138-kilovolt (kV) substation in Eastern San Diego County
- Construction of the Southwest Powerlink (SWPL) loop-in, a short loop-in of the existing SWPL transmission line to the proposed ECO Substation
- Construction of a138 kV transmission line, approximately 13.3 miles in length, running between the proposed ECO Substation and the rebuilt Boulevard Substation
- "Rebuild" of the existing Boulevard Substation, but it will be a new and much larger substation

D28-84

Additional ECO Substation details:

- 58 acres with 25 acres of additional cut and fill
- 15 X 30 120,000 gallon water tank
- 2 retention basins, 1.2 and 1.9 acres
- Microwave communication tower and backup generator (noise issues) and cumulative Radio impacts

D28-84 Cont.

- Tallest structure 135'
- Approximately 1,500' from nearest property line /but many more residential lots are in close proximity and have not been fully disclosed.

D28-85

- These properties will be vastly reduced in appeal and value but there is no mention of compensation. Other properties were outright condemned for easements.
- A new custom off-the-grid home is less than 3,600 feet just north side of I-8, at base of Table Mountain, with a gorgeous view over the proposed 80 plus acre substation site and on into Baja where the ESJ turbines will be. Yet there are no photos showing the views (value) that will be lost.

D28-86

- DEIR/EIS Project documents / maps do not disclose proximity of multiple vacant private properties within 1 mile.

D28-87

- 13.3 miles of new 138 kV transmission line to connect with new Boulevard Substation (eminent domain)

D28-88

- 14 homes reportedly located within 500 feet of new 138 kV line (DEIR/EIS D.85 Noise)

D28-89

The Growth Inducing Effects of ECO Substation and design to ultimately expand to include up to five 500-kV lines with 4,480 MW capacity *are not addressed:*

" The ECO Substation will be designed so that it will ultimately be expanded to include the following components:

- ***Five 500 kV bays***
- Nine 239 kV bays
- Nine 138 kV bays
- ***Four 500/230 transformer banks***
- Three 230/128 kV transformer banks
- One or more 500 kV series capacitors
- Two 230 kV , 63 MVAR shunt capacitors
- Four 12 kV. 180 MVAR shunt reactor banks
- One 230 kV static VAR compensator

D28-90

Source :SDG&E's ECO Substation Application. Expansion info at page 8 :
http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/SDG&E%20ECO%20Application_A0908003.pdf

D28-90 Cont.

D28-91

- The maximum amount of oil required for the transformers at the ECO Substation will be approximately 569,800 gallons that represent a threat to sole source groundwater supplies and a major fire hazard.

- Where all those new transmission lines will run through our rural communities

D28-92

The photo above shows the SDG&E communication tower that was installed around May 2010 at the Tierra Del Sol project area. Will there be another? This represents cumulative impacts to fire fighters who are quartered less than 100 feet from this cell tower complex , that is much large than shown in this photo

Substation explosions and fires, like the recent SDG&E fire in Escondido, are of major concern, with the potential for out of control fires, and the release of toxic fumes and oil that can either ignite or seep into groundwater and watercourses, and, and only limited emergency response staff, equipment, and funding to address a massive increase in high risk infrastructure into rural communities and sensitive public lands and open space.

D28-93

Photo and news story on Dec 21, 1010 fire below were found at www.10News.com

Transformer Fire At SDG&E Substation Extinguished *Substation Located In 500 Block Of Enterprise Street In Escondido*

POSTED: 3:07 pm PST December 22, 2010

"ESCONDIDO, Calif. -- A stubborn fire sparked when an electrical transformer exploded at a North County utility substation continued to burn for a second day Thursday, until crews ultimately were able to suffocate the flames with a chemical foam. The non-injury blaze at the San Diego Gas & Electric facility in the 500 block of Enterprise Street in Escondido erupted shortly after noon Wednesday. About an hour later, city officials used a reverse 911 system to urge residents within a mile of the heavily smoky fire to limit their time outdoors in the area as much as possible as a health precaution. Crews initially tried to let the blaze, which was burning in a roughly 30- by-30-foot area, burn itself out. Late Wednesday evening, they tried in vain to extinguish it with foam. The blaze kept burning until firefighters attacked it once again with the chemical suppressant this afternoon. The effort finally succeeded shortly before 2:30 p.m., police Lt. Craig Carter said."

SDG&E substation fire video posted on youtube: http://www.youtube.com/watch?v=iEHvpo9i4fU

D28-93 Cont.

BOULEVARD SUBSTATION ISSUES / CONCERNS

Boulevard Substation is not a "rebuild " it will be brand new much larger substation on residential land and taking out a home and mature oaks"

- New 3-acre substation will be built on residential zoned property immediately east of the existing older and much substation.
- ***Boulevard Expansion will allow for up to four generation tie-lines***
- There is evidence that substations and switchyards can generate excessive noise, low frequency noise and infrasound and dangerous levels of EMF and stray voltage.
- Comments were submitted into the record on this project from Paul Thompsen whose home and that of his neighbors, the Kidd family, in Ontario Canada are so adversely impacted from the adjacent wind turbine substation that they cannot live in them. Paul and Kidd family members have also developed a sensitivity to electricity due to overexposure generated by the substation. Attempts by the turbine company to remediate the problems have not been successful. Thompson's property taxes were reduced by 50% after he played a recording of the noise in his home to the assessment board. The Kidd family had to move away and sell their horses and abandon a successful breeding business due to adverse health effects to themselves and their animals.
- Pre-construction health surveys and testing by an unbiased third party must be conducted for ambient full spectrum noise and stray voltage readings, to set a base line that the energy company must maintain at their own expense--not the expense of the impacted neighbors.
- Currently designated 1 DU 4/8/20 acres and zoned S 92 Multiple Use. Pending General Plan Update will re-designate as Semi-rural SR -10 1 DU/20, 20 acres.)
- Existing home and structures will be removed. Mature Oaks may be removed.
- 2 single family homes are located within 500-600 feet (DEIR/EIS D.85 Noise)
- Nearby homes are located south, west, north , and east of new site. (see current views at -14AFigure D.34 existing setting: http://www.cpuc.ca.gov/environment/info/dudek/ecosub/Draft_EIR/D-3_VisualResources.pdf
- About 50 homes or more are within about 1,500' of proposed substation and new 138 kV line as shown in Figure D.4-5c. More are out of site in the Calexico Lodge area across Old 80 to the Northwest.
- At least one known sensitive receptor, ill with cancer and suppressed immune system, lives less than 2,000 feet southwest of proposed substation. Their home is also about 750 feet from the SDG&E easement that is a potential route for two or more new 138 kV lines that will serve Campo and Manzanita Wind projects.
- Two steel poles 85' tall will be installed southwest of new substation. These are much more industrial and view impairing in appearance.

D28-94

- New 138 kV lines will come in from Jewel Valley to the south from ECO Substation impacted many private properties along the way. SDG&E has already used eminent domain despite the fact that their project has not yet been approved.
- New 138 kV lines will come in from the north from Tule Wind--but no easements have been secured and may not be made available. Iberdrola does not have eminent domain rights to condemn.
- 2 New 138 kV lines will come in from the west along an unidentified SDG&E Easement (likely along the line that comes into the existing substation from the west) from unidentified new substation locations that will serve SDG&E's and Invenergy's proposed Campo and SDG&E's Manzanita Wind projects.
- **One or more of these new 138 kV lines (for Campo / Manzanita Wind) will likely pass very near the southern boundary of the Clover Flat Elementary School in Boulevard.**
- New 138 kV line will come in from the Jewel Valley area (south) , from the Ribbonwood Road area (northwest), and potentially from the McCain Valley Road / Old Hwy Road area (northeast)
- **These routes and impacts to those property owners and adjacent property owners must be disclosed and the cumulative impacts addressed.**

D28-95

http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/SDG&E%20ECO%20Application_A0908003.pdf

TULE WIND / IBERDROLA RENEWABLES

IBERDROLA'S INTERFERENCE WITH BOULEVARD COMMUNITY PLAN;

EXPENSIVE $400 K/YEAR LOBBYING CAMPAIGNS;

RECEIPT OF OVER $1 BILLION IN ARRA GRANT REWARDS;

- ## IBERDROLA IS CUTTING BACK ON 2011-2012 INVESTMENTS BY OVER 1/2--SHARES DOWN:

- In 2007, Iberdrola spent around $1.5K in lobbying, in 2008 and 2009 they spent just under $400k and in Jan -July 26 ,2010, they spent $399,950 in lobbying the US Senate, according to the Center for Responsive Politics.
- Bloomberg reported on March 2, 2011 that Iberdrola Renewables is cutting back on 2011-2012 investments by over 1/2 --shares down: http://www.bloomberg.com/news/2011-03-02/iberdrola-renovables-sets-limit-of-350-megawatts-for-investment-in-2012.html
- Iberdrola's 2010 presentation to CEC workshop described their wind energy as an incremental product. Slides shows Big Horn Wind project average at 30 % that is backed up with Iberdrola's own thermal energy. Energy sells to California market and receives Renewable Energy Credits.

D28-96

- Private Rough Acres Ranch property split into many different parcels with different owners of record is involved in Tule Wind with 12 turbine locations, and a proposed 5 acre switchyard another 5 acre O& M building, parking yards, new access roads that cross the Tule Creek flood plain. Impacted properties are in various names related to Hamann Companies, Hamann Family members, Johh Gibson, numerous charities , foundations, and trusts, etc, that can result in reduced or voided taxable income and or property taxes that help support limited local infrastructure including local fire departments and other local funding that comes back to the community that is based on the local tax base.

D28-97

- The proposed Tule Wind Project, consisting of up to 134 wind turbines in the 1.5 to 3.0–megawatt (MW) range generating up to 200 MW of electricity, would be located in the McCain Valley Resource Conservation / Recreation Area. An area that was unlawfully down zoned to accommodate this foreign-owned project on our public lands.
- On August 8, 2009, Iberdrola Renewables wrote a letter to San Diego County challenging our Draft Community Plan using inaccurate and self-serving information in an aggressive move to remove the language that we had written in to the plan to protect our constituents from the adverse effects that have been documented in relation to industrial wind turbine projects installed in close proximity to homes and livestock and sensitive lands and wildlife.
- It is amazing that one of Harley McDonald's comments was "You have a lot of water up here." There is No basis for that opinion.

D28-98

- The two page groundwater resources study for the project does not provide any technical data or actual well data. It only uses items taken from the County's groundwater report. It identifies a O&M building that will require a well, but does not provide anything but conjecture. The document states that water for construction will be provided from another supply.
- The water resources sections mentions 3 wells at Rough Acres, but no details about them, other than that they are there. These are probably the same wells we have been asking for information on for a long time.
- The water resources section and the 2010 Groundwater Resources assessment done by Geo-Logic Associates does not provide any factual, verifiable evidence that groundwater resources are available for the construction or operation of the Tule Wind project.
- The groundwater resources assessment merely documents a county report and a conversation with the San Diego County groundwater geologist

D28-99

- Tule Wind / Iberdrola refuses to identify either the make, model or generating capacity of the turbines they plan to use here.

D28-100

- If the Preferred Alternative is approved with a reduced number of turbines, Iberdrola will likely use 3 MW turbines that are much larger and will generate more adverse impacts to visual, noise, stray voltages, shadow flicker, interference with training, operations and communications for military, Homeland Security, and emergency service aviation activities in the impacted established routes of travel and areas of daily activity for Border Patrol, here, near the border.
- Larger turbines will likely increase EMF around the turbines, on the lines, and at the substations that will in turn impact residents and visitors, pets, livestock, wildlife and habitat.

D28-101

- In addition to up to 134 unidentified industrial wind turbines and associated generator step-up transformers, and the Tule Wind MW Project would include the following components:
- Proposed for approximately 15,000 acres of public land, some private ranch land, tribal land and State Land Commissions Land near Boulevard.
- Closet homes and the Lark Canyon and Cottonwood Campgrounds are 900 feet or more from turbines, transmission lines and ancillary facilities (DEIR/EIS D.86 Noise)
- The residence of an elderly couple, Robert and Kathryn McCallister (APN 61103002 & 61107002 Mc Callister Robert & Kathryn Trust), will be about 2,000 feet east of turbines, and less than 1,000 feet west of both the proposed 500 kV Sunrise Powerlink and Tule Wind 138 kV line. I will be helping them draft a comment letter.
- Another senior couple live on the opposite side of the ridgeline placing turbines far too close.
- A 34.5 kV overhead and underground collector cable system linking the wind turbines to the collector substation

D28-102

- A 5-acre collector substation and a 5-acre operations and maintenance (O&M) facility
- Two meteorological towers and one sonic detecting and ranging (SODAR) unit
- A new 138 kV overhead transmission line running south from the collector &E Boulevard Substation
- 36 miles of newly constructed access roads and temporarily widened and improved existing access roads that will increase dust, erosion, and access to previously protected areas and habitat for wildlife.
- Turbines in J string on Ewwiaapaayp tribal land will be 100 feet from Sawtooth Wilderness Area.
- 11 Turbines on private in holdings in R string, East of McCain Valley Road would be surrounded BLM In-Ko-Pah Area of Critical Environmental Concern
- Turbines will be located within McCain Valley National Cooperative Land and Wildlife Management Area and inside the Lark Canyon Off-Highway Vehicle Park.
- BLM lands were down-zoned from Visual Resource Management Class II to Class IV, in the 2008 Eastern San Diego Resource Management Plan revision, specifically to accommodate the Tule Wind project. That downzone is the subject of unresolved federal litigation.

Facing reality of wind energy

August 11, 2008 in Salina Journal

Iberdrola of Spain, owner of Elk River, realized over $9.9 million in PTC allowances in 2007. Foreign companies are not regulated by the Kansas Corporation Commission. There are no state or federal regulations of any kind on WECS. Few Kansas counties have wind regulations. WECS will force consumers to pay for their electricity three times; to build the WECS, build conventional power as backup, and additional transmission lines to carry power from the WECS to the grid. WECS will not produce large economic benefits to a community as evidenced by records from Gray County (Montezuma), or Butler County (Elk River). Elk River has produced seven jobs. Most employees live outside the community.

Perhaps it would clarify the wind issue if some basic facts were understood. The term is WECS: Wind Energy Conversion Systems, not "farms," "ranches," or "parks." The structures are industrial-scale turbines.

WECS will produce small amounts of energy with an efficiency range averaging 35 percent at most locations. WECS in Kansas in operation or under construction have the ability to produce 1,014 megawatts of electricity at maximum production; less than a quarter of that electricity stays in Kansas.

WECS will not replace conventional coal, gas or nuclear plants, because wind energy is intermittent, unpredictable, unreliable and expensive and cannot be stored in commercial quantities.

D28-103

WECS will not reduce our consumption of oil. Three percent of oil is used nationwide and 1 percent is used in Kansas for "peaking" periods when electricity is in high demand and wind cannot be counted on.

WECS will pay money to very few landowners. Elk River benefits four landowners; only one is local.

WECS will transfer massive amounts of taxpayer dollars to wind developers and owners, 65 percent nationwide are foreign; 14 out of the 17 in Kansas are foreign owned. Benefits include PTC (Production Tax Credits), rapid depreciation schedules and electricity sales.

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WECS will force consumers to pay for their electricity three times; to build the WECS, build conventional power as backup, and additional transmission lines to carry power from the WECS to the grid.

WECS will not produce large economic benefits to a community as evidenced by records from Gray County (Montezuma), or Butler County (Elk River). Elk River has produced seven jobs.

Most employees live outside the community. Construction crews and vehicles were from out of state.

WECS will pay most counties PILOT payments. (Payment in Lieu of Taxes) Considered a "gift" to the county, a "payment without consideration," it is not legally enforceable.

WECS will be totally tax exempt in Kansas unless the current law is changed. WECS will not substantially reduce greenhouse gas, since conventional plants kept in "spinning reserve" to take up slack when wind dies are less efficient.

WECS will contribute to the division and disruption of communities. Riley, Geary, Wabaunsee, Morris, Chase, Butler, Lincoln, Ellsworth, and Ellis counties have all experienced community division involving a wind project. Projects have disrupted communities, split neighbors and even divided families.

WECS will contribute to the destruction and fragmentation of the last remnants of our prairies and open spaces. Elk River's 8,000 acres of beautiful native prairie is now scarred with 100 turbine foundations, trenching to all turbines and about 22 miles of road. The destruction in progress along I-70 at the Smoky Hills wind complex on 25,000 acres of mixed grass prairie shows how native grasslands are turned into an industrial complex that dominates the horizon.

Few developers or power purchasers care about the destruction of the prairie. The notable exceptions are Westar and KCP L who have met with conservation groups and landowners before developing in order to locate their projects more responsibly.

The governor has wisely encouraged developers to leave a portion of the Flint Hills undeveloped, but all open grasslands are at risk.

Rose Z. Bacon ranches with her husband, Kent, in the Flint Hills of Morris County. She was a member of the Governor's Wind and Prairie Task Force.

Web link: Rose Z. Bacon"

D28-103
Cont.

LINKED ARTICLES OF INTEREST:

- **Section 1603: The renewable energy bailout** (02 February 2011)[Tax Breaks & Subsidies]]
- **White House memo and wasteful handouts** (15 November 2010)[Tax Breaks & Subsidies | Energy Policy]
- **Iberdrola Renovables to limit 2012 Investments; Shares decline** (02 March 2011)[General]
- **Lure of crude puts clean energy on the back burner** (27 February 2011)[General | Australia / New Zealand]
- **Wind farms and deadly skies; Turbines on Texas coast killing thousands of birds, bats each year** (27 February 2011)[Impact on Wildlife | Texas]
- | Impact on Birds | New Hampshire]
- **PG&E ends bid to buy wind farm project for $900 million** (21 January 2011)[General | California]
- **Calif. rule may stunt Oregon clean energy market** (20 January 2011)[Energy Policy | USA |

- **Decision denying a certificate of public convenience and necessity for the Manzana windproject** (21 December 2010)[California]
- **Austerity pulling plug on Europe's green subsidies** (25 January 2011)[Energy Policy | Europe]
- **Judge cites condor impact; halts sale of wind farm in Kern County** (25 January 2011)[Impact on Birds | California]
- **In green Spain, unemployment nearly twice U.S. rate** (16 April 2010)[General | USA]
- **Burning Iberdrola turbine** (13 September 2008)[Safety | Structural Failure | Europe]

D28-103 Cont.

Source of linked documents above:
http://www.windaction.org/search?module=search&q=Iberdrola&x=16&y=9

ENERGIA SIERRA JUAREZ GEN-TIE PROJECT

1,250 MW WIND PROJECT & MASSIVE EXPANSION POTENTIAL(SEMPRA GENERATION)

KPBS March 4, 2011: According to US/Mexican news reports, Sempra is currently the subject of ongoing investigations into numerous violations including the Baja Officials Raise Concerns About Sempra's LNG Pl **Download (video with audio)**

By Hank Crook, Alison St John **Editors Roundtable** transcript | Friday, March 4, 2011

First, Ensenada Mayor Enrique Pelayo attempted to shut down Sempra's liquefied-natural-gas terminal in Baja after alleging that permits for the facility were improper. Now, Mexican federal lawmakers are calling for a review of the LNG plant's permits. We talk about why neighbors are concerned about the facility and why officials on both sides of the border are questioning Sempra's business practices in Baja.

Guests: JW August, managing editor for 10 News, **Ricky Young,** watchdog editor for the San Diego Union-Tribune **and Scott Lewis,** chief executive officer of voiceofsandiego.org

D28-104

- The DEIR/EIS reportedly addresses the gen-tie line including any potential impacts to the U.S. associated with wind turbines constructed in Mexico.
- We incorporate by reference all previous comments made during this EIS/EIR process, the DOE's EIS process for this project, and the Sunrise Powerlink EIR/EIS process.
- Sempra Aug 08 letter asks DOE to limit ESJ Gen tie to Renewables and 1,250 MW: http://esjprojecteis.org/docs/DOE_Presidential_Permit_clarification.pdf
- The quote below is perceived as a *lie by omission* -- what the letter does not say is that the ECO Substation will be built to accept up to five 500 kV lines and that the Presidential Permit, once

granted, can be amended to accept much more energy importation from Mexico. And that energy may *not* be renewables.

- "*ESJ U.S. Transmission requests that the import capacity in the Presidential Permit be limited to the physical capacity of the Generator-tie line (1250 MW) and that power on this line be limited to renewable energy projects*."
- See Sempra's linked 2008 letter stating there is an 80 MW limit on SWP and their ECO Substation interconnection Queue shows 2,480 MW lined up: http://esjprojecteis.org/docs/Sempra_response_to_DOE_re_Sunrise-ECOS_05-30-08.pdf
- National and International labor unions oppose this project due to export of jobs.

D28-104
Cont.

- This is just one of many examples of how Sempra runs rough shod over the Mexican people and their resources while reaping incredible profits from their self-serving actions.
- It has been stated that the Mexican environmental permit for this project has been approved. DOE must understand that the first approval is heavily conditioned. Those conditions include: 1) A 1 year avian study 2) A change in land use designation away from Forest Lands 3)Sempra is required to provide specifics on turbine manufacturers, GPS locations for each turbine, road, and project accessory.
- All of these conditions must be met at least 6 months prior to any construction. The Mexican approvals are far from a done deal, which is why they told the press that they will not build the project until it is needed. The project may never be built and this Presidential Permit can then be amended to allow the transmission of non-renewable energy from Sempra's multi-million dollar Mexican Natural Gas infrastructure, including their existing gas line that runs through the Energia Sierra Juarez lease area
-
- **Information found at the bottom of page 35 of CEC Out of State Guidelines (Jan 2011) , reveales that ESJ gen tie line can import energy from a foreign source and tie it into the California grid at ECO Substation and SWPL and it magically becomes eligible to be treated as in-state because it meets their quidelines. All that foreign energy also becomes eligible for Renewable Energy Credits that can be sold on the open market.**

- **However, the CEC Guidelines also say that to be eligible, # 5"if located outside of the United States, the facility is developed and operated in a manner that is as protective of the environment as would a similar facility be if it were located in California., or # 4 faculty would not cause or contribute to any violation of California environmental quality standard or requirement within California>http://www.energy.ca.gov/2010publications/CEC-300-2010-007/CEC-300-2010-007-CMF.PDF**

D28-105

- This project also requires a Presidential Permit (PP-334) from the United States Department of Energy and a Major Use Permit from the County of San Diego, that we have commented on.
- The ESJ is proposed by Energia Sierra Juarez, a subsidiary of Sempra Generation which is a subsidiary of Sempra Energy. Sempra Energy had revenues of $12 billion in 2006, $11 billion in 2008, and $ 8 billion in 2009. In a 2006 report they reported they had provided investors with an average annual return in excess of 15%.
- It was announced in a Sept 28, 2010 press release, that Luis Tellez, who currently serves as chairman of the board and chief executive officer of the Mexican Stock Exchange, was re-elected to join Sempra Energy's board of directors.
- The press release also states that "As a government official, Tellez was a key player in crucial policy decisions to improve the structure of the Mexican economy, agriculture, infrastructure and energy."
- One can surmise that Mr. Tellez has may be handsomely rewarded, in some way, for helping Sempra with their multi-billion dollar investments in their natural gas infrastructure in Mexico,

with shepherding those projects, and the ESJ project, through the Mexican permitting agencies. Sounds like very a convenient and profitable partnership for both Sempra and Tellez. It should be of concern that large part of that profit has likely come at the expense of the Mexican people, their impacted communities, and their resources.

- Sempra's Natural gas pipeline runs through the ESJ lease area. A new water line was installed through the same area in the last few years. In the future, a gas-fired power plant could be built in the ESJ area that could access the proposed cross-border power line with an amended Presidential Permit.
- **Mexican Social /environmental Justice issues:**
- ESJ Is an export only wind energy project. It is our understanding that under Mexican law, Sempra can write off 100% of the cost of their ESJ turbine project through an accelerated depreciation tax incentive for renewable energy projects.
- Therefore, the Mexican people will bear the financial burden of building Sempra's wind energy project that will not provide any energy whatsoever to Mexico. They will likely be subsidizing 100% of the ESJ wind energy that will be exported for use by American consumers. If that is not a social/environmental injustice, what is?
- Then on the US side, the California rate and tax payers get to pay for increased energy price and rates for remote Sempra wind energy previously reported at $400 million, the $300 million SDG&E ECO Substation, and the SDG&E Sunrise Powerlink--not to mention the lost value and use and enjoyment of our own properties as well as our now degraded, devalued and much less appealing public lands.

And there is more to come with the future phases of Energia Sierra Juarez, 1,000 MW Aubunal Wind, and the Union Fenosa Wind projects.

D28-105 Cont.

CUMULATIVE SCENARIO AND IMPACTS

The following projects were inexplicably left out of the cumulative projects list:

- **New US Border Patrol Station approved with FONSI for Ribbonwood Road just north of I-8:** This project has been approved with a vastly inadequate EA/FONSI over our strong objections and request for full EIS. Approximately $29 million in ARRA funding has already been granted as reported in the San Diego Union Tribune. This project will generate construction and operation traffic that will result in separate and cumulative significant adverse impacts to road and helicopter traffic, road damage, ingress and egress issues for private property owners that have no other access to and from their properties--*other than Ribbonwood Road.*

- **Rough Acres Ranch Campground MUP Permit Application / Dudek working on project**
  Project Description: This is a major pre-application review for a conference center and campground facility tobe used for corporate retreats, community meetings, and religious gatherings. The project site would also be used as an official Emergency Evacuation Center for

D28-106

backcountry communities. The project site is 760-acres in size and is located off of McCain Valley Road. A secondary access road (24' DG private road) is proposed to be approximately 2 miles long that would connect Ribbonwood Road in the west to McCain Valley Road in east. Pleases note that this connector road and the two wind turbines shown onsite are proposed as part of the Tule Wind Project Major Use Permit, and are not part of this major use permit.

The proposed campground facility would include a conference center (8,300 square feet) and three single-family residences approximately 5,000 square feet in size with agricultural storage barns. It would include two dry camping areas with 2 clubhouses, 2 stand alone bathrooms, and 75 camp spaces to accommodate any combination of tents, trailers and motor-homes. The campground would include picnic benches, fire rings and an equestrian facility with support corrals and bleacher seating. Sports/Recreation facilities would include a multi-purpose field, archery / skeet-shooting range, a swimming pool and easy access to the off-road vehicle park located off-site in the north. Accessible parking spaces would be provided per the requirements of the California Building Code. All other parking would be available at each camp site or in designated parking areas constructed of decomposed granite on native soils. The campground would provide overnight accommodations for up to 450 people for up to 14-days at a time and 4 fulltime employees
County comment: " Please note that County Staff did not evaluate all of the uses noted on the plot plan, as they were not included in the submitted project description. The internal compatibility of such uses including motor-homes, mobile home residential facilities, meat processing, equestrian centers, church services and wind/solar power facilities were not analyzed. Given the broad range of uses allowed permitted by a Major Use Permit in the A-72 Zone, it may be necessary to conduct a subsequent major pre-application conference if the project description deviates from what was analyzed. Therefore, prior to a full submittal, please submit a detailed project description and accompanying plot plan. County staff will compare the resubmitted project description with what was previously analyzed to make sure information provided in this Pre-application Letter and Project Issue Checklist can be relied upon."

D28-106 Cont.

- **3 more Major Use Permits in works for Rough Acres Ranch / Hamann / charity / foundation properties that need to be added as cumulative impacts**. **Dudek is doing some if not all of those project reviews. #1 MUP: Case # PROJECT NAME: ROUGH ACRES RANCH CAMPGROUND FACILITY;** MAJOR PREAPPLICATION CONFERENCE; CASE NUMBER: 3992 11-002; PROJECT ADDRESS: OFF OF MCCAIN VALLEY ROAD; APN 611-070-01& 03 AND 611-060-03; KIVA PROJECT: 11-0138043
- **Rough Acres Ranch / Concentrix 30 MW Solar project:** Hamann Companies consultant, Jim Whalen of Whalen and Associates attended our March 3 planning group meeting with Michael Armstrong, Business Development USA for Concentrix Solar. Concentrix and the Hamann

Company / family / charities (?) are in negotiations for the lease and /or purchase of approximately 200 acres of Rough Acres Ranch property for a 30 MW facility. Each 6 kW unit stands over 20 feet tall. They need an average of 6 acres/MW. Chair Tisdale and Vice-Chair Noland previously visited the Concentrix test site at UCSD with Michael Armstrong, JIm Whalen, and Phoebe Hamann

- **Debenham Energy's installed MET tower and industrial wind energy plans for the Cleveland National Forest** have been confirmed by Tim Cardoza in statement, below, made directly to the author of this letter on March 2,2011. We previously submitted comments to the Forest Service objecting to Debenham's permit applications for multiple MET towers. It has been brought to our attention that Scott Debenham is working with both the Ewiiaapaayp Band and Pattern Energy for a large-scale industrial wind turbine project that incorporates both tribal land and Forest land. This project must be analyzed and the cumulative impacts recognized and addressed, especially in light of the Ewiiapaayp land involvement in the Tule Wind project.

"I can confirm for you here that Mr. Debenham was issued a Special Use Permit for a single MET tower to measure wind energy resources on the Descanso District along Fred Canyon Road, located within the SW1/4 of the SE 1/4 of Section 12, Township 16 South, Range 5 East, SBBM. An environmental analysis for the project was completed on 1/25/2010 in the form of a Decision Memo for a Categorical Exclusion from further NEPA review, and signed by District Ranger Owen Martin. The NEPA document approved installation of three MET towers, however, Mr. Debenham decided only to move forward with one, which was constructed last month. As I believe you commented on the MET tower NEPA review, you may have a copy of that document in your files. " Tim Cardoza, Lands Specialist, Descanso Ranger District, Cleveland National Forest 3348 Alpine Blvd., Alpine, CA 91901, 619 445 6235 ext. 3434, Fax 619 445 1753

D28-106 Cont.

Campo Wind Issues / Concerns

Campo Wind Project 160-300 MW (no specific Details have made available yet)

- The existing Kumeyaay Wind farm is already suspected of causing adverse effects for folks and wildlife in a radius of up to 3 miles or more. We receive repeated complaints.
- SDG&E and Invenergy propose to construct and operate approximately 106 turbines capable of generating 160 MW of electricity on Campo tribal lands.
- In addition to the 160 MW of generating capacity proposed for this project, the Campo Tribe has requested that an additional 140 MW of generation be analyzed in the Bureau of Indian Affairs' NEPA review of the project for future development purposes.

D28-107

- These projects should be studied one phase at a time in order to address future unknown adverse impacts that may result from phase 1.
- 6 MET towers were granted Categorical Exclusions by the Bureau of Indian Affairs without making any effort to distribute the public notice.
- MET towers have been placed in very close proximity to tribal residences and to private property on the south side of Old 80 and south of Hwy 94.
- These MET towers serve as Constructive Notice that potential industrial wind turbine projects will be arriving in the future.
- The mere presence of these MET towers reduce adjacent property values
- Turbines (approximately 450 feet tall from ground to tip of the fully extended turbine blade) would be located on available ridgelines on the reservation, again, some of these ridgelines are within several hundred feet of private property and residences.
- The proposed Invenergy and SDG&E Campo Wind Project would connect with the Boulevard Substation Rebuild component of the ECO Substation Project.
- The related switchyards will be off-reservation and new 138 kV line will reportedly use existing SDG&E easements back to the new larger Boulevard Substation
- These off-reservation impacts are cumulative.
- The combination of both SDG&E and Invenergy working together is not comforting.

MANZANITA WIND ISSUES / CONCERNS

D28-107 Cont.

Manzanita Wind Project (no details available yet)

- SDG&E proposal for 57.5 MW, which could include up to 25 wind turbines depending on the turbine size selected.
- Not all tribal members are happy with this proposal. Many are not.
- Some members, their families, and their neighbors are already suffering adverse health effects, noise and shadow flicker from the Kumeyaay Wind turbines.
- New Turbines are to be located on the same ridgeline as the existing Kumeyaay Wind facility that are already far too close to tribal homes and offices.
- Turbines are proposed to be approximately 414 feet tall from ground to tip of the turbine blade fully extended.
- Access easements are needed but not yet secured across tribal land
- Oaks will likely need to be removed to widen roads to necessary width to accommodate large turbine parts, cranes and other equipment.
- Project would connect with the new Boulevard Substation "Rebuild" component of the ECO Substation Project.
- It is expected that the Campo and Manzanita wind energy projects would develop a switchyard for both facilities on non-tribal lands and a new 138 kV transmission line

would be constructed along the existing ROW of the 69 kV (?) transmission corridor that currently connects to the existing Boulevard Substation.

- The new 138 kV transmission line would interconnect with the proposed Boulevard Substation Rebuild component of the ECO Substation Project.
- SDG&E has not identified their wind energy development partner or the company that installed their 4 MET towers--that are very close to some tribal homes.
- Again, these projects represent significant and cumulative impacts to a wide variety of resources and residents.

ENEL JEWEL VALLEY PROJECT (JORDAN)

ISSUES / CONCERNS

Jordan Wind Project (now Enel Jewel Valley Project)

WE MAY PAY MORE NOT LESS (as often stated) for Enel wind energy.

Enel proudly announces that "the Company is a leader in promoting "green premium" transactions - that is, sales of renewable energy at higher-than-market prices, based on its environmentally beneficial attributes and desirability for environmentally-conscious electricity producers" : www.enel.northamerica/greenCredits.asp

D28-107 Cont.

- The Boulevard Planning Group has voted to oppose Enel's multiple MET facility Administrative Permit Applications due to the adverse impacts they represent to property values through Constructive Notice and more.
- Enel Green Power Jewel Valley Project changed the proposed Jordan 40 2.3 MW turbines (total generating capacity of 92 MW) into 158 MW wind and 10 MW solar tracking units on over 7,000 acres of ranch land.
- Like the rest of Boulevard, Jewel Valley and the upper McCain Valley are very scenic areas with homes in close proximity virtually all the way around.
- The towers of the proposed wind turbines would be approximately 260 feet tall (height from ground to tip of fully extended blade would be approximately 430 feet).
- Enel's preferred point of interconnection is the new and much larger Boulevard Substation component of the ECO Substation Project.
- A new project switchyard and 138 kV line would be needed to connect to the Boulevard Substation and will need to secure easements across private property--not an easy thing to do.
- Again, there will be significant cumulative impacts to a wide variety of resources.

Proximity of turbines to residence: See Figure D. 4-9 at page D-43 in DEIR/EIS

- When you use the scale on the Figure D.4-9 map, you can see that most of Boulevard will be impacted within the 1, 2 & 3 mile radius of currently proposed wind turbine projects
- We don't have a firm number for impacted homes

D28-107 Cont.

INDUSTRIAL WIND TURBINES' IMPACTS ON PROPERTY VALUES

Property value impacts from industrial wind projects:
http://www.windaction.org/faqs/24176

Turbines declared a nasty neighbour as secret buyout is revealed

- Peter Rolfe
- From: *Sunday Herald Sun*
- January 30, 2011 12:00AM

Noel Dean and other residents believe the Waubra wind farms have caused medical problems. Picture: Tony Gough *Source:* Herald Sun

VICTORIANS who have endured health problems from a nearby wind farm have been gagged from talking in return for the sale of their land.

D28-108

The following material is considered Comment D28-108.

Note: An additional comment (D28-109) follows on the last page of this comment letter.

Spanish multinational energy company Acciona has been quietly buying farms adjacent to its site at Waubra, near Ballarat, as an increasing number of residents in the tight-knit community complain of the ill-effects of living near turbines.

Since the wind farm started operating in July 2009, about 11 houses in the area have been vacated by people complaining of noise problems.

Acciona has bought at least another seven houses, the purchase of two of which appear to have been prompted by the new State Government's threat to shut down the farm unless noise and permit conditions were met.

Locals in the tiny town of 700, 35km northwest of Ballarat, say the sales took place on the proviso landowners would not talk about the price of the purchase or negative health effects they blame on the wind farm.

http://www.heraldsun.com.au/news/victoria/turbines-declared-a-nasty-neighbour/story-e6frf7kx-1225996775637

Invenergy's 99 MW Forward Energy Wind project , near Brownsville, WI, started operation in 2008 with 86 GE 1.5 sle turbines.

The Wirtz family abandoned their home of 12 years & alpaca farm to escape the noise and illness attributed to the turbine project.

The Wirtz family had been living in and renovating the 100 year old home pictured below for 12 years before Invenergy began erecting 86 industrial scale wind turbines. The 400 foot structures are sited as close as 1000 feet from non-participating homes. The turbine in this photo is located 1250 feet from the Wirtz home.

WIND FARM PROPERTY SOLD AT SHERIFF'S SALE

SOURCE: The Daily Reporter, dailyreporter.com

May 6, 2010 / By Paul Snyder

The attorney representing two Oakfield residents in a case against Chicago-based Invenergy LLC wants the results of a sheriff's sale this week to convince the state to review the case.

Madison-based attorney Ed Marion on Thursday sent a letter to the Public Service Commission of Wisconsin, requesting it consider new facts in Ann and Jason Wirtz's case against Invenergy.

The Wirtzes abandoned their home in Brownsville last year after Invenergy's Forward Energy Wind Center became operational in 2008. The property, appraised at $320,000 in 2007, sold to the Bank of New York Mellon at a sheriff's sale Tuesday for $106,740.

"I hope it will influence the commission to look favorably, at least, at giving us our day in court," Marion said.

The Wirtzes want the PSC to force Invenergy to compensate the family for their losses, although no specific amount is named.

Marion said the PSC has not yet made a decision as to whether it will review the case.

(See more information on the Wirtz family / interviews at the link below:)

http://betterplan.squarespace.com/todays-special/tag/invenergy-invenergy-wisconsin

Iberdrola's co-owned Maple Ridge Wind Farm, near Watertown, NY: 140 Vestas 1.65 MW turbines and substation generates complaints from adverse impacts / and broken promises

Compare Iberdrola's co-owned Maple Ridge Wind Farm advertisement photo below *vs* the real view, that the closest neighbors are subjected to-- the views they *don't* show in the pretty advertisements

MAPLE RIDGE I WIND FARM, NEW YORK

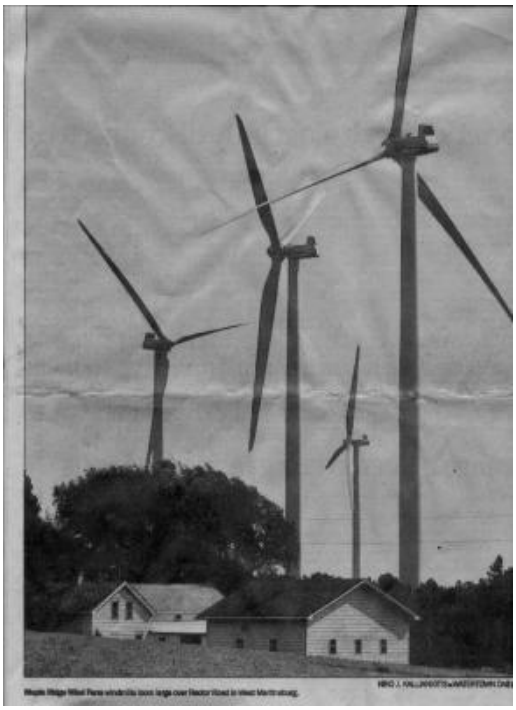
Maple Ridge Wind Farm.

Maple Ridge I Wind Farm, co-developed and co-owned with Iberdrola Renewables, is located about 75 miles northeast of Syracuse, New York. Phase I has an installed capacity of 231 MW - enough to power approximately 64,000 homes each year. The wind farm, which achieved commercial operation in June 2006, consists 140 Vestas V82 1.65 MW turbines. The wind farm's electricity flows into the New York energy grid. Renewable Energy Credits are contracted to the New York State Energy Research and Development Authority.

http://www.horizonwind.com/projects/whatwevedone/mapleridge/

"***Welcome to Maple Ridge Windfarm. A blasted, ruined, industrialized landscape where there was once serenity. And beauty. Sarah wandered down to the old family farm earlier this fall. She stood on the road and gazed upon vandalism. And wept***. "

photo below from Watertown Daily (News) Times (date unknown) included in printed statement below dated 11/4/05



Credits: Watertown Daily News
Description:

Calvin Luther Martin, Malone, NY 11/4/05

It's Friday evening and I just got off the phone with a middle-aged lady who lives on the Tug Hill Plateau near Watertown, New York (USA). What makes this banal fact remarkable is that the woman now finds herself living in a mind-blowing forest of 40-story-high industrial wind turbines.

The developers (Is this the right word to use for these people?) have given it the charming name, Maple Ridge Windfarm. Everyone else in Upstate New York knows it as the Tug Hill Plateau: a high tableland famous for its views of the Adirondacks (to the south), Canada (to the north), and L. Ontario (to the west). Also a serious migratory bird flyway. People remember Tug Hill as gorgeous and wild.

No more. Sarah (I have changed her name to protect her privacy) was eager to talk. I found her full of homespun wisdom and quick to chuckle, even though she was in obvious pain. This place, which has been home and memories, has become a nightmare. When the turbine salesmen rang her doorbell a year ago to ask what she thought "about renewable energy" (that was their opening line), she soon steered the conversation around to the stupendous view. Look there, she said, pointing to the mountains: this is what I cherish.

No more. She is now surrounded by colossal industrial wind turbines. How many? I asked. Fifteen to twenty within a mile radius, she replied. I could hear her despair, her disbelief. The wind companies (Zilkha and PPM) spent the summer feverishly cobbling together their Goliath machines: 187 in this first phase of the project. There are more to come in Phase II. And who

knows how many more phases? Besides the dozen plus overshadowing her, there is a power substation mere yards from her backdoor, in a ravine she remembers well as a child. (The ravine was often struck by lightning, she recalled, as she wondered if this was the best spot for a power station. Fond memories often bubbled to the surface as we talked—a surface now rendered incomprehensible.)

Sarah took the company-sponsored bus trip to Fenner, NY, to inspect Fenner's 20 turbines ("Go to Fenner and see for yourself": they got the same cheery line we get here, in Clinton & Franklin counties). She thought the Fenner turbines huge, but, it turns out, they are not as colossal as what she now has next door. Besides, that was only 20; this is 187. The number boggles her mind. She met a lady in Fenner with a turbine or two on her property. She motioned Sarah aside and whispered not to trust the wind energy company. The woman and her husband are not getting what the company promised, and are suing as a result.

The wind salesmen snowed Sarah's town board. They promised the sun and the moon; the board swooned and said amen. The wind guys managed to talk the town into a PILOT (Payment in Lieu of Taxes) rather than taxation, to Sarah's disgust. She was clearly dubious the salesmen would deliver what they promised. And when it came to a public hearing, the town board hid the announcement so cunningly that Sarah was totally unaware of it.

The construction has shattered her life. Noise. Roads cratered and potholed and rutted. Trees chain-sawed and bulldozed into piles. Giant pits bored into the earth and filled with rebar-reinforced concrete. Finally, the towers and 40-ton propellers and 60-ton nacelles stacked atop all this. Literally, skyscrapers.

The turbines are not yet running; they will be in another few months. Sarah dreads that day: the pulsed thump thump thump; the huge shadow from blades sweeping the landscape, everywhere you look (morning & evening). Sarah has sensitive hearing; she's especially worried about the low frequency thump, night and day, weeks on end. Already she struggles with 187 flashing red lights. And she tries to compose herself over the floodlit power station next door. When she telephoned the project manager to ask why those confounded lights need to be left on all night, he got testy and dismissed her.

The floodlights still drill into her windows.

Welcome to Maple Ridge Windfarm. A blasted, ruined, industrialized landscape where there was once serenity. And beauty. Sarah wandered down to the old family farm earlier this fall. She stood on the road and gazed upon vandalism. And wept.

She's angry. She feels lied to. She has a neighbor, a young man and his wife and little children, who is also outraged. The man is building a lovely home; he moved here because of the magnificent views, the beauty. Now, this. He worries about his kids' health once the generators fire up.

Sarah feels helpless, and kept saying she thinks she will move. Driven from her home. She worries no one will buy it, or will offer a fraction of its pre-turbine worth. She foresees town revenues plummeting as people refuse to pay the tax on turbine-depreciated property.

In the end, she said, she and her neighbors were not organized well enough to stop the wind salesmen. The property owners and town fathers fell in line perfectly, like sheep to be slaughtered. Yet many of them don't live on their land, or have moved elsewhere, leaving Sarah and her neighbors to deal with this horror.

I urged her to start a daily journal of her experiences and the "progress" of the wind power project. I also urged her to take photographs of her landscape and the windmills. And I suggested she get an electrical engineer to check for ambient underground current, so she can sue the wind companies for stray current once the turbines go on line. I suggested, too, that she and her neighbors get a complete physical and neurological exam before the turbines are fired up, again, to establish a medical baseline for future medical problems.

I told her, finally, I had seen the amazing photograph of the Tug Hill turbines in the Watertown Daily Times last month. "Yes," she mused, "that was taken near my home." Then added, "It's actually worse than the picture shows." (newspaper photo above)

Wind Energy's downside

Wind energy produces stray dirty energy: http://www.windaction.org/news/24759
Dangerous health impacts from industrial wind turbines:
http://www.windaction.org/faqs/24875

Wind farm oil taints Martinsburg well: http://www.windaction.org/news/13367?theme=print

Comments from a regretful wind farm participant (farmer):
http://www.windcows.com/files/What_have_I_done_2.pdf
Modern turbines produce dangerously "Dirty" electricity:
http://www.windaction.org/documents/2095

New York Times: With wind energy, opportunity for corruption:
http://www.nytimes.com/2009/12/14/world/europe/14wind.html?_r=1&pagewanted=all

ENERGY OUTLOOK

Thursday, March 03, 2011

Could Competition and Low Demand Stall Wind Power's Growth?

In the last week I've seen reports that two of the biggest wind power developers in the world, Spain's Iberdrola Renovables and Portugal's EDP Renovaveis, plan to reduce their wind power investments in the US for at least the next couple of years. That's significant because these two firms together accounted for just under a third of the 5,115 MW of new wind turbines installed

in the US last year. This isn't for lack of opportunities or incentives, but for some very old-fashioned reasons: low demand and competition from other energy sources. It's an important reminder that renewable energy can't just be viewed as a set of technologies; they are also businesses, and as such are subject to the normal ups and downs of the market. It also highlights the limitations of government incentives.

Wind power had been on a tear in the US as recently as 2009, when a record 10,010 MW of turbines were installed, extending an enviable 5-year run of 40% average annual growth in wind capacity. Last year that growth slowed to 15% as new installations fell by half. That occurred in spite of the federal stimulus program that converted tax credits for renewable energy projects into up-front cash grants, paying $ 3.5 billion to wind developers out of a total of $4.2 billion expended in 2010. Although eligibility for that benefit was due to expire on 12/31/10, it was subsequently extended through 2011 under December's "lame duck" tax legislation, largely on the strength of arguments that it would keep wind and other renewables growing at a brisk pace. What happened?

At least two major factors related to the business environment are weighing on wind development, as well as another factor unique to renewables. First, electricity demand that was depressed by the recession is apparently still at least 1% below pre-crisis levels. That doesn't sound like much, but the difference is roughly equivalent to the entire amount of electricity generated from wind power in 2008. As a result, utilities have become less keen to sign long-term offtake agreements, or "power purchase agreements" (PPAs), with new wind farms. Both EDP and Iberdrola cited this problem in reference to their 2011 plans.

Wind power also faces strong competition from cheap natural gas, as you've probably heard many times by now. Despite some resistance to shale drilling in states like New York, there's every indication that US gas output will continue to expand. Last year the US produced more natural gas than in any year since 1973, and the end of this boom is not in sight. Although advocates may claim that wind is now cost-competitive with gas, that remains a best-case analysis for locations with excellent wind resources and good access to transmission. Natural gas at $5 per million BTUs yields electricity at 5¢/kWh from a combined-cycle gas turbine. That sets a pretty tough bar for wind, especially when gas turbines can produce power on-demand, 24/7, while wind turbines generate power an average of 30% of the time, intermittently.

Unexpectedly, wind power may also be facing competition from solar power. In a recent interview the CEO of NRG Energy Inc., a large power generator, pointed to the greater opportunities for innovation in solar, compared to wind. The cost of installed photovoltaic modules, particularly in utility-scale applications, has fallen much faster in recent years than the cost of wind turbines. That's not to say that power from solar is cheaper than from wind, but solar is starting to look like a better investment for utilities, which have been signing PPAs with

solar project developers in droves. It's also noteworthy that for the first time last year more solar power was installed in Europe than new wind power, by a healthy margin.

It's probably premature to conclude that the US wind boom has ended, and that wind capacity is now likely to grow at lower, more normal rates in the future, compared to its extraordinary past performance. This could just be a lull, as the enormous additions of the last few years are absorbed into a power grid that is still modernizing and remains a long way from the smart grid that will be needed to accommodate much larger contributions from intermittent renewables of all types. At the same time, it's worth noting that government incentives can't eliminate every obstacle that renewables face, and that arguments that the Treasury cash grants in lieu of tax credits should be extended beyond 2011 should be assessed with much more critical judgment than was possible in the scramble of a lame duck Congressional session.

http://energyoutlook.blogspot.com/2011/03/could-competition-and-low-demand-stall.html

Wind Shortfalls Make Grid Guys Nervous

Ken Silverstein | Mar 02, 2011

When it comes to integrating wind into the transmission lines, system operators say that they are challenged. While they understand and appreciate the reasoning, they are saying that the networks lack the flexibility to handle wind variation.

Green energy has a lot of public appeal. But the intermittent nature of wind and solar power coupled with the relatively higher costs put the grid's traffic cops in an untenable position. Those are the fellows whose job it is to schedule the resources to where they need to be so that the electricity keeps flowing. Their task is to maintain that reliability with the lowest-priced fuels.

"We have to be truthful about what the impact will be," says Jim Detmers, principal in Power Systems Resources and the former chief operating officer of the California ISO. "The devil is in the details. These new embedded costs will be significant." Better communication with policymakers is essential.

In the case of California, it now has 3,000 megawatts of wind. In a few years, that will be 7,000 megawatts. A few years later, it will be 10,000 megawatts. By 2020, the goal is to have 33 percent of electricity generated from renewable energy. "That's making grid operators nervous," says Detmers, who spoke at Wartsila's Flexible Power Symposium in Vail, Colo.

Simply, the wind does not blow on demand. Ditto for the sun. So these resources must be backed up with other, "dispatchable" forms of generation. But such "firming" or "cycling" creates two distinct issues: The first is that the power is not free and the second is that if coal

plants are “cycled” up and down, they release more pollutants per unit of output than if they ran full steam ahead.

No doubt, the price of wind and solar energy is falling while their productivity rates are increasing. But the technologies still have a ways to go...

http://www.energybiz.com/article/11/02/wind-shortfalls-make-grid-guys-nervous

How Green Is Your Lost Job?

Posted 03/01/2011 06:20 PM ET **Investors Business Daily**

The Thanet Offshore Wind Farm off the coast of Kent, England, is the largest site of its type. AP

Power: A study of renewable energy in Scotland shows that for every job created in the alternative energy sector, almost four jobs are lost in the rest of the economy. We've seen this movie before.

Not only has the sun set on the British Empire, but the promise of wind apparently is deserting it as well. A new study called "Worth The Candle?" by the consulting firm Verso Economics confirms the experience of Spain and other countries: The creation of "green" jobs destroys other jobs through the diversion of resources and the denial of abundant sources of fossil fuel energy.

The economic candle in the U.K. is being blown out by wind power. The Verso study finds that after the annual diversion of some 330 million British pounds from the rest of the U.K. economy, the result has been the destruction of 3.7 jobs for every "green" job created.

The study concludes that the "policy to promote renewable energy in the U.K. has an opportunity cost of 10,000 direct jobs in 2009-10 and 1,200 jobs in Scotland." So British taxpayers, as is the case here in the U.S., are being forced to subsidize a net loss of jobs in a struggling economy.

"There's a big emphasis in Scotland on the economic opportunity of investing in renewable energy," says study co-author and Verso research director Richard Walsh. "Whatever the environmental merits, we have shown that the case for green jobs just doesn't stack up."

Again, it's been shown that wind energy can't hold a candle to other more traditional and more reliable forms of energy.

"The Scottish renewable sector is very reliant on subsidies from the rest of the U.K.," co-author Tom Miers adds. "Without the U.K.-wide framework, it would be very difficult to sustain the main policy tolls to promote this industry."

As here, only continuous subsidies and redistribution of resources to an unproductive and uncompetitive source of energy keeps the alternative energy industry alive, politically and economically.

As the Telegraph's James Delingpole reminds us in reporting the results of the British study, "wind and solar power have proved a disaster in Germany, Denmark and Spain (where Dr. Gabriel Calzada Alvarez calculated that for every 'green job,' the country had destroyed 2.2 jobs in the real economy)."

If these numbers were extrapolated to America, instead of a touted 3 million-job gain from alternative energy, we should expect the loss of at least 6.6 million jobs in other industries.

Calzada noted that these are direct job losses. "The loss of jobs could be greater if you account for the amount of lost industry that moves out of the country due to high energy prices," he said in an interview.

Under a target agreed to with the European Union, Britain is committed to generating nearly a third of its electricity from renewable sources, mainly through building thousands of wind turbines.

The Daily Mail's Christopher Booker calls the push for alternative energy "the greatest scam of our age," a statement we find hard to disagree with.

Booker reports that in Britain, "To keep our homes warm we were having to import vast amounts of power from nuclear reactors in France." He notes that the total usable output from Britain's 3,500 turbines is no more than a single conventional power plant, which is necessary as a backup when the wind doesn't blow.

These wind turbines are so expensive, according to Booker, that Holland recently became the first country in Europe to abandon its EU renewable-energy target, saving billions of euros.

Despite the evidence in country after country, we intend to repeat their mistake.

Energy Secretary Steven Chu and Interior Secretary Ken Salazar, architects of the Obama administration's economy-killing war on fossil fuels, announced on Monday that the

development of offshore wind farms would be fast-tracked, with a goal of issuing leases off four Atlantic Coast states by the end of the year. Tilting at windmills will not create jobs, make us energy-independent or save the earth.http://www.investors.com/NewsAndAnalysis/Article.aspx?id=564579&p=2

Wind Energy is Intermittent and Unreliable and expensive Load backup /Firming needed

Why aren't Lackawanna windmills turning?

Updated: Tuesday, 01 Mar 2011, 7:34 PM EST
Published : Tuesday, 01 Mar 2011, 5:59 PM EST

- George Richert
- Posted by: Eli George

LACKAWANNA, N.Y. (WIVB) - Have you noticed many of the new windmills along Route 5 are not working?

This isn't the first time they've had mechanical problems, and we managed to dig up some hard numbers on just how much electricity they actually are generating.

In its first year, Steelwinds had to replace all of the gear boxes in the eight turbines. The next year, the blades had to be fixed. And for this entire winter, only half of the Lackawanna windmills have been working at any given time.

So we did some research to see just how much electricity these turbines have actually been producing. According to the numbers filed with the NY Independent System Operator, the eight Lackawanna windmills averaged about 40 Megawatt hours of electricity per year in 2008 and 2009. That's enough to power almost 6,000 homes, and works out to about 23 percent of its capacity. 100 percent would only be achieved in a constant wind, with turbines that never needed maintenance, so 30 percent is the average capacity for a wind farm.

The bottom line is Steelwinds is putting out less electricity than an average wind farm, partly because of mechanical problems, but it has no effect what Lackawanna gets.

Mayor Norman Polanski said, "We still get our money from them, our $100,000 a year. Uh, but people call about them all the time, they want to know what's going on

At the going rate for electricity, Steelwinds is still making over $2 million a year for the electricity it is generating. On top of that, its investors get an extra two cents a kilowatt for going green. So the investors that helped pay a million bucks to build each one of these turbines get $800,000 every year in federal tax credits

http://www.wivb.com/dpp/news/erie/Why-arent-Lackawanna-windmills-turning#viewSingle112300341

Mitigation issues

Mail Online

Why the £250bn wind power industry could be the greatest scam of our age - and here are the three 'lies' that prove it

By Christopher Booker
Last updated at 11:20 AM on 28th February 2011

Scarcely a day goes by without more evidence to show why the Government's obsession with wind turbines, now at the centre of our national energy policy, is one of the greatest political blunders of our time.

Under a target agreed with the EU, Britain is committed within ten years — at astronomic expense — to generating nearly a third of its electricity from renewable sources, mainly through building thousands more wind turbines.

But the penny is finally dropping for almost everyone — except our politicians — that to rely on windmills to keep our lights on is a colossal and very dangerous act of self-deception...

http://www.dailymail.co.uk/news/article-1361316/250bn-wind-power-industry-greatest-scam-age.html#ixzz1FJkdtBDh

Wind Energy Gets Huge Subsidies. So Where Are The CO2 Reductions?

August 27, 2010
Energy Tribune

Over the last few years, the wind industry has achieved remarkable growth largely due to the industry's claim that using more wind energy will result in major reductions in carbon dioxide emissions. There's just one problem with that claim: it's not true. ***(This an extended version of the August 24 piece I published in the Wall Street Journal.)***

Recent studies show that wind-generated electricity may not result in any reduction in carbon emissions, or those reductions will be so small as to be almost meaningless.

This issue is especially important now that states, even in the absence of federal legislation, are mandating that utilities produce arbitrary amounts of their electricity from renewable sources. By 2020, for example, California will require utilities to obtain 33% of their electricity from renewables. About 30 states including

Connecticut, Minnesota, and Hawaii, are requiring major increases in the production of renewable electricity over the coming years. Wind, not solar or geothermal sources, must provide most of this electricity, because it is the only renewable source that can rapidly scale up to meet the requirements of the mandate. But those mandates will mean billions more in taxpayer subsidies for the wind industry and result in higher electricity costs for consumers.

There are two reasons wind can't make major cuts in carbon emissions. The wind blows only intermittently and variably; and wind-generated electricity largely displaces power produced by natural gas-fired generators rather than that coming from plants that burn more carbon-intensive coal...

http://www.robertbryce.com/node/377

Boulevard wind farms made this list starting in the 1980's

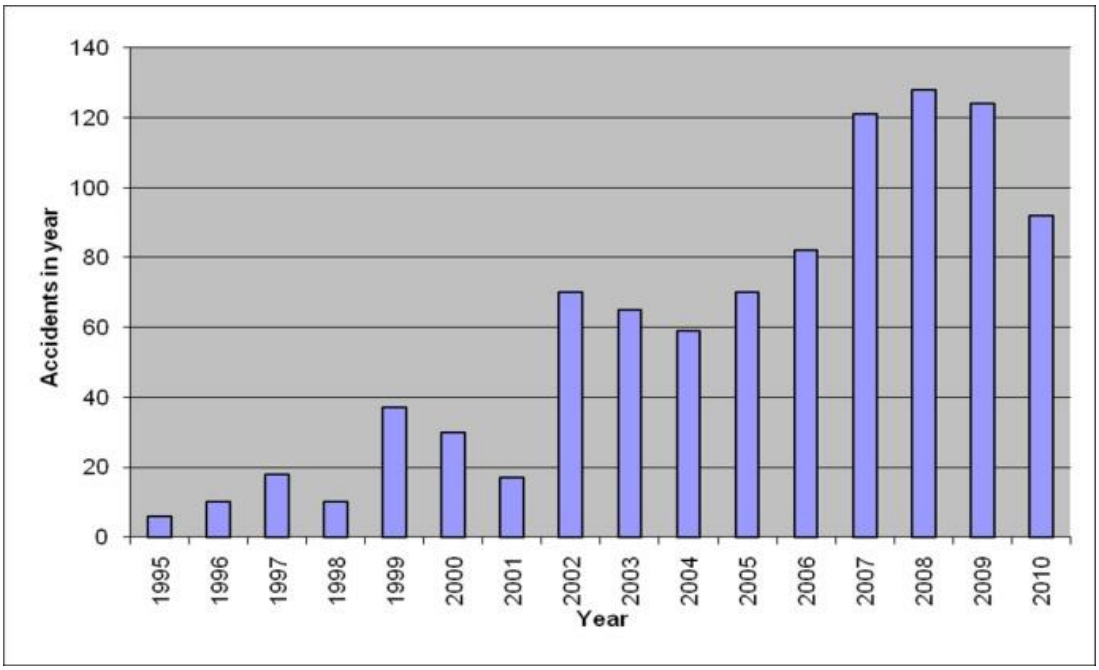
Summary of Wind Turbine Accident data to 31st December 2010

The detailed accident list with sources may be downloaded **here**

The attached detailed table includes all documented cases of wind turbine related accidents which could be found and confirmed through press reports or official information releases up to 31 December 2010. CWIF believe that this compendium of accident information may be the most comprehensive available anywhere.

Data in the detailed table attached is by no means fully comprehensive - CWIF believe that what is attached may only be the "tip of the iceberg" in terms of numbers of accidents and their frequency. However, the data gives an excellent cross-section of the types of accidents which can and do occur, and their consequences. With few exceptions, before about 1997 only data on fatal accidents has been found.

The trend is as expected - as more turbines are built, more accidents occur. Numbers of recorded accidents reflect this, with an average of 16 accidents per year from 1995-99 inclusive; 48 accidents per year from 2000-04 inclusive, and 103 accidents per year from 2005-10 inclusive.



This general trend upward in accident numbers is predicted to continue to escalate unless HSE make some significant changes - in particular to protect the public by declaring a minimum safe distance between new turbine developments and occupied housing and buildings (currently 2km in Europe), and declaring "no-go" areas to the public, following the 500m exclusion zone around operational turbines imposed in France.

http://www.caithnesswindfarms.co.uk/page4.htm

False claims that “wind farms” provide large economic and job benefits

January 3, 2011 by Glenn R. Schleede

Summary:

Energy expert Glenn Schleede details key flaws found in the Jobs and Economic Development Impact model (JEDI) used by the DOE's National Renewable Energy "Laboratory" (NREL) to the forecast economic benefits of wind energy development.

One would think that by now Obama Administration officials would admit that "wind farms" do not provide large economic and job benefits. However, recent Administration statements suggest the delusion continues and, perhaps, that officials do not understand why their expectations are unrealistic.

False expectations may be due to the infamous "JEDI" model (Jobs and Economic Development Impact model) developed for DOE's National Renewable Energy "Laboratory" (NREL) by a

wind industry consultant-lobbyist. Unfortunately, this "model"(paid for with our tax dollars) has been widely promoted by NREL and DOE and outputs from the model are used by "wind farm" developers to mislead the public, media, and government officials.

Economic models often produce false or misleading outputs because (a) the model itself is faulty, and/or (b) unrealistic assumptions are "fed into" to model, with the result that the models overstate national, state, and/or local job and other economic benefits. In the case of wind energy models, basic flaws and faulty assumptions often include one or more of the following:

1. Ignoring the fact that much of the capital cost of "wind farms" is for equipment purchased elsewhere, often imported from other countries. Some wind energy advocates claim that wind turbines are "manufactured" in the US when, in fact, they are merely assembled in the US using imported parts and components. About 75% of the capital cost of "wind farms" is for turbines, turbine parts and components, towers and blades - so a large share of the "wind farm" cost is for imports. These add to the outflow of wealth from the US and provide no economic or job benefits in the US.

2. Assuming that employment during project construction results in new jobs for local workers -- when most "wind farm" construction jobs are short term (6 months or less) and the overwhelming share of them are filled by specialized workers who are brought in temporarily.

3. Assuming that the very few permanent "wind farm" jobs are new jobs filled by local workers - when, in fact, these few permanent jobs are often filled by people brought in for short periods. Some "wind farm" owners contracts with suppliers of wind turbines and other equipment for maintenance work with the result that no "new" jobs for local workers are added.

4. Assuming that temporary workers who are brought in for short periods live and spend their pay checks -- and pay taxes -- locally when, in fact, these workers spend most of their wages where they and their families have permanent residences -- where the workers spend most of their weekends and where they pay nearly all of their taxes.

5. Assuming that the full purchase price of the goods and services purchased locally (often minimal in any case) has a local economic benefit. In fact, only the local value added may have a local economic benefit. This truth is illustrated by the purchase of a gallon of gasoline -- let's say for $3.00. Only the wages of the service station employees, the dealer's margin, and the taxes paid locally or to the state mayl have a local or state economic benefit. Economic benefits associated with the share of the $3.00 that pays for the crude oil (much of it imported), refining, wholesaling, and transportation generally flows elsewhere.

6. Assuming that land rental payments to land owners for allowing wind turbines all have local economic benefit. In fact, these payments will have little or no local economic benefit when the payments are to absentee landowners OR if the money is spent or invested elsewhere or is used to pay income taxes that flow to Washington DC or state capitals.

7. Using "input-output" models that spit out "indirect" job and other economic benefits that, in effect, magnify (a) all of the overestimates identified above, and (b) use unproven formula and data to calculate alleged "multiplier" effects.

8. Ignoring the environmental and economic COSTS imposed by "wind farm" development, which include (a) environmental, ecological, and economic costs associated with the production

of the equipment, and constructing and operating the "wind farm" (e.g., site and road clearing, (b) wildlife habitat destruction, noise, bird and bat kills and interference with migration and refuges, (c) scenic impairment, (d) neighboring property value impairment, and (e) infrastructure costs.

9. Ignoring the fact that electricity produced from wind turbines, has less real value than electricity from reliable generating units -- because that output is intermittent, volatile and unreliable. Also, the electricity is most likely to be produced at night in colder months, not on hot weekday late afternoons in July and August when demand is high and the economic value of electricity is high.

10. Ignoring the "backup power" costs; i.e., the added cost resulting from having to keep reliable generating units immediately available (often running at less than peak efficiency) to keep electric grids in balance when those grids have to accept intermittent, volatile and unreliable output from "wind farms."

11. Ignoring the fact that electricity from "wind farms" in remote areas generally results in high unit costs of transmission due to (a) the need to add transmission capacity, (b) the environmental, scenic and property value costs associated with transmission lines, (c) the electric transmission "line losses" (i.e., electricity produced by generating units but lost during transmission and never reaches customers or serves a useful purpose), and (d) inefficient use of transmission capacity because "wind farms" output is intermittent and unpredictable and seldom at the capacity of the transmission line that must be built to serve the "wind farm."

12. Ignoring the fact that the higher true cost of the electricity from wind is passed along to ordinary electric customers and taxpayers via electric bills and tax bills which means that people who bear the costs have less money to spend on other needs (food, clothing, shelter, education, medical care -- or hundreds of other things normally purchased in local stores), thus reducing the jobs associated with that spending and undermining local economies that would benefit from supplying these needs.

13. Perhaps most important, ignoring the fact that the investment dollars going to "renewable" energy sources would otherwise be available for investment for other purposes that would produce greater economic benefits. "Wind farms" have very high capital costs and relatively low operating costs compared to generating units using traditional energy sources. They also create far fewer jobs, particularly long-term jobs, and far fewer local economic benefits. "Wind farms" are simply a poor choice if the goals are to create jobs, add local economic benefits, or hold down electric bills.

Download File(s):

FalseClaims_wind.PDF (125.88 kB)

Filed under : Energy Policy : USA

http://www.windaction.org/documents/30628

Modeling the effects of wind turbines on radar returns

December 5, 2010 by R. Ryan Ohs, Gregory J. Skidmore, Dr. Gary Bedrosian

Summary:

This paper explains how wind turbines located near radar installations can significantly interfere with a radar's ability to detect its intended targets. The authors explain software tools capable of calculating the radar cross section of electrically large objects. In this paper, interference from wind turbines is predicted using XGtd simulations and new post-processing algorithms that calculate Doppler shift quantities based on points of interaction with the rotating turbine blades.

Wind turbines located near radar installations can significantly interfere with a radar's ability to detect its intended targets. In order to better understand and mitigate the adverse effects of wind turbines on radar, the government and wind farm community need tools that can be used to analyze the radar returns from wind turbines. Remcom's XGtd® software is a high frequency solver capable of calculating the radar cross section of electrically large objects. In this paper, interference from wind turbines is predicted using XGtd simulations and new post-processing algorithms that calculate Doppler shift quantities based on points of interaction with the rotating turbine blades. Results of the analysis are used to calculate the bistatic radar cross section and Doppler shift from two blade orientations. In addition, the time-varying monostatic radar cross section and Doppler shift for a single wind turbine are analyzed and shown to agree well with measured data from actual wind turbines.

Web link: http://downloads.vertmarkets.com/files/downloads/d...

Download File(s):
windturbineeffectsonradarreturns.pdf (485.83 kB)

http://www.windaction.org/documents/30275

The problems with 'Noise Numbers' for wind farm noise assessment

September, 2010 by Dr. Robert Thorne

Summary:

Dr. Robert Thorne presented this paper at the annual symposium on turbine noise held by the Society for Wind Vigilance. The evidence documented in his paper show "there is the potential for adverse health effects for individuals due to wind farm activity while living in their residences and while working on their farms within 3500 metres of large-scale turbines". Dr. Thorne's complete paper can be downloaded by clicking on one of the links at the bottom of this page.

CONCLUSIONS

Personal perception of a sound is investigated through assessment of personal noise sensitivity, personal perception of the characteristics of the sound and observable adverse health effects. Noise includes vibration in any form that can be "felt" by a person. There is, in my opinion and despite the differences in opinion as to cause, considerable agreement between the parties - residents, clinicians and acousticians - as to observable health effects from unwanted sound.

There are clear and definable markers for adverse health effects before and after the establishment of a wind farm and clear and agreed health effects due to stress after a wind farm has started operation. It is the mechanism of the physical or mental process from one to the other that is not yet defined or agreed between affected persons, clinicians and psychoacousticians. There has, however, been considerable work recently (May-June 2010) on the possible mechanism between infrasound and adverse health effects.

It is concluded that:

• Wind farm reports and approval conditions (if approvals are issued) must provide clear and specific methodologies to measure wind farm sound under compliance testing conditions or under complaint conditions when turbine sound is part of the ambient sound.

• "Background" compliance monitoring is not sustainable as there is no proven methodology to accurately measure wind turbine sound, complaints especially, in the presence of ambient sound.

• Wind farms exhibit special audible characteristics that can be described as modulating sound or as a tonal complex. Compliance monitoring must include real-time measurement of special audible characteristics such as modulating sound in order to determine the perceptible effects of audible sound.

• Meteorological conditions, wind turbine spacing and associated wake and turbulence effects, vortex effects, turbine synchronicity, tower height, blade length, and power settings all contribute to sound levels heard or perceived at residences.

• Noise numbers and sound character analyses are meaningless if they are not firmly linked to human perception and risk of adverse health effects.

• No large-scale wind turbine should be installed within 2000 metres of any dwelling or noise sensitive place unless with the approval of the landowner.

• No large-scale wind turbine should be operated within 3500 metres of any dwelling or noise sensitive place unless the operator of the proposed wind farm energy facility, at its own expense, mitigates any noise within the dwelling or noise sensitive place identified as being from that proposed wind farm energy facility, to a level determined subject to the final approval of the occupier of that dwelling or noise sensitive place.

Web link: http://www.windvigilance.com/downloads/symposium20...

Download File(s):

swv_symposium_paper_problems_with_noise_numbers.pdf (2.27 MB)

http://www.windaction.org/documents/30847

Documents

FAA testimony before the House Armed Services Committee on the impact of wind farms on military readiness

June 29, 2010 by Nancy Kalinowski

Summary:

Statement of Nancy Kalinowski, Vice President for System Operations Services, Air Traffic Organization of the FAA delivered this testimony before the House Armed Services Committee, Subcommittee on Readiness on the Impact of Wind Farms on Military Readiness. An excerpt of Ms. Kalinowski's testimony shown below explains the problem produced when the moving turbines interfere with radar. Her complete testimony can be accessed by clicking on the links at the bottom of the page.

Excerpt:

The number of wind turbine cases handled by the FAA has increased from 3,030 in 2004 to 25,618 last year. To date in 2010, we have 18,685 wind turbine cases. One concern that the wind turbines raise is that the blade tips rotate above the radar, thus affecting the capability of the target to be received on the radar equipment. Additionally, they reflect radio waves, and exceed the line of sight protection criteria. To give you an idea of the impact of wind turbines on long range radar, there is a radar cross section spectrum that identifies how clearly a range of objects are picked up on the radar. Insects and birds are at the low end. Conventional cruise missiles are in the mid range. Most aircraft are a little higher in the spectrum, with large aircraft (e.g., a Boeing 747) and the space shuttle at the highest end of the spectrum. Wind turbine blades spinning, in some instances, at more than 200 miles per hour are picked up by radars with a signal strength greater than a Boeing 747. Because the radar repeatedly sees this large return, the radar will not pick up actual aircraft in the same area.

The clutter that is created by wind turbines can result in a complete loss of primary radar detection above a wind farm. When that clutter occurs, it appears at all altitudes, so simply directing the aircraft to a different altitude does not solve the problem. Similarly, on the Next Generation Weather Radar (NEXRAD), wind farm activity looks remarkably like storm activity, thus complicating the communication of precise weather information by controllers to pilots. (Wind turbine impacts on NEXRAD, which are owned and operated by the National Oceanic and Atomospheric Administration, are not currently considered in FAA's evaluation process.) Existing FAA radars have limited capability to filter out clutter. The radar can be modified by increasing the sensitivity to reduce clutter from the wind turbines, but in doing so, what the radar can see is also reduced, to the point where actual aircraft targets can drop off. Consequently, there are real and significant issues that must be evaluated by the government prior to the approval of wind turbines.

Although not an issue of consideration in the evaluation process, another issue of some concern is that there is competition for the land which both the radars and the wind turbines need to occupy. Lease holders who currently have primary radars are now being offered substantial

financial incentives not to renew their leases with the FAA and instead, lease to companies that want to install wind turbines. This puts the FAA in the undesirable position of having to condemn property at fair market value to avoid losing the use of the navigational aid. The call for the FAA to simply move its radars to accommodate requests to install wind turbines fails to take into account that this is not a realistic option for a number of reasons. The FAA cannot take down a radar without an unacceptable loss of coverage. Even assuming an acceptable, alternate site could be identified, the radar could not simply be moved. Rather, a new radar would have to be installed at the new location. The reality is that the FAA does not have extra radars available for replacement and there are no spare long range radars. Even if a new radar were available, moving the radar site would require changes to the national airspace system. Airways, reporting points, and airspace fixes are parts of the airspace system that could be impacted. Depending on the situation, such changes could require regulatory action. The bottom line is that moving radars around the country is a costly, disruptive, unacceptable, and unworkable proposition. It may sound simple, but in fact, it is not something the FAA can accommodate or the taxpayers can afford.

Web link: http://www.faa.gov/news/testimony/news_story.cfm?n...

Download File(s):
Kalinowski_Testimony062910.pdf (24.81 kB)

http://www.windaction.org/documents/28500

Gresham's Law of Green Energy

January 10, 2011 by Jonathan A. Lesser

Summary:

Jonathan Lesser explores how high-cost subsidized renewable resources risk destroying jobs and hurting consumers.

Conclusions

Industries that require never-ending subsidies simply cannot increase overall economic welfare. To conclude otherwise is to believe in "free-lunch" economics of the worst kind. Yet, freelunch economics are driving the push for renewable energy.

The subsidies paid by ratepayers transfer wealth from existing generators to a chosen few renewable resource owners. One may like to rail against the existing generators - as many politicians have - but the long-run implications of such subsidies will be to destroy competitive wholesale electric markets and drive out existing competitors. This course of action will cost jobs because businesses, forced to pay higher electricity prices, will either relocate, contract, or disappear altogether. It will reduce the disposable income of consumers, who will forever be forced to subsidize renewable resources (just as they must now subsidize corn ethanol producers) - all in the name of
"green energy."

Cape Wind stands at the forefront of this new renewable energy push, one that is based on long-discredited - and, alas, long-believed promises.Unfortunately, it is politicians who are selecting the winners and losers in the renewables game, and the select few are benefiting at the expense of the many, i.e., the
ratepayers. This is hardly a recipe for economic growth.

Web link: http://www.cato.org/pubs/regulation/regv33n4/regv3...

Download File(s):
GreshamLawGreenEnergy.pdf (279 kB)

Michaels on the viability of wind as an economic choice for U.S. electrical future

June 16, 2010 by Robert J. Michaels, PhD

Summary:

Economist Robert J. Michaels from California State University provided this testimony before the U.S. House Committee on Science and Technology Energy and Environment Subcommittee in reference to renewable energy policy. Dr. Michaels expresses doubts that wind energy will have much of an impact on displacing fossil fuels, or that government subsidies for the wind industry will create jobs. A summary of his testimony is provided below. His full testimony can be accessed by clicking on one of the links at the bottom of the page.

Summary and Conclusions

The value of funding the changes that the Committee is considering depends critically on an assumption that requires far more thorough examination than it has thus far received – that wind power will be an economic choice for the nation's electrical future. Almost all of the evidence points in the opposite direction. There are two types of renewable resources: ones like biomass, waste and geothermal generators that have long occupied a small niche in markets where they have long stood on their own. The other resources, primarily wind, have yet to pass market tests and instead thrive because of subsidies and regulatory requirements that utilities purchase their output. Official data show clearly that the costs of electricity from wind and solar units are well above those of every fossil fuel, and are expected to remain high. We have seen wind's sensitivity to subsidies in the pattern of investments with and without its production tax credit, and in the statements of its trade association about the importance of those subsidies. Further, claims that all energy sources are subsidized can be quite misleading. Looking at fuel actually consumed in power production, a megawatt-hour of wind power receives 90 times the subsidy of one produced from natural gas. Most of wind's subsidy takes the form of tax breaks for producers rather than direct allocations of funds for research.

Other problems are still matters for research, but as they arise they suggest that government think twice before it continues to rush electricity into heavier dependence on wind power. Wind's

useful contributions to capacity are weather dependent, and wind often produces the least when it is the most needed. Integrating wind into regional markets will require substantial transmission investments, and preliminary results of work on wind power's actual impact on fossil fuel emissions are not encouraging. Regional political factors and electrical geography may further render some planned operational changes difficult or impossible to implement. Finally, as an engine of "job creation," wind power is probably a poor choice.

It is always hazardous for a non-expert (or for that matter an expert) to predict policy trends. Unfortunately, this Committee will have little choice but to do so when considering the GE / NREL study. Public opinion is in flux, but absent national carbon control and / or renewables requirements, the value of implementing its recommendations will fall precipitously. Markets are also changing in ways that bring up further questions. Over the past few years wind power has grown strongly, largely fueled by subsidies and regulatory requirements. Over that same period a revolution in fossil fuels has taken place, but without such subsidies or regulations. The technologies to access natural gas in shales, tight sands and coal seams have come of age. They can now reach hitherto unimagined volumes located all around the nation at current prices, and with what most agree are minor environmental impacts. The nation's gas reserves are massively increasing, and the history of oil and other minerals strongly suggests that early estimates of reserves will turn out to have been far too low. America can probably look forward to literally centuries of its own clean, safe, competitively produced, and truly secure fuel. Looking forward also means looking backward. Abundant gas means less need for power from coal and uranium, and from uneconomic renewables as well. Gas-fired generation is cost-effective, fuel-efficient, environmentally acceptable almost everywhere, and already an integral part of almost every utility's power supply. The future belongs to the efficient, and it is time to abandon the mistaken belief that efficiency and renewable are synonyms.

Web link: http://gop.science.house.gov/Media/hearings/energy...

Download File(s):
100613MICHAELS testimony final.pdf (93.68 kB)

http://www.windaction.org/documents/27984

Modern wind turbines generate dangerously "Dirty" electricity

April 28, 2009 by Catherine Kleiber

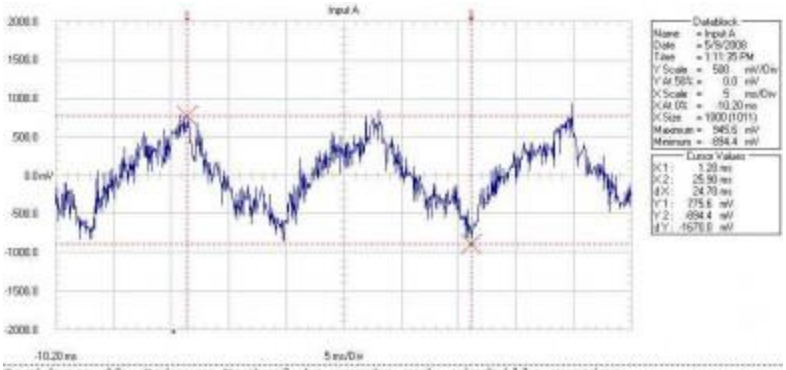
Summary:

Wind turbines are causing serious health problems. These health problems are often associated, by the people having them, with the flicker and the noise from the wind turbines. This often leads to reports being discounted. Residents of the area around the Ripley Wind Farm in Ontario where Enercon E82 wind turbines are installed feel that the turbines are making them ill.

Wind turbines are causing serious health problems. These health problems are often associated, by the people having them, with the flicker and the noise from the wind turbines. This often leads to reports being discounted.

Residents of the area around the Ripley Wind Farm in Ontario where Enercon E82 wind turbines are installed feel that the turbines are making them ill. Residents suffer from ringing in the ears, headaches, sleeplessness, dangerously elevated blood pressure (requiring medication), heart palpitations, itching in the ears, eye watering, earaches, and pressure on the chest causing them to fight to breathe. The symptoms disappear when the residents leave the area. Four residents were forced to move out of their homes, the symptoms were so bad. Residents also complain of poor radio, TV and satellite dish reception. There is no radio reception under or near the power lines from the wind turbines because there is too much interference. Local farmers have found that they get headaches driving along near those power lines.

The waveforms below were taken at one of the residences in the area. The first waveform was taken before the wind farm started operation. (As you can see, a ground current problem existed even before the wind farm started.) The frequency profile of the neutral to earth voltage changed dramatically after the wind farm became operational (second waveform). There are far more high and very high frequencies present; indicated by the increased spikiness of the waveform.



Residence #3, Primary Neutral to remote rod, windmills running before the collection line was buried.

As demonstrated by these waveforms, wind turbines are extremely electrically polluting. Studies and anecdotal reports associate electrical pollution with a similar set of symptoms to those experienced by the residents of the area (1, 2, 3). The symptoms associated with electrical pollution are caused by overexposure to high frequencies and are known as radio wave sickness (4). Technical papers discuss the fact that it requires only very small amounts of high frequency signals (either from transients or communications) on wiring to induce significant electrical currents in the human body. They support findings of human health problems caused by exposure to even small amounts of high frequencies (5, 6). The specific symptoms experienced depend on both the frequencies present and the body type and height of the person being exposed. Increased risk of cancer is associated with exposure to both "dirty" power on wires and electrical ground currents (7, 8). Animals also experience health problems related to electrical pollution exposures. Dairy cow's milk production and health suffers as exposure to high frequency transients increases (9, 10).

Suncor and Acciona have tried to some degree to correct the problem at the Ripley Wind Farm. They buried the collector line from the turbine near some of the most badly affected homes and gave the homes a separate distribution line. They also put an insulator between the neutral line

and the grounding grid for the wind farm. As you can see, from the waveform below, it helped somewhat. It reduced the high frequencies being induced on the distribution system by the proximity of the collectors and the high frequencies put directly on the neutral by the tie to the wind farm grounding grid. However, it is still not as good as before the wind farm installation and neither is their health.

Residence #3, Primary Neutral to remote rod, windmills on, collection line now buried.

This is not the only wind farm that seems to be causing serious health problems for local residents. The Enercon E82 does not seem to be unique in its design or problems. Wind turbines generate a sine wave of variable frequency in order to be able to take advantage of the full range of wind speeds. However, the grid only operates at 60Hz, so the variable frequency is converted to DC and then an inverter is used to convert the DC signal to 60 Hz AC. This is the signal that is put on the power line. Most inverters generate an extremely "dirty" signal, which is a 60Hz waveform polluted with a lot of high frequency transients. The previous waveforms are examples of this. The people in this house were so sick at home with the wind turbines running that they had to abandon their home and move elsewhere while they waited for the problem to be fixed. The changes made by the wind farm combined with a neutral isolation device installed by the homeowners has made the home livable, but their health is still affected by the operation of the wind turbines.

In order to eliminate the electrical pollution problem wreaking havoc on the health of people living in proximity to wind farms, the inverters need to be properly filtered at each wind turbine and all collection lines from the wind turbines to the substation should be buried. At the substation the electricity must also be filtered before being allowed on the power grid. There also needs to be a proper neutral system installed to handle the high frequency return current.

More information about electrical pollution and health can be found at http://www.electricalpollution.com . The author can be contacted with questions about electrical pollution at webmaster@electricalpollution.com . If you would like to get periodic email updates relevant to electrical pollution, please email with "join email list" in the subject heading. If you need measurements done, please contact Dave Stetzer in Wisconsin (608-989-2571 or dave@stetzerelectric.com) or Dave Colling in Canada (519-395-5194 or kave@hurontel.on.ca).

http://www.windaction.org/documents/20955

Stray voltage culprit, Bruce meeting hears

By BILL HENRY

Posted 1 year ago

Three months after the Ripley Wind Farm went online in December 2007, Dave Colling's phone started ringing.

Three of his neighbours were seeing doctors about recurring ear aches. They knew Colling, a former dairy farmer who lives within two kilometres of the turbines near the southern Bruce County community, had an interest in and could test for what he calls "electrical pollution."

"It's like living inside a microwave. It radiates," Colling told more than 100 people in Keady last Tuesday night.

He said stray voltage eventually forced four families from their homes. Two have not returned, and one family sold the farm and moved away.

"Everybody says it's in their heads. It's not in their heads," Colling said. "I know these people. They're honest, hardworking people."

Wind farm officials in Ripley finally agreed to bury some transmission lines. That improved but didn't end the problems, Colling said.

Many people experience difficulty breathing and a pressure in their chest. Colling said it's caused by stray electricity, citing numerous research sources linking illness to electrical hypersensitivity. Symptoms at some Ripley homes can arrive within 15 minutes, he said....

One farmer, his pregnant wife and their two-year-old daughter have been living in a single room at a Kincardine hotel since April at the wind farm's expense, Colling said.

Before that, her parents had taken their "screaming" child to the hospital emergency department some 10 times with ear aches. Her mother moved the girl out of the house, but the aches returned as soon as she would visit for the weekend.

"This little two-year-old girl does not know what a wind turbine is doing to her. She has no connection mentally that this thing is making her sick," Colling said.

Colling also said there's evidence that earthworms have vacated much of the land near the turbines, and rodents, cats and dogs won't go near some farm buildings where he has measured electrical pollution.

"It drives everything away," he said

http://www.todaysfarmer.ca/ArticleDisplay.aspx?archive=true&e=2160644

Calculating wind power's environmental benefits

June, 2009 by Thomas Hewson Jr. and David Pressman

Summary:

Energy analyst Tom Hewson provides details on new wind power generation and whether the claimed benefit of avoided emissions is overstated.

It's commonly believed that new wind power generation will displace coal and natural gas-fueled power plants and thereby avoid all their associated greenhouse gas (GHG) emissions such as carbon dioxide (CO2), nitrous oxide (NOX) and sulfur dioxide (SO2). The benefits of these avoided emissions have become a major factor in wind developers gaining public support for their plans to site wind farms. These purported benefits also are the reason for the large subsidies governments have provided to offset wind's higher power production costs.

Unfortunately, some of these environmental claims are built upon incorrect assumptions about how U.S. environmental regulations actually work and the type of generation a new wind project will displace. On any given power project, the benefits of avoided air emissions can be calculated as the simple difference between whether a designated project is built versus if the project is not built. This simple calculation has been incorrectly done by several renewable project developers and their consultants. Their mistakes have led them to incorrectly claim large air emission benefits from building new wind facilities...

Finally, proponents who suggest that wind is able to entirely displace CO2 overlook a fact fundamental to energy generation: wind's unpredictability means it truly has no generating capacity value and its construction will not displace building any new coal or natural gas generating capacity. Grid reserve margins require wind back up and the inefficiency of quickly firing up a natural gas unit to meet erratic wind generation output means any emissions displacement is minimal. Wind is simply an additional capital cost which proves to be more than twice as expensive for the ratepayer.

Conclusions

Any analysis of wind power's potential to displace fossil fuel generation must first correctly reflect current environmental regulations. Any air pollutant subject to a cap and trade program covering SO2, NOX and regional CO2 may be displaced but not avoided. Emission levels will remain at the same capped levels with or without wind project development. With the eventual implementation of a federal cap and trade law regulating CO2 emissions appearing likely, wind power will likely offer no future incremental greenhouse gas emission reduction benefit.

One must also distinguish between closed market states with renewable portfolio standards and those open market states without them. Those competing in these closed set-aside protected markets are competing against other renewable projects and not in the open market against lower cost conventional power sources. In these closed markets, no incremental carbon reduction benefits exist between competing renewable power projects. However, these closed power markets were established though regulation and/or legislation and their creation carved out a portion of the open market that reduced the demand for conventional power generation and non-capped fossil fuel emissions. In any case, any avoided emissions benefit is not attributable to a single wind developer, but to regulatory action that has created the closed market for wind and other renewables.

Creating a federal renewable portfolio standard would create a nationwide closed market for renewables, meaning wind projects would again offer no incremental emissions benefits given their direct competition with other renewables and not coal or natural gas. Unfortunately, many of the claims made regarding wind's supposed avoided air benefits are overstated.

Authors: *Thomas Hewson Jr. is a principal with Energy Ventures Analysis of Arlington Va. where he directs the firm's environmental consulting practice. His experience spans more than 32 years evaluating environmental issues related to energy use for DOE, EPA, EPRI, major electric utilities, fuel suppliers, equipment vendors, utility commissions, investment firms and citizens groups. He holds a BSE in civil engineering from Princeton University.*

David Pressman is an Analyst for Energy Ventures Analysis and holds a bachelor of arts degree from the University of Rochester.

Web link: http://online.qmags.com/PE0709/Default.aspx

Download File(s):
HEWSONCalculating the cost of wind power.pdf (332.12 kB)

http://www.windaction.org/documents/22493

Living with turbines: a sad story from Shelburne, Ontario

February 18, 2011 by northgowerwindturbines

Shelburne, a village best known for its annual fiddle festival, located an hour west of Toronto, is now home to about 150 industrial wind turbines. The community was told 20 originally, and now they have over 100, with many many more planned.

What follows is a letter to Melancthon Township Council by a local resident, an organic farmer who has been living amid the turbines with his family for about three years now. The family's life is in ruins. His doctor has told them they must move, their Realtor says they will never be able to sell their property. This is the reality of "clean" "green" renewable industrial-scale wind power development.

Mayor Bill Hill

PO Box 465 Shelburne, Ontario

Dear Mayor Bill Hill,

I would like this opportunity to introduce myself to you. My name is Farshad Davoodian, I am a registered farmer in Melancthon, Dufferin County. As I am sure that you are aware we are currently living in the middle of hundreds of wind turbines that have been planted here by the Canadian Hydro Company. Initially I did not have an objection to their existence as they gave us incorrect information regarding the discomfort we are now experiencing. They have completely fisrupted our lives, we have trouble sleeping due to the constant sound, they have affected our health. We have now found ourselves in a position that it has become impossible to work, the noise has been unbearable and we cannot rest in our own home, the sound is comparable to a washing machine that never stops. Our health has been in constant decline since their existence and we cannot continue living and working here, we are put in a position of being run from our farm and home. I hope that you can do what you can in your power to bring our concerns to the table. I believe an investigation should be commenced regarding these issues. I am sure I am not the only one living under these conditions. I have enclosed letters that clearly show the company

Trans Alta is not denying the excess noise. Our correspondence as well as a letter from my doctor showing her concerns regarding our health.

_____

We will report if there is any action or discussion following the reading of this letter at the council meeting.

northgowerwindactiongroup@yahoo.ca

http://northgowerwindactiongroup.wordpress.com/2011/02/18/living-with-turbines-a-sad-story-from-shelburne-ontario/

Report: CA Utilities Signing Expensive Clean Power Contracts

By Ucilia Wang, Contributor | February 21, 2011 |

It's no secret that renewable electricity in general is more expensive than power from fossil fuels. But how much more expensive? A California report shows that the state's utilities have signed contracts that will cost them over $6 billion more than they would otherwise pay for electricity from natural gas power plants.

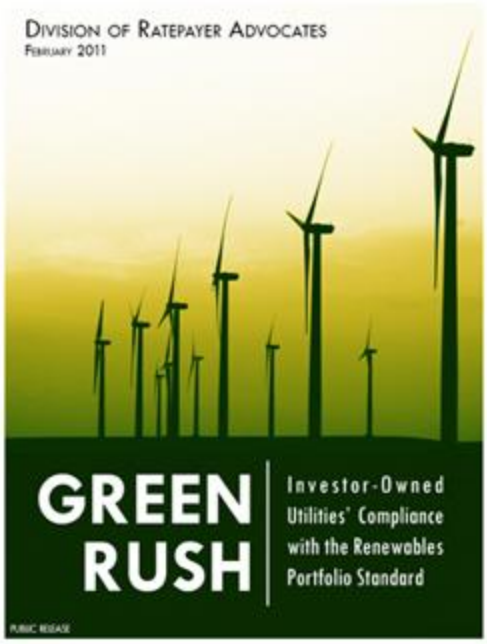
The report, released by the Division of Ratepayer Advocates (DRA) last Friday, says 59 percent of the contracts signed by the state's three largest utilities are priced above the market price referent (MPR), which is a yardstick used by the California Public Utilities Commission (CPUC) in reviewing the contracts. The MPR takes into account the costs of building, operating and maintaining a 500-megawatt combined cycle natural power plant. The more expensive contracts have prices that on average are 15 percent higher than the MPR

http://www.renewableenergyworld.com/rea/news/article/2011/02/report-cal-utilities-sign-too-many-expensive-clean-power-contracts?cmpid=WNL-Wednesday-February23-2011

Green Rush: DRA Report Urges CPUC to Be More Discriminating on Contract Prices When Approving Renewable Contracts

DRA has released *Green Rush: Investor-Owned Utilities' Compliance With the Renewables Portfolio Standard*, a report analyzing California investor-owned utilities' progress in renewable procurement and outlining ratepayer concerns with their renewable strategies.

>> See the report



The California Legislature has set standards for renewable procurement -- including 20 percent of utilities' power coming from renewable sources by 2010, with a flexible compliance date of 2013. DRA's report finds that utilities are well on their way to meeting the 20 percent goal as well as a 33 percent renewable level. But DRA's analysis finds that the CPUC has continued to approve renewable contracts more expensive than outlined standards, and that utilities have exceeded the Legislature's above-market fund cost cap by more than $5 billion.

The report encourages the CPUC to be more discriminating in its approval of utility contracts for renewable procurement. DRA analysis has found that the CPUC has only rejected two renewable contracts. Green Rush outlines specific measures that could help the CPUC bring ratepayer costs down while maintaining flexibility to help California get more of its power from sustainable, clean, renewable technologies.

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Experts weigh in on turbine noise

BY GARY RENNIE, THE WINDSOR STARFEBRUARY 17, 2011

In a case that's put Ontario's Green Energy Act on trial drawing expert witnesses from around the world, a prominent Canadian physician testified Wednesday that construction of new wind turbines should be put on hold until appropriate medical studies are done to ensure the safety of nearby residents.

"The province ought not to proceed with the development of industrial wind turbines any further," said Dr. Robert McMurtry, a past dean of the medical school at the University of Western Ontario and a former assistant deputy minister of health for the federal government.

"There is a lot of suffering," McMurtry said. "We need to understand why." McMurtry was a witness for Chatham-Kent residents trying to overturn ministry of environment approval for Suncor's proposed Kent Breeze windfarm.

Using audio and video teleconferencing, expert witnesses from England, New Zealand and the U.S. have already weighed in on the complex science of industrial noise and how humans perceive and react to it.

Suncor and environment ministry lawyers have a long list of experts of their own to call in the weeks ahead.

Final arguments to the twomember Ontario Environmental Review Tribunal panel aren't expected to be made until April.

Considered the key witness for sceptics of the safety of turbines as currently regulated in Ontario, McMurty spoke of his experiences talking to more than 40 people who have lived close to the 120-metre high towers and whirling blades. They complain of prolonged sleep deprivation, stress, headaches, extreme fatigue and high blood pressure, he said.

Leaving their homes to stay with relatives or in motels provides relief from the symptoms, McMurtry said. "The only cure is to move."

McMurtry was critical of both Ontario's noise standard for wind turbines and the 550-metre setback from turbine locations to homes in the regulations to the 2009 Green Energy Act.

"I do not have confidence in those guidelines."

http://www.windsorstar.com/story_print.html?id=4299742&sponsor=true

Wind industry group opposes federal guidelines to protect birds

Penn Energy 2/2011

The American Wind Energy Association Industry said it will oppose plans by a federal agency to adopt voluntary regulations on wind developers to protect birds and other wildlife.

AWEA said in a release that more than 34,000 MW of potential wind power development, $68 billion in investment and 27,000 jobs are at risk due to U.S. Fish and Wildlife Service policies on golden eagles.

"Those numbers are expected to grow exponentially with analysis of the full scope of the proposed guidelines," AWEA said.

Two Fish and Wildlife Service documents offer guidelines for utility-scale and community-scale wind energy facilities to, according to the agency, "avoid and minimize" negative impacts to fish, wildlife, plants and their habitats.

"Draft Voluntary, Land-Based Wind Energy Guidelines" was developed for industry to avoid and minimize impacts to federally protected migratory birds and bats and other impacted wildlife resulting from site selection, construction, operation and maintenance of land-based, wind energy facilities. The Fish and Wildlife Service also developed peer-reviewed "Draft Eagle Conservation Plan Guidance" for wind project developers and employees who must evaluate impacts from proposed wind energy projects to eagles protected by the Bald and Golden Eagle Protection Act and other federal laws.

AWEA said it cannot support either document even though it participated for more than two years in a public, collaborative Federal Advisory Committee process. AWEA said the process resulted in consensus recommendations on wind turbine siting that wind energy developers broadly supported.

AWEA said in a release "Unfortunately, the guidance released deviates significantly from the consensus recommendations." Among other problems with the guidance as released, it could:

- Delay construction of projects by up to three years and require operating projects to retroactively conduct post-construction wildlife studies for a minimum of two and as much as five years, adding unforeseen costs to the operating budgets of these facilities.
- Require "adaptive management", which could include operational changes, such as shutting off turbines at certain times of the year, which will add further unquantifiable costs to even projects already permitted and operating.
- Request analysis on wildlife-based sound impacts without any peer-reviewed scientific evidence that sound related to the construction and operation of wind farms has the potential to impact wildlife.
- "Greatly expand" applicability under the National Environmental Policy Act (NEPA) to projects built on private lands, adding time and costs to developing wind projects, when there is no federal staff to perform this "vastly increased amount of administrative work."

Rumbling from turbines puts wind up sleep-deprived locals

- Rebecca Puddy
- From: *The Australian*
- February 17, 2011 12:00AM

Dreaming of building a house and farming the land, Julie Quaft and her husband, Mark, bought a quiet 16ha property 100km north of Adelaide six years ago.

Since then, a wind farm has been built next to her house, which she said had not only robbed her of her dreams, but affected her health.

"It's made things very hard for me because I can't sleep," Mrs Quaft said. "It sounds like a huge jet engine rumbling on the hill."

The wind farm in Waterloo, near Clare, 100km north of Adelaide, began operating in October, but will be opened today by Mike Rann, amid criticism from the divided country community.

While many farmers have supported the project -- particularly those earning an income from turbines built on their land -- others have claimed to have suffered significant health effects.

Waubra Foundation medical director Sarah Laurie has studied the health effects of wind turbines and is concerned about the symptoms reported worldwide.

Related Coverage

- SA - the 'clean and green' state *Adelaide Now, 16 hours ago*
- Turbine neighbours gagged in buy-up *Herald Sun, 29 Jan 2011*
- Wind farm fight heads to court *Adelaide Now, 28 Jan 2011*
- Tycoon's tilt at march of turbines *The Australian, 21 Jan 2011*
- Wind farms linked to health problems *Adelaide Now, 16 Jan 2011*

"The main symptoms are chronic sleep deprivation, night terrors, people waking up in the night in a panic for no reason and bed-wetting," Dr Laurie said.

"We think that what is happening is that people's sympathetic nervous systems are being stimulated so they get a massive rush of adrenalin in the middle of the night."

The state's push to develop wind farms is being driven by a target of having 33 per cent of energy generated by renewable sources by 2020.

More wind power is generated in South Australia than in any other state or territory, with 13 farms operating. As in Victoria, wind farms have attracted strong opposition from locals.

In October, Family First senator Steve Fielding asked federal parliament to examine their social and economic impact.

The parliamentary committee received hundreds of submissions, many expressing community concern over the turbines' health effects. Owned by Roaring 40s, the farm near the Quaft family has 37 turbines. Bill, a Waterloo resident who did not want to be identified, has all but moved to a nearby town to escape the constant roaring and pounding effect from the soundwaves.

He said the wind farm developers had put a wedge into the previously close-knit community.

"We've been deceived and conned all along," Bill said. Roaring 40s managing director Steve Symons said the wind farm had strong support from the community and the organisation had tried to work with those who had objections.

"With the health issues, as an industry, that hasn't been medically proven, but to the extent we have complaints from residents in relation to noise, we go to their houses and test the noise levels with microphones," Mr Symons said. "We are in compliance with the noise requirements of the EPA (Environment Protection Authority) and they are the most stringent noise requirements in Australia."

Two cases are before the state's courts, with residents questioning the health and environmental impact of planned wind farms.

http://www.theaustralian.com.au/news/nation/rumbling-from-turbines-puts-wind-up-sleep-deprived-locals/story-e6frg6nf-1226007202813

Trouble brewing for wind farms?

By Donna Barker - dbarker@bcrnews.com **Created: Wednesday, December 15, 2010 8:41 p.m. CST**

PRINCETON — The future development of wind farms in Bureau County could be up in the air.

After hearing complaints at Tuesday night's meeting from Ohio residents Todd and Deb Anderson about the Big Sky wind farm, the Bureau County Board discussed the need to re-evaluate the county's zoning ordinances, especially in regards to wind farms, as well as the possible need to place a moratorium on any future building of wind farms in Bureau County...

The board also discussed ongoing litigation with Iberdrola Renewables over the road agreement for the Providence Heights wind farm south of Tiskilwa. There have also been problems with wind turbines and meteorological towers not erected in the approved locations, board member Joe Bassetti said.

After further discussion, board member Marshann Entwhistle suggested prohibiting future wind farm development in Bureau County until the county can solve the various problems and study the impact of wind farms in Bureau County.

"I really think that this county needs to put a moratorium on any future wind farms going into this county," Entwhistle said. "If you drive around this county, it's really looking pretty bad."

Board member Dan Rabe said the board needs to consider the taxing dollars brought into the county by the wind farms, as well as the money earned by the landowners for renting property to the wind farm developers. In response, Wilt said the county board is not to take financial impact into consideration when dealing with zoning issues...

http://www.bcrnews.com/articles/2010/12/15/r_pgd6shkaqk25qx1glma2la/index.xml?__xsl=/article-tip.xsl

California approves first US cap and trade scheme

California regulators approve nation's first system that gives polluters financial incentives to emit fewer greenhouse gases

guardian.co.uk, Friday 17 December 2010 10.13 GMT

http://www.guardian.co.uk/environment/2010/dec/17/california-cap-and-trade-emissions

renewable energy credits can be collected and sold for tons of $$ / mark Hass

Second Rebuttal in Economist Debate

February 2, 2011
Economist Debates

Mr Sawyer once again, without any evidence, claims wind is cheaper than hydrocarbon-based generation and that wind's costs have come down. That is simply not true. In December, the US Energy Information Administration determined that the cost of new wind projects increased by 21% last year.

My opponent talks about scale and tosses out some percentages, but no hard numbers. Here are some: in 2009, total global wind energy production was about 260 terawatt hours, or 1.3% of global electricity production. (Production from solar and geothermal was so small as to be insignificant.) That is the energy equivalent of about 435,000 barrels of oil per day. Global primary energy consumption averages about 225m barrels of oil equivalent per day. Thus all global wind energy output in 2009 was the equivalent of about 1/500th of global energy needs. Put another way, global wind output in 2009 was less than 1/100th of the amount of energy derived from natural gas. Renewables will grow rapidly, but it will be decades before they can make a sizable difference in global carbon emissions

Mr Sawyer and many others in the wind industry fervently pray that they can dismiss the burgeoning backlash against industrial wind as "anecdotes" and "a few cases of NIMBY obstructionism". He dares not admit the resistance to the visual blight and the deadly serious infrasound-related health issues that make his industry unwelcome in so many rural communities around the world. He should visit Copenhagen, which in 2009 held a headline-grabbing UN-sponsored global climate conference, at which no real agreement was made. The Copenhagen Post recently reported: "State-owned energy firm Dong Energy has given up building more wind turbines on Danish land, following protests from residents complaining about the noise the turbines make." It appears that Denmark, the supposed Valhalla of wind energy, has many of the NIMBYs that Mr Sawyer so despises. He should also look at the 3,500-signature petition given

to the Scottish Parliament a few days ago which opposes "badly sited, industrial scale wind" projects in Scotland.

Does natural gas have environmental challenges? Absolutely. There is no such thing as a free lunch, particularly when it comes to energy and power systems. But with billions of people living in dire poverty, the answer is not expensive, intermittent, unreliable energy from renewables. Instead, those people must be brought into modernity with clean, cheap, reliable, dispatchable forms of power. And the best choice to provide that power over the near term is clearly natural gas.

Original file here: http://economist.com/debate/days/view/647

http://johnosullivan.livejournal.com/30603.html

LEGISLATIVE ASSEMBLY OF ONTARIO **STANDING COMMITTEE ON GENERAL GOVERNMENT**

Excerpted quote from Barb Ashbee, Shelburne, a homeowner adversely affected by industrial wind turbines placed too close to her family's home. Quote taken from the attached document, Hansard 15-APR-2009_G023.pdf, starting at the bottom of page 34. According to this testimony, (emphasis added) her home was located within 1496 feet (456 meters) and 2296 feet (700 meters):

"You need to know the problems with wind turbines and people living with them. I know you probably know me. You've probably seen my letters. When the wind tur-bines started up in early December, we had terrible noise issues, and it was pretty much instant. There were three nights straight we didn't sleep at all, and that's what prompted my letter to the wind company and to—I actually sent it to the MP because I didn't know how this all worked at that time. I had no idea.

We had no thoughts that we were going to have problems. When the wind turbines were actually going up at our place in the summer, we were putting a double-car garage up at the same time. We had put in a new fence, a new deck, everything. We weren't expecting anything. We're not anti-wind, we're not anti-green, but there are big problems with the setbacks in our area.

By the way, I'm from Shelburne. I'm sorry; I should have said that to begin with.

The closest turbine is 456 metres behind us. There are two north and south of it. Our house faces east. Across the road, the next closest is just under 700 metres. When those winds pick up, they're so loud we cannot sleep at night. We've had test after test.

I will say the wind company has been very diligent in trying to find out what the problem is. Tests have been going on over four months now. They've been in our house with monitors, outside the house with monitors. They've shut turbines on, off. We've spent a lot of time with them, and I think they will agree that the two of us have worked very well together—with the acoustics company and with themselves—but they can't fix the problem

There's this horrible hum and vibration in our house. It just drives you mad. It's been there for the last six days. I'm sorry. It comes and goes, but it's so loud you can't sleep, and it's coming through the walls. The buried cable transmission lines go up the side of our property—we're on one acre—and I don't know if it's electrical coming through the ground in our house or what it is. We're looking for a rental now because we can't stay there.

When I hear people say, "There aren't problems," and "It's all in their heads," and they're just unhappy because they don't have a turbine, I don't even know what to do. My government has not been helping. My MPP, thank God, has been active in trying to work on my behalf with the government, giving everybody my story, and my council has been good, but I'm not getting anything back from anybody.

This hum and vibration is not covered in the guide-lines. There are no guidelines for interior noise in our house. When the winds are whipping up, and we can't sleep for days and days at a time, there's nothing. You

phone the MOE and I cannot tell you how many times I heard, “We’re in compliance. We’re in compliance.” They’re in compliance. They’re in compliance. In fact, they weren’t in compliance. Finally, we dragged it out and got the acoustics study back. It’s just been such a fight to get information.
Now they’re shutting five turbines down at night, and I thank them for that because that’s helping with the noise, but this vibration in the house is horrible, it’s absolutely horrible. Nobody should have to live like that, and I can’t believe the government hasn’t intervened and sent someone to our house to test for dirty electricity or whatever it is. It’s unconscionable, it just is.
We didn’t want to speak out in December. Finally, I gave up and I started writing letters because I didn’t know what to do because now our property value is zero. If I could move out of there, I’d have a for sale sign, we’d be gone, but we can’t sell our house. We’re into the fourth month and a couple of weeks ago a wind company head office guy came and talked to us. We’ve talked to so many people. He said, “Okay, I’ll see you in a month.” I’m like, “A month? We’ve gone on far enough.”

Here we are, we can’t move. We have nobody helping us. Yes, they’re doing their best, but look at the size of the company and look at the number of turbines they have up in Canada, and they can’t fix that problem. If you guys are going to go push more through—and then, because I came out and starting speaking, I’ve got people all over the province phoning me and saying, “Help us. We’re not getting anywhere with our MPP. Nobody’s listening to us.” And I’m trying to help, I’m trying to get the word out... **Mr. Peter Tabuns:** I’m very sorry to hear of the experiences that you’re going through, because they clearly have had an impact on you. Can you tell me the name of the wind company?

Ms. Barbara Ashbee-Lormand: Canadian Hydro...**Mr. Peter Tabuns:** The acoustics report that was produced: Is that something that you would be willing to share with the committee?

Ms. Barbara Ashbee-Lormand: I don’t see why no **Mr. Peter Tabuns:** Do you get the vibration when the turbines are shut down?

Ms. Barbara Ashbee-Lormand: Yes, and it’s my thought—and they can’t figure it out. Mind you, nobody from the MOE has come to check, but there are buried cable transmission lines going up the side of our property and there are Bell wires, and there’s a theory that perhaps the transmission cables are inducing electricity into the Bell wire, which is coming into our home. It’s grounded in our circuitry so it’s going around our house. We have had, just last week, an electrical consultant test for dirty electricity and he did find dirty electricity at 13 volts, which may not sound like much, but it’s a lot "

It has been stated that the buyout agreement/contract, that Barb Ashbee and her husband later signed with the owners of the offending wind turbine project, included a non-disclosure "gag order" that prevents her from disclosing the name of the project, the owners, or the size and model of the turbines that were the alleged cause of their physical, emotional and financial distress.

Our independent research found the following information (1-3 below) that we believe documents that name of the offending wind energy project, the size type and model of the turbines involved, and the names and addresses of those property owners that were bought out by the owners of the wind farm. It is our understanding that Barb Ashbee ,and her husband Dennis, were the last property owners do secure a buyout and that other property owners are still suffering:

1) The **Melancthon EcoPower Centre** is a 199.5 megawatt (MW) wind farm in Melancthon Township, near Shelburne, Ontario. The centre, Canada's largest wind energy installation, is owned and operated by Canadian Hydro.[1][2]

Construction of the Melancthon EcoPower Centre began with the 67.5 MW Phase I in 2005 and achieved commercial operation in March 2006. Construction of the 132 MW Phase II of the project began in 2007 and achieved full commercial operation in November 2008.[1]

2)

Source of photo and Melancthon EcoPower Centre information (#1-2) above:
http://en.wikipedia.org/wiki/Melancthon_EcoPower_Centre

3)

Fact
Melancthon - $1.75 million buy outs

Roy and Teresa Brownell
375557 6TH LINE AMARANTH
PT LT 29, CON 5, PT1, 7R787

Sandra Marie and Stephan Williams
58232 COUNTY ROAD 17, RR6
PT LT 291, CON 2SWTS, PT 2, 7R4396

Walter Mark Benvenete
97121 4TH LINE MELANCTHON
PT LT 284 & 285 CON 4 SWTS 163913
(house removed)

Helen and Bruce Fraser
58234 COUNTY ROAD 17, RR6
PT LT 291, CON 2 SWTS, PT 2 7R924

David and Sheryl Barlow
PT LT 1, CON 5 SWTS 157736 HWY 89

Barbara Ashbee, Dennis Lormand
335498 7th line Amaranth, Shelburne
PT of east half of LT 29 CON 7

Another issue that has come to the attention of the Ontario Federation of Agriculture is stray voltage. We appreciate the work that's being done by the Ontario Energy Board to put in the necessary steps and pro-

cedures to address this, but let's be clear: This is not witchcraft, this is not hoodoo; this is an actual problem that can be addressed in several ways. We need to ensure that proper collection wires are used to bring this energy to the transformer. We need to ensure minimum separ-ation distances between collection lines and distribution lines go from five metres to 30 metres to not induce that stray voltage. And sometimes, the noise complaints that people have about wind turbines could be a result of stray voltage in their homes. Again, we need to get to the scientific base of getting this information out to where it can go.

More testimony from those adversely impacted by industrial wind turbine projects in the Ripley area:
G-548 STANDING COMMITTEE ON GENERAL GOVERNMENT 15 APRIL 2009 /starting at page
Health and safety: We're like the first population of smokers who went to their doctors with health problems. This is the third official warning to the Liberal govern-ment of Ontario: There will be harm to citizens of all ages and gender, due to wind projects.
1650
Let's be very clear on one serious point: Each of the families has had the same two environmental changes in their lives since November 2007:
(1) Our hydro configuration has changed to now in-clude the connection to unfiltered power from the turbines and its substation.
(2) The blades of the industrial turbines began to rotate over, near and above the height of our homes.
Sleep deprivation; sleep disturbances; poor-quality sleep; humming in the head by the ears; edginess; a feel-ing as if you've had five cups of coffee; bad temper; heart palpitations; heaviness in the chest; pains in the chest like needles; increased blood pressure, 217 over 124; uncontrollable ringing in the ears; earaches; sore eyes, like you have sand in them; digestive problems which continued for months; headaches which caused you to be bedridden; the sensation of your skin crawling or being bitten by bugs; sore joints; nosebleeds; sores on feet that would not heal until you moved out of your

home; inability to concentrate or form words; a severe feeling of being unwell; bedridden for days; depression; tiredness; anxiety; stress—these are the signs and symptoms we have experienced over the past 17 months. Note that the above all start to subside when you leave the polluted environment of your home. The health changes are individual. Even the pets are affected while in the home—losing hair, sore ears—but not when away from the home.

The long-term health effects have also started to show. There's an increased sensitivity to certain sounds and high-frequency lighting, such as in the local stores, and in this room as well. You feel ill upon entering the building. Hearing difficulty has occurred. What other effects will occur?

Just like the first group of smokers, we counted on the government we hired and paid our tax money to, to have intelligently had all the facts determined before any wind project began.

Who is accountable for the unseen health changes occurring within our bodies from basically living in a vibrating microwave? What protection is there for a developing two-year-old who cries endlessly and pulls at her ears when she's in her home, but not when she's away from the project? Who's accountable to the young family who are expecting their second child? What if there's a deformity or a miscarriage resulting from infra-sound, low-frequency sound and the electrical pollution?

The health costs of four families have impacted the health insurance plan 61 times, strictly for health problems due to the two factors stated previously. I had a local hospital finance department calculate a rough estimate for the bill of one family member—$5,000 for one family member. Fourteen ER visits; 19 doctor visits; seven specialist visits, for ear, foot and heart; blood work, six times; audiologist, five times; CT scans, twice; heart machines and stress tests, five; Doppler testing, one; X-ray, one; urine tests, one—do the math. This is just four families so far. Who's going to pay for the health costs due to the health effects of wind projects?

There's additional in the gold.

Mr. Glen Wylds: Thank you, Sandy. I'm Glen Wylds. I live in the middle of the Ripley wind farm. I'm going to talk about the financial impact, the cost, to us as the homeowners.

Each family has incurred additional costs from bud-gets for food, fuel, laundry and doctor visits while living away from our homes. Family events had to be held in restaurants. There is wear and tear on our vehicles. There is the extra cost of extensive phone bills from trying to get the problems fixed. There is the price of putting isolators on our homes to protect our families from the unfiltered power. There's the cost of going to meetings. There's loss of productivity due to sleep deprivation. A loss of three weeks from work occurred.

The market value of a property is determined by what buyers are willing to pay for it after it is exposed to the market for a reasonable period of time. Affecting market value is the saleability of a property. The more saleable,

CPCN not PTC

A lesser setback would amount to "nothing less than government endorsed property takings, eliminating the safe use and development of land without meaningful compensation."

1. It amazes me that these bat deaths didn't serve as the "canary-in-the-coal-mine". The very large and fast turbine blades produce bat-lung-rupturing extremes of air pressure. These same extreme pressure variants are what produce the high levels of infrasound which impact on the health of area residents.

   The term CATVIE best describes the effect .. "Clear Air Turbulence Vortex Infrasound Effect".

1. Until cross-discipline studies are conducted (Health, Acoustics, Engineering, Statistical Analysis), we'll keep on spinning our individual wheels as we try to counter the pseudo-science BS of turbine proponents!

Impact of turbine noise on health and well-being

September, 2010 by Dr. Daniel Shepherd
Summary:

Dr. Daniel Shepherd was invited by the Ohariu Preservation Society in New Zealand to provide an evaluation of the impact of turbine noise on health and well-being. The report specifically references the proposed Mill Creek wind energy facility proposed to be built on rural land northwest of Wellington, New Zealand in the Makara and Ohariu valleys. His full report can be accessed by clicking on the link at the bottom of this page. The conclusions of his report are shown below.

10.6 Ruling against the Mill Creek proposal will financially disadvantage a minority of the community. Supporting the Mill Creek proposal will compromise the well-being of a great many more residents. In addition, those who elicit strong emotional reactions to the loss of amenity that will accompany the turbines will also likely exhibit high annoyance responses to the turbine noise that will encroach the Ohariu Valley soundscape. Furthermore, those individuals who are highly noise sensitive will likewise suffer from the turbine noise.

10.8 It is not clear to me that Meridian has undertaken sufficient duty of care in assessing the health impacts of turbines in the Ohariu Valley. For example, to the best of my knowledge they have not assessed prevalence of vulnerable groups (elderly, children) or traits (noise sensitivity) or considered factors that predict amenity values (e.g., length of residence). Nor have they reasonably dealt with the experiences of residents in the adjacent Makara Valley. There is a sense that they have attempted to suppress meaningful debate in the direct links between noise and health and instead present arguments based on fears of technology. While I have some sympathy for this argument in certain contexts (e.g., the placement of cell phone towers) the approach is not relevant to the current context.

10.9 Based on these observations (i.e., 10.8), based on data I have collected and analysed, and based on the current state of knowledge linking noise to impaired health in vulnerable persons, I opine that consent should not be granted for the proposed turbines in the Ohariu Valley.

Daniel Shepherd holds a PhD in psychoacoustics, a Masters of Science degree in psychology, a Bachelor of Science degree in psychology and biology. His PhD dissertation was a study on the abilities of human observers to discriminate between low level sounds. Currently he is a Senior lecturer at the Auckland University of Technology in New Zealand, lecturing in the areas of psychological assessment, biopsychology, and statistical analyses at both the undergraduate and postgraduate levels. He has published papers on the psychophysical measurement of human hearing abilities and has presented at numerous international conferences on the topic.

http://www.windaction.org/documents/31031

2-7-11: Raytheon Co. has been selected by the U.S. Department of Homeland Security (DHS) to develop an advanced wind turbine modeling tool. The tool will provide an accurate assessment of

turbines' effects on radar systems throughout the U.S.

Wind farms can interfere with the radar tracking of aircraft and weather by creating a Doppler effect as they rotate, creating potential blackout zones.

http://nawindpower.com/e107_plugins/content/content.php?content.7302

www.abcbirds.org

“The real answer is that we simply don’t yet have enough data to reliably estimate cumulative impacts, but once acquired they will likely far exceed current estimates. The growing and disproportionate 'take' of species of conservation concern also appears to be an issue relative to the overall number of birds killed, and that is another cause for worry,” stated Dr. Albert Manville of the FWS’s Division of Migratory Bird Management.

“We are plunging head-long into wind power, but so far, very few studies have been conducted that show what scale of impact it will really have on birds,” said Mike Parr, ABC’s Vice President. “While American Bird Conservancy supports bird-smart wind power, we do not support the fast-tracking of wind projects without adequate environmental oversight or assessment that can help developers and the public be certain that significant numbers of birds will not be harmed.”

In the near future, the Department of the Interior is expected to issue industry guidelines on the siting and operation of wind power to reduce bird and other wildlife impacts. Whether these guidelines will be binding or not is a cause of major concern to conservationists. “We wouldn’t allow stop signs to be voluntary, so why would preventing the killing of birds, which violates the Migratory Bird Treaty Act, be voluntary?” said ABC’s Vice President of Conservation Advocacy, Darin Schroeder.

Another major concern about wind development is that certain sensitive species may be affected very significantly by wind build-out. These include the spectacular Golden Eagle, the declining Greater Sage-Grouse, and endangered species such as the Whooping Crane. These species can be impacted by transmission lines and the infrastructure associated with wind farms, or by the turbines themselves.

In addition, today, American Bird Conservancy requested a Congressional hearing to investigate the scale and impact of bird kills caused by wind energy. “The impacts to birds from wind power have gone unrecognized and unaddressed, and are wrongly dismissed by industry as insignificant. In the light of the rapid growth in the industry to meet federal renewable energy targets, ABC is requesting a Congressional hearing into the bird impacts of wind power,” added Schroeder. “ABC supports bird-**smart wind power, but without strong federal standards protecting birds, we fear a major, on-going new threat will be created. We still have time to get it right if we act now,” he stated.**

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Mail Online

In China, the true cost of Britain's clean, green wind power experiment: Pollution on a disastrous scale

By SIMON PARRY in China and ED DOUGLAS in Scotland

Last updated at 10:01 PM on 29th January 2011

This toxic lake poisons Chinese farmers, their children and their land. It is what's left behind after making the magnets for Britain's latest wind turbines... and, as a special Live investigation reveals, is merely one of a multitude of environmental sins committed in the name of our new green Jerusalem

The lake of toxic waste at Baotou, China, which as been dumped by the rare earth processing plants in the background

On the outskirts of one of China's most polluted cities, an old farmer stares despairingly out across an immense lake of bubbling toxic waste covered in black dust. He remembers it as fields of wheat and corn.

Yan Man Jia Hong is a dedicated Communist. At 74, he still believes in his revolutionary heroes, but he despises the young local officials and entrepreneurs who have let this happen.

'Chairman Mao was a hero and saved us,' he says. 'But these people only care about money. They have destroyed our lives.'

Vast fortunes are being amassed here in Inner Mongolia; the region has more than 90 per cent of the world's legal reserves of rare earth metals, and specifically neodymium, the element needed to make the magnets in the most striking of green energy producers, wind turbines.

Live has uncovered the distinctly dirty truth about the process used to extract neodymium: it has an appalling environmental impact that raises serious questions over the credibility of so-called green technology.

The reality is that, as Britain flaunts its environmental credentials by speckling its coastlines and unspoiled moors and mountains with thousands of wind turbines, it is contributing to a vast man-made lake of poison in northern China. This is the deadly and sinister side of the massively profitable rare-earths industry that the 'green' companies profiting from the demand for wind turbines would prefer you knew nothing about.

Hidden out of sight behind smoke-shrouded factory complexes in the city of Baotou, and patrolled by platoons of security guards, lies a five-mile wide 'tailing' lake. It has killed farmland for miles around, made thousands of people ill and put one of China's key waterways in jeopardy.

This vast, hissing cauldron of chemicals is the dumping ground for seven million tons a year of mined rare earth after it has been doused in acid and chemicals and processed through red-hot furnaces to extract its components

Read more: http://www.dailymail.co.uk/home/moslive/article-1350811/In-China-true-cost-Britains-clean-green-wind-power-experiment-Pollution-disastrous-scale.html#ixzz1Cd94l0jv

http://www.owensoundsuntimes.com/ArticleDisplay.aspx?e=2952501

The Telegraph

Promoters overstated the environmental benefit of wind farms

The wind farm industry has been forced to admit that the environmental benefit of wind power in reducing carbon emissions is only half as big as it had previously claimed.

It will be regarded as a concession that twice as many wind turbines as previously calculated will be needed to provide the same degree of reduction in Britain's carbon emissions Photo: PA

By Patrick Sawer 10:28AM GMT 20 Dec 2008

Comment

The British Wind Energy Association (BWEA) has agreed to scale down its calculation for the amount of harmful carbon dioxide emission that can be eliminated by using wind turbines to generate electricity instead of burning fossil fuels such as coal or gas.

The move is a serious setback for the advocates of wind power, as it will be regarded as a concession that twice as many wind turbines as previously calculated will be needed to provide the same degree of reduction in Britain's carbon emissions.

A wind farm industry source admitted: "It's not ideal for us. It's the result of pressure by the anti-wind farm lobby."

For several years the BWEA – which lobbies on behalf of wind power firms – claimed that electricity from wind turbines 'displaces' 860 grams of carbon dioxide emission for every kilowatt hour of electricity generated.

However it has now halved that figure to 430 grams, following discussions with the Advertising Standards Authority (ASA)...

Dr Mike Hall, an anti-wind farm campaigner from the Friends of Eden, Lakeland and Lunesdale Scenery group in the Lake District, said: "Every wind farm application says it will lead to a big saving in the amount of carbon dioxide produced. This has been greatly exaggerated and the reduction in the carbon displacement figure is a significant admission of this.

"As we get cleaner power stations on line, the figure will get even lower. It further backs the argument that wind farms are one of the most inefficient and expensive ways of lowering carbon emissions."

Because wind farms burn no fuel, they emit no carbon dioxide during regular running. The revised calculation for the amount of carbon emission they save has come about because the BWEA's earlier figure did not take account of recent improvements to the technology used in conventional, fossil-fuel-burning power stations.

The figure of 860 grams dates back to the days of old-style coal-fired power stations. However, since the early 1990s, many of the dirty coal-fired stations have been replaced by cleaner-burning stations, with a consequent reduction in what the industry calls the "grid average mix" figure for carbon dioxide displacement.

As a result, a modern 100MW coal or gas power station is now calculated to produce half as many tonnes of carbon dioxide as its predecessor would have done.

The BWEA's move follows a number of rulings by the ASA against claims made by individual wind farm promoters about the benefits their schemes would have in reducing carbon emissions.

In one key adjudication, the ASA ruled that a claim by Npower Renewables that a wind farm planned for the southern edge of Exmoor National Park, in Devon, would help prevent the release of 33,000 tonnes of carbon dioxide into the atmosphere was "inaccurate and likely to mislead". This claim was based on the 860-gram figure.

The watchdog concluded: "We told Npower to ensure that future carbon savings claims were based on a more representative and rigorous carbon emissions factor."

The ASA has now recommended that the BWEA and generating companies use the far lower figure of 430 grams.

http://www.telegraph.co.uk/earth/energy/windpower/3867232/Promoters-overstated-the-environmental-benefit-of-wind-farms.html

The Telegraph

Wind turbines 'less efficient than claimed'

Wind turbines are 25 per cent less effective than the renewable energy industry claims, according to research.

11:08AM GMT 02 Jan 2011

The John Muir Trust (JMT), one of Scotland's leading conservation bodies, has challenged the common assertion that wind farms run at an average of 30 per cent capacity over a year.

A study carried out for the Trust into the energy generated by dozens of wind farms, the majority of which are in Scotland, between November 2009 and last month, found they actually ran at 22 per cent of capacity.

Campaigners insist the figures, drawn from data provided by the National Grid, challenge the role of wind farms as an efficient source of renewable energy.

They said hundreds of wind farms had secured planning permission across Scotland based on inaccurate assumptions of their output.

"This analysis shows that over the course of a year, the average load factor fell well short of what the industry claims, yet the 30 per cent figure is peddled at every public inquiry into a proposed wind farm," said Helen McDade, head of policy at the JMT. "This data is needed to counter that hype."

http://www.telegraph.co.uk/earth/energy/renewableenergy/8236254/Wind-turbines-less-efficient-than-claimed.html

WIND BARGAINING

http://www.eastoregonian.com/news/local_news/article_2e8dfa2e-10e2-11e0-9076-001cc4c002e0.html

Patient homeowners in Gilliam and Morrow counties get paid by Shepherd's Flat

Posted: Sunday, December 26, 2010 3:17 am

By ERIN MILLS East Oregonian | 0 comments

As the mammoth Shepherd's Flat wind farm makes a growing commotion on the hills above the Willow Creek valley, several residents are packing up or already gone.

"I told them I wouldn't sign any noise easement unless they bought me out," said Richard Goodhead, who retired with his wife, Joanne, to a 106-acre farm in the valley in 1997.

At first, Goodhead said, Patricia Pilz a representative from Caithness Energy — the company building Shepherd's Flat — refused his proposal. She hoped he would take a $5,000 check and sign a noise waiver like some of his neighbors.

"She said, 'We're not in the real estate business,'" Goodhead said. "I said, fine — I'm not in the windmill business."

A month and several negotiations later, the company changed its tune. The Goodheads signed a final purchase agreement this week with the New York-based company, selling their land and home for $800,000.

The Goodheads made a killing, according to the Gilliam County assessor's office. A clerk reported their manufactured home and farm has a real market value of $167,110.

No Caithness representative, including Pilz, responded to the East Oregonian's repeated phone calls for this story. However, Pilz told a New York Times reporter last summer that Caithness does not change the "market price" for a noise waiver, because that would be unfair. The Goodheads tell a different story; they say Caithness offered them several deals before it caved to their request for a buyout. One was $6,000 every year for about 20 years, another was the proceeds from one nearby turbine. All the offers required the Goodheads to sign a waiver allowing noise levels of up to 50 adjusted decibels at their residence.

Fifty adjusted decibels, or 50 dBA, is about the sound of a normal conversation in a room. Oregon's industrial noise ordinance caps the allowable decibels for a wind farm at nearby residences at 36 dBa or 10 dBA above a measured ambient noise level.

The company that owns the wind farm to the south of Shepherd's Flat, Invenergy, and its neighbors have fought over the noise rule for several months. The county planning commission heard hours of testimony and both parties appealed its decision to the county court twice. The issue still isn't resolved; the next hearing will be sometime in January.

The other side of the story, of course, is how profitable Shepherd's Flat will be for landowners and the county. Now a growing network of roads and concrete slabs, Shepherd's Flat is already providing much-needed employment for an area suffering from the recession. During the construction phase, it will employ an average of 500 people. Upon completion, 35 will work at the farm full-time.

Once its 338 turbines are up and running, Shepherd's Flat will begin paying property taxes. According to its tax arrangement with counties, called a strategic investment plan, it will pay more than $5 million to Gilliam County and more than $2 million to Morrow County every year for the next 15 years.

Thanks to Shepherd's Flat, a handful of landowners will retire in style. Industry insiders say they are paid up to $15,000 per turbine per year.

Other neighbors of Shepherd's Flat who have sold their homes are Clyde and Alicia Smith and Arman and Sandra Kluehe. The Kluehes got less than they feel their home was worth, but they're not complaining. They learned of Shepherd's Flat shortly after relocating from the Willamette Valley and never relished the thought of living across a narrow valley from a forest of turbines. When Pilz offered them the $5,000, they turned her down.

The Kluehes put their house on the market, but after months of no bites, they grew resigned. They continued to upgrade their home, installing a pellet stove and a sprinkler system for their new trees. They painted the house's trim. The painter was just finishing up one day when their real estate agent called. He said a buyer was ready to pay full price, cash, for the Kluehe's house.

They wavered for a moment — they had just invested nearly $20,000 — but the agent said they could not back down or the buyer could sue.

"I just looked at my husband and said, 'We don't really have an option,'" Sandra Kluehe remembered. "We had five weeks, maybe six, to find a house and get out. It was very stressful."

The buyer was a Portland-based lawyer. A quick dig on the Internet revealed the lawyer worked for Caithness. Sandra Kluehe found out later the purchaser was actually a local landowner involved in the wind farm.

The Kluehes now live in Redmond, near Smith Rock State Park, where no wind turbines are allowed.

"It feels like a burden has been lifted from our shoulders," Arman Kluehe said. "There's like an oppression in that valley."

By buying noise easements, Caithness hopes to avoid a similar dispute. But the Goodheads are among those who don't want to live next to a wind farm for any price. Joanne Goodhead pointed out that the jury is still out on the health effects of turbines. The Oregon Public Health Office recently held "listening sessions" around the state to hear residents' concerns. The wind industry maintains that turbines are perfectly safe.

The Goodheads also wonder what will become of the valley's wildlife. The area's antelope population has noticeably declined since the Willow Creek wind farm came, they said. And a curlew nesting area will soon be surrounded by turbines.

"Everyone is rolling over and playing dead for (the wind companies), it's amazing," Joanne Goodhead said. "Anything that's quoted as 'green' is OK, whether it is or not.

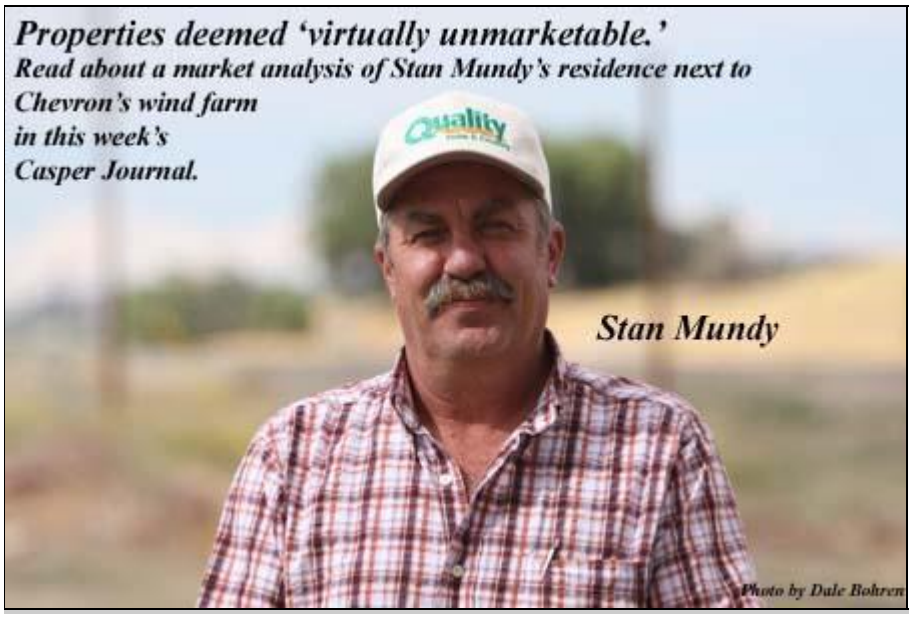
Properties 'virtually unmarketable'

by Greg Fladager / *Tuesday, September 21, 2010 3:26 PM MDT*

A survey by a local realtor may have confirmed the worst suspicions of Stan Mundy, whose home is closest to Chevron's wind farm northeast of Casper.

Glen Taylor, of Equity Brokers in Casper, did a real estate survey Sept. 10, 2010, and concluded properties directly adjacent to the Chevron Wind Towers are now "virtually unmarketable" at "any realistic price."

In his report, Taylor said no residential properties have sold in his three-road survey area since October 2009, and 10 are presently on the market (five that were listed in the past two years didn't sell).



Taylor wrote, "No reasonable buyer would choose a property close to the wind towers over a property that isn't close to wind towers unless the price is so low that the investment would be a no brainer."

Taylor said in his report that rural property close to town is usually in good demand, and noted he's the agent for one parcel in the area. He has had over 50 inquiries on his listing in about two months, but 40 dropped interest after learning about the location.

"In follow-up with the inquiries, the number one reason for not having genuine interest in this property is because of the proximity of the wind towers," Taylor wrote in his report.

http://www.casperjournal.com/articles/2010/09/22/news/news50.mundy%20story%209-22.prt

Paul Thompson/substation noise/

And now that the ARB, an arm of the Ontario government, has upheld a claim for loss of property value due to the proximity of a hydro substation and a wind farm, can a host of court cases and class action lawsuits for noise contamination and property devaluation be far behind?

Bob Aaron is a Toronto real estate lawyer and board member of the Tarion Warranty Corp. ***bob@aaron.ca***. http://www.yourhome.ca/homes/articlePrint/747191

Why rise of wind farms is a ticking time bomb

Capacity has doubled but fears over quality remain

Dr Gao Hu , deputy director of the National Development and Reform Commission's Centre for Renewable Energy Development and an author of the report, said that the wind-power boom on the mainland in recent years had left behind quality "time bombs" that, if not quickly and properly replaced, would blow up the industry's long-term growth.

Some turbines installed three or four years ago have already begun to show signs of ageing, with issues ranging from oil leaks and gearbox malfunctions to blades snapping, Gao said. They were supposed to last for a decade with little maintenance.

In China, more than 70 per cent of these troubled turbines were made by domestic manufacturers. Because they are made to meet lower standards than those overseas, "our nightmare is an outbreak of quality issues across the country", Gao said.

"It has not happened yet, but if it happens, the time is likely to be 2011 or 2012, a generally accepted make-or-break point for the turbines."

http://www.scmp.com/portal/site/SCMP/menuitem.2af62ecb329d3d7733492d9253a0a0a0/?vgnextoid=90124e3e1baab210VgnVCM100000360a0a0aRCRD&ss=china&s=news

MSNBC 10-20-10: WASHINGTON — The Obama administration is crediting its anti-recession stimulus plan with creating up to 50,000 jobs on dozens of wind farms, even though many of those wind farms were built before the stimulus money began to flow or even before President Barack Obama was inaugurated.

Out of 70 major wind farms that received the $4.4 billion in federal energy grants through the stimulus program, public records show that 11, which received a total of $600 million, erected their wind towers during the Bush administration. And a total of 19 wind farms, which received $1.3 billion, were built before any of the stimulus money was distributed. (See a list of the projects here.)

Yet all the jobs at these wind farms are counted in the administration's figures for jobs created by the stimulus.

In the coal country of eastern Pennsylvania, FAA records show, the last turbine on the 51-turbine Locust Ridge II wind farm in Mahanoy City, Pa., was erected on Jan. 1, 2009, the first

day a project could be eligible for a stimulus grant. But the other 50 turbines were built in 2008 ***— 31 of them before Obama was elected. The farm's developer, Iberdrola Renewables, the subsidiary of a Spanish utility, collected $59.1 million in stimulus money.***

Noble Environmental turbine collapse - (2)

March 6, 2009
Credits: Michael Fellion
Description:

The Altona wind energy facility which went on line in early 2009 lost a turbine due to collapse. The project consists of 65 GE 1.5 MW turbines. No explanation for the collapse has been released. The turbine caused a fire when the nacelle hit the ground.

http://www.windaction.org/pictures/20314

Lastly, wind developers are procuring power purchase agreements that pay on average $49 to $57 per MWH with a 2 to 3% increase each year, over a normal 20 to 30 year contract term. A 1.5 MW wind turbine based on a 25% (Department Of Energy - 2008 national average) operating efficiency capacity rating at $49/MWH would yield about $160,965 in gross revenue annually. This doesn't include factoring in the generous production tax credits, grant money or additional allowances for carbon offsets. These are worth about another $15/MWH or extra $49,275 in gross revenue per year that the developer and/or utility company usually inherits, not the landowner

Turbines at NY's Maple Ridge facility

January 4, 2009
Credits: Wind Energy Ethics - www.stlawrencewind.org
Description:

An actual photograph of wind turbines erected in Lowville, NY at the Maple Ridge wind energy facility.

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http://www.windaction.org/pictures/19372

Wind Energy Ghosts 2-15-10:

Although carbon credit schemes often assign profitable carbon credits to wind farm operators based on a theoretical displacement of carbon emitted by coal or natural gas producers, in reality these plants must keep burning to be able to quickly add supply every time the wind drops off. The formulae do not take into account carbon emitted by idling coal and natural gas plants nor the excess carbon generated by constant fire-up and shut down cycles necessitated to balance fluctuating wind supplies...

laws requiring large wind producers to be allowed to tie into the existing utility grid

"Renewable Portfolio Standards" forcing utilities to buy intermittent wind generated electricity.

"Renewable Energy Certificates" tradable separately from the electricity itself to sell to companies needing to meet the portfolio standards.

A 10-year "Production Tax Credit" that now equals $.019/kWh

Accelerated depreciation allowing tax write-off using an accelerated 5-year double-declining-balance method (40% per year).

In early 2009 the Socialist government of Spain reduced alternative energy subsidies by 30%. Calzada continues:

"At that point the whole pyramid collapsed. They are firing thousands of people. BP closed down the two largest solar production plants in Europe. They are firing between 25,000 and 40,000 people...."

"What do we do with all this industry that we have been creating with subsidies that now is collapsing? The bubble is too big. We cannot continue pumping enough money. ...The President of the Renewable Industry in Spain (wrote a column arguing that) ...the only way is finding other countries that will give taxpayers' money away to our industry to take it and continue maintaining these jobs."

That "other country" is the United States of America.

Waxman-Markey seems dead, and Europe's southern periphery is bankrupt. But the

http://www.aph.gov.au/Senate/committee/clac_ctte/impact_rural_wind_farms/info.htm

December 30, 2010

HAMMOND NEW YORK— The town's Wind Committee voted 9-1 Tuesday evening to adopt the controversial Residential Property Value Guarantee and move it on to the Town Council as part of its proposed wind zoning law... Iberdrola representative Jenny Burke had just made available to committee members, which apparently was offered as an alternative to the value guarantee.

Good-neighbor agreements are made between non-participating land owners in the vicinity of wind turbines and the wind company, according to Ms. Burke, and can involve either monthly or annual payments in exchange for closer proximity. In response to a question from committee member Frederick Proven, Ms. Burke said such agreements typically apply to anyone living within 3,000 feet of a wind turbine but that it hadn't been decided for this particular project

http://www.watertowndailytimes.com/article/20101230/NEWS05/312309963

Town Councilor regrets High Sheldon Wind Farm (Sheldon, NY)

October 31st, 2009 by admin

"I would compare my relationship with the wind developer to a relationship with the Devil himself. [Sheldon] is another example of why industrial wind farms do not belong anywhere near people"—Glenn Cramer, Town Councilor (Sheldon, NY).

INVENERGY

High Sheldon wind farm Noise Complaints

July 28, 2009
Credits: Wyoming County Citizens
Description:

Image of the High Sheldon wind facility taken from a farm in the town. The Invenergy facility consists of seventy-five 1.5 megawatt wind turbines (total 112.5 megawatts). The project went online in January 2009. Noise complaints have been filed by residents living within the shadows of the towers.

Source: http://www.windaction.org/pictures/22487

Town Councilor regrets High Sheldon Wind Farm (Sheldon, NY)

Posted By admin On October 31, 2009 @ 8:00 am In Uncategorized | No Comments
"I would compare my relationship with the wind developer to a relationship with the Devil himself. [Sheldon] is another example of why industrial wind farms do not belong anywhere near people"—Glenn Cramer, Town Councilor (Sheldon, NY).

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Editor: The following letter was written 10/30/09 by Sheldon, NY, Town Councilman Glenn Cramer, responding to a letter (click here) by a Cape Vincent landowner trying to sell his town on industrial wind turbines.

»»»»»»»»»»»»»»»»»»»»

I read your article on a proposed wind farm and your reference to Sheldon, NY. I am a Town Board Member in Sheldon and have participated in the process for the last four years. [*Editor*: Click here for a copy of the High Sheldon Wind Farm *Draft Environmental Impact Statement*.] Yes, our wind project is up and running. Yes, it does pay the town tax. However, it does not pay the fire department tax and there are no surplus funds.

I would compare my relationship with the wind developer to a relationship with the Devil himself. The town is hopelessly divided. Landowners hosting turbines are even questioning whether they have made the correct choice. TV and radio reception was destroyed in most areas of the town. Also, the Buffalo doppler radar can no longer forecast weather conditions accurately in locations east of our wind farm.

The first house has just sold that was directly related to turbine concerns, and for much less than the owner wanted for it. He was told by his realtor to take the offer, as it would be the best he could get. He complained of rattling windows, shadow flicker and an unending "thump, thumping" sound from the nearby turbines. He also stated that his children couldn't sleep through most nights.

A poor Sheldon Town Law, designed by the wind company, states that the turbine sounds should not exceed 50dBA at the property line. That did sound reasonable at the time. Then we find out that one house is reporting 70dBA at it owner's residence. However, this is not violation of the law as it was written (at the property line), and now the wind farm is

grandfathered and there is no recourse against them even if the law were rewritten. Turbine location is very critical, as the sound travels at unpredicted distances and it is delivered by the wind.

Sound is a huge concern to many people living near these turbines. But, vibrations are another emerging problem. Turbines secured into the bedrock can pose a problem for neighbors and animals. One man told me that he could feel the turbines as he lay on the ground in his driveway and worked on the family car.

I wouldn't use Sheldon as an example of a successful wind farm. It is another example of why industrial wind farms do not belong anywhere near people. When someone from Sheldon supports the wind farm, ask him or her what he or she stands to gain financially from it. I think you will see a direct relationship. Some residents have gained from the wind farm, but it has been at the expense of their neighbors.

Glenn Cramer

Town Councilor

Sheldon, NY 10/30/09

Article printed from River City Malone: **http://www.rivercitymalone.com**
URL to article: **http://www.rivercitymalone.com/?p=3080**
URLs in this post:
[1] Image: **http://www.rivercitymalone.com/wp-content/uploads/2009/10/sheldon-ny-447x477.jpg**
[2] click here:
http://www.watertowndailytimes.com/article/20091030/OPINION02/310309974

Inverngy / Blade failure at Grand Ridge wind site (photo below)

August 10, 2010
Description:

Two turbines at the 100.5 MW Grand Ridge Energy wind facility in La Salle County, Illinois, about 80 miles southwest of Chicago, experienced blade failures on July 23-24, 2010. A spokeswoman for Invenergy Wind said that, in the event of high winds, the turbines are designed to come to rest with one blade pointing down and parallel to the base of the tower. According to Invenergy, the winds came so quickly that the safety mechanism did not have time to engage.

Invenergy turbine blade failure (1)

March 26, 2009
Description:

Residents in Illinois photographed this recent blade failure at the Grand Ridge wind energy facility in La Salle County, Illinois, 80 miles southwest of Chicago. The Grand Ridge wind project employs 66 GE 1.5-megawatt wind turbines and was commissioned in late 2008.

http://www.windaction.org/pictures/20477

INVENERGY BUILDS WIND FARMS AND DOUBLES THEIR GAS-FIRED POWER PLANT…

SEATTLE TIMES

Originally published February 19, 2011 at 8:58 AM | Page modified February 19, 2011 at 3:23 PM:
http://seattletimes.nwsource.com/html/localnews/2014276519_apwasatsopnaturalgas.html

Grays Harbor County natural gas-fired power plant OK to expand

Chicago-based Invenergy LLC can move forward with plans to double the capacity of a natural gas-fired power plant in Grays Harbor County.

The Associated Press
OLYMPIA, Wash. —
Chicago-based Invenergy LLC can move forward with plans to double the capacity of a natural gas-fired power plant in Grays Harbor County.
Gov. Chris Gregoire on Friday approved a state panel's recommendation that the plant in Satsop be allowed to expand from 650 megawatts to 1,300 megawatts. The governor says the project will provide the region with energy benefits without significant environmental effects.
Invenergy wants to add two combustion-turbine generators and a single steam generator. The new permit requires the company to install measures to curb noise levels.
The Energy Facility Site Evaluation Council licenses major energy projects in Washington. It approved the expansion and sent the proposal to the governor last December.

Enel /Fenner wind turbine collapse

December 27, 2009
Credits: Ryan Petersen
Description:

A 329-foot wind turbine, base to blade tip, collapsed early Sunday morning, December 27,2009 at the Fenner wind farm in Fenner, New York. http://www.windaction.org/pictures/24818

http://www.dailystandard.com/archive/story_single.php?rec_id=14300

Workers have begun making changes to the Fenner Wind Farm that the owners hope will get the turbines spinning by September.

Crews have been working to reinforce the foundations on 19 windmills since just after Memorial Day, said Enel North America spokesman Hank Sennott.

Enel officials have not yet determined what **caused a 187-ton Turbine 18 to fall in the early hours of Dec. 27.**
Workers will excavate each turbine's foundation before drilling holes to install 474 steel dowels. When finished, each base will be reinforced with four to six tons of steel and 10 truckloads of concrete.


Michelle Gabel/The Post-StandardScott Preston (right) and David Bajgerowicz, both of Fuller Excavating, clear away dirt near the foundation of a wind turbine in Fenner. Workers are reinforcing the foundations following the collapse of one of 20 wind turbines at the Fenner Wind Farm.

The plan was drafted by engineers who spent the last six months studying what happened at Turbine 18.

In the wake of the collapse, the developer said an online system that notes any faults or abnormal events in daily performance showed no indication that anything was wrong before the collapse.

Last month, **developers said they ruled out faulty construction** and were focusing the investigation on historical load and wind patterns.

"There's no road map for any of this," Sennott said.

Until the construction is complete, each turbine is surrounded by temporary orange fences.

The barriers are set back 325 feet from the base – the exact height of each turbine.

Contact Alaina Potrikus at apotrikus@syracuse.com or 470-3252.

http://www.syracuse.com/news/index.ssf/2010/06/workers_reinforce_foundations.html

(Enel) Madison County Wind Turbine Bends; wind turbine fails

One of the turbines at the Fenner Wind Farm hasn't been spinning since Wednesday night, because one of its blades has apparently been badly bent. ...A person who lives near the site says it sounded like a car crashing when the blade broke. There no word yet on when it'll be fixed.

November 15, 2007 in WSYR9

Madison County (WSYR-TV) - One of the turbines at the Fenner Wind Farm hasn't been spinning since Wednesday night, because one of its blades has apparently been badly bent.

It's located off Peterboro Road in Madison County. A spokesman for Enel North America, the company that owns the site, says they aren't sure how it happened. General Electric, who made the turbines, has a team on the site looking at the damage.

Crane at work site topples

11/8/2007

By DARRIN STINEMAN Salina Journal

LINCOLN COUNTY -- A 320-foot crane used to construct turbines at the under-construction Smoky Hills Wind Farm fell Wednesday morning while it was being moved from one site to another, said Glenn

Melski, vice president and manager of operations for Enel North America, one of the companies that's managing the project.

"Thankfully, no one was hurt, and we're trying to assess the situation and see how it affects the project," Melski said Wednesday afternoon. "We're investigating what happened. It's likely wind-related, but (the investigation) is very preliminary."

When the crane fell at about 10 a.m. Wednesday, winds at the site were blowing about 40 mph, Melski said. He said he didn't know of any other instances of cranes being toppled on projects Enel was involved with.

The 56-turbine, first phase of the wind farm, which is about five miles northwest of Ellsworth, had been scheduled for completion in December. Melski said he didn't know how much the crane incident would affect the project's schedule.

"It'll be a setback, but we're looking at mitigation plans," he said. "We won't know until we know whether the crane is repairable."

Asked the monetary value of the crane, Melski said: "I have no idea. They're definitely in the millions range."

Installation of the turbines began in September. The first phase of the project covers 10,000 acres and stretches nearly 10 miles from east to west along Interstate Highway 70. A second phase, which doesn't have a firm starting date, will bring the totals to 22,000 acres and 15 miles.

The first phase will generate about 100 megawatts of electricity annually, which is enough to power 30,000 to 35,000 homes. The second phase would add another 150 megawatts of capacity.

Massachusetts-based Enel North America is managing the project in partnership with TradeWind Energy, Lenexa.

n Reporter Darrin Stineman can be reached at 822¬-1416 or by e-mail at dstineman@salina.com.

http://www.saljournal.com/rdnews/story/crane_falls

More news on Enel...

- **Italy's renewable energy incentives need overhaul, Enel's Conti says** (08 February 2011)[UK]
- **Enel's IPO falls short of target** (29 October 2010)[General | Europe]
- **Fenner turbines turning** (12 August 2010)[Structural Failure | New York]
- **Wind power project: All Hatchet Ridge turbines up** (07 August 2010)[Impact on Landscape | Impact on Views | California]
- **Spain said to save $1.5 billion on wind power cuts** (09 July 2010)[Tax Breaks & Subsidies | Europe]
- **Italian budget takes some wind out of green market** (24 June 2010)[General | Europe]
- **Workers reinforce foundations on wind turbines in Fenner following tower collapse** (22 June 2010)[Structural Failure | New York]
- **Work begins on Fenner windmills** (22 June 2010)[Structural Failure | New York]
- **Company working to turn Fenner wind turbines on in July** (21 June 2010)[Structural Failure | New York]
- **Fall of Fenner windmill remains a mystery** (21 June 2010)[Structural Failure | New York]

- **Investigation into Fenner windmill collapse focuses on turbine foundations** (13 May 2010)[Safety | Structural Failure | New York]
- **Windmill down; Fences up** (05 May 2010)[General | New York]
- **Investigation into Fenner wind turbine collapse nearly complete** (05 April 2010)[Structural Failure | New York]
- **Fences go up around Fenner windmills as investigation of Dec. 27 accident continues** (19 March 2010)[Safety | New York]
- **Enel: Turbine collapse could have 'significant impact' on wind industry** (09 March 2010)[Structural Failure | New York]
- **Cause of collapse at Fenner wind farm still unknown as investigation continues** (01 March 2010)[Structural Failure | New York]
- **Investigators still looking for cause of wind turbine collapse** (04 February 2010)[Structural Failure | New York]
- **Data indicate turbine operated normally before collapse** (05 January 2010)[Safety | New York]
- **Company: Windmill didn't trigger alert with monitors before it fell** (03 January 2010)[Safety |

Please forgive these unorganized and incomplete comments, that need some serious edited. Once again there is not enough time to fully research, gather, properly format, and submit enough information to establish a strong basis for legal standing in the event these massive and destructive projects are inappropriately or unlawfully approved for our ruggedly beautiful and still wild area, *and* our low- income rural communities can manage to scrape together the funds *and* find an attorney willing and able to defend us from this aggressive and wholly unnecessary political /corporate /industrial assault. However, this planning group cannot take legal action.

In closing, on behalf of our constituents, we ask that you please take to heart the following definitions of Cumulative Impacts and Precautionary Approach, taken from the California EPA's page on Environmental Justice, and remember there are all kinds of pollution that can and effect the well being of the human body, soul, and mind, including noise, and visual pollution: http://www.calepa.ca.gov/EnvJustice/ActionPlan/

D28-109

- **Cumulative impacts** means exposures, public health or environmental effects from the combined emissions and discharges, in a geographic area, including environmental pollution from all sources, whether single or multi-media, routinely, accidentally, or otherwise released. Impacts will take into account sensitive populations and socio-economic factors, where applicable and to the extent data are available.
- **Precautionary approach** means taking anticipatory action to protect public health or the environment if a reasonable threat of serious harm exists based upon the best available science and other relevant information, even if absolute and undisputed scientific evidence is not available to assess the exact nature and extent of risk.

Sincerely,

/s/

Donna Tisdale, Chair

619-766-4170

Comment Letter D29

From: Edwards, Kathleen <Kathleen.Edwards@fire.ca.gov>
Sent: Friday, March 04, 2011 4:52 PM
To: ECOSUB
Cc: Windsor, Howard; Porter, Thomas; Garrett, Jim
Subject: CAL FIRE Comments for the SDG&E East County - Tule Wind Projects

Iain Fisher, CPUC, and Greg Thomsen, BLM:

It is my understanding today is the close of the comment period for the DEIR/EIS and FPP for the Tule Wind Project. The following bullets are a summary of the comments that will be fully developed and submitted to your orgainzations within the next week.

Reference 1: Draft Environmental Impact Report/Environmental Impact Statement for the SDG&E East County Substation Project, Pacific Wind Development Tule Wind Project, and Energia Sierra Juarez U.S. Transmission, LLC, Energia Sierra Juarez Gen-Tie Project

Issue Date: December 2010 D29-1

SCH No. 20091210790
DOI Control No. DES 10-62
East County Substation Project No. DOI-BLM-CA-D070-2010-0027-EIS
Tule Wind Project No. DOI-BLM-CA-D070-2008-0040-EIS

Reference 2: Fire Protection Plan for the Tule Wind Project, County of San Diego

Issue Date: February 2011

Major Use Permit Application Number: MUP 3300-09-019
Environmental Review Number: 3910-1000001

Comment to the EIS/EIR, Section 15 – Fire and Fuels and the Fire Protection Plan for the Tule Wind Project

- Remove references to CCR Title 14, Forest Practice Rules, Article 8, Rule #918 Fire Protection D29-2
  - The reference is not accurate – "applies to all vegetation operations in SRAs". The reference is applicable for timber harvesting operations related to Z'berg-Nejedly Forest Practice Act of 1973 and other associated laws. (See Title 14, CCR, Chapters 4, Chapter 4, Section 896 General). For the correct reference see the next bullet.
- Add reference to these applicable codes sections below, as they are applicable for both the construction phase of the proposed project and for the long-term operational and maintenance of the proposed projects as well: California Public Resources Code (PRC) – Division 4, Chapter 6: D29-3
  - Section 4427 – Operation of Fire causing equipment
  - Section 4428 – Use of Hydrocarbon powered engines near forest, brush, or grass covered lands without maintaining firefighting tools
  - Section 4431 – Gasoline powered saws, etc.; firefighting equipment
  - Section 4442 – Spark arresters or fire prevention measures; requirements; exemptions
- Update the reference from the "California Fire Plan" to "2010 Strategic Fire Plan" – see the http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf668.pdf D29-4
- Regarding the CAL FIRE Fire Safety Inspection Program, remove the reference to the CAL FIRE form number "LE-38". While the current form number/identifier is LE-100, the department is reviewing/updating this form and may opt to revise/update the form number as well. D29-5
- CAL FIRE Cost Recovery Program – While the examples reference cases related to the non-compliance with vegetation clearance requirements, these types of non-compliance violation are not the only conditions in which the department may seek cost recovery. See the PRC references above, as they provide direction regarding clearance during operations, fire fighting tools, and spark arrestors. D29-6

- If in the event that the proposed deviates from the proposed area and realigns onto forested landscapes then a Registered Professional Forester may be required to review/approve the vegetation management plan. (PRC 750-783, Professional Foresters Law). D29-7
- Update the reference of the Red Flag Alert to Red Flag Warnings & Fire Weather Watches
    - The National Weather Service issues Red Flag Warnings & Fire Weather Watches to alert fire departments of the onset, or possible onset, of critical weather and dry conditions that could lead to rapid or dramatic increases in wildfire activity.

      A Red Flag Warning is issued for weather events which may result in extreme fire behavior that will occur within 24 hours. A Fire Weather Watch is issued when weather conditions could exist in the next 12-72 hours. A Red Flag Warning is the highest alert. During these times extreme caution is urged by all residents, because a simple spark can cause a major wildfire. A Fire Weather Watch is one level below a warning, but fire danger is still high. D29-8
- CAL FIRE request addtional time needed to fully complete the review of the DEIR/DEIS and the FPP. D29-9

Thank you for the opportunity to provide comments to these environmental review documents.

Kathleen Edwards
Unit Forester
Pre-Fire/Resource Management Division

CAL FIRE
San Diego Unit
2249 Jamacha Road
El Cajon, CA 92019
O (619) 590-3103
M (619) 219-9264

Comment Letter D30

From: Traci Verardo-Torres <Traci@calparks.org>
Sent: Friday, March 04, 2011 1:28 PM
To: ECOSUB; catulewind@blm.gov
Cc: Traci Verardo-Torres
Subject: Comments re: Tule Wind DEIR/EIS
Attachments: 030411_CSPF_Tule Comments.pdf

On behalf of the California State Parks Foundation, attached please find our comments on the proposed Tule Wind Energy Project. Please do not hesitate to contact me at the contact information below if there are any questions regarding our letter.

D30-1

Thank you,
Traci Verardo-Torres

_____
Traci Verardo-Torres
Vice President, Government Affairs
California State Parks Foundation
1510 J Street, Suite 120
Sacramento, CA 95814
TEL: (916)442-2119
FAX: (916)442-2809
traci@calparks.org
www.calparks.org

CALIFORNIA STATE PARKS FOUNDATION

March 4, 2011

Iain Fisher, CPUC
Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, California 92024
VIA ELECTRONIC MAIL and FAX

RE: Tule Wind Energy Project Draft Environmental Impact Report/Draft Environmental Impact Statement (DEIR/EIS)

Dear Messrs. Fisher and Thomsen,

On behalf of the California State Parks Foundation (CSPF) and its 120,000 members statewide, I appreciate the opportunity to comment on the Draft Environmental Impact Report/ Environmental Impact Statement (DEIR/EIS) for the Tule Wind Energy Project (Project).

CSPF is the only statewide, independent nonprofit organization dedicated to protecting, enhancing and advocating for California's magnificent state parks. In the last several years, we have led statewide efforts to protect state parks from incompatible developments that impact and threaten public access, visitor enjoyment and the economic vitality of California's 278 state parks. In addition to pursing state legislation, we have been integrally involved in regional and local campaigns to protect state parks from transportation, utility, and commercial developments that were wholly incompatible with the recreational, natural and cultural resources goals of the effected state parks. We were actively involved as an intervener in the proceedings on the Sunrise Powerlink project during the time when the project contemplated construction of new utility towers and transmission lines directly through Anza-Borrego Desert State Park.

D30-1 Cont.

CSPF's interest in this Project is related to its impacts to Anza-Borrego Desert State Park (ABDSP), located adjacent to portions of the proposed Project. We appreciate the willingness to extend opportunities for public comment on the Project. Based on the documentation provided in the DEIR/EIS, however, we believe the impacts from the Project to ABDSP are significant and unmitigable, and that the project is inconsistent with the natural resource goals and mandate of ABDSP, and with public enjoyment of the character of the park.

D30-2

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www.calparks.org

Anza-Borrego Desert State Park is California's largest state park, with more than 530,000 acres owned by the California Department of Parks and Recreation. Its land is located across three counties: San Diego, Imperial and Riverside. The park contains 12 wilderness areas that, together, comprise the majority of the entire state wilderness areas (as designed by Public Resources Code Section 5093.33) in California. During Fiscal Year 2008-09, the park hosted over half a million visitors (543,013), including Californians, out-of-state visitors, and international tourists. Such visitation generated more than $412,000 in visitor fees and use of concessions. Preservation of the park in a manner that continues to draw such high visitation is critical to the 278-unit state park system, but also to the community of Borrego Springs, which is essentially surrounded by the park.

D30-2 Cont.

Impacts to ABDSP from the Project

Visual Impacts

As described above, one of the most unique features of ABDSP is its wilderness. The experience by a visitor in a state park with designated state wilderness is specifically and deliberately distinct from an experience in another state park or state recreation area. As discussed in Section D.5 of the DEIR/EIS, Public Resources Code Sections 5093.31 and 5093.33 define the need and purpose of wilderness designations in the state. Additionally, peaks and summits throughout the park allow vista points and viewsheds that are magnificent and unparalleled.

D30-3

The park will experience significant visual impacts from the placement of the proposed 400-foot turbines. Placement of turbines along the McCain Valley ridgeline are, according to the DEIR/EIS, likely visible up to five miles away. Turbines may be visible from Sombrero Peak, Jacumba Peak, Tule Mountain, the In-Ko-Pah and Jacumba Mountains sections and Whale Peak in the Vallecito Mountains. Given that the DEIR/EIS acknowledges that impacts to scenic vistas from the Project are significant and unmitigable (D3.157-158), this Project will alter the character and distinctiveness of the park. Disruption of the experience currently present for park visitors is essentially a disruption of the character and nature of the park itself.

Biological

The California Department of Parks and Recreation (DPR) is submitting comments regarding specific impacts to sensitive and federally-listed and state-listed species that reside in or utilize habitat corridors located within ABDSP. We support those comments. We recognize concerns have already been raised by other state and federal entities with respect to the proximity of Project turbines to Golden Eagle nests and habitat. Additionally, we are concerned that the Project may disrupt or interrupt critical habitat for the federally-endangered and state-threatened bighorn sheep that are iconic and recognizable throughout the state park. Page D.2-59 indicates a portion of the Project area is located less than half a mile from critical habitat of the bighorn sheep.

D30-4

Cumulative Impacts from Renewable Energy Projects

Meeting the state's renewable energy objectives is an important goal, but one that cannot be made to be at odds with continued protection of the state's natural infrastructure. We are additionally concerned about the presence and progress of other wind energy and renewable projects in this same Project area. We do not believe alternatives from this DEIR/EIS can be reasonably adopted or plans or permits issued by the approving agencies without clarity and specific identification of the cumulative impacts from all pending projects that are proposed to this area and these resources.

D30-5

As currently envisioned among the alternatives, significant changes to the placement of turbines and associated infrastructure and operations of those turbines would be necessary to avoid the visual and biological impacts to ABDSP described above.

D30-5 Cont.

Thank you for the opportunity to comment on the proposed Project and DEIR. Please do not hesitate to contact me at 916-442-2119 with any questions regarding this letter or CSPF s position on this proposed Project.

Sincerely,

Traci Verardo-Torres
Vice President, Government Affairs

cc: California Department of Parks and Recreation

Comment Letter D31

From: Richard James <rickjames@e-coustic.com>
Sent: Friday, March 04, 2011 7:58 PM
To: ECOSUB; catulewind@blm.gov
Cc: 'Donna Tisdale'; jvolker@volkerlaw.com
Subject: Comments onEast County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects
Attachments: Draft Review of Noise Studies and Related Material.pdf

To: Iain Fisher, CPUC
Greg Thomsen, BLM, c/o Dudek
605 Third Street
Encinitas,
California 92024

Please accept my report on the proposed combination project: East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects.
State Clearinghouse No. 2009121079
DOI-BLM-CA-D070-2010-0027-EIS (ECO Sub)
DOI-BLM-CA-D070-2008-0040-EIS (Tule Wind)

D31-1

These comments are submitted on behalf of Backcountry Against Dumps, P.O. Box 1275, Boulevard, CA 91905, at the request of Ms. Donna Tisdale, President.
If you have any questions please feel free to contact me by email at rickjames@e-coustic.com or by phone at (517) 507-5067.

Thank you,

Richard James, INCE

E-Coustic Solutions
Okemos, MI 48805
Tel: (517) 507-5067
Fax: (866) 461-4103
Email: rickjames@e-coustic.com

E-Coustic Solutions

Noise Control ● Sound Measurement ● Consultation
Community ● Industrial ● Residential ● Office ● Classroom ● HIPPA Oral Privacy
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Principal
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REVIEW OF NOISE STUDIES AND RELATED MATERIAL SUBMITTED REGARDING EAST COUNTY SUBSTATION/TULE WIND/ENERGIA SIERRA JUAREZ GEN-TIE PROJECTS

DATE: MARCH 4, 2011

Introduction

This review was conducted on behalf of Backcountry against Dumps, Inc.1 for their public comments on the PUC/BLM DEIR/DEIS for the proposed East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects, (referred to here as the proposed "Project"). The State Clearinghouse Number is: 2009121079 (DOI-BLM-CA-D070-2010-0027-EIS (ECO Sub) and DOI-BLM-CA-D070-2008-0040-EIS (Tule Wind)).

Although, the focus is on the Applicant's Environmental Document (Section 3.12 Noise) and the Tule Wind Project Draft Noise Analysis Report conducted on behalf of Iberdrola by HDR Engineering for the Tule Wind Project, comments and concerns expressed in this review should be considered as applying to all of the proposed Project, as appropriate for any differences.

My work with local communities and citizens groups around the U.S. and Ontario, Canada has focused on the question of how to integrate industrial wind turbines into rural communities. I would like to share my concerns about siting criteria for modern industrial scale wind turbines.

I have visited sites throughout the Midwest from western Iowa to the coast of Maine and Ontario to West Virginia where wind turbines were either operating or proposed. I have also reviewed the noise criteria and setbacks proposed by States, Provinces and local government bodies for wind farms. This has given me broad exposure to a number of different situations each with their own requirements. Based on this I find three issues that have a particular importance for my report.

D31-1 Cont.

I would like to focus on several points:

First, setbacks, from property lines to the nearest turbine of less than 2 kilometers (1.25 miles) are clearly inadequate for most quiet rural communities. The presence of nearby will not mask or otherwise offset the noise from wind turbines.[2] Wind turbine noise is distinctively annoying. The reports and documents submitted on behalf of the Project do not correctly or adequately describe the impact of the proposed project on the host community, or its residents whose homes and properties are close to the footprint of the project. This distance may seem extreme but is needed based on the experiences of communities with other wind turbine projects. People living at distances up to 1 mile from wind turbines on flat land and, for turbines located on ridges above the homes at distances of up to 2 miles are experiencing adverse health effects from sleep disturbance at night from audible turbine noise. Other aspects of wind turbine sound emissions, especially amplitude modulated infra and low frequency sounds that may not be reach the threshold of audibility are currently believed to be caused by vestibular disturbances from rapid modulations of the infra and low frequency sound.

D31-2

[1] Backcountry Against Dumps, Donna Tisdale, President, P.O. Box 1275, Boulevard, CA 91905

[2] Pedersen, E., van den Berg, F., Why is Wind Turbine Noise poorly masked by road traffic noise?, Inter-noise 2010, Lisbon, Portugal June 13-16, 2010 (invited paper)

Second, background sound levels submitted on behalf of the Project's developers and/or operators often include sounds of short term events and 'wind noise' are reported. The measurements used to collect this information do not meet any recognized national or international standard[3]. Instead a novel procedure is substituted for recognized standard measurement procedures. The end result is a biased assessment of background sound levels that overstates the background sound levels of the community by as much as 10 to 15 dBA. Use of this data to evaluate the potential for negative impacts of the people living near the project as defined in the CEQA Guidelines leads to a conclusion that the wind turbine noise will not be a source of noise pollution[4] at the homes and properties near the project. Had the background noise been properly measured the conclusion would be that the Project will have a significant impact on the adjacent communities and wilderness areas. D31-3

Third, computer model estimates of operational sound levels from the proposed projects understate the impact of the turbines on the community. D31-4

Fourth, information provided by representatives and experts for the Project, on topic of health risks, infra and low frequency noise, noise limits and setbacks, background sounds in rural communities and computer modeling studies are incorrect, incomplete or otherwise misleading. The assertions that there is no research supporting a concern that wind turbine sound emissions at receiving properties and homes and cannot result in adverse health effects do not reflect current understanding of independent medical and acoustical research.

Had the background studies met the procedural and protocol requirements of the American National Standards Institute's (ANSI) S12.9 and S12.18 standards for measuring environmental sounds outdoors the study would have reported much lower background sound levels. The Project would have a "significant impact" under the rules of the CEQA Guidelines (Appendix G (VII)). Had the modeling properly addressed the increased sound power emitted by wind turbines from atmospheric conditions, rough downwind topography from the large boulders and outcroppings on the sides of the ridges, and small inter-turbine spacing, the dBA and dBC sound levels predicted for the sensitive receiving locations would have been much higher. These conditions include those of: D31-5

- nighttime atmosphere with a stable boundary layer (temperature inversion) and high wind shear above that boundary layer (e. g. high wind shear),
- periods of atmospheric turbulence, as is likely for turbines mounted on high locations with rough terrain, and
- inter-turbine wake-induced turbulence created when turbines are located in rows with inter-turbine spacing of less than 5 to 7 rotor diameters (new information indicates this may need to be more like 10 to 15 rotor diameters) to prevent inter-turbine wake turbulence. Turbines in the current layout are as close as 3 rotor diameters or less.

The specific CEQA rules that define when an impact is significant that would not be met if the background noise study and computer modeling had met the been conducted according to the practices identified in this report are:

---

[3] ANSI-ASA S12.9 Part 2, (R2008) Measurement Of Long-Term, Wide-Area Sound, ANSI-ASA S12.9 Part 3 (1993 R 2008) Short Term Measurements with Observer Present, ANSI-ASA_S12.9_Part_1_(R_2003) Quantities and Procedures for Description and Measurement of Env. Sound, and ANSI-ASA_S12.18-1994_(R2009) Procedures for Outdoor Measurement of SPL.

4 Noise pollution: the emission of sound that unreasonably interferes with the enjoyment of life or with any lawful business or activity.

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

The combination of the above negative factors in the reports prepared as submittals regarding the Project's wind turbine noise emissions/pollution will result in sleep disturbance for a significant fraction of those who live within a mile away. Chronic sleep disturbance results in serious health effects. For a smaller portion of the community, there will be a risk of the adverse health effects currently described as Wind Turbine Syndrome mediated through the body's organs of balance (vestibular) and proprioception. This is a different set of symptoms and causes than what would be expected of higher levels of infra and low frequency sound and are not related to the audibility of the ILFN. The reports and other documents provided by the developer's of the Project focus on the adverse health effects that occur when the sound pressure level of the noise source exceeds the Threshold of Perception. The adverse health effects of concern are not related to this set of health effects. They are a result of modulated infra and low frequency sounds at levels below the threshold of audibility. D31-5 Cont.

The result of these technical flaws along with an outdated understanding of how the human body responds to acoustical energy below the threshold of perception leads to a conclusion that if the Project, as proposed, is approved, it will, with a high degree of certainty, have negative noise impacts that are "significant."

I have reviewed the Applicant's Environmental Document, Section 3.12 Noise, and the Tule Wind Project Draft Noise Analysis Report prepared for Iberdrola by HDR Engineering of Minneapolis, Minnesota. I have also had the opportunity to review similar documents prepared for other wind turbine projects by HDR and other acoustical consulting groups that work for the wind turbine project developers. My experience with industrial wind projects leads me to conclude that wind turbine utilities that produce sound levels at the properties and homes of people adjacent or within the Project will exceed the 40 dBA (L(night-outside) limit provided by the World Helath Organization (WHO) for safe and healthful sleep. It will result in a high level of community complaints of both noise pollution, sleep disturbance, and nuisance. In addition, there is mounting evidence that for the more sensitive members of the community, especially children under six, people with pre-existing medical conditions, particularly those with diseases of the vestibular system and other organs of balance and proprioception, and seniors with existing sleep problems will be likely to experience serious health risks. D31-6

The review will address a number of topics. Those topics include:

- Discussion of terms and standards,
- Discussion of weather and its effect on turbines
- Discussion of spacing and its effects on turbine noise
- San Diego County CNEL of 45 requires that one hour Leq to be 37.7. A limit of 40 dBA Leq outside a home (per WHO for nighttime noise) would just slightly exceed the CENL of 45 limit.
- An Overview summarizing deficiencies in the Draft Noise Analysis Report (October 2010) by HDR Engineering Inc, Minneapolis, MN. (referred to as "HDR")
- Description of wind turbine noise as a source of environmental noise exposure and noise pollution for humans

- Specific issues with the Noise Analysis Report produced regarding the Project
- Evidence that the Project noise will exceed the permitted levels,
- Comments on the potential risks to health and welfare of persons living near the footprint of the Project specifically regarding wind turbine noise.

D31-6 Cont.

Review of Terms and Standards

Terms

L_{Aeq}: The equivalent energy level in dBA. A measure of the acoustic energy over some interval of time that expresses the total energy of time-varying sound as a single number. Leq is very sensitive to short duration high amplitude events. A one hour Leq measurement in a quiet rural area with sound levels of 25 dBA for 59 minutes will have an Leq of 42.3 dBA if, during that hour, a short term noise, such as a vehicle pass-by on a nearby road, raises the sound level to 60 dBA for one minute. Leq is not a good descriptor for the background sound level in a quiet community where there are extremes between the residual sound (all sounds from afar that are not short term) and short term events that have high sound levels.

L_{An}: A statistical value determined by sampling sounds for some period of time, often 10 minutes to an hour, but it could also be longer, constructing a histogram. The L_{A90} would be the sound level representing the quietest 10% of the time. It is traditionally associated with the long term background sound level or residual sound level. The L_{A10} would be the sound level representing the noisiest 10% of the time. It is traditionally used as a descriptor of noisiness. The L_{A50} would be the sound level representing the median of the distribution of sound levels. The L_{A50} is not the same as L_{Aeq}. However, the L_{A50} is less sensitive to short term events and thus is often used to represent an 'average' sound level.

D31-7

Ambient sound[5]: at a specified time. the all encompassing sound associated with a given environment, being usually a composite of sound from many sources at many directions, near and far, including the specific sound source(s) of interest.

Residual sound[5]: at a specified time, the all-encompassing sound, being usually a composite of sound from many sources from many directions, near and far, remaining at a given position in a given situation when all uniquely identifiable discrete sound sources are eliminated, rendered insignificant, or otherwise not included. Specified in S12.9, Part 1 the residual sound may be approximated by measuring the percentile sound level exceeded during 90 to95 percent of the measurement period (e.g. L_{A90}).

Background sound[5]: all-encompassing sound associated with a given environment without the contributions from the source or sources of interest. In S12.9, Part 3, background sound is described as a combination of (one) Long-term background sound, and (two) short-term background sounds, with the durations for long and short defined according to application and situation.

Long-term background sound[5]: background sound measured during a measurement, after excluding the contribution of short-term background sounds in accordance with one of the methods specified in the standard S12.9, Part 3. Long-term background sound is assumed to be approximately stationary in a statistical sense[6], over the measurement duration, and it is describe

[5] Reference standards are S12.9 parts 1 and 3 for these definitions.

[6] Seasonal and weather related sounds such as insects, birds, wind rustle in dry leaves, should also be considered short term sounds for the purpose of measuring the long term background sound level. In addition, the test instruments shall

solely by its sound exposure per unit time (in each frequency-weighted or frequency-filtered band of interest).

Short-term background sound[5]: background sound associated with one or more sound events which occur infrequently during the basic measurement period, the measurement interval with or without the source operating, and measured in accordance with one of the methods in the standard S12.9, Part 3.

> Note: the sound exposure and time of occurrence of short-term background sounds cannot be described statistically during the basic measurement period. Examples of short-term background sounds include sounds from such sources as: a nearby barking dog, accelerating motor vehicle, radio music siren and aircraft flyover etc.

D31-7 Cont.

Standards Used in Assessing Land-Use Compatibility

EPA Levels Document (1973): In the 1970's the EPA operated an Office of Noise Abatement and Control (ONAC) that was tasked with promulgating standards for communities and other non-occupational environments. In 1973, the EPA published the 'Levels" document which provided a resource for communities that were developing local or state level noise ordinances. This work was primarily focused on the needs of urban and sub-urban communities with existing noise exposure. The body of the document presents information for this target audience. For communities with different soundscapes, such as rural communities the tables and graphs presented in the body of the document were not appropriate. To address the needs of these other communities the Levels document included an Appendix that provided a method for adjusting the recommendations for noise exposed urban and suburban environments to account for differences from the urban/suburban ones. Table-7 in the Figure 1 shows the adjustment factors that are to be added to the 55/45 L_{dn} for the noise exposed urban/suburban environment to normalize the data to the equivalent annoyance level. For example, an urban or suburban community with prior experience with noise might find sound levels of 55 dBA during the day and 45 dBA during the night to be satisfactory. For a rural community with

D31-8

Table D-7
Corrections To Be Added To The Measured Day-Night Sound Level (L_{dn}) Of Intruding Noise To Obtain Normalized L_{dn}[d-3]

Type of Correction	Description	Amount of Correction to be Added to Measured L_{dn} in dB
Seasonal Correction	Summer (or year-round operation)	0
	Winter only (or windows always closed)	-5
Correction for Outdoor Noise Level Measured in Absence of Intruding Noise	Quiet suburban or rural community (remote from large cities and from industrial activity and trucking)	+10
	Normal suburban community (not located near industrial activity)	+5
	Urban residential community (not immediately adjacent to heavily traveled roads and industrial areas)	0
	Noisy urban residential community (near relatively busy roads or industrial areas)	-5
	Very noisy urban residential community	-10
Correction for Previous Exposure & Community Attitudes	No prior experience with the intruding noise	+5
	Community has had some previous exposure to intruding noise but little effort is being made to control the noise. This correction may also be applied in a situation where the community has not been exposed to the noise previously, but the people are aware that bona fide efforts are being made to control the noise.	0
	Community has had considerable previous exposure to the intruding noise and the noise maker's relations with the community are good	-5
	Community aware that operation causing noise is very necessary and it will not continue indefinitely. This correction can be applied for an operation of limited duration and under emergency circumstances.	-10

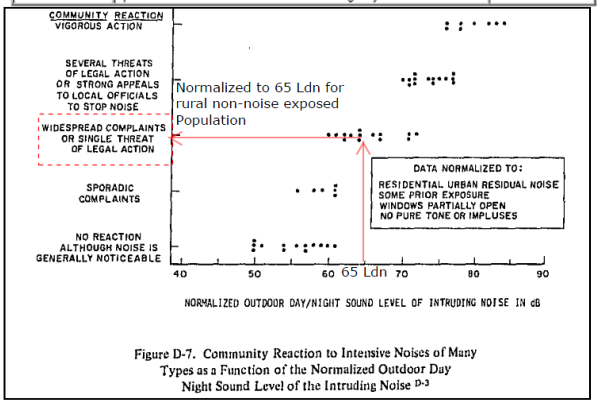

Figure D-7. Community Reaction to Intensive Noises of Many Types as a Function of the Normalized Outdoor Day Night Sound Level of the Intruding Noise [D-3]

Figure 1- Table and Figure D-7 from EPA Levels Document (1973)

not be located near roads, poles, fences, trees, walls or other reflecting surfaces or sources of local noise not representative of the larger community. This also includes streams and locations near roads.

prior noise exposure these levels would not be appropriate. Applying the +10 dB normalizing factor to Figure-7 results in an L_{dn} of 65 dB. Thus, the 45 dBA night and 55 dBA day sound levels that produce little or no negative community response from an urban/suburban population with prior noise exposure will result in widespread complaints and threats of legal action if they are experienced in a rural community. To avoid complaints the rural community L_{dn} must not exceed 45 dBA during the day and 35 dBA at night. If the rural community had no prior experience with noise exposure then an additional 5 dB is added to the normalization process. This would result in a nighttime limit of 30 dBA and a daytime limit of 40 dBA to avoid complaints.

D31-8 Cont.

ANSI S12.9 Part 4 (R_2005): Noise Assessment and Prediction of Long-term Community Response

In 1980 the ONAC was defunded by the administration and has remained unfunded since that time. To cover the loss of the EPA the Acoustical Society of America (ASA) and the American National Institute (ANSI) promulgated a standard that incorporated the same basic concepts as the EPA Levels document and the normalizing process of Table and Figure D-7. This standard can be applied to assess a community's response to a new noise source. It will result in the same recommendations for a rural community as the EPA document. For a non-noise exposed rural community ANSI S12.9 Part 4 sets the nighttime sound level at 30 dBA (Leq) and the daytime to 40 dBA (Leq).

Standards for Computer Modeling of Sound Propagation

ISO 9613-2: Acoustics-Attenuation of Sound during propagation outdoors, Part 2: General Method of Calculation: This standard specifies engineering methods for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of noise sources. The method is applicable, in practice, to a great variety of noise sources environments. It is applicable, directly or indirectly, to most situations concerning road or rail traffic, industrial noise sources, construction activities, and many other ground based noise sources. It does not apply to sound from aircraft in flight, or to blast waves from mining, military, or similar operations. It is validated only for noise sources that are located close to the ground (approximately 30 m difference between the source and receiver height). It is also limited to noise sources that are within 1000 m of the receiving location. Meteorological conditions are limited to wind speeds of approximately 1 m/s and 5 m/s when measured at a height of 3 m to 11 m above the ground. When all constraints, including these, are met by the situation being modeled the procedure is accurate within a +/- 3 dB range. Its use has not been validated by any independent peer-reviewed process for use in siting wind turbines. However, it became the practice in the mid-1990s to use commercial software packages for modeling a general-purpose industrial and traffic noise such as the Cadna/A software package which is based upon this iso-standard for wind turbine projects in Britain and many of its ex-colonies. This practice was promoted by the British Wind Energy Association (BWEA) and trade associations in other countries. This practice was not followed by many of the countries in the European Union because of their concern about the limitations of the method not being applicable to wind turbines. For example, there are alternate models that have been developed specifically for wind turbines in the Nordic countries. These models, have been validated by peer-reviewed independent studies and used in those countries.

D31-9

The Swedish EPA has recently promoted a modeling algorithm for wind turbines that applies both for onshore and offshore turbines. This model incorporates enhancements to the iso-9613 part 2 algorithms that address the specific characteristic of wind turbine sound omissions to propagate at a decay rate of 3 dB per doubling of distance for distances of several hundred meters away from the turbine. The ISO-Standard assumes propagation occurs at the decay rate of 6 dB per doubling of

distance. Later in this report the results of applying the Swedish model to the Project will be discussed and the impact of that model on sound levels both close to the turbines and at greater distances will be presented. Although it may be argued that the ISO-Standard is commonly used for wind turbine projects, it must be noted that there are many wind turbine projects where the initial models indicated there would be no problems that once operation started exhibit problems. Use of a model that understates real-world operational sound levels is a very likely cause of this problem.

IEC 61400-Part 11: acoustic noise measurement techniques: The purpose of this standard is to provide a uniform methodology that will ensure consistency and accuracy in the measurement and analysis of acoustical emissions by wind turbine generator systems. The standard was prepared for application to wind turbine manufacturers trying to meet well-defined acoustical emission performance requirements, and the purchaser in specifying such requirements. This standard is used to determine the sound power level emitted by wind turbines under conditions defined as normal operation. Normal operation is specified as weather conditions that are not severe and represent operation with low wind shear. Such conditions are normally defined as a "neutral" or "unstable" atmosphere where the windshear will generally be in the range of 0.15 or less and in general under 0.20. This weather condition is commonly observed during daytime of warm seasons and in particular can be described as a warm sunny afternoon in the temperate zone. Under low wind shear conditions the wind speed does not increase significantly between the height where the blade is lowest in this rotation and the top where it is at its highest peak. This allows the anemometer located on the turbine's hub to calculate the optimum angle of attack of the blades and RPM of the hub for maximum efficiency in extracting energy. Because inefficiency in extracting energy results in increased noise, heat, turbulence, and additional stresses on the blades the lowest noise immission condition for wind turbine is when it is most efficiently extracting energy from the wind. In a paper by William Palmer, P.ENG., Ontario Canada the effect of varying wind shears on wind turbine noise is explored[7]. Figure 2 shows an example of the optimal weather conditions for a windshear of 0.14 with no stability layer (temperature inversion boundary). The second best situation is a higher-level windshear such as 0.44 again without a stable boundary layer. However, because there will be a significant difference in the wind speed at the bottom and at the top of the blades rotation path the windshear of 0.44 will be more difficult for the turbine to find the optimum operating mode then for the 0.14 windshear. Both of these conditions follows a logarithmic relationship described as the Power Law which permits the estimation of a wind speed at some arbitrary height such as the hub from the wind speed at a lower height such as a 10 m meteorological tower.

D31-9 Cont.

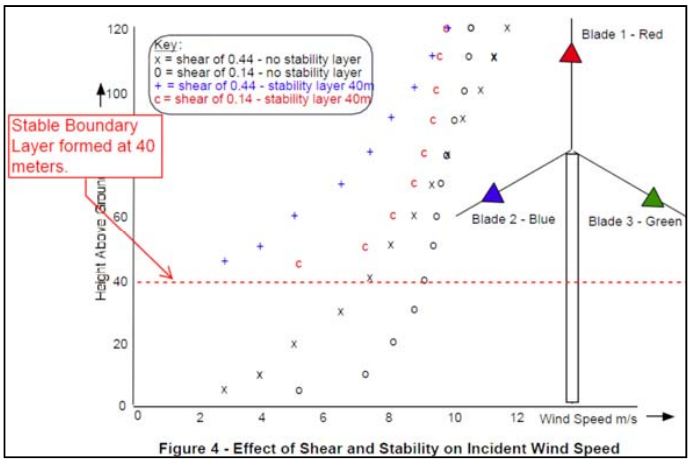

Figure 4 - Effect of Shear and Stability on Incident Wind Speed

Figure 2- Example of wind shear in neutral and stable atmospheres

[7] Palmer, W. P,Eng, "A new explanation for Wind Turbine Whoosh, Wind Shear," Third International Meeting on Wind Turbine Noise, Aalborg, Denmark, June 2009.

At night, after the sun's heating of the ground stops, the ground cools. The convection currents present in the daytime that cause the warmed air next the ground to rise upwards mixing with the upper level winds in a smooth gradient also stop. A cool layer of air forms that surface and get some altitude often between 20 m 200 m above the ground a boundary layer forms where the cool air meets the warmer higher-level air. This boundary layer causes a complete disconnect between the wind speeds below it and above it. Below the boundary layer winds are often calm or even still. There is insufficient wind to cause leaf rustle or other sounds associated with surface level winds. Figure 2 which is extracted from Mr. Palmer's paper shows the stable boundary at 40 m by stopping the markers for windshear at that height. These are the two curves on the left side of the figure. It is important to understand, that when a stable boundary layer forms the winds above the boundary layer are often moving at a very high rate and that rate increases rapidly with height. It is not uncommon to see wind shear coefficients of 0.7 to 1.0 or higher when these conditions form.

To compound the situation, if the stable boundary layer forms at an elevation higher than the bottom of the blades rotation path the blade will descend into it. Under these conditions the turbine blades which are under wind load above the stable boundary layer lose that load when they enter the still air below the boundary layer. This is situation that the turbine operating system which depends upon hub level anemometers cannot detect nor can it adjust the blades to account for this change. Is this condition that Mr. Palmer believes produces the maximum sound power from the turbine blades and is responsible for the deep blade whoosh that is the source of complaints during nighttime. Measurements of turbines operating this condition have shown blade whoosh (amplitude modulation) of 8 to 15 dBA above the normal sound levels. For the situation of high wind shear without the stable boundary layer blade whoosh (amplitude modulation) normally ranges from 5 to 8 dBA.

This phenomenon has also been studied by Dr. Fritz van den Berg for his graduate thesis titled: "The Sounds of High Winds. In "The Sounds of High Winds " Dr. van den Berg presents a method for determining the increased sound power emitted by wind turbines for various mismatches between the optimum angles of attack for the blades and what occurs when the blades are not at the optimum angle due to high wind shear. He shows that increases of 10 dB can be expected for angle mismatches of 9° or more. Even slight mismatches of 4 to 7° can increased sound power by 3 to 8 dBA.

To further complicate the assessment of a wind turbines sound power under real world situations the atmospheric condition of a stable atmosphere is a very common feature of warm season nights. In temperate zone climates it can occur as often as 60% of summer evenings. In a desert environment, where the solar heating and nighttime cooling can be even more extreme a stable atmosphere maybe even more common. Since the IEC 61400 – 11 measurement procedure only provides information for the sound power under the neutral atmosphere and low windshear use of the data from that standard will consistently under predict the sound levels of wind turbines during these, nighttime conditions.

D31-9 Cont.

Overview

This review identified a number of deficiencies in the report and information presented by HDR regarding the potential for excessive noise exposure on adjoining properties. Most are concerned with the assumptions and methodology HDR used in constructing the computer model of sound propagation. They fall into the following three categories.

D31-10

First, the HDR model included the tolerances for instrumentation error of the IEC 61400-11 test procedures of 2 dB but did not include the tolerances for the ISO 9613-2 modeling procedure of ± 3

dB. If the HDR model had included this tolerance the results shown on the contour maps and tables of their report would be 3 dB higher than stated. D31-10 Cont.

A second, and equally significant fault is that the predicted sound levels underestimate the sound levels that will be received on the properties and at homes adjacent to the wind turbine utility under nighttime stable atmospheric conditions. The Sound Power data used in the sound propagation models does not represent the noise produced by wind turbines during nighttime operations with high wind shear and stable atmospheric conditions. The IEC 61400.11 test standard collects data under neutral atmospheric conditions that do not cause these louder "thumping" or "whooshing" type of noise emissions.

In "Effects of the wind profile at night on wind turbine sound" G.P. van den Berg states:

> "....measurements show that the wind speed at hub height at night is up to 2.6 times higher than expected, causing a higher rotational speed of the wind turbines and consequentially up to 15 dB higher sound levels, relative to the same reference wind speed in daytime. Moreover, especially at high rotational speeds the turbines produce a 'thumping', impulsive sound, increasing annoyance further. It is concluded that prediction of noise immission at night from (tall) wind turbines is underestimated when measurement data are used (implicitly) assuming a wind profile valid in daytime."[8] D31-11

The "thumping" referred to in the Van den Berg paper occurs in synchronization with blade rotation (about one "thump" or "whoosh" per second assuming the hub is rotating at 20 rpm). "Thumping" does not referring to the blade "swish" of 1-3 dBA present when the turbine is operating in a neutral atmosphere. This "swish" is included as part of the wind turbine sound power ratings provided by the manufacturer. The "thumping" of concern is the much louder noise that is not accounted for in the manufacturer's test data. This occurs typically at night under a stable atmosphere where there is high wind shear. This "thumping" can modulate by 5 to 10 dBA or more and is a result of increased sound power emissions from the wind turbine's blades.

Based on this reviewer's experience the nighttime noise is increased by at least 5 dBA over what is observed for similar hub level wind speeds during the day under a neutral atmosphere. If the increased sound power caused by the nighttime atmospheric conditions had been added to the manufacturer's sound power for neutral atmospheric conditions the predicted values would be 5 dBA or more higher than what is shown in the HDR report tables and contour map.

Third, the sound propagation modeling software used for the sound models is a general purpose model designed for modeling noise from common urban noise sources like industrial plants, roads, and railways. The ISO Standard limits use of the methods to noise sources that are no more than 30 meters above the receiving locations. A wind turbine with a hub height of 80 meters exceeds this ISO limitation by 50 meters. The HDR report did not disclose this limitation or make any effort to account for the errors that may accrue from the noise source exceeding the source height limits. Cadna/A is based on the ISO standard and thus limitations to the standard apply equally to the Cadna/A model. D31-12

The result of these three failings is that the HDR model does not address the types of audible noise from wind turbines that occurs as a result of the summer night time wind speed profile. The model does not represent the nighttime high wind shear conditions that people find most objectionable. If D31-13

[8] Van den Berg, G.P., "Effects of the wind profile at night on wind turbine sound" Journal of Sound and Vibration, 2003

the model had correctly addressed tolerances and the need to increase the IEC61400-11 sound power levels to account for increased sound emissions at night the contour map and tables would be at least eight (8) dBA higher. This increase would have expanded the boundary of the 40 dBA threshold to include many of the homes around the perimeter of the Project. As a rule of thumb, assuming that the increased sound power for nighttime operation results in a 5 dBA increase and the 3 dB ISO tolerances are included, all receiving properties that have sound level projections between 32 and 40 dBA will exceed 40 dBA.

D31-13 Cont.

Properly modeled, this project would not comply with San Diego County's 45 dB CNEL limit at sensitive receiving properties. To remain under the 45 CNEL criteria the wind turbine's evening and nighttime Leq would need to be under 38 dBA Leq.

Leq 1hr Hours

$L_d := 37.75 \quad H_d := 12$

$L_e := 37.75 \quad H_e := 4$

$L_n := 37.75 \quad H_n := 8$

$H_{CNEL} := H_d + H_e + H_n$

$H_{CNEL} = 24$ Hours per day

$$L_{CNEL} := 10 \cdot \log\left[\frac{\left[H_d \cdot \left[10^{\left(\frac{L_d}{10}\right)}\right]\right] + \left[H_e \cdot \left[10^{\left(\frac{L_e+5}{10}\right)}\right]\right] + H_n \cdot \left[10^{\left[\frac{(L_n+10)}{10}\right]}\right]}{24}\right] \text{ dBA}$$

$L_{CNEL} = 44.145$ CNEL in dBA

Figure 3-37 Leq just meets the 45 CNEL criteria

Description of wind turbine noise

It is common for people to look at wind turbines as a separate type of noise source. However, some of the problems associated with them are easier to understand if we view wind turbines as a special case of very large exposed-blade industrial fan. For example, if we take a look at the spectrum from a fan, as shown in Figure 4, there are certain characteristics that all fans have in common. There is maximum energy at the blade passage frequency, tones above the blade passage frequency, and broadband noise. The harmonics of that tone have somewhat lower energy content. The broadband spectrum starts above the range where the tones no longer dominate. The energy is highest at the blade passage frequency and drops off as frequency increases.

D31-14

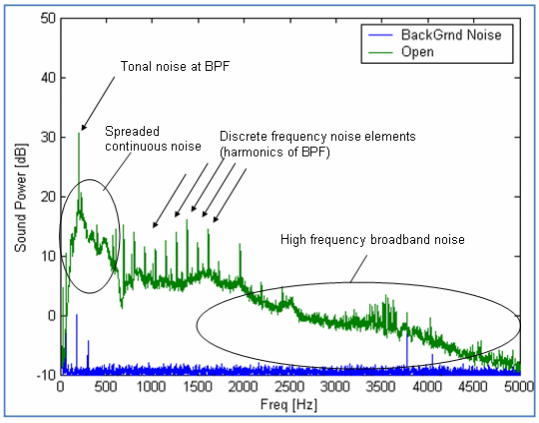

Figure 4-Typical Fan Noise Spectrum

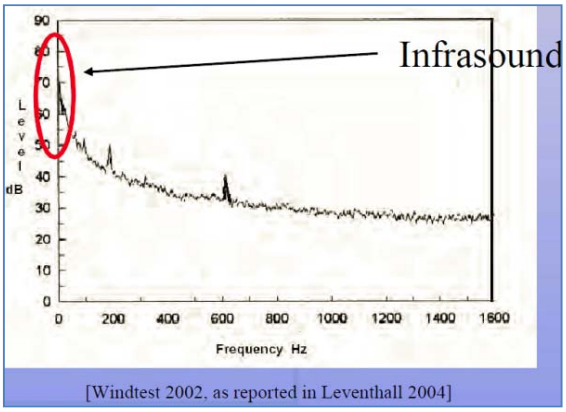

Figure 5-Vestas V-52 Spectrum (From NREL)

In Figure 5, the wind turbine spectrum for a Vestas V-52 shows some of the same spectral characteristics. It does not show the tones and harmonics at the blade passage frequency (BPF) because for industrial scale upwind turbines this is usually between 1 and 2 Hz and the harmonics occur below 10 Hz. Because this is a difficult range of frequencies to measure, especially in field test situations, most information about the spectral characteristics do not show the infrasound range (0-20Hz) sound pressure levels (SPL). This is further obscured by the practice of wind industry acoustical consultants to present data using of A-weighting (dBA). The practice masks the spectrum shape by creating a visual impression of minimal low-frequency sound content. Even when octave band (1/1 or 1/3) SPLs are presented the reports normally ignore frequencies below 31.5 or 63 Hz. The wind industry and its consultants often conclude that there is little or no infra or low frequency content. If that is true, then the customary reporting practices are understandable. But, if those assumptions are not accurate, then these practices mask a potential source of significant problems.

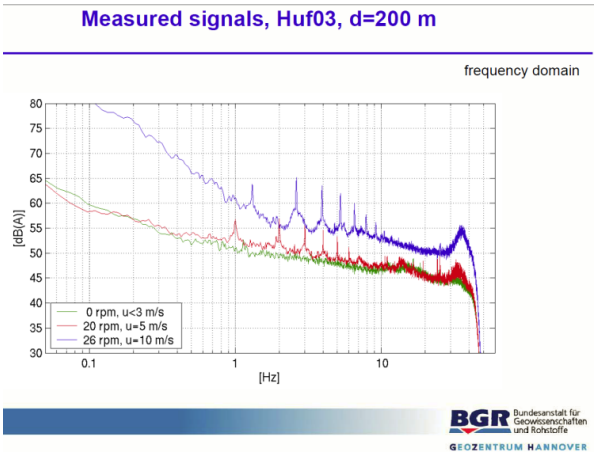

Figure 6-Wind Turbine Infrasound

The graphic to the left (Figure 6) is expanded in the lower frequency range to show a wind turbine's spectrum for the frequency range of 0-10 Hz. Now the tones and harmonics are clearer. Also, note the correlation of the frequency of the tones to rotational speed. This graph is from a study conducted by the Federal Institute for Geosciences and Natural Resources, Hannover, Germany, titled: "The Inaudible Noise of Wind Turbines" presented at the Infrasound work shop in 2005 (Tahiti).

D31-14 Cont.

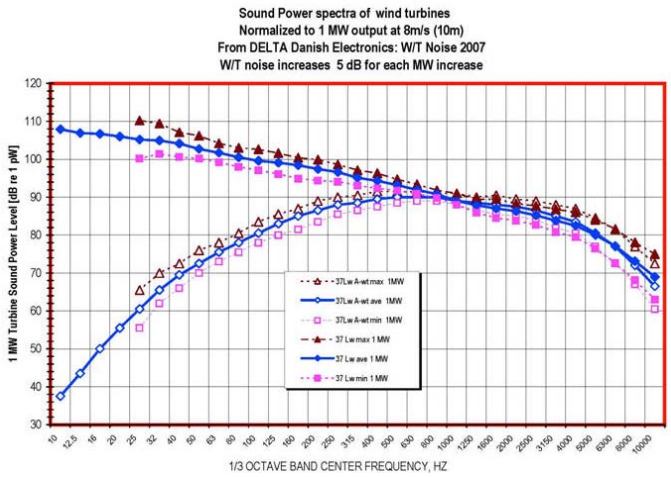

Figure 7-Sound Power Level of 37 Turbines Normalized to 1MW

The question is often asked: "Are the sound emission characteristics similar or different for different models and makes of wind turbines?" Figure 7 shows the general spectrum shape of 37 modern upwind turbines representing Turbines of the type anticipated for the Project. This graph shows the sound power data after normalizing the data for each turbine to 1 MW of power output.[9] It is clear that there is little deviation in spectral shape between any of the various models that is not related to power produced. However, as seen in the A-weighted curves of the same data, the use of A-weighting masks the low frequency energy content. All

[9] DELTA, Danish Electronics, Light & Acoustics, "EFP-06 Project, Low Frequency Noise from Large Wind Turbines, Summary and Conclusions on Measurements and Methods," April 30, 2008

modern upwind industrial scale wind turbines have similar high sound pressure levels and tones in these lowest frequencies. To say that wind turbines do not have significant infra and low frequency sound is to mischaracterize it's acoustic spectrum.

D31-14 Cont.

Wind turbine noise is distinctively annoying

There have been several studies, primarily conducted in European countries with a long history of wind turbines, showing that at the same sound pressure (decibel) level or less, wind turbine noise is experienced as more annoying than airport, truck traffic or railroad noise[10,11]. There are several reasons why people respond more negatively to wind turbine noise that are directly a result of the dynamic modulations of the noise, both audible and inaudible, more than the absolute level of the sounds received. Wind turbine noise has been shown to cause the same level of annoyance at 35 Leq as road, rail and air traffic at levels or 45 to 50 Leq.

D31-15

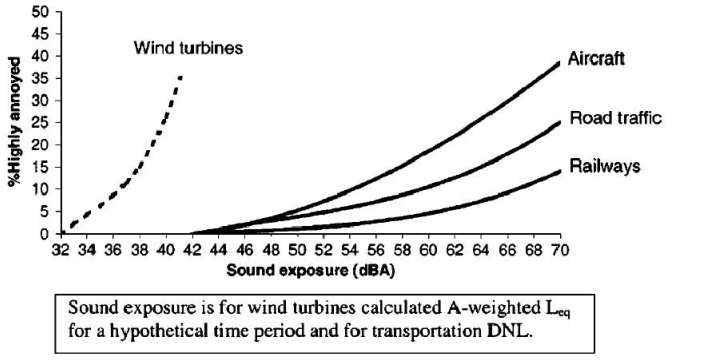

Figure 2. Percent of respondents reported high annoyance attitude as a function of sound level (Day-night average sound level for aircraft, road traffic, and railways; Leq for wind turbines). Source: Pedersen and Person Waye (2004), Figure 3.

Figure 8-Graph from Pedersen 2004

Amplitude Modulation (Audible Blade Swish)

It is not clear which characteristic of wind turbines makes them more annoying than other common sounds in the community. This is not because the sounds are hard to describe, but rather because wind turbine noise, especially at night, includes several annoying characteristics. Whether it is the distinctive rhythmic, impulsive or modulating character of wind turbine noise (all synonyms for "thump" or "whoosh" or "beating" sounds); its characteristic low frequency energy (both audible and inaudible, and also impulsive); the adverse health effects of chronic exposure to wind turbine noise (especially at night); in-phase modulation among several turbines in a wind farm (this can triple the impulse sound level when impulses of three or more turbines become synchronized); or some combination of all of these factors that best explains the increased annoyance is not fully understood. One or more of these characteristics are likely present depending on atmospheric and topographic conditions, (especially at night)[12] as is the individual susceptibility of each person to them.

D31-16

Nevertheless, reports based on surveys of those living near wind farms consistently find that, compared to surveys of those living near other sources of industrial noise, annoyance is significantly higher for comparable sound levels among wind utility footprint residents. In most cases, where relationships between sound level and annoyance have been determined, annoyance starts at sound

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[10] E. Pedersen and K. Persson Waye, "Perception and annoyance due to wind turbine noise: a dose–response relationship," J. Acoust. Soc. Am. 116, 3460–3470 (2004).

[11] Vandenberg, G., Pedersen, E., Bouma. J., Bakker, R. "WINDFARMperception Visual and acoustic impact of wind turbine farms on residents" Final Report, June 3, 2008.

[12] G.P. Van den Berg, "The beat is getting stronger: The effect of atmospheric stability on low frequency modulated sound on wind turbines," Noise notes 4(4), 15-40 (2005) and "The sound of high winds: the effect of atmospheric stability on wind turbine sound and microphone noise" Thesis (2006)

levels 10 dBA or more below the sound level that would cause equivalent annoyance from the other common community noise sources. Whereas one would expect that people would be annoyed by 45 dBA nighttime sound levels outside their homes in an urban area, rural residents are equally annoyed by wind turbines when the sound levels are 35 dBA. Given that wind turbine utilities are often permitted to cause sound levels of 40 or higher at the outside of homes adjacent to or inside the footprint of wind utilities the negative reactions to wind turbines from many of those people is understandable. Their reactions provide objective evidence from currently operating wind utilities that a substantial number of people who live near the Kent Breeze project will complain that the noise level they experience is both causing nighttime sleep disturbance and creating other problems once operation commences.[13] [14]

Although there remain differences in opinions about what causes the amplitude modulation of audible wind turbine noise most of the explanations involve high wind shears and/or turbulence as it moves into turbine's blades[15]. There are a number of explanations that have been presented to explain this noise. For example, eddies in the wind, high wind shear gradients (e.g. different wind speeds at the higher reach of the blades compared to the lower reach), slightly different wind directions across the plane of the blades, and interaction among turbines, have each been identified as causes of modulating wind turbine noise from modern upwind turbines.[16]

Consultants for wind utility developers often claim that wind turbine sound emissions inside and adjacent to the project footprint estimated by the sound propagation model's represent "worst-case" conditions. The IEC 61400-11 test procedures used to derive this data states that the turbine's reported sound power levels represent the turbine's sound emissions at or above its nominal operating wind speeds under standardized weather and wind conditions. These weather conditions require a neutral atmosphere where the wind shear fits the assumptions of the power law for winds at 10 meters and the hub level. This condition is often associated with a warm, sunny afternoon. That is reasonable given that the purpose of these tests is to produce standardized data to permit a prospective buyer of turbines to compare the sound emissions from various makes and models. This needs to be understood as being similar to the standardized gasoline mileage tests for new vehicles. One does not get the mileage posted on the vehicle sticker since each person's driving habits are different. The same is true for wind turbines and the environments in which they operate. The IEC test data does not account for the increased noise from turbulence or other weather conditions that cause higher sound emissions. A review of the IEC 61400-11, Wind Turbine Systems-Part 11: Acoustic Noise Measurement Techniques' assumptions in the body and appendices (esp. Appendix A) show that the IEC test data reported to turbine manufacturers is not 'worst case' for real world operations. Weather can introduce additional deviations from model results along its propagation path. ANSI standards for outdoor noise caution that turbulence in the air can increase the downwind sound levels by several decibels. It should be clear that any assertions by the acoustical modeler that the models represent "worst case" sound level estimates rely on careful phrasing or ignorance of the underlying standards and methods.

D31-16 Cont.

[13] Kamperman and James (2008); James (2009b); Minnesota Department of Health (2009), pp. 19-20.
[14] Bajdek, Christopher J. (2007). *Communicating the Noise Effects of Wind Farms to Stakeholders*, Proceedings of NOISE-CON (Reno, Nevada), available at http://www.hmmh.com/cmsdocuments/ Bajdek_NC07.pdf
[15] Van den Berg (2006, pp. 35-36); Oerlemans/Schepers (2009).
[16] Bowdler, "Why Turbine Noise Annoys – Amplitude Modulation and other things," Where Now with Wind Turbines, Environmental Protection U.K. Conference, Sept. 9, 2010 Birmingham, U.K.

Impulsive sound was considered more problematic for older turbines that had rotors mounted downwind from the tower[17]. The sound was reduced by mounting the rotor upwind of the tower, common now on all modern turbines[18]. Initially, many presumed that the change from downwind to upwind turbine blades would eliminate amplitude modulated sounds (whooshes and thumps) being received on adjacent properties. However, in a landmark study by G. P. van den Berg[19], it was shown that the impulsive swishing sound increases with size because larger modern turbines have blades located at higher elevations where they are subject to higher levels of wind shear during times of ground level "atmospheric stability." This results in sound fluctuating 5 dBA or more between beats under moderate conditions and 10 dBA or more during periods of higher turbulence or wind shear[20].

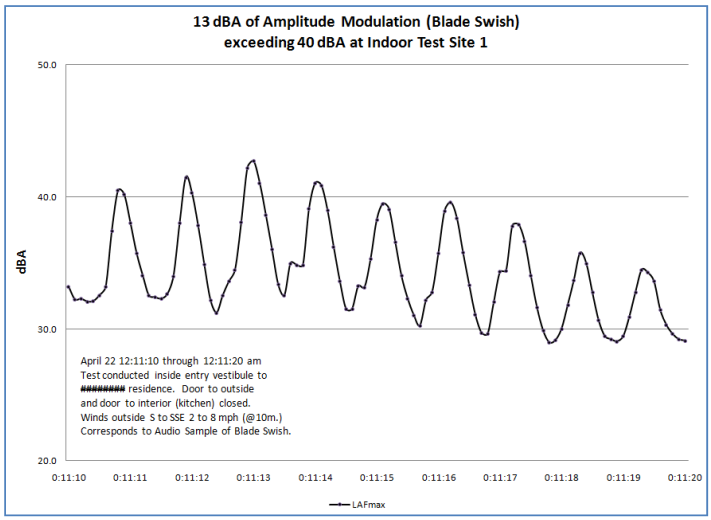

Figure 9-Audible Blade Swish inside home from New York Wind Utility

This author has confirmed night time amplitude modulation (blade thumping) at every wind project he has investigated. During periods of high turbulence or wind shear levels the sound levels produced by blade "thump" have been as high as 10-13 dBA. Figure 9's graph shows the rise and fall of the A-weighted sound levels from blade swish measured inside a closed entry vestibule to a home. This test site is approximately 1500 feet from two (2) turbines with sound emission characteristics similar to the turbines proposed for the Project. It should be noted that other tests measured sound levels exceeding 40 dBA inside the home in the rooms facing the turbines with a window partly open.

D31-16 Cont.

[17] Rogers (2006, p. 10)
[18] *Id.*, pp. 13, 16; Van den Berg (2006), p. 36.
[19] Van den Berg (2006, p. 36)
[20] *Id.*,

To compensate for the added annoyance of fluctuating or impulsive sound, the sound power levels of the turbine must be increased above what is reported for neutral atmospheric conditions under IEC 61400-11. The impact of this increased annoyance from short term fluctuations in sound levels is cited in the Minnesota Department of Public Health report of 2009.[21] The evidence collected by this reviewer as demonstrated in Figure 5 shows that this increase in noise emissions is generally applicable. It is the days and nights when the amplitude modulation is at its worst that cause complaints. It is not the 1-3 dB swishes of a summer afternoon, but the 6-9 dB whooshes of a late evening or the 10 -14 dB thumps during warm season night time weather with high turbulence or wind shear that matter. These conditions are common in warm weather months and at any time when significant vertical and horizontal turbulence and wind shear may occur.

D31-16 Cont.

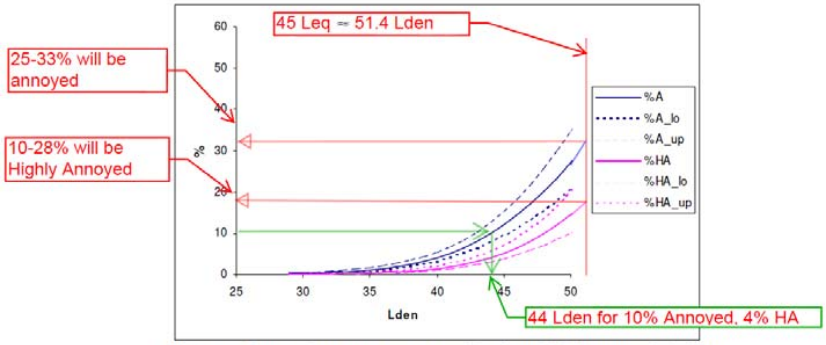

Figure 2 – Expected percentages annoyed (%*A*) and highly annoyed (%*HA*) indoors by wind turbine noise, with 95% confidence intervals.

Figure 10-Annoyance inside a home for outside wind turbine noise.

A recent paper by Drs. Pedersen and van den Berg assessed the annoyance felt by people inside their homes for various sound levels of wind turbine noise outside the homes. Figure 10 shows the annoyance level for the situation of 45 Leq outside the home. This results in an annoyance value of about 1 out of every 3 people. The position that 45 dBA wind turbine noise outside a home is compatible with sleeping inside the home (even with the windows closed) is shown to be false.

Frequency of Conditions that Cause Blade Swish

The phenomenon of wind shear coupled with ground level atmospheric stability refers to the boundary that forms between calm air at ground level and winds above the boundary at a higher altitude. "*A high wind shear at night is very common and must be regarded a standard feature of the night time atmosphere in the temperate zone and over land.*"[22] A paper presented at the 2009 Institute of Noise Control Engineers, Noise-Con 2009 conference in Ottawa, Canada on background noise assessment in New York's rural areas noted: "*Stable conditions occurred in 67% of nights and in 30% of those nights, wind velocities represented worst-case conditions where ground level winds were less than 2 m/s and hub-height winds were greater than wind turbine cut-in speed, 4 m/s.*"[23]

D31-17

Based on a full year of measurements every half-hour at a wind farm in Germany, Van den Berg found:

> "*the wind velocity at 10 m[eters] follows the popular notion that wind picks up after sunrise and abates after sundown. This is obviously a 'near-ground' notion as*

[21] Van den Berg (2006), p. 106; Minnesota Department of Public Health (2009), p. 21. *See also* Pedersen, "Wind turbine noise, annoyance and self-reported health and well being in different living environments," 2007, p. 24)
[22] Van den Berg (2006, p. 104). *See also* Cummings (2009)
[23] Schneider, C. "Measuring background noise with an attended, mobile survey during nights with stable atmospheric conditions" Noise-Con 2009

> *the reverse is true at altitudes above 80 m. . . . after sunrise low altitude winds are coupled to high altitude winds due to the vertical air movements caused by the developing thermal turbulence. As a result low altitude winds are accelerated by high altitude winds that in turn are slowed down. At sunset this process is reversed.*[24]"

D31-17 Cont.

In other words, when ground-level wind speed calms after sunset, wind speed at typical hub height for large wind turbines (80 meters, or 262 feet) commonly increases or at least stays the same. As a result, turbines can be expected to produce noise while there is no masking effect from wind-related noise at the ground where people live. "*The contrast between wind turbine and ambient sound levels is therefore at night more pronounced*.[25]" The blade angle is calculated for the average wind speed (at the hub) but the wind speeds at the top and bottom can require different settings to avoid producing noise. As the turbine's blades sweep from top to bottom under such conditions the blade encounters different wind velocities that do not match the blade's angle of attack resulting in rhythmic swishing noise from the parts of the rotation where blade angle mismatches occur[26]. Such calm or stable atmosphere at near-ground altitude accompanied by wind shear near turbine hub height occurred in the Van den Berg measurements 47% of the time over the course a year on average, and most often at night[27].

Infra and Low Frequency Sounds

The level of annoyance produced by wind turbine noise also increases substantially for **low frequency sound,** once it exceeds a person's threshold of perception. Annoyance and the sense of loudness increase more rapidly than the more readily audible mid-frequency sounds. Sound measured as dBA is biased toward 1,000 Hz, the center of the most audible frequency range of sound pressure. Low frequency sound is in the range below 200 Hz and is more appropriately measured as dBC for low frequency sound or in dBG for infrasound. Because infra and low frequency sounds from wind turbines include significant dynamic modulation in the frequency range from the Blade Passage Frequency of about 1 Hz up to about 10 Hz standard acoustical instruments such as 1/3 octave band analyzers and FFT analyzers using band filtering cannot be used to measure the short duration pulsations. Using instrumentation that can provide 1/3 octave band resolution of the spectrum sound pressure levels can only be used for assessing relatively long periods of the infrasound (minutes or hours, not seconds or milliseconds) and even then the readings may understate the total acoustic energy and the maximum sound pressure levels during those pulsations[28].

D31-18

Sound below 20 Hz, termed infrasound, is generally presumed to not be audible to most people. *See* Leventhall (2003, pp. 31-37); Minnesota Department of Public Health (2009, p. 10); Kamperman and James (2008, pp. 23-24). However, if these criteria are applied to the most sensitive people, the thresholds drop approximately 6-12 dB. But the Thresholds of Perception are for a single steady pure tone under laboratory conditions. Wind turbine sounds are a complex mix of tones, all within the same critical band. Because the auditory system integrates the energy of the various tones it is possible that for some people they will be audible at levels lower than what is required for a single

[24] (Van den Berg 2006, p. 90)
[25] *Id.*, p. 60
[26] *Id.*, p. 61. *Cf. also* Minnesota Department of Public Health (2009), pp. 12-13 and Fig. 5.
[27] Van den Berg 2006, p. 96
[28] A paper co-written by this reviewer and Wade Bray of Head Acoustics is being prepared to present the findings of an analysis of wind turbine low and infrasonic sound that shows these micro-time pulsations at the July 2011 Noise-Con to be held in Portland, OR.

pure tone. The combination of people with extra sensitivity and the presence of a complex set of tones in the range from 0 to 20 Hz puts the infrasound sound pressure levels measured on receiving properties and inside homes within the threshold of perception for a subset of the population. However, when someone states that wind turbine infra sound is not significant because it does not reach the amplitudes needed to exceed the Thresholds of Perception they are mischaracterizing the situation. The truth is we only know the Thresholds of Perception for single pure tones. When the sounds are more complex as for wind turbines with their multiple combinations of tones with varying types of amplitude and frequency modulation we do not know the Threshold of Perception. All we know is that it is likely to be lower than for a single pure tone.

For many years it has been presumed that only infra and low frequency sounds that reached the threshold of audibility for people posed any health risks. Many acoustical engineers were taught that if you cannot hear a sound, it cannot harm you. Recent research has shown that the human body and auditory system is more sensitive to infra and low frequency noise (ILFN) than previously believed. This perception is not one that is 'heard' but rather it is one that involves the organs of balance (vestibular systems). The vestibular portion of our auditory system can respond to levels of infra and low frequency sound at pressures significantly lower than what is needed to reach the thresholds of audibility.[29]

Dr. Nina Pierpont has conducted a study of the effects of infra and low frequency sound on the organs of balance that establishes the causal link between wind turbine ILFN and medical pathologies. This research is discounted by the wind industry as not meeting standards for epidemiology and that it is not 'peer-reviewed.' Neither accusation is correct. The type of epidemiological study conducted by Dr. Pierpont is termed a case-crossover study. Dr. Carl Philips, a highly respected epidemiologist not associated with the wind industry has said: [30]

D31-18 Cont.

> "*In particular, my scientific analysis is based on the following points, which are expanded upon below:*
>
> "*1. Health effects from the turbine noise are biologically plausible based on what is known of the physics and from other exposures.*
>
> "*2. There is substantial evidence that suggests that some people exposed to wind turbines are suffering psychological distress and related harm from their exposure. These outcomes warrant the label "health effects" or "disease" by most accepted definitions, though arguments about this are merely a matter of semantics and cannot change the degree of harm suffered.*
>
> "*3. The various attempts to dismiss the evidence that supports point 2 appears to be based on a combination of misunderstanding of epidemiologic science and semantic games. Multiple components of this point appear below. " Also,*
>
> "*There is ample scientific evidence to conclude that wind turbines cause serious health problems for some people living nearby." And,*
>
> "*The reports that claim that there is no evidence of health effects are based on a very simplistic understanding of epidemiology and self-serving definitions of what does not count as evidence.*

---

[29] Alves-Pereira, Marianna and Nuno A. A. Branco (2007a). *VibroAcoustic disease: Biological effects of infrasound and low-frequency noise explained by mechanotransduction cellular signaling*, 93 PROGRESS IN BIOPHYSICS AND MOLECULAR BIOLOGY 256–279, available at http://www.ncbi.nlm.nih.gov/ pubmed/17014895><
and, Alves-Pereira, Marianna and Nuno A. A. Branco (2007b). *Public health and noise exposure: the importance of low frequency noise*, Institute of Acoustics, Proceedings of INTER-NOISE 2007,

[30] Philips, Carl v., " An Analysis of the Epidemiology and Related Evidence on the Health Effects of Wind Turbines on Local Residents," for Public Service Commission of Wisconsin docket no. 1-AC-231, Wind Siting Rules, July 2010.

Though those reports probably seem convincing prima facie, they do not represent proper scientific reasoning, and in some cases the conclusions of those reports do not even match their own analysis."

Further, the report was peer-reviewed by some of the top experts in the U.S. and Britain who have experience with vestibular disturbances and adverse health conditions. These reviews were included in the published final report. The criticisms leveled at Dr. Pierpont's work are not supported by the facts.

The new research is not from the traditional fields that have provided guidance for acoustical engineers and others when assessing compatibility of new noise sources and existing communities. Instead it comes from the field of research into auditory and vestibular function. A recent peer reviewed paper by NIDCD/NIH researcher Dr. Alec Salt, reported that the cochlea responds to infrasound at levels 40 dB below the threshold of audibility.[31] These studies show how the body responds to extremely low levels of energy not as an auditory response, but instead as a vestibular response.

In a personal communication, this reviewer asked Dr. Salt the question: "Does infrasound from wind turbines affect the inner ear?" Dr. Salt responded:

> "There is controversy whether prolonged exposure to the sounds generated by wind turbines adversely affects human health. The un-weighted spectrum of wind turbine noise slowly rises with decreasing frequency, with greatest output in the 1-2 Hz range. As human hearing is insensitive to infrasound (needing over 120 dB SPL to detect 2 Hz) it is claimed that infrasound generated by wind turbines is below threshold and therefore cannot affect people. The inner hair cells (IHC) of the cochlea, through which hearing is mediated, are velocity-sensitive and insensitive to low frequency sounds. The outer hair cells (OHC), in contrast, are displacement-sensitive and respond to infrasonic frequencies at levels up to 40 dB below those that are heard."
>
> "A review found the G-weighted noise levels generated by wind turbines with upwind rotors to be approximately 70 dBG. This is substantially below the threshold for hearing infrasound which is 95 dB G but is above the calculated level for OHC stimulation of 60 dB G. This suggests that most wind turbines will be producing an unheard stimulation of OHC. Whether this is conveyed to the brain by type II afferent fibers or influences other aspects of sound perception is not known. Listeners find the so-called amplitude modulation of higher frequency sounds (described as blade "swish" or "thump") highly annoying. This could represent either a modulation of audible sounds (as detected by a sound level meter) or a biological modulation caused by variation of OHC gain as operating point is biased by the infrasound. Cochlear responses to infrasound also depend on audible input, with audible tones suppressing cochlear microphonic responses to infrasound in animals. These findings demonstrate that the response of the inner ear to infrasound is complex and needs to be understood in more detail before it can be concluded that the ear cannot be affected by wind turbine noise."

D31-18 Cont.

During the summer of 2009, this reviewer conducted a study of homes in Ontario where people had reported adverse health effects that they associated with the operation of wind turbines in their communities[32]. The study involved collecting sound level data at the homes and properties of these people, many of who had abandoned their homes due to their problems. This study found that sound levels in the 1/3 octave bands below 20 Hz were often above 60 dB and in many cases above 70 dB. Since the shape of the spectrum for wind turbine sound emissions is greatest at the blade passage frequency which was below the threshold for the instruments used it can be assumed that the sound pressure levels in the range of 0 to 10 Hz exceeded 70 dBA. Given the statement by Dr. Salt that vestibular responses would start at levels of 60 dBG or higher this data supports the

[31] Salt, Alec, "Responses of the ear to low frequency sounds, infrasound and wind turbines", Hearing Research, 2010. This work was supported by research grant RO1 DC01368 from NIDCD/NIH

32 James, R. R., "Comments Related to EBR-010-6708 and -010-6516" Comment ID 123842, 2009

hypothesis that there is a link between the dynamically modulated infra sound produced by wind turbines and reported adverse health effects.

Adverse health effects related to inaudible low frequency and infra sound have been encountered before. Acoustical engineers in the Heating, Cooling and Air Conditioning (ASHRAE) field have suspected since the 1980's and confirmed in the late 1990's that dynamically modulated, but inaudible, low frequency sound from poor HVAC designs or installations can cause a host of symptoms in workers in large open offices[33]. The ASHRAE handbook devotes considerable attention to the design of systems to avoid these problems and has developed methods to rate building interiors (RC Mark II) to assess them for these low frequency problems[34]. The report on Ontario by this reviewer includes an Appendix that provides more detail on this aspect of how inaudible infra and low frequency sound can cause adverse health effects.

When infra and low frequency sound is in the less-audible or inaudible range, it is often felt rather than heard. Unlike the A-weighted component, the low-frequency component of wind turbine noise "*can penetrate the home's walls and roof with very little low frequency noise reduction*.[35]" Further, as discussed in the 1990 NASA study the inside of homes receiving this energy can resonate and cause an increase of the low frequency energy over and above what was outside the home. Acoustic modeling for low frequency sound emissions of ten 2.5 MW turbines indicated "*that the one mile low frequency results are only 6.3 dB below the 1,000 foot one turbine example*.[36]" This makes the infra and low frequency sound immissions from wind turbines a potential problem over an even larger area than the audible sounds, such as blade swish and other wind turbine noises in the mid to high frequency range.

D31-18 Cont.

The acoustical consultant that does not practice in this field may not be as aware of the problems of amplitude modulated, in-audible low frequency sound identified by the ASHRAE engineers. Many have not integrated these new understandings of how infra and low frequency sound can affect the vestibular organs into their work on community noise. These levels were only a few years ago considered too low to cause any physical response. Today, there is a renewed interest in these effects. A paper titled: Infrasound, The Hidden Annoyance of Industrial Wind Turbines, by Prof. Claude Renard of the Naval College and Military School of the Fleet (France) concludes:

> "*The information given above is enough to understand that it is better not to be exposed to infrasound which propagates far from its point of origin and against which it is impossible to protect oneself due to the long wavelengths.*
>
> "*Those most affected by exposure to infrasound are rural inhabitants living in proximity to wind turbines, and those working in air-conditioned offices.*
>
> "*The people in the former category are exposed to the infrasound 24 hours a day, whereas people in the latter category are only exposed to infrasound 6 hours a day.*
>
> "*The most important issue is therefore to know what intensity of infrasound can be tolerated without inconvenience over these periods of time.*
>
> "*We do not have the answer to this question.*"

33 Persson Waye, Kirsten, Rylander, R., Benton, S., Leventhall, H. G., Effects of Performance and Work Quality Due to Low Frequency Ventilation Noise, Journal of Sound and Vibration, (1997) 2005(4), 467-474.
34 The study also showed that NC curves are not able to predict rumble. This use of NC curves was disproved in the 1997 Persson Waye, Leventhall study. Use of the RC Mark II procedures is more appropriate for this use.
35 Kamperman and James (2008), p. 3.
36 *Id.*, p. 12

Specific Issues with the HDR Noise Assessment Report

Problems with Cadna/A (Limitations on Use of ISO 9613-2 Algorithms)

As discussed earlier in this review the sound propagation modeling presented by HDR and used as the basis for conclusions about the impact of the Project on nearby properties and residences underestimates the sound levels that will be received on the properties and homes adjacent to the wind turbine utility. The sound propagation modeling software used for the sound models (Cadna/A and others) are general-purpose commercial packages for use in modeling noise from noise sources like industrial plants, roads, and railways, not wind turbines. Although this does not completely preclude the use of the Cadna/A software package, it does call into question the implied assertion by HDR by representing the predicted sound levels to a tenth of a decimal precision that the predicted values can be assumed to be precise. We need to apply reasonable safety factors and give consideration to the known tolerances and limits to the accuracy of the procedures in our conclusions. Further, it must be understood that there are other computational methods and algorithms that can be used to model wind turbines other than the ISO method that produce different results. For example, the Swedish model that was mentioned in the discussion about ISO 9613-2 has been validated by independent researchers for use with wind turbines. This model was used by this reviewer to predict the sound pressure levels in dBA and dBC for a home near a row of wind turbines and one at a distance of about 1 to 1.25 miles to demonstrate the difference in outcomes. A table comparing the outcomes is presented later in this report.

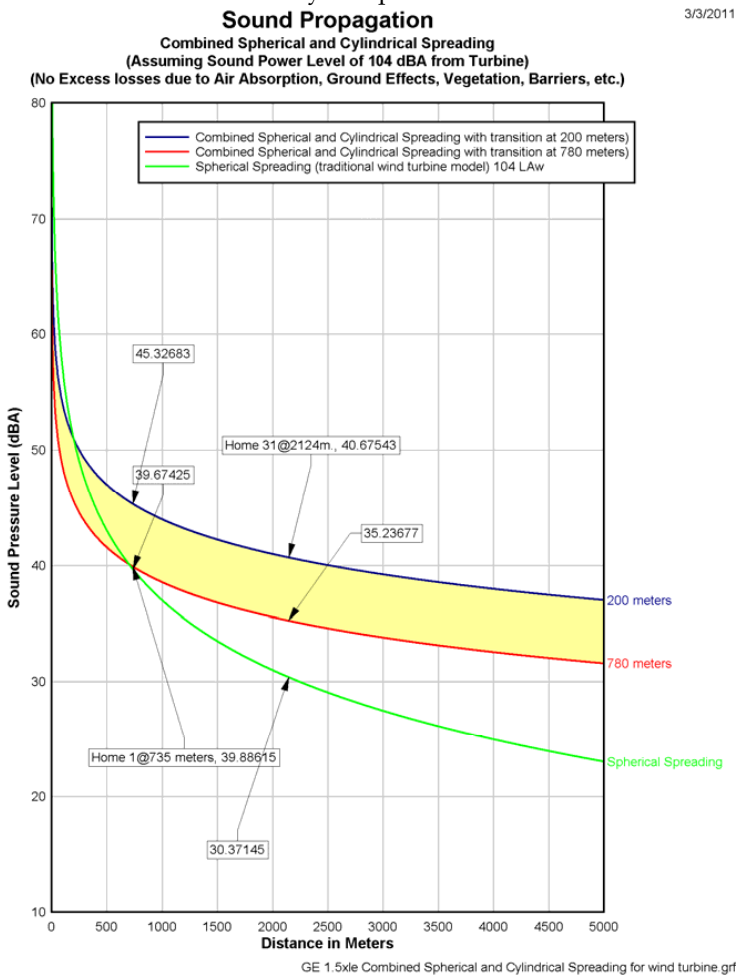

Figure 11-Comparison of decay rate for ISO 9613-2 and Swedish model

The graph shown in Figure 11 shows the decay rate for the two modeling methods. The Swedish method includes a new variable that adjusts the distance from the turbine where the sound field converts from a decay rate of 6 dB per doubling of distance (ISO 6913-2 also known as spherical spreading or point source calculations) to 3 dB decrease per doubling (known as Cylindrical spreading or line source calculations). For reflective surfaces like water, ice or hard rock this value is about 200. For ground surfaces that absorb part of the acoustic energy this may be 800 or higher. The graph shows the ISO decay rate as the bottom green trace. For a single

D31-19

turbine with a sound power level of 104 dBA the sound pressure at about 735 meters (a little less than the distance from turbine R12 to Home #1) would be 39 dBA. This is about the same as the Swedish model when the variable is set to 780 meters. If the ground was highly reflective as might be expected for rocky hard packed desert land the sound level would only have dropped to 45 dBA. At 2124 meters (a little less than the distance from turbine G17 to Home #31) the difference between the two models is much greater. Here the ISO model would predict 30 dBA but the Swedish model would predict 35 to 40 dBA depending on the ground absorption assumption. Based on this graph the HDR model is understating the sound levels for homes at distances of 4000 meters by 8 dBA or more. These differences do not consider the increased sound power levels due to wind shear at night. Under those conditions the sound levels predicted by both methods would be 5 to 8 dBA higher. This demonstrates why the Project cannot claim with any degree of assurance that it will not produce sound levels at sensitive properties that exceed the 45 CNEL limits set by San Diego County. In fact, it is quite likely that these exceedances will occur and they will occur most often at night when the create a serious challenge to residents for sleep disturbance.

D31-19 Cont.

Use of Tolerances

HDR included the 2 decibel tolerance associated with instrumentation error from the IEC 61400 – 11 test protocol for measuring the sound power produced by wind turbines. However, HDR does not include the three (3) dB tolerance associated with errors when applying the ISO-methodology (See Table 5 from the ISO standard Figure 12).

If HDR had included the three (3) dB tolerance for the ISO methodology, the results of the models for daytime and nighttime operating modes would have shown many of the homes proximate to the project being exposed to sound levels over 45 dBA CNEL (38 Leq is required for compliance if the turbines operate at night). ISO 9613-2, Table 5, Section 9, "Accuracy and limits of the method" (Figure 12), shows the tolerance as plus/minus 3 dB for predictions. This applies when the noise source is at a height greater than 5m and less than 30 m above the receiver and the receiver is within 1000 m. of the noise source.

D31-20

Table 5 — Estimated accuracy for broadband noise of L_{AT}(DW) calculated using equations (1) to (10)

Height, h *)	Distance, d *)	
	$0 < d < 100$ m	$100\text{ m} < d < 1\,000$ m
$0 < h < 5$ m	± 3 dB	± 3 dB
$5\text{ m} < h < 30$ m	± 1 dB	± 3 dB
*) h is the mean height of the source and receiver. d is the distance between the source and receiver.		
NOTE — These estimates have been made from situations where there are no effects due to reflection or attenuation due to screening.		

Figure 12-Table of Tolerances for ISO Model if all assumptions are met.

It essential to include the three (3) dB tolerance in the predictions. Further, the predicted values should be viewed as estimates, not precise values even with the tolerance included because the wind turbine does not fit the model's assumptions for height and spherical spreading.

Use of Sound Power Data Representing Sound Emissions in a Neutral Atmosphere

Sound power levels must represent the conditions that cause the intrusive blade swish that is commonly associated with nighttime sleep disturbance and complaints. The manufacturer's reported power levels represents a standardized value for 'typical' conditions of a neutral atmosphere with a moderate wind shear gradient. The HDR report made no attempt to address this deficiency.

D31-21

Evidence of wind farm noise exceeding certificate of approval levels

D31-22

A spreadsheet model was developed for two of the properties near the wind project that applies the ISO tolerances as they should be applied. In addition, a model using the Swedish algorithms was also developed. Two homes were selected as representing the sensitive receiver sites. They are home #1, which is one of the closest homes to the turbines (approx. 1/2 mile), and home #31, which is about a mile and a quarter away from the nearest turbines. They were selected as representatives of other properties for comparison to the sound levels reported by HDR. These models were constructed using spreadsheets and are attached as appendix materials for review.

Evidence of Tule Wind Exceeding 45 dBA CNEL (38 L_{Aeq} during nighttime hours)

Residence	Nearest turbine (m)	HDR Study Report (w/o ISO tolerance) dBA/dBC	E-CS Study ISO Model (no ground absorption) dBA/dBC	E-CS Study Swedish Model variable of 780 for partly absorptive ground	E-CS ISO model with 5 dBA increase in Turbine Sound Power Level* dBA/dBC
1	735 m. (R12)	47/58	45/58	51/62	50/63
31	2142 m. (G17)	39/51	35/50	47/58	40/55

* Adjustment for Nighttime Blade Thump under a stable atmosphere with high wind shear. This could be considered the Predictable Worst Case Condition.

D31-22 Cont.

The two ISO models are in general agreement with the E-CS ISO model having slightly lower dBA levels for Homes 1 and 31. This is likely because the E-CS model only considered the nearest turbines where the HDR model considered the effect of the nearby turbines as well as those at greater distances. The E-CS model based on the Swedish model that combines spherical and cylindrical sound propagation shows a large increase over either of the two ISO models. For Home #1 the increase is 3 dBA over the HDR ISO model and 6 dBA over the E-CS ISO model. As expected the E-CS Swedish model shows a much lower decrease in sound with distance than the ISO models. This is explained above in the narrative for Figure 11 as a result of the propagation decrease changing from 6 dB per doubling of distance to 3 dB per doubling of distance. For Home #31, located at a mile and a quarter from the nearest turbine the daytime sound level is projected to be as high as 47 dBA. This is only 4 dBA lower than at Home 1 whereas the ISO models show a difference of about 10 dBA. If we were to consider the increased sound power for nighttime stable atmospheric conditions with high wind shear above the stable boundary layer the nighttime sound levels at Home #1 would be approximately 50 dBA. This reviewer has measured similar high sound levels at similar distances during stable atmospheres at several wind utility projects. For the same nighttime conditions homes at a distance of a mile may experience sound levels of 40 dBA.

In the 2008 manuscript by George Kamperman, Bd. Cert. INCE, P.E. and myself we set criteria designed to protect the public health we stated that a setback of at least 1.25 miles was needed to achieve this goal[37]. Given that the World Health Organization's 2009 Nighttime Noise Guidelines find that the Threshold for Adverse Health Effects is 40 dBA at night outside a home the results shown in the above Table confirm the need for such distances. For specific topographies that

[37] Kamperman, G.W., Bd.Cert. INCE, P.E., James, R.R. INCE, "The 'How To' Guide to Siting Wind Turbines To Prevent Health Risks Fro Sound, 2008.

increase the distance that sound travels or increase sound power emissions due to in-flow turbulence from wake interference due to layout or rough terrain downwind of the turbines, or that are more susceptible to the daytime warming and nighttime cooling of the ground and atmosphere this 1.25 mile setback may not be sufficient.

D31-22 Cont.

Conclusion

It is the opinion of this reviewer, based on his personal experience and the review described in this document that a properly conducted study would identify many more homes in the vicinity of the wind turbines where the receiving properties will have sound levels that exceed 40 dBA. When adjusted for known tolerances of algorithms and measurements used to construct the model and the increased sound power emitted by wind turbines at night under conditions of high wind shear, a common situation during the warm season most of the homes in the areas bounding the Project will have sound levels that exceed 40 dBA at night. The San Diego County CNEL limit of 45 dBA for sensitive receivers will be exceeded at any location were the nighttime L_{Aeq} exceeds 38 dBA. This is likely to be most of the area within 1.25 miles of the perimeter of the Project. For the non-residential areas used for campgrounds and outdoor recreation the soundscape will no longer be the natural sounds of nature but instead the industrial sounds of wind turbines. The belief that the noise from the highways will somehow 'mask' the wind turbine sounds is not supported by current research. Wind turbine noise, especially at night under stable atmospheric conditions or during weather that causes increased turbulence in the in-flow air the wind turbine sounds will be characterized by large swings in sound level synchronized with turbine blade rotation of about one 'whoosh" or "thump" per second. This amplitude modulation is an additional reason that it can be expected that sleep disturbance will be a common factor for people living or camping in the area. Further, there is reason to be concerned that for a sub-set of the people in the community the infrasound and low frequency content of the wind turbine noise will pose additional health risks due to interactions with their organs of balance. These concerns are not hypothetical. There are many similar large scale wind turbine projects operating in the U.S. and around the world. A fair number of these projects result in complaints from people living near or inside the project's footprint of night time sleep disturbance and symptoms that are part of wind turbine syndrome. These projects were granted permits based on the same process of assessing background sound levels and computer modeling that were used for the Project. Given the analysis above it is reasonable to conclude that this project will join the ranks of wind utilities that cause adverse health conditions and noise pollution if it is approved.

D31-23

This project should be rejected based on the concerns raised in this report. There may be other arrangements of turbines that might be compatible with the community and current land use. However, this current arrangement, with inter turbine spacing of less than three rotor diameters, hard dense reflective ground surfaces, desert heating and cooling cycles being likely to create stable nighttime atmospheric conditions, and the rough terrain which will increase the in-flow turbulence all result in increased noise levels for residents and visitors.

In the opinion of this reviewer the Project will result in the exposure of persons to or generation of noise levels in excess of standards established in the San Diego County noise ordinance, and also exceed the WHO 2009 nighttime guidelines setting 40 dBA (Leq) at night as the threshold for adverse health effects. It will also result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

The Project, as currently proposed should be rejected.

End of Review

Richard R. James, INCE
For E-Coustic Solutions

March 4, 2011

The following material is considered Comment D31-24.

Appendix
Model Spreadsheets

Version: 2 Dec. 6, 2010

Predicted dBA, dBC, and dBZ Leq Average Sound Pressure Levels (Residence 31) (Swedish Model)

			1/1 Octave Band Center Frequency (Hz) with Un-weighted Sound Pressure Levels (dB(Z) L_{eq})											From 1/1 Octave Band SPL's		
	Receiver Elevation to Tower Hub (m.)	140														
	Octave Band Center Frequency (Hz)		8	16	32	63	125	250	500	1000	2000	4000	8000	dB(Z) Leq	dB(C) Leq	dB(A) Leq
Sound Power (Lw)==>	GE 1.5xle 1.5 MW V_{10} of 10m/s or greater		116	114	112	110	108	106	103	98	92	86	86	120	115	104
	ISO 9613-2 Model Tolerance		3	3	3	3	3	3	3	3	3	3	3	3	3	3
	IEC 61400-11 Meas. Tolerance		2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Additional Lw from conditions not part of IEC test conditions															
Air Absorption Coefficient (Alpha) db/m @ 20C 50%RH																
	Transition point for Spherical to Cylindrical:	780			0.0001	0.0002	0.0005	0.0013	0.0027	0.0047	0.0099	0.0290	0.0300	---	---	---

Turbine No:	Distance to tower base (ft)	Distance to tower base (m)	Distance to hub (m)	8	16	32	63	125	250	500	1000	2000	4000	8000	dB(Z) L_{eq}	dB(C) L_{eq}	dB(A) Leq	Distance to tower hub (m.)
G15	7755	2364	2368	50	48	46	44	43	41	37	32	27	20	20	54	50	38	2368
G16	7400	2256	2260	51	49	47	44	43	41	37	32	27	20	20	55	50	39	2260
G17	7028	2142	2147	51	49	47	44	43	41	37	32	27	20	21	55	50	39	2147
R11	7320	2231	2236	51	49	47	44	43	41	37	32	27	20	20	55	50	39	2236
R12	7650	2332	2336	50	48	46	44	43	41	37	32	27	20	20	55	50	38	2336
G18	7419	2261	2266	51	49	47	44	43	41	37	32	27	20	20	55	50	39	2266
G19	8125	2477	2480	50	48	46	44	42	41	37	32	26	20	20	54	49	38	2480
Cummulative Effect of Listed Turbines as Long Term Average L_{eq} SPL's															dB(Z) L_{eq}	dB(C) L_{eq}	dB(A) Leq	% Highly Annoyed
Turbines Only (w/o AM or Turb.):				59	57	55	53	51	49	46	41	35	28	29	63	58	47	20% +/- 20%

Predicted dBA, dBC, and dBZ Leq Average Sound Pressure Levels (Residence 31) (ISO Model)

			1/1 Octave Band Center Frequency (Hz) with Un-weighted Sound Pressure Levels (dB(Z) L_{eq})										From 1/1 Octave Band SPL's		
	Octave Band Center Frequency (Hz)		8	16	32	63	125	250	500	1000	2000	4000	8000	dB(Z) Leq	dB(C) Leq	dB(A) Leq
Sound Power (Lw)==>	GE 1.5xle 1.5 MW V_{10} of 10m/s or greater		116	114	112	110	108	106	103	98	92	86	86	120	115	104
	ISO9613-2 Accuracy Tolerance (U.L.)		3	3	3	3	3	3	3	3	3	3	3	3	3	3
	IEC 61400-11 Meas. Tolerance		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Single Turbine Lw + Tolerances==>	GE 1.5xle 1.5 MW V10 of 10m/s or greater	121.0	119.0	117.0	114.6	113.3	111.4	107.6	102.7	97.2	90.6	90.9	125.2	120.2	109.1
Air Absorption Coefficient (Alpha) db/m @ 10C 70%RH																
	MOE Absorption Coefficients					0.0001	0.0004	0.0010	0.0019	0.0037	0.0097	0.0328	0.1170	---	---	---

Turbine No:	Distance to tower base (ft)	Distance to tower base (m)	Distance to hub (m)	8	16	32	63	125	250	500	1000	2000	4000	8000	dB(Z) L_{eq}	dB(C) L_{eq}	dB(A) Leq	Distance to tower hub (m.)
G15	7755	2364	2368	43	41	39	36	34	31	25	15	-4	-66	-265	46	41	26	2368
G16	7400	2256	2260	43	41	39	36	34	31	25	16	-3	-62	-252	47	41	27	2260
G17	7028	2142	2147	43	41	39	37	35	32	26	17	-1	-57	-238	47	42	27	2147
R11	7320	2231	2236	43	41	39	36	34	31	25	16	-2	-61	-249	47	41	27	2236
R12	7650	2332	2336	43	41	39	36	34	31	25	16	-4	-64	-261	47	41	26	2336
G18	7419	2261	2266	43	41	39	36	34	31	25	16	-3	-62	-252	47	41	27	2266
G19	8125	2477	2480	42	40	38	35	33	30	24	15	-6	-70	-278	46	41	25	2480
Cummulative Effect of Listed Turbines as Long Term Average L_{eq} SPL's															dB(Z) L_{eq}	dB(C) L_{eq}	dB(A) Leq	% Highly Annoyed
Turbines Only (w/o AM or Turb.):				51	49	47	45	43	39	34	25	8	5	5	55	50	34.9	5% +/- 3%

Predicted dBA, dBC, and dBZ as Average (Leq) Sound Pressure Levels (Residence #1) (Swedish Model)

			1/1 Octave Band Center Frequency (Hz) with Un-weighted Sound Pressure Levels (dB(Z) L_{eq})										From 1/1 Octave Band SPL's		
	Octave Band Center Frequency (Hz)		8	16	32	63	125	250	500	1000	2000	4000	8000	dB(Z) Leq	dB(C) Leq	dB(A) Leq
Sound Power (Lw)==>	GE 1.5xle 1.5 MW V_{10} of 10m/s or greater		116	114	112	110	108	106	103	98	92	86	86	120	115	104
	ISO9613-2 Accuracy Tolerance (U.L.)		3	3	3	3	3	3	3	3	3	3	3	3	3	3
	IEC 61400-11 Meas. Tolerance		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Single Turbine Lw + Tolerances==>	GE 1.5xle 1.5 MW V10 of 10m/s or greater	121.0	119.0	117.0	114.6	113.3	111.4	107.6	102.7	97.2	90.6	90.9	125.2	120.2	109.1
Air Absorption Coefficient (Alpha) db/m @ 10C 70%RH																
	MOE Absorption Coefficients					0.0001	0.0004	0.0010	0.0019	0.0037	0.0097	0.0328	0.1170	---	---	---

Turbine No:	Distance to tower base (ft)	Distance to tower base (m)	Distance to hub (m)	8	16	32	63	125	250	500	1000	2000	4000	8000	dB(Z) L_{eq}	dB(C) L_{eq}	dB(A) Leq	Distance to tower hub (m.)
G19	4023	1226	1234	48	46	44	42	40	37	32	25	12	-23	-126	52	47	33	1234
G18	3517	1072	1081	49	47	45	43	41	39	34	27	15	-17	-107	53	48	35	1081
R12	2412	735	748	53	51	49	46	45	42	38	31	21	-2	-65	57	51	39	748
R11	2613	796	809	52	50	48	45	44	41	37	31	20	-5	-73	56	51	38	809
G17	3005	916	927	51	49	47	44	43	40	36	29	18	-10	-88	55	50	37	927
G16	3395	1035	1044	50	48	46	43	42	39	34	27	16	-15	-103	54	48	35	1044
G15	4004	1220	1228	48	46	44	42	40	37	32	25	12	-22	-126	52	47	34	1228
G14	4788	1459	1466	47	45	43	40	38	36	30	23	9	-32	-155	51	45	32	1466
Cummulative Effect of Listed Turbines as Long Term Average L_{eq} SPL's															dB(Z) L_{eq}	dB(C) L_{eq}	dB(A) Leq	%Highly Annoyed
Turbines Only (w/o AM or Turb.):				59	57	55	53	51	48	44	37	26	5	3	63	58	44.9	20%+/- 10%

Predicted dBA, dBC, and dBZ as Average (Leq) Sound Pressure Levels (Residence #1) (ISO Model)

				1/1 Octave Band Center Frequency (Hz) with Un-weighted Sound Pressure Levels (dB(Z) L_{eq})										From 1/1 Octave Band SPL's		
	Receiver Elevation to Tower Hub (m.)		140													
	Octave Band Center Frequency (Hz)			8	16	32	63	125	250	500	1000	2000	4000	8000	dB(Z) Leq	dB(C) Leq	dB(A) Leq
Sound Power (Lw)==>	GE 1.5xle 1.5 MW V_{10} of 10m/s or greater			116	114	112	110	108	106	103	98	92	86	86	120	115	104
	ISO 9613-2 Model Tolerance			3	3	3	3	3	3	3	3	3	3	3	3	3	3
	IEC 61400-11 Meas. Tolerance			2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Additional Lw from conditions not part of IEC test conditions																
	Single Turbine Lw + GE 1.5xle 1.5 MW			121	119	117	115	113	111	108	103	97	91	91	125	120	109
Air Absorption Coefficient (Alpha) db/m @ 20C 50%RH																	
	Transition point for Spherical to Cylindrical: 780					0.0001	0.0002	0.0005	0.0013	0.0027	0.0047	0.0099	0.0290	0.0300	---	---	---
Turbine No:	Distance to tower base (ft)	Distance to tower base (m)	Distance to hub (m)	8	16	32	63	125	250	500	1000	2000	4000	8000	dB(Z) L_{eq}	dB(C) L_{eq}	dB(A) Leq	Distance to tower hub (m.)
G19	4023	1226	1234	53	51	49	47	45	44	40	35	29	23	23	57	52	41	1234
G18	3517	1072	1081	54	52	50	47	46	44	40	35	30	23	24	58	53	42	1081
R12	2412	735	748	55	53	51	49	48	46	42	37	32	25	25	59	55	43	748
R11	2613	796	809	55	53	51	49	47	45	42	37	31	25	25	59	54	43	809
G17	3005	916	927	54	52	50	48	47	45	41	36	31	24	24	59	54	42	927
G16	3395	1035	1044	54	52	50	47	46	44	40	36	30	23	24	58	53	42	1044
G15	4004	1220	1228	53	51	49	47	45	44	40	35	29	23	23	57	52	41	1228
G14	4788	1459	1466	52	50	48	46	45	43	39	34	29	22	22	57	52	40	1466
Cummulative Effect of Listed Turbines as Long Term Average L_{eq} SPL's															dB(Z) L_{eq}	dB(C) L_{eq}	dB(A) Leq	% Highly Annoyed
Turbines Only (w/o AM or Turb.):				63	61	59	57	55	53	50	45	39	33	33	67	62	51	>20% +/- 20%

Version: 2.0 Dec. 6, 2010

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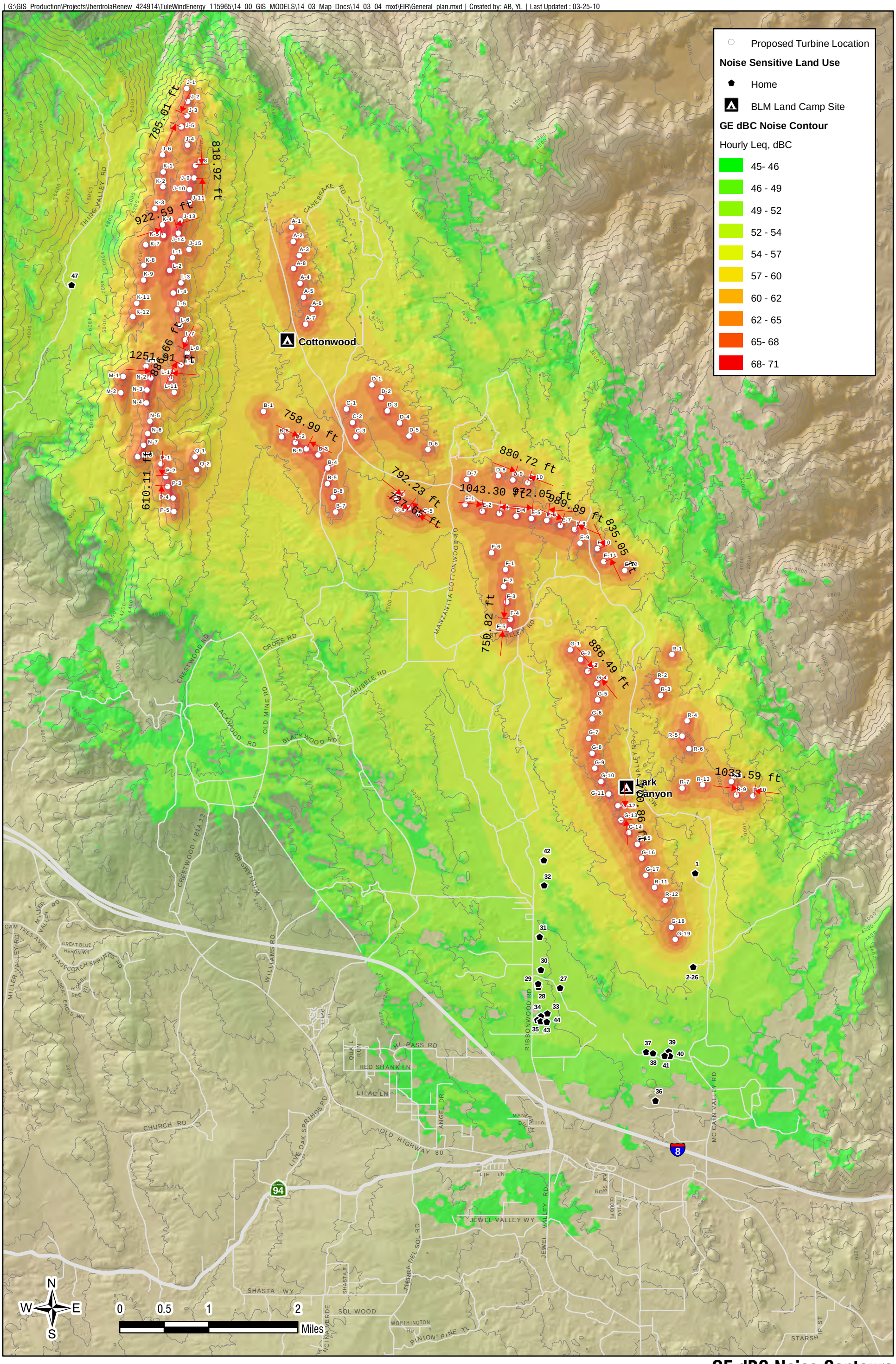

GE dBC Noise Contours

FIGURE 9

Iberdrola Renewables | Tule Wind Project | Applicant's Environmental Document

HDR
ONE COMPANY | *Many Solutions*℠

Third International Meeting
on
Wind Turbine Noise
Aalborg Denmark 17 – 19 June 2009

A New Explanation for Wind Turbine Whoosh – Wind Shear

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Abstract

The cyclic "Whoosh" created by wind turbines are their most recognizable audible feature, often reported as their most annoying aspect. Many references describe that the whoosh is generated due to the interaction between the turbulent air following the trailing edge of the blades, and the downwind tower.

However, this explanation leaves unanswered questions. Why is the whoosh so different from day to night? Neither the tower nor the blades change. A simple empirical test explains part of the mystery. Hold your finger in front of your pursed lips. As you blow on your finger at greater and lesser velocity, you hear that same familiar cyclic whoosh as you do from a wind turbine.

We know that at night the atmospheric profile changes, due to the condition of wind shear, as wind speed at height become uncoupled from lower elevations. We know also from audio / photographic studies that the sound from wind turbine blades is most concentrated at the blade tips.

When the bits we know are melded, a new model develops that explains how the cyclic whoosh of wind turbines can be described by the movement of the blades through high wind speeds at the top to low speeds at the bottom of the blade rotation. The sound increases as the blades go to the top of the circle and decreases as the blades go to the bottom of the cycle.

This knowledge might be used to reduce the annoying cyclic whoosh of wind turbines by a cyclical pitch of the blades as they reach the top of their rotation. This would also decrease stresses on the blades caused by flexure, and might even reduce blade failure probability.

Introduction

People who have followed the debate over wind turbines would readily agree that they would be rich if they had a dollar (or euro) for every article written or every hearing statement by someone saying something like "I went out to the turbine site, stood under the turbine, and could carry on a normal conversation. I don't know what all the fuss is about; there was only a gentle "swish" sound. They aren't noisy!"

However, the wealth accumulated would be quickly erased if the interested data gatherer had to give a dollar (or euro) to every distraught resident from homes surrounding wind turbines, who said, “I just cannot get used to the constant pounding “Whoosh Whoosh Whoosh” that I hear at night from those turbines. Even with my head under the pillow, it is an unwelcome intruder into our home!”

Given the assumption that regardless of their personal opinion one way or another about wind turbines, most people strive to tell the truth, how does the unbiased observer make sense of it all? The speakers cannot all be right, can they? The points of view are exactly divergent. It is too easy to fall into the trap so often set, to accuse the “other side” of not telling the truth, or of just using excuses to explain personal preferences. This paper attempts to provide an explanation to the quandary that is probably one of the greatest mysteries about wind turbines – why they are not noisy to the person who stands under them in the daytime, and yet are unwelcome noisy intruders at night for the resident who lives near them.

It turns out that the explanation may not be so difficult to understand at all, and it may arise from a well-understood climatic condition that is familiar, but which is not well recognized in the acoustical codes prepared for wind turbines.

Common Explanations for Whoosh

A number of references describe the “Whoosh” heard from wind turbines as being due to the interaction between the turbulent air following the trailing edge of the wind turbine blade as it passes the region of slowed wind speed in front of the tower. Other explanations for the Whoosh have been written to describe it as being due to the acoustical Doppler effect, which arises as the wind turbine blades rotate on their downward path approaching an observer on the ground. A paper[i] by Stefan Oerlemans and Gerhard Schepers presented at the Second Wind Turbine Noise Conference in Lyons in 2007 describes the use of an elliptical array of microphones mounted on a board16 metres by 18 metres placed on the ground “roughly one rotor diameter upwind of turbines to measure sound from the blades to measure the distribution of noise sources in the rotor plane and on individual blades” to show that for an observer on the ground, “most of the noise is produced by the outer part of the blades (but not the very tip) during the downward motion.” Their paper shows some pictures of the test set up and typical noise source distributions in the rotor plane.

None of the common explanations proposed to date have suggested a reason for the Whoosh to vary from day to night. As none could explain the anecdotal observations made by residents living near wind turbines, of noise being more pronounced at night, it was necessary to search further.

A New Player Enters the Field – Atmospheric Stability

During the 2007 Ontario Municipal Board hearings related to the appeal by citizens against the Municipality of Kincardine, Ontario zoning bylaws passed to permit erection of wind turbines on 105 lots by the Enbridge Ontario Wind Power development, Meteorological Consultant James W. S. Young Ph.D. P. Eng, presented a paper titled “Analysis of Boundary Layer Winds near Goderich and Their

Application to Wind Farms along the Easy Coast of Lake Huron."[ii] Figure 1 (adapted from Young) shows the first 1000 metres atmosphere above the surface of the earth.

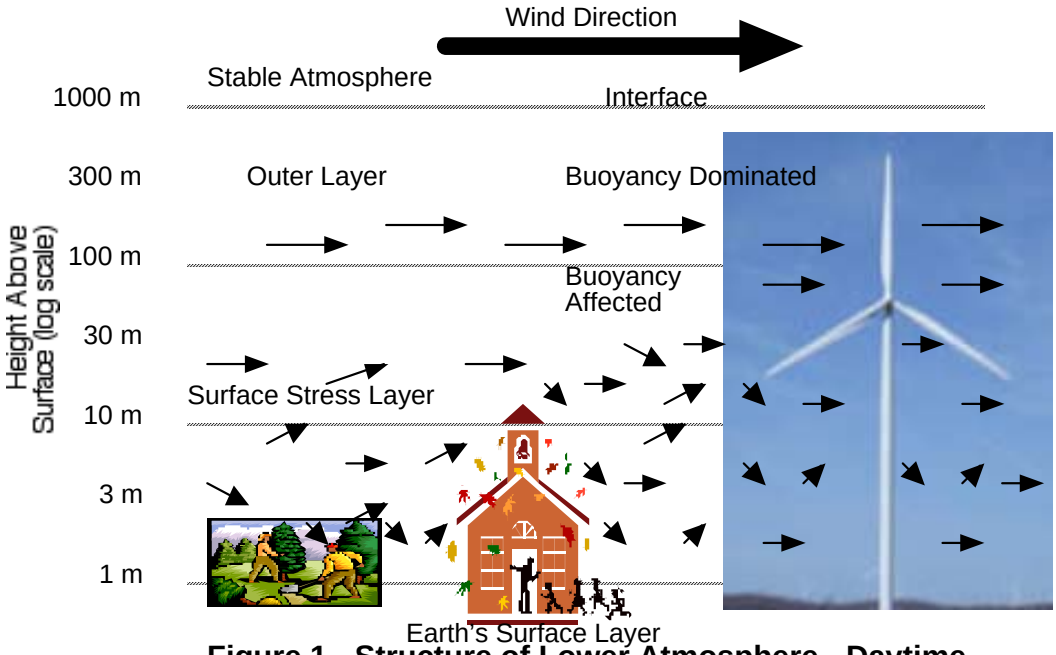


Figure 1 - Structure of Lower Atmosphere - Daytime

Young notes that above about 1000 metres we are in a stable layer of unchanging wind speeds with height, while below that level wind flow is dominated by either buoyancy or surface stress. He states, "The surface stress (or friction) dominates up to about 30 metres. Modern wind turbines typically operate above the surface stress layer in the buoyancy dominated region. In this region the wind flows tend to be less affected by turbulence (instabilities in the atmosphere)."

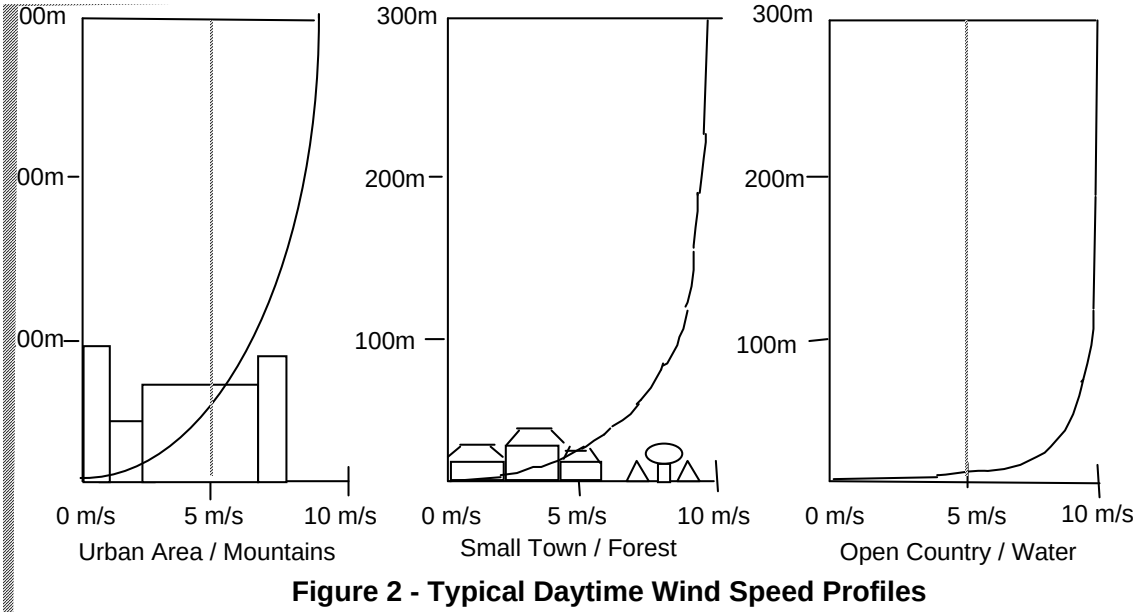


Figure 2 - Typical Daytime Wind Speed Profiles

Figure 2 (also adapted from Young's paper) describes the typical patterns that are exhibited by the wind velocity with height as the surface roughness varies over urban (or mountainous) areas, suburbs (or forest) and level country (or water). The figure shows higher wind speeds at lower elevations over flat smooth terrain or water which favours placement of wind turbines in such areas.

The wind velocity with height is normally explained by the power equation:

$$V_h / V_r = (h_h / h_r)^{\alpha}$$

where:

V_h = wind velocity at height h

V_r = wind velocity at reference height (normally 10 metres)

h_h = height in question

h_r = reference height (normally 10 metres)

α = the wind shear coefficient

Young goes on to note that another factor needs to be considered, the stability of the atmosphere. This can be stable, neutral, or unstable. Figure 3 below, also adapted from Young's report, shows the conditions of a neutral atmosphere near the ground, with a stable atmosphere above, or a stable atmosphere near the ground with a neutral condition above.

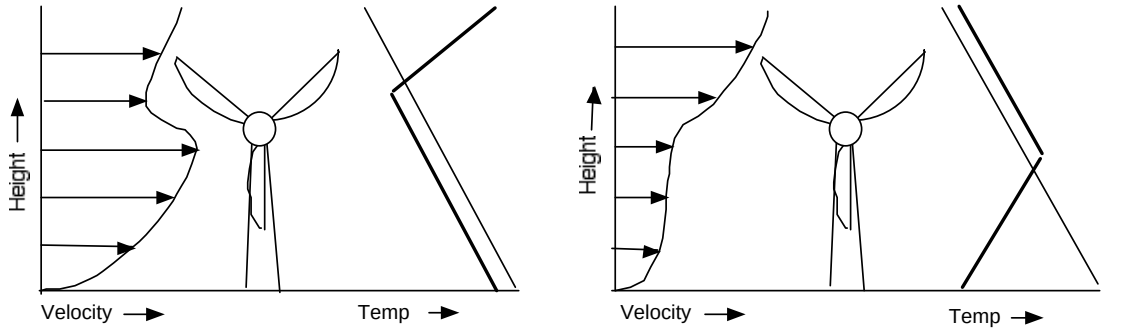


Figure 3 - Stability of Atmosphere Can Influence Profile

The sketches in Figure 3 show that neither the wind velocity nor the temperature necessarily follow the power equation of a steadily increasing velocity with height, or the temperature relationship of a decreasing temperature with height. The figure shows a typical wind turbine with a hub height of about 80 metres, at the transition point between the stable and neutral atmosphere condition as might occur.

The temperature reference line shows that in a neutral atmosphere, the temperature can be expected to fall about 1°C per 100 metres, but in the stable atmosphere, the temperature can rise with height. (This is alternately described as a temperature inversion).

The condition of thermal stability above ground elevation can be referenced in other fields of science. The Encyclopaedia of Soil Science shows in an article on Erosion by Wind[iii] that "atmospheric conditions with neutral buoyancy are found with cloudy skies (which reduce radiative heating) and strong winds (which promote atmospheric mixing and prevent temperature stratification.) " It goes on to describe that "On clear and sunny days (especially in arid or semi-arid areas) strong radiative heating may result in thermal instability (with a steep temperature gradient) which increases buoyancy effects and vertically stretches turbulent eddies … Conversely, atmospheric stability (often occurring at night with radiative cooling of the surface) tends to squeeze turbulent eddies vertically resulting in a strong wind gradient with little vertical mixing."

Similarly, the doctoral dissertation "The Sounds of High Winds" by G.P van den Berg[iv] discusses the subject of atmospheric stability and notes, "Atmospheric stability has a profound effect on the vertical wind profile and on atmospherical turbulence strength." Van den Berg discusses both the power law function and the logarithmic wind profile. He notes that the power law has no real physical basis, and that it may not apply under all conditions. Similarly van den Berg notes that the logarithmic wind profile "is an approximation of the wind profile in the turbulent boundary layer of a neutral atmosphere."

Values of the wind shear coefficient $\propto$ are related to stability classes as defined by the Pasquill classes by van den Berg or the Classification Company Det Norkse Veritas (DNV) as shown in the following table.

Pasquill Class	Name	DNV Class	Shear Coefficient $\propto$
A	Very unstable		0.09
		Unstable	0.16
B	Moderately unstable		0.20
C	Neutral	Neutral	0.22
D	Slightly stable		0.28
		Stable	0.35
E	Moderately stable		0.37
F	(Very) stable		0.41

A slightly different Pasquill Classification was defined in the paper by F. Pasquill "The estimation of the dispersion of windborne material"[v] in 1961.

Table 1: The Pasquill stability classes

Stability class	Definition	Stability class	Definition
A	very unstable	D	neutral
B	unstable	E	slightly stable
C	slightly unstable	F	stable

Table 2: Meteorological conditions that define the Pasquill stability classes

Surface wind speed		Daytime incoming solar radiation			Nighttime cloud cover	
m/s	mi/h	Strong	Moderate	Slight	> 50%	< 50%
< 2	< 5	A	A – B	B	E	F
2 – 3	5 – 7	A – B	B	C	E	F
3 – 5	7 – 11	B	B – C	C	D	E
5 – 6	11 – 13	C	C – D	D	D	D
> 6	> 13	C	D	D	D	D

Note: Class D applies to heavily overcast skies, at any wind speed day or night

The issue of atmospheric stability is an important one for predicting the impacts of releases from chemical facilities, fires, and nuclear facilities. The "Safety Report" of Bruce Nuclear Generating Station A[vi], for example, shows the prevalence of stability class E and F. The 1994 issue of the Safety Report, shows stability classes E and F occurring with the following frequency (based on 4 to 9 years of data for each):

London Ontario	28.4% of the time
Mount Forest Ontario	27.3% of the time
Muskoka Ontario	27.9% of the time
Sudbury Ontario	22.1% of the time
Flint, Michigan	28.5% of the time
Wiarton, Ontario	24.5% of the time

In the 2003 reissue of the "Safety Report"[vii] atmospheric stability was calculated using the Sigma Theta (σ_θ) method, as dictated by the US NRC and US EPA. Using this method the frequency of occurrence of Atmospheric Stability Classes E and F for Wiarton Ontario in the preceding 4 year period was E = 9.3% and F = 9.1%.

Since by definition Pasquill Class E and F can only exist at night (which is less than half of a day in Ontario), the fact that these conditions exist between 18.4 to 28.4% of the time in total in Ontario, suggest that they apply for over half of all nights.

Modelling Atmospheric Stability

It is clear that neither the normal power equation (described above), nor the common logarithmic relationship for wind speed as a function of vertical elevation from International Standard IEC 61400-11 shown below provide any transition to describe the change in atmospheric conditions that occur when atmospheric stability occurs.

$$V_s = V_z \left[\frac{\ln \{Z_{ref}/Z_{oref}\} \ln \{H/Z_o\}}{\ln \{H/Z_{oref}\} \ln \{z/z_o\}} \right]$$

where:

Z_{oref} is the reference roughness length of 0.05 m

Z_o is the roughness length

H is the rotor centre height

Z_{ref} is the reference height, 10 m

Z is the anemometer height

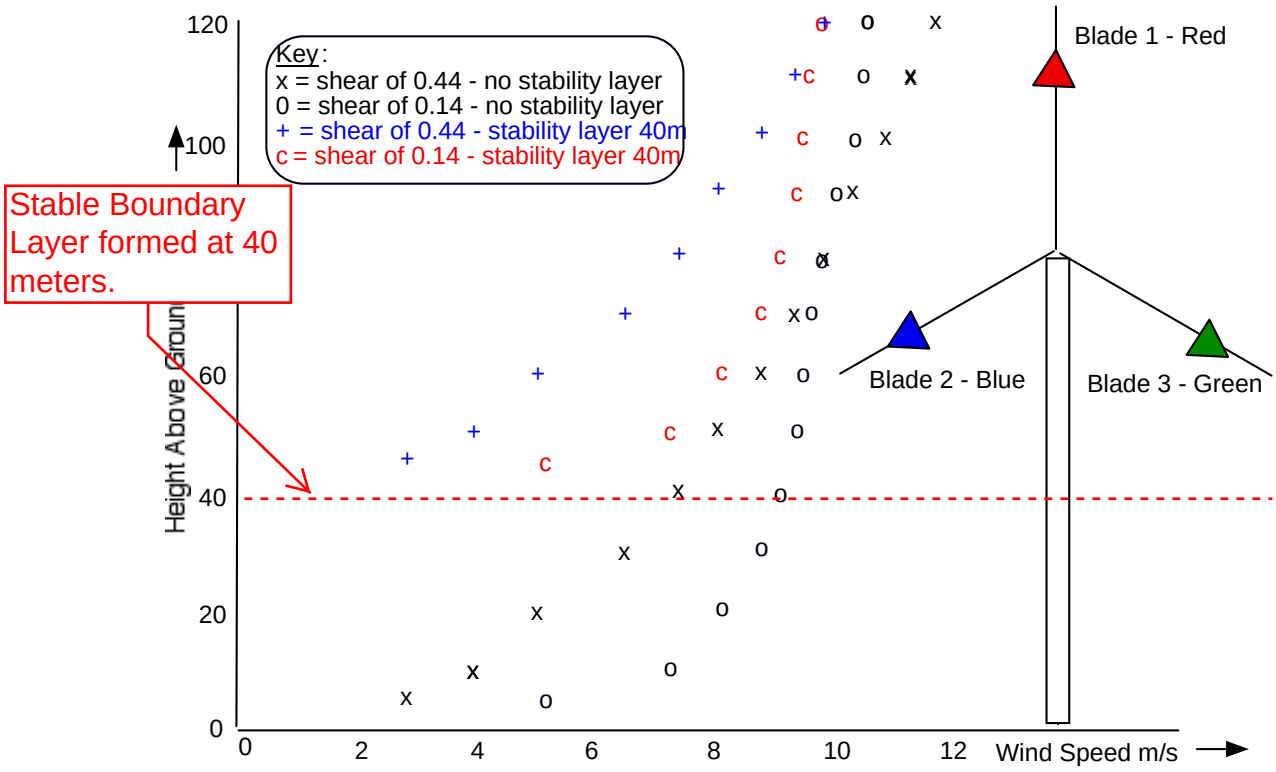


Figure 4 - Effect of Shear and Stability on Incident Wind Speed

Figure 4, on the previous page shows the effect of varying wind shear and on the stability level on the wind speed in metres per second at increasing heights above ground. For the case of no stable layer in the lower atmosphere, the case has been shown where for shears of 0.14 (nominally a neutral atmosphere) and for 0.44 (a stable atmosphere), plotting both cases for the same wind speed of 10 metres per second at the 80 metre hub height of a wind turbine. The curve labelled with the "o"s show that for the case of the wind shear of 0.14 (neutral atmosphere) this corresponds to a wind speed of about 7.5 metres per second at 10 metres above the ground, while for the wind shear of 0.44 (stable atmosphere) the curve labelled with the "x"s shows a wind speed of 10 metres second at 80 metres corresponds to a wind speed of 4 metres per second at 10 metres above the ground. The two shifted curves noted by the "+" and "c" symbols show the case of atmospheric stability that can occur on the majority of nights as shown above for the case of Southern Ontario.

In this case, the wind speed may be low up to the level of the top of the stable layer. This is a familiar phenomenon seen in the smoke that rises vertically from a campfire on the ground or a low chimney at night before sharply changing direction when it reaches the top of the stable layer. The power law is applied as before to calculate the wind speeds above the top of the stable layer once the atmosphere again becomes either neutral or unstable.

Sketched beside the curves of wind speed, as a function of height is a normal wind turbine, with a hub height of 80 metres and a blade diameter of 82 metres. Observation of this figure shows that during the neutral atmosphere with a shear of 0.14 and no stable layer (typical of daytime hours) the wind speed is roughly the same from the top to the bottom of the turbine rotor (varying less than 10% from the top to the bottom of the blade circle.) However, during the condition of a stable atmosphere that can exist on the majority of nights, the variation of incident wind speed across the turbine rotor varies significantly more, ranging from 33% to over 100%. Not only does this variation of wind speed cause high mechanical stresses across the rotor at night as reported by the United States National Renewable Energy Laboratory[viii] it can be shown that it has an impact on the "Whoosh" noise.

Showing the Effect of Stability on Noise

In "The Sounds of High Winds" van den Berg shows the strong influence between angle of attack (the angle between the incoming air flow and the blade chord)[ix] and wind turbine noise in a stable atmosphere. In Figure III.2 of his paper (adapted as Figure 5 below), the local wind velocity divided by the air velocity due to rotation is seen to be the tangent of the flow angle φ.

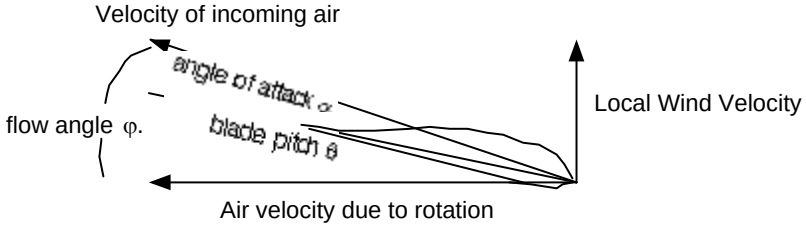


Figure 5 - Air Flow Over Turbine Blade

To display the result of atmospheric stability on the noise produced, an Excel spreadsheet was created to calculate the wind speed incident on the turbine blades as they rotate, in both daytime neutral cases and at night when a stable level is created in the atmosphere typical of the case shown in Figure 4. For simplicity, the turbine blades were designated as the Red, Blue and Green blade, and the elevation was calculated for the point 75% of the distance from the hub on the turbine blade (recognizing the work by Oerlemans / Schepers) for one full rotation of the turbine rotor at each 30-degree increment of the rotation. The rotation direction is clockwise with the Blue blade following the Red blade. See Photos 1 and 2 at the end of the text. The example of a turbine with an 82-metre rotor diameter was used, typical of wind turbines being installed today in Ontario – the Vestas V82, or the Enercon E82.

The wind speed at the location of each of the three turbine blades was then calculated, for the cases of a wind shear of 0.14, 0.26, and 0.44, and for a stable layer at 0 metres, 20 metres and 40 metres, to give 9 cases. The wind speed was calculated using an assumption that the wind speed is constant (and low) up to the top of the stable atmosphere layer, then to increase as given by the power law. The increase is described by the wind shear α after that point. Calculations were made for wind shears from 0.14 to 0.44 (typical of shears shown to exist in the paper[x] presented at 2007 at the Wind Turbine Noise Conference). Actually, the work by Young, presented at the Ontario Municipal Board in 2007 showed that in a number of cases, the wind shear α was greater than 1.0.

Once the local wind speed was calculated incident upon each blade, then the velocity of incoming air was calculated as the resultant vector from combining the local wind velocity and the air velocity due to rotation of the blade. This assumed the rotational speed of 14.4 revolutions per minute at the point 75% from the hub on each 41 metre blade as about 45 metres per second.

Then the "flow angle" of the airflow over the turbine blade was calculated from the tangent relationship described above (the local wind velocity divided by the air velocity due to rotation is seen to be the tangent of the flow angle φ).

In Table B1 of appendix B of his paper "the Sounds of High Winds" van den Berg describes the increase of trailing edge sound with angle of attack α as follows.

A	1°	2°	3°	4°	5°	6°	7°	8°	9°
$\Delta SPL_{TE}(\alpha)$ (dB)	0.4	1.4	2.9	4.6	6.4	8.0	9.4	10.6	11.5

Since van den Berg identifies a linear relationship between the added sound pressure level ΔSPL and the angle of attack, the spreadsheet data was then used to add the angle of attack for each of the three turbine blades for the nine cases of varying wind shear and top of the stable layer. While this would not produce an actual sound power level, the intent was to show the change in the summed flow angles as the blades rotate. Since for modern turbines, the blade pitch does not vary other than for changing power levels, changes in the angle of attack can be derived from changes in the total flow angle as the air passes over the turbine blade.

The results of the curves are discussed in the observations, below. The spreadsheet data is available from the author.

Observations

Chart 1 plots the summed flow angle from all three turbine blades at each rotary position for the nine cases examined. For the assumption of the same 10 metre per second air flow at the 80 metre hub level of the turbine, the greatest summed flow angle exists for the case of the lowest wind shear, as expected since for this case the wind velocity is most constant across the entire turbine rotor. This condition results in the least variation in the summed flow angle as the rotor goes through its circular circuit, and thus a “swish” of little variation. Chart 1 shows that as a stable level in the atmosphere is created, the variation in the summed angle of flow becomes more apparent, and the “Whoosh” would become more apparent. Again, the Chart shows that the greatest summed flow angles are calculated for the smallest wind shear. This is largely a result of the method of calculation, which assumes the same 10 metres per second at the 80 metre level for the case with no stable level.

Chart 2 makes it clear that the most significant changes in the normalized sum of the Angle of Flow exists for the case with the largest wind shear and the top of the stable level at 40 metres. The high shear, coupled with a stable atmosphere produces much more variable effect in the flow angle. Since this is the predominant cause of the turbulent flow condition, and hence the noise, it produces a cyclic nature of the sound. Chart 2 shows that the highest normalized sum for the Angle of Flow occurs when the blades pass the top of their path, and is lowest when the blades pass the bottom of the path. This is contrary to the finding of Oerlmans and Schepers, who determined that “most of the noise is produced by the outer part of the blades during the downward motion” as noted earlier. Figure 6 suggests an explanation of the discrepancy.

ObserverDistance	Rotation when Sound Arrives
82 m	0.4 sec = 0.1 revolution
200 m	0.7 sec = 0.2 rev
400 m	1.2 sec = 0.3 rev
600 m	1.8 sec = 0.4 rev

Figure 6 - Apparent rotation at distance

Field observations taken to confirm the conclusions of this report at a distance of about 400 metres from the turbine pictured did appear to indicate that the “Whoosh” was most pronounced as each blade passed the 4 o’clock position (or 120 to 150 degrees). However, when one considers that at

15°C sound travels at 340 metres per second, one recognizes that at a distance of 400 m the sound takes 1.2 seconds to reach the observer, and in that time, the turbine blade rotates 0.3 revolution. What certainly sounded to this observer to be a sound loudest during the downward motion with the “Whoosh” occurring about the 4 o’clock position, means that the sound was actually generated 0.3 of a revolution earlier, as the blade was just passing the top of its path. This confirms the calculation performed in this report, and supports the observation that the greatest sum of the flow angle, and thus the summed angle of attack occurs when the blades pass the top of the rotation.

One sees that an explanation of the night time “Whoosh Whoosh Whoosh” compared to the daytime gentle “swish swish swish” becomes clear. When the normalized daytime case, for the neutral or turbulent atmosphere is examined, the fluctuation in flow angle, and hence sound levels is barely evident, while the nighttime case with a stable level in the atmosphere case shows a very pronounced cyclic nature.

Conclusions

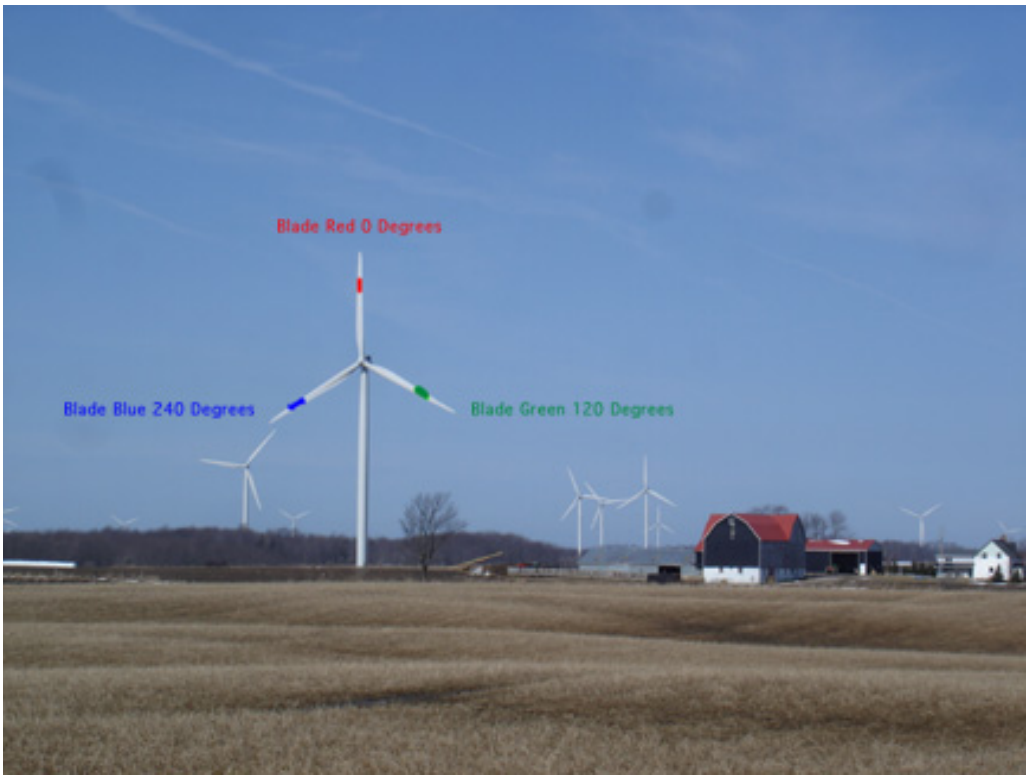
The anecdotal evidence that wind turbines are more annoying at night, and that the “Whoosh” is more pronounced at night cannot be fully explained by the normal power law, the logarithmic change in velocity with height, by Doppler effects, or by the creation of sound towards the outer limits of the turbine blade on downward motion.

The explanation of the cyclic nature of the “Whoosh Whoosh Whoosh” can be found in the cyclical change of the sound level that occurs, particularly at night, as a stable atmosphere is created. The stable atmosphere creates the greatest change in the summed angle of attack considering the contribution of each blade taken together, as is heard by an observer. This paper has shown that this condition of a stable atmosphere occurs on the majority of nights in Ontario (and likely occurs elsewhere with a similar frequency, as climatic conditions do not observe political boundaries).

The model results displayed in this paper show that when a stable atmosphere exists at night time, the cyclic nature of the sound from wind turbines is more pronounced than it is in the daytime when a stable level in the atmosphere does not exist. Human hearing is capable of resolving a wide variation of sounds, and is particularly sensitive to changes in sound level. Previous work by van den Berg, Pedersen, Bouma, and Bakker, “WINDFARMperception”[xi] published in 2008 showed that “in general respondents perceived wind turbines as being louder in wind blowing from the turbine to their dwelling (and less loud the other way around), in stronger wind ***and at night***.” The report also stated, “In this survey sound was the most annoying aspect of wind turbines. From this and previous studies it appears that sound from wind turbines is relatively annoying: at the same sound level it causes more annoyance than sound from air or road traffic. ***A swishing characteristic is observed by three out of four respondents that can hear the sound*** and could have been one of the factors explaining the annoyance.”

The existence of this condition as shown in this report reinforces the need to apply a penalty to the average sound received from wind turbines at night because the cyclic “Whoosh” produced during stable atmospheres makes them particularly noticeable and annoying, compared to other noise sources.

Photographs



Charts

Chart 1 – Summed Angle of Flow as Turbine Rotates

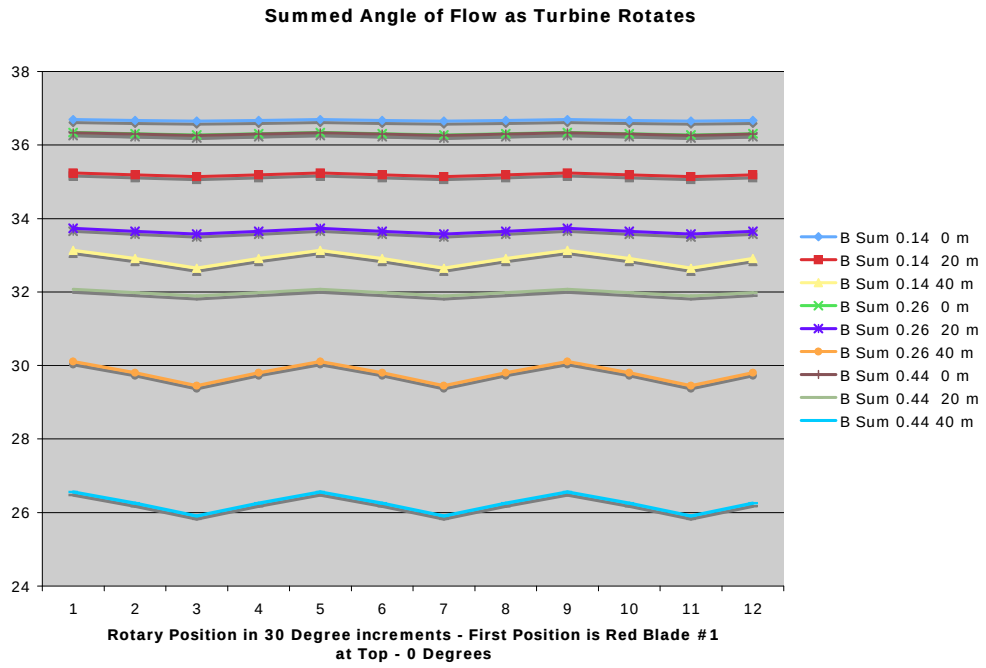
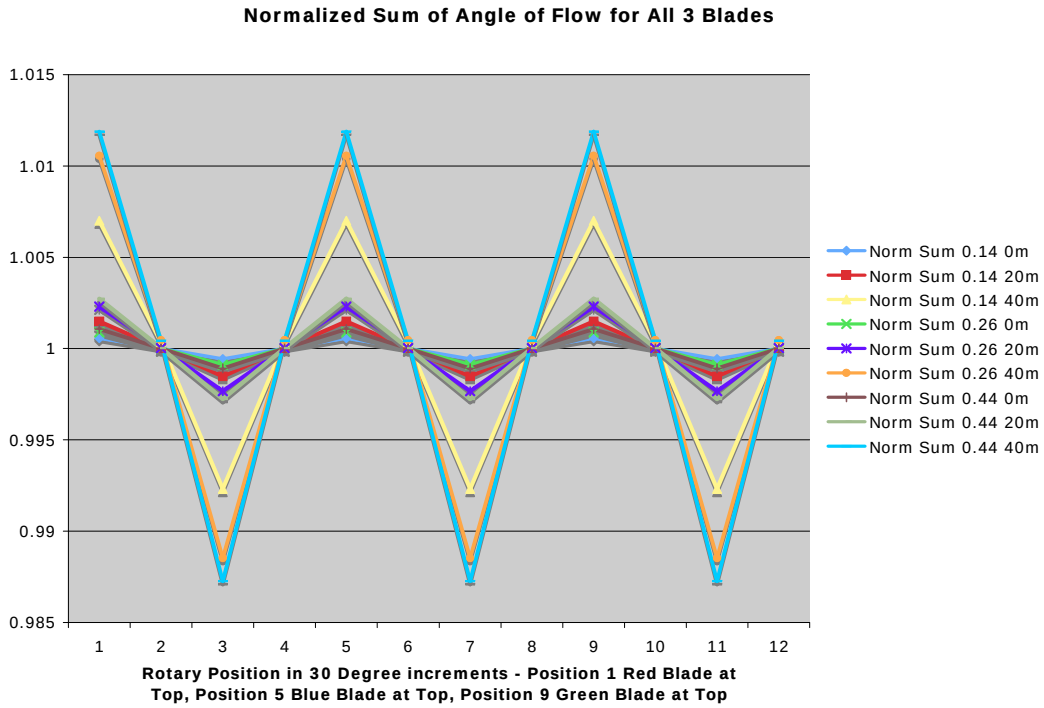


Chart 2 – Normalized Sum of Angle of Flow for All 3 Blades



Acknowledgements

I would like to acknowledge the review of a first draft of this paper by the following experts (arranged alphabetically). I do not wish to imply that the reviewers necessarily concur with all content of the paper, but their thoughtful comments helped to clarify the final product for subsequent readers. Thank you sincerely.

- John Harrison, Professor Emeritus, Physics, Queens University, Kingston ON, Canada
- George Kamperman, Acoustical Consultant, Wisconsin Dells, WI, USA
- Nick Kouwen, Professor Emeritus, Civil and Environmental Engineering, University of Waterloo, ON, Canada
- Stefan Oerlemans, National Aerospace Laboratory, NLR, The Netherlands
- Gerard Schepers, ECN Wind Energy, The Netherlands
- G.P. (Frits) van den Berg, University of Groningen, The Netherlands
- Jim Young, Meteorological Consultant, Kincardine ON, Canada

References

[i] Oerlemans, Stefan and Schepers, Gerard, "Prediction of Wind Turbine Noise and Comparison to Experiment" presented at the Second international Meeting on Wind Turbine Noise, Lyon France, September 2007.

[ii] Young, James W.S. Ph.D., P.Eng. "Analysis of Boundary Layer Winds near Goderich and Their Application to Wind Farms along the East Coast of Lake Huron" by as presented at Ontario Municipal Board Hearing PL060986, April 2007.

[iii] Lai, R. "Encyclopaedia of Soil Science" ISBN: 0849350530, Page 618, Erosion by Wind: Micrometeorology.

[iv] van den Berg, G.P. "The Sounds of High Winds, the effect of atmospheric stability on wind turbine sound and microphone noise" submitted as a doctoral dissertation to the University of Groningen, May 12, 2006. Chapter III from pages 27 to 38 discusses the subject of atmospheric stability.

[v] Pasquill, F. (1961). "The estimation of the dispersion of windborne material." The Meteorological Magazine, vol 90, No. 1063, pp 33-49.

[vi] Bruce Generating Station A Safety Report, Chapter 1, Site Evaluation, Section 2, "Factors Affecting a Release" 1994 Edition, subsection 2.2.1.6 "Atmospheric Stability"

[vii] Bruce Nuclear Generating Station A Safety Report, NK21-SR-01320-00001, Rev 002, July 4, 2003, predicts stability class using the Sigma Theta (σ_θ) method as defined by the US NRC (Nuclear Regulatory Commission) Proposed Revision 1 to Regulatory Guide 1.23: Meteorology Programs in Support of Nuclear Power Plants, 1980, and the US EPA (Environmental Protection Agency) "Guidelines on Air Quality Models" Report No, EPA-450/2-78-027R, Table 9-3, pp 9-21, 1986.

[viii] Kelley N, Smith B, Smith K, Randall G, Malcolm D, "Evaluation of Wind Shear Patterns at Midwest Wind Energy Facilities" National Renewable Energy Laboratory, US Department of Energy, May 2002, Paper NREL/CP-500-32492.

[ix] Van den Berg G.P. . "The Sounds of High Winds, the effect of atmospheric stability on wind turbine sound and microphone noise" submitted as a doctoral dissertation to the University of Groningen, May 12, 2006 (previously also listed as Reference iv) discusses angle of attack and stability on noise in Chapter III, Chapter V, and Appendix B.

[x] Palmer, William K.G. "Uncloaking the Nature of Wind Turbines – Using the Science of Meteorology" presented at the Second International Meeting on Wind Turbine Noise, Lyon, France, September 2007.

[xi] Van den Berg F, Pedersen E, Bouma J, Bakker R, "WINDFARMperception – Visual and acoustic impact of wind turbine farms on residents" University of Groningen, FP6-2005-Science-and-Society-20. Specific Support Action, Project no. 044628, Final Report, June 3, 2008.

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WHY IS WIND TURBINE NOISE POORLY MASKED BY ROAD TRAFFIC NOISE?

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Abstract
The possibility of road traffic noise masking noise from wind turbines was explored among residents living close to wind turbines in the Netherlands (n = 725) with different levels of road traffic noise present. No general masking effect was found, except when levels of wind turbine sound were moderate (35 – 40 dB(A) Lden) and road traffic sound level exceeded that level with at least 20 dB(A). This low masking capacity may be due to the different time patterns of these noise sources, both on a small time scale (car passages/regular blade passing) and a larger time scale (diurnal and weekly patterns). Also, wind turbine sound is relatively easy audible and may be heard upwind more often than road traffic.

Keywords: Wind turbine noise, road traffic noise, masking, audibility, time patterns.

1 Introduction

Suitable sites for wind turbines can be difficult to find due to conflicting requirements. Placing wind farms close to the electric grid and existing roads (both are usually better available in populated areas) is favourable for investment costs, but it may increase the possibility that neighbours may be visually and aurally disturbed. It is therefore not uncommon that wind turbines are planned to be erected at distances from dwellings that are unacceptable by the local residents.

The individual appraisal of wind turbines planned close to one's home is not irrational but based on considerations such as the evaluation of the wind turbines' impact (scenic and otherwise) and feelings of equity and fairness [1]. The apprehension that for example the

noise will be disturbing in an otherwise comparable quiet area has been confirmed by research: wind turbine noise may be louder and is apparently more annoying than was assumed before the growth in wind turbine numbers and power in the '90s [2, 3]. The recommended noise limits (different in different countries), and consequently a minimum distance depending on the number of wind turbines and their sound power levels, should therefore be kept or should even be more rigorous if the original level of noise protection is to be maintained.

To decrease the adverse impact it has been suggested that masking sounds could create a situation where the wind turbines could not be heard and therefore not annoying. Outdoor sounds that are potential maskers are natural sounds like wind induced sounds from trees or sound from sea waves, or manmade noise, of which road traffic appears to be the most common. Models have previously suggested that natural sounds are fairly good potential maskers for wind turbine noise due to, for example, similarities between the broadband noise of vegetation and wind turbine sound [4]. Experimental listening tests have however shown that the detection thresholds for wind turbine noise in the presence of natural sounds from trees or sea waves are in the range -8 to -12 dB S/N-ratio, implying that the ambient sound must have a considerably higher level in order to completely mask the wind turbine noise [5]. Loudness tests, in the same series of experiments, indicated on the other hand that introducing natural sounds, for example the rustling of trees, of the same level as the wind turbine sound, could reduce the perceived sound level of the wind turbine sound with up to 5 dB. This hypothesis is yet to be experienced in the field; it is not obvious that this would lead to decreased risk for noise annoyance.

The masking effect of road traffic on wind turbine noise has to our knowledge not been studied in listening tests. An epidemiological study carried out in the Netherlands 2007 [3] provided an opportunity to compare the perception of wind turbine noise at different levels of ambient noise, in this study mainly from road traffic. The results indicate that also for traffic noise the masking effect is low [6]. The objective of this paper is to discuss why road traffic does not decrease the risk for being annoyed by wind turbine sound.

2 Method

A field study was carried out in the Netherlands among residents in wind farm areas. A stratified sample of 1948 people living within different levels of wind turbine noise were approached with a questionnaire about environmental issues in their residential area; 725 responded satisfactory (37%; a non-response analysis showed no statistically significant differences between responders and non-responders). The questionnaire comprised two parallel parts measuring perception of sound and attitude towards the sound source; one part concerning road traffic sound and the other concerning wind turbine sound. The possibility to hear the sounds from the dwelling or the garden/balcony was measured binary with no/yes. Noise annoyance was measured with several items, referring both to outdoor and indoor situations. Two factor scores derived from five items (WT annoyance, Cronbach's alpha 0.89) and six items (RT annoyance; Cronbach's alpha 0.86), respectively, were used as dependent variables with mean = 0 and standard deviation = 1. Attitude towards the noise source's impact on landscape scenery were measured with a 5-point scale from "very positive" to "very negative". Noise sensitivity was measured on a 5-point scale. Stress was measured with 6 items and factorized (Stress; Cronbach's alpha 0.84).

The immission levels in dB(A) of wind turbine sound outside the dwelling of each respondent were calculated as recommended by the international ISO standard [7]. The levels correspond to a situation with a neutral atmosphere and a wind speed of 8 m/s at 10 m height. The immission levels were transformed into levels of day-evening-night values (Lden) by adding 4.7 dB [8]. Levels of road traffic sound were obtained from the Dutch National Institute for Public Health (RIVM) who supplied calculated Lden immission levels due to traffic in 5 dB intervals for a 25 by 25 m grid over the entire country. The levels approximate road traffic exposure as there was no railroad or airport close to any of the respondents. The respondents were divided into sub-samples due to the levels of road traffic sound exceeding the levels of wind turbine sound. This paper explores to what extent wind turbines were heard or were annoying when the sound levels of road traffic exceeded that of wind turbines with 5-10 dB (n = 79), 10-15 dB (n = 138), 15-20 dB (n = 108) or 20-25 dB (n = 67). Noise annoyance due to wind turbines is influenced by having an economical benefit from the wind turbines or not [3]. Only respondents that did not benefit were included when the impact of road traffic noise on annoyance with wind turbine noise was explored and the sample sizes were therefore somewhat reduced in Figure 2 (below): 5-10 dB (n = 70), 10-15 dB (n = 119), 15-20 dB (n = 102) or 20-25 dB (n = 66). For more detailed description of the research methods see [3] and [6].

3 Perception of wind turbine sound in different levels of road traffic sound

3.1 Possibility to hear wind turbine sound

The proportions of respondents that reported hearing wind turbine sound outside their dwelling increased from 0-23% at the interval 30-35 Lden to 59-69% at 40-45 Lden (Figure 1). Though there are differences between the groups these are not statistically significant, *i.e.* no masking effect was detected.

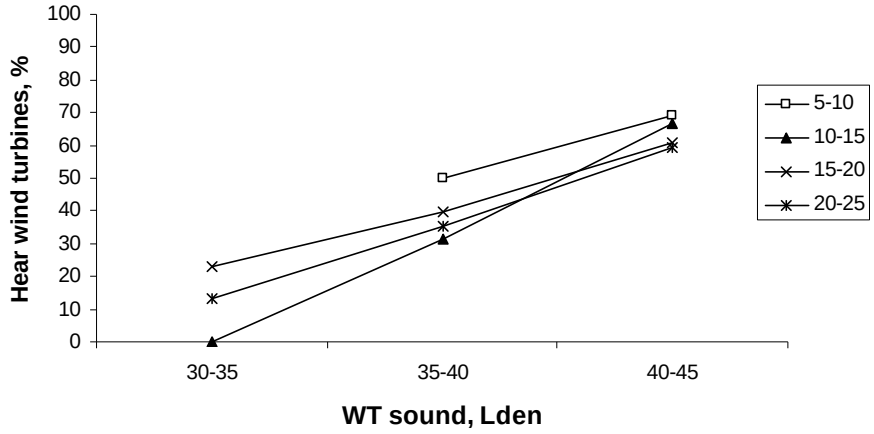

Figure 1. Proportion of respondents that could hear wind turbine sound outdoors at their dwelling or garden/balcony (%) related to levels of wind turbine sound (Lden) for four situations where road traffic sound levels exceeded wind turbine sound levels with 5-10, 10-15, 15-20 or 20-25 dB(A) Lden.

3.2 Annoyance due to wind turbine sound

The mean annoyance score increased from -0.6 - -0.5 at the interval 30-35 Lden to 0.1 – 0.8 at 40-45 Lden (Figure 2). When looking at the four RT-WT level difference groups, a reduction of annoyance was found, but only for respondents in the interval 35 – 40 Lden of wind turbine noise when the road traffic noise exceeded wind turbine noise with 20 – 25 dB. This difference was statistically significant (t = -0.69; p<0.05), other differences were not.

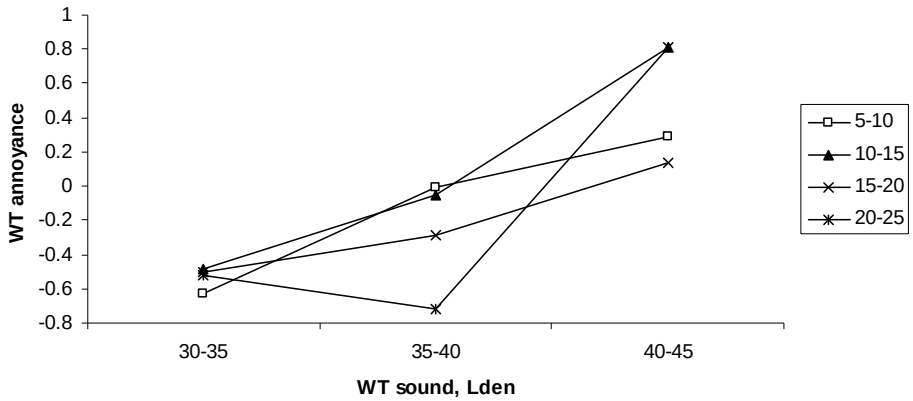

Figure 2. Mean annoyance score for wind turbine noise related to levels of wind turbine sound (Lden) for four situations where road traffic sound levels exceeded wind turbine sound levels with 5-10, 10-15, 15-20 or 20-25 dB(A) Lden.

Annoyance due to wind turbine noise was positively correlated to annoyance with road traffic noise (r = 0.26; p<0.001) suggesting that there was no masking effect but an increased risk for annoyance if both noises were present. This result was explored further in a multivariate general linear model with two dependent variables present simultaneous: annoyance with wind turbine noise and annoyance with road traffic noise (Figure 3).

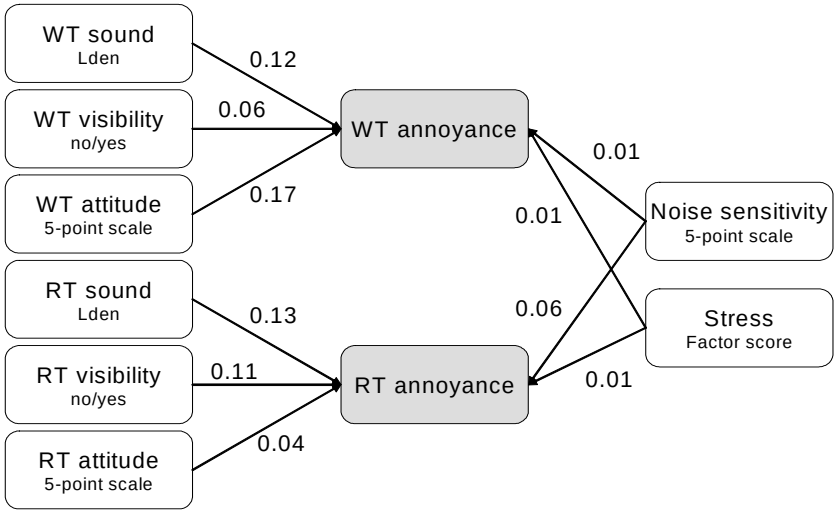

Figure 3. Conceptual figure of variables simultaneous explaining the variance of the two dependent variables annoyance with wind turbine noise (adj. R-square 0.43) and road traffic noise (adj. R-square 0.38), respectively. Result of multivariate general linear model. Adjusted for economical benefits from wind turbines. Partial eta-squared values; only statistically significant associations are shown.

Noise from wind turbines, together with visibility of wind turbines and attitude to their impact on the landscape, only explained the variance in annoyance due to wind turbines, but not the variance in annoyance due to road traffic. Similar, noise levels, visibility and attitude regarding road traffic were only associated to annoyance with road traffic noise. However, noise sensitivity and stress explained part of the variance of both annoyance score, which explains the correlation between them. The test indicates that there was no enhanced risk for annoyance due to double exposure: this risk is simply the sum of both separate risks.

3.3 Conditions influencing loudness of wind turbine sound

One of the questions in the WINDFARMperception study survey was about conditions when the wind farm sound was louder or less loud [10]. Figure 4 shows the results: more respondents thought the sound from the wind farm was louder when the wind blew from the wind farm towards the dwelling or when the wind was stronger. Unfortunately we do not know whether respondents were referring to the near-ground wind they were exposed to or the higher altitude wind that the blades were exposed to (which can be inferred from the rotational speed and the backwards bending of the blades). A minority of respondents (22%) thought the sound was less loud at night: 40% thought the sound was louder at night and another 38% saw no clear difference between night and day in this respect.

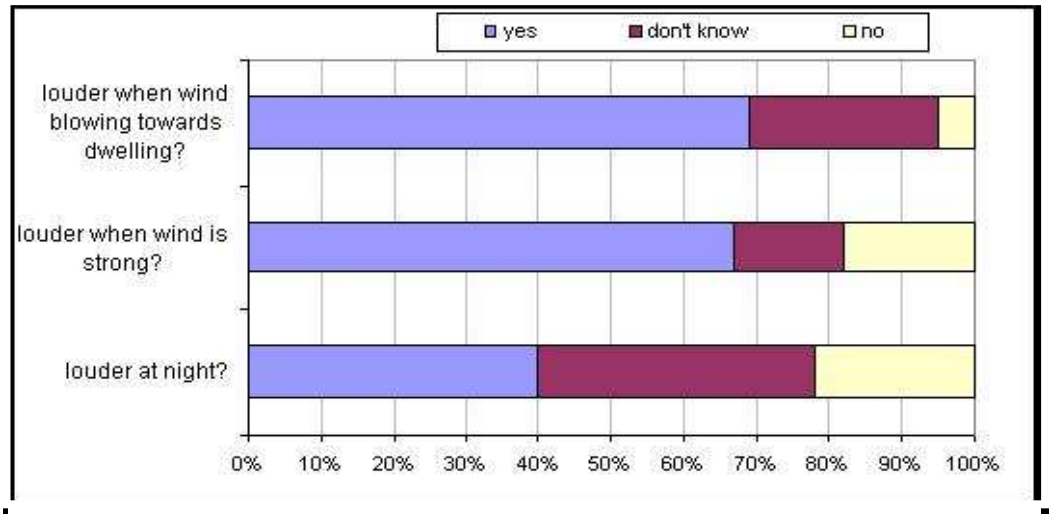

Figure 4. Opinions on conditions when wind farms are perceived as being louder or less loud (based on [10])

4 Possible acoustical explanations for the poor masking effect

In the text above WT and RT sound levels were compared based on their Lden at receiver locations. However, when the Lden values are equal this does not mean that both sounds are acoustically equal, nor that the levels are equal at all times or the sounds have the same perceptive quality–even when they are of the same level. The distributions over time and frequency, as well as the character of the sound and the altitude of the source, have an influence on their perception, and thus possibly on the annoyance they may cause. These influences will be discussed here.

4.1 Diurnal variations in level

Road traffic noise usually subsides at night and in early morning resumes to the morning rush hour level. Figure 5 shows the change in level for two situations: a busy motorway in the central part of the Netherlands and the city ring road of Amsterdam (figure taken from [9]). It also shows that the lowest night time levels Lmin are approximately 8 dB below the highest levels in day time for the motorway; for the ring road the difference is somewhat higher: 10 dB. When compared to Lden, the minimum levels are approximately 12 dB lower.

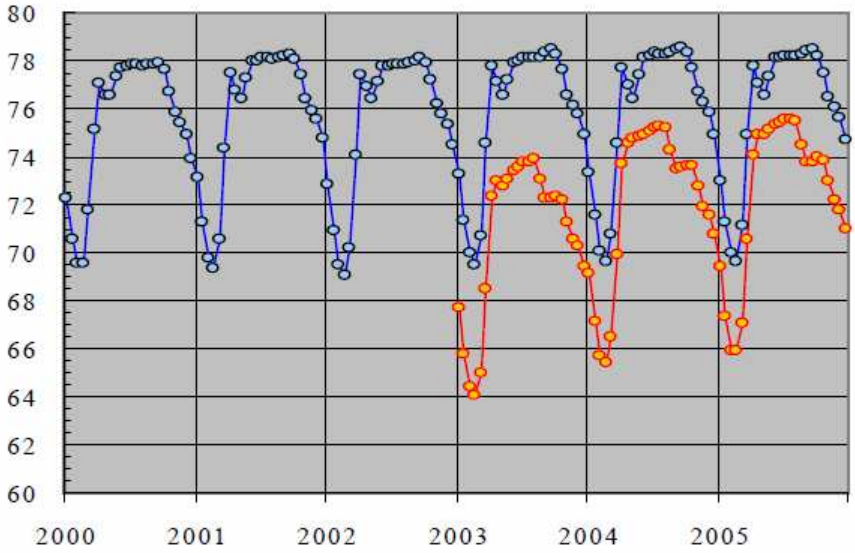

Figure 5. Hourly equivalent sound level (Leq) in dB(A) per average day in each of six years at a busy motorway (blue dots) and over three years at the Amsterdam ring road (orange dots).

The diurnal variation for an 80 m hub height wind turbine is rather different as figure 6 shows for an average day in one year, where wind speed data from 1987 have been used (figure taken from [10]).

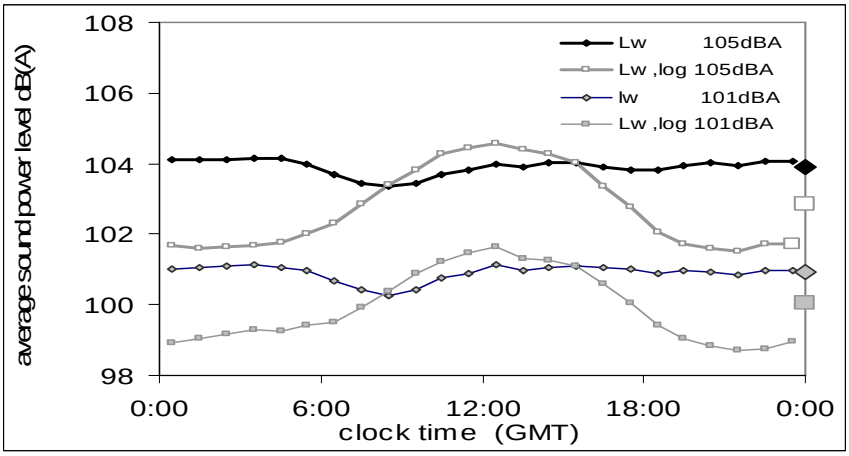

Figure 6. Hourly averaged real and estimated (log) sound power level of a Vestas V80-2MW at two power settings.

Here the night time level is on average higher than daytime levels, as in daytime the 80 m wind is slowed down by more intense coupling to lower altitude air due to vertical movements that are stronger when the sun is up. Here the night time level is approximately 6 dB lower than the Lden due to this wind turbine, the lowest (daytime) level is 7 dB lower than Lden. Hence, when road traffic and wind turbines produce the same Lden sound level, the RT level in the quietest hour of the night is 12 dB lower whereas the WT level at that time is 6 dB lower and thus, at that time, 6 dB higher than the RT sound level. In daytime this difference is smaller (3 dB).

4.2 Spectral differences

Road traffic sound as well as wind turbine sound is relatively broad band. In figure 7 the spectral distributions of the sounds are plotted as A-weighted octave band levels where each level is given relative to the total sound power. Expressed this way, the reference total sound power is equal (*viz.* 0 dB) for each source. The WT spectrum is the sound power spectrum of a Vestas V80-2MW, the RT spectra are those used for light, medium and heavy vehicles in the Dutch calculation model for road traffic noise, and the average spectrum for all traffic as measured at the city ring road (taken from [9]). The figure shows that wind turbine sound, when compared to road traffic sound, is relatively loud at low frequencies up to 500 Hz and then less loud (at higher levels the wind turbine is again louder, but such high frequencies are irrelevant at distances over several hundreds of meters, and even more so when indoors). Of course at some distance from the sources the spectrum will change due to frequency dependent attenuation, but that will affect the spectra in the same way and thus not change the relative contributions. If the WT and RT sound levels are equal at the receiver, the WT will be louder at frequencies below 500 Hz, and less loud above that frequency. All spectral levels of the wind turbine will be lower then the RT spectral levels (averaged over traffic types) when the wind turbine level is reduced by at least 8 dB. The other way around, all RT spectral levels will be lower than the (average) WT levels if the wind turbine is at least 4 dB louder.

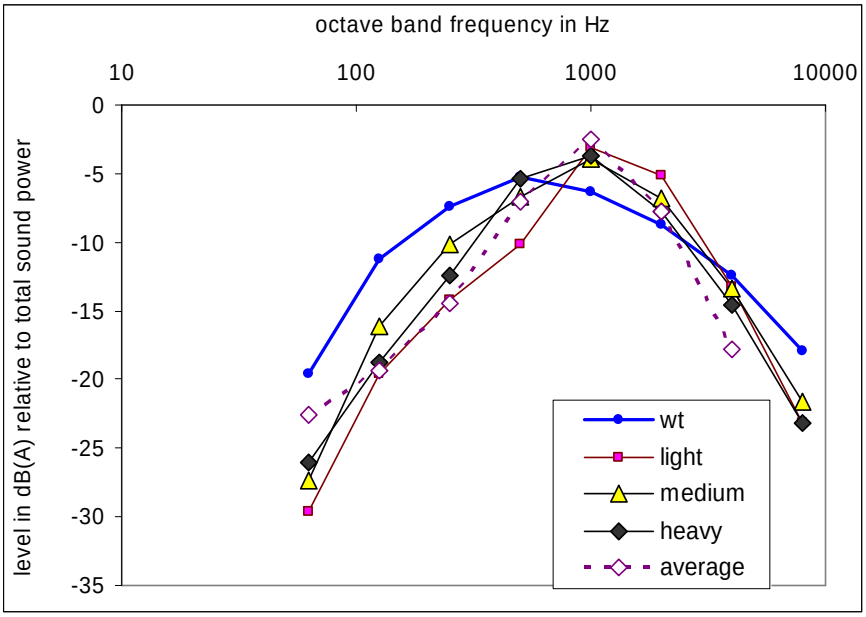

Figure 7. Octave band spectra (each level relative to total sound power level) of a wind turbine (wt) and of light, medium and heavy vehicles and the average as determined on the city ring road.

4.3 Sound character: swishing

Swishing is an important characteristic of wind turbine sound: 75% of the respondents of the WINDFARMperception study thought that swishing or lashing was the best description of the sound [10]. Reported swish levels (the level of the peaks occurring at blade passing frequency relative to the base level in between peaks) are up to approximately 5 dB, highest reported values are 9 dB [11]. Obviously the audible modulation attracts attention, just as the reverse gear beep on trucks or the signal of an alarm clock do. From various studies it follows that this modulation is equivalent in annoyance to the un-modulated sound at an approximately 5 dB higher level.

4.4 Sound shadow

Usually a sound source is louder downwind of the source than upwind in the sound shadow, where only reflected and turbulence scattered, but no direct sound rays can reach an observer. The distance between the sound source and its sound shadow depend on atmospheric conditions and on the height of the source. With a normal temperature profile (temperature decreasing with height) in a still atmosphere sound rays refract upward and the sound shadow is along a circle with the source in its center. When some wind is present, and it is when a wind turbine is in operation, the refraction due to wind is usually stronger and there is a sound shadow only in the upwind direction. The distance to the source depends on the wind speed and the height of the source: for a high source the sound shadow is further away than for a low source. In figure 8 the contours of the sound shadow related to a sound source at 95 m height are plotted, using night time atmospheric data from the Royal Netherlands Meteorological Institute and an algorithm provided by Makarewicz et al [12]. The contours are open as there is no sound shadow in the downwind direction. For a source at 95 m height the minimum and maximum distances to the sound shadow in the upwind direction at night are just over 500 m and just over 1 km (average over all days 650 m). For a road, the sound shadow is at least 130 m and at most 250 m (average: 160 m) from the road in the upwind direction. This means that for residents at several hundreds of meters from a road may often not hear the road when it is downwind, but they will often be able to hear wind turbines in that situation if these are alongside the road.

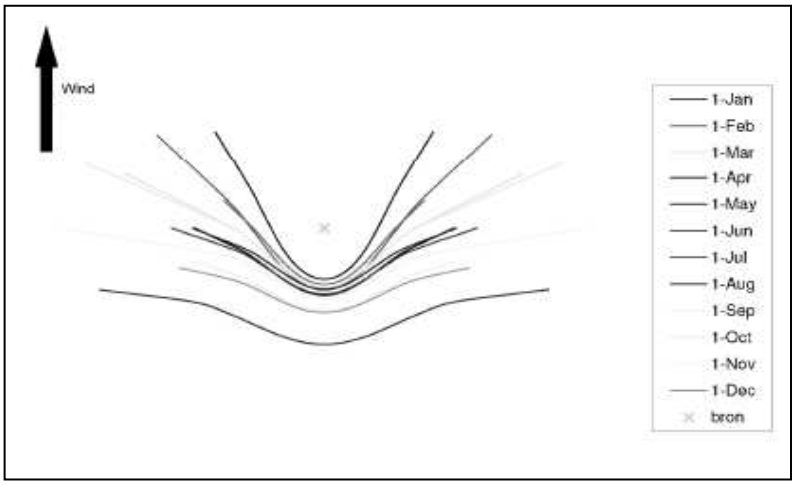

Figure 8. Contours of the sound shadow in twelve night over a year for a source (x) at 95 m height.

5 Discussion

Most respondents in the WINDFARMperception survey thought the sound from one or more modern, tall wind turbines at night is louder than or not very different from the sound in daytime, which is consistent with the actual average sound levels of these turbines. Also, most respondents thought the sound is louder in strong winds and when the wind is blowing towards their dwelling, which is consistent with the wind dependent sound power level and the directivity of the sound (higher at the downwind side).

Comparing equal Lden levels of road traffic and wind turbine sound gives no information on the levels or the relative audibility of each sound at specific times. In fact, at equal Lden values wind turbine sound levels will be higher at night than road traffic sound levels because of the different diurnal patterns, the different spectral distributions and the modulation present in wind turbine sound. It can be estimated that the Lden due to modern, tall wind turbines must be 6 dB (diurnal variation) + 8 dB (spectral differences) + 5 dB (amplitude modulation) = 19 dB lower then the Lden due to road traffic in order to obtain equal hourly levels at the least busiest traffic hours at night. If the road is a provincial road and not a very busy motorway, there may be shorter or longer periods of time, especially at night, when no road traffic at all can be heard. In that case the Lden due to that road traffic is in fact irrelevant when determining the audibility of a wind turbine.

It is not clear whether the greater distance of the sound shadow to a source is important in relation to annoyance. An upwind receiver may be in the sound shadow of a road but not in the sound shadow of a wind turbine along that road, but the receiver is in that case also at the front side of the turbine which emits less sound than the rear side.

Acknowledgments

We thank our co-researcher Roel Bakker and Jelte Bouma at the Medical Center in Groningen, and the RIVM for providing the road traffic sound data.

References

[1] Wolsink, A. Wind power implementation: The nature of public attitudes: Equity and fairness instead of ‘backyard motives’. *Renewable & Sustainable Energy Reviews*, Vol 11, 2007, pp 1188-1207.

[2] Pedersen. E.; Persson Waye, K. Wind turbines—low levels noise sources interfering with restoration?, *Environmental Research Letters*, Vol 3, 2008, 5 pp.

[3] Pedersen. E.; van den Berg, F.; Bakker, R.; Bouma, J. Response to noise from modern wind farms in The Netherlands, *Journal of the Acoustical Society of America*, Vol 126 (2), 2009, pp 634-643.

[4] Bolin, K. *Masking of wind turbine noise by ambient noise*. Licentiate Thesis in Technical Acoustics. KTH, Stockholm, Sweden, 2006.

[5] Bolin, K.; Nilsson, M.E.; Khan, S. The potential of natural sounds to mask wind turbine noise, *Acta Acustica united with Acustica*. Vol. 96, 2010, pp 131-137.

[6] Pedersen. E.; van den Berg, F.; Bakker, R.; Bouma, J. Can road traffic mask sound from wind turbines? Response to wind turbine sound at different levels of road traffic sound, *Energy Policy*, Vol 38, 2010, pp 2520-2527.

[7] *Attenuation of sound during propagation outdoors. Part 2: general method of calculation*. ISO 9613-2, Geneva, Switzerland, 1996.

[8] Van den Berg, F. Criteria for wind farm noise: Lmax and Lden. *The 7th European Conference of Noise Control, Acoustics'08*, Paris, June 30 – July 4, 2008.

[9] Jabben J, Potma CJM. *Sound monitor 2005 – trend and validation measurements of environmental sound.* Report RIVM (in Dutch), Bilthoven, 2006

[10] Van den Berg F, Pedersen E, Bakker R, Bouma J. *Project WINDFARMperception – Visual and acoustic impact of wind turbine farms on residents.* University of Groningen, UMCG and University of Göteborg, 2008

[11] Van den Berg F. Why is wind turbine noise noisier than other noise? *Proceedings of Euronoise2009*, Edinburgh, October 26-28, 2009

[12] Makarewicz R, Wojciechowska H. Noise duration for a single overflight. *Journal of the Acoustical Society of America*, Vol. 114 (218), 2003, 218-224

Invited Paper

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PREDICTING ANNOYANCE BY WIND TURBINE NOISE

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Abstract
While wind turbines have beneficial effects for the environment, they inevitably generate environmental noise. In order to protect residents against unacceptable levels of noise, exposure-response relationships are needed to predict the expected percentage of people annoyed or highly annoyed at a given level of wind turbine noise. Exposure-response relationships for wind turbine noise were derived on the basis of available data, using the same method that was previously used to derive relationships for transportation noise and industrial noise. Data from surveys in Sweden and the Netherlands were used to achieve relationships between L_{den} and annoyance, both indoors and outdoors at the dwelling. It is shown that a given percentage of annoyance by wind turbine noise is expected at much lower levels of L_{den} than the same percentage of annoyance by for instance road traffic noise. Results were used to guide new noise regulation for wind turbines in the Netherlands.

Keywords: Wind turbine noise, Annoyance, Exposure-response, Noise regulation

1 Introduction

Wind turbines have beneficial effects for the environment since they offer a clean substitute for fossil fuels. However, an inevitable side-effect is that they generate environmental noise. In order to protect residents against unacceptable levels of noise and guide noise regulation, it is important to be able to predict the expected percentage of people annoyed or highly annoyed at a given level of wind turbine noise. Recent studies investigating the community response to wind turbine noise have shown that a proportion of the residents living in the vicinity of wind turbines perceive the noise generated by them as being annoying [1-3]. Findings suggest that, at equal noise exposure levels, the expected annoyance due to wind turbine noise might be higher than annoyance due to other environmental noise sources [2,4]. The annoyance also appears to be high in comparison to exposure-response relationships for stationary sources, suggesting that wind turbines should be treated as a

new type of source in noise regulation. However, the relationship between exposure and annoyance was previously not investigated using noise exposure measures that correspond to international standards for assessing the impact of community noise (L_{den} or L_{dn}). Furthermore, relationships were based on annoyance perceived outdoors at the dwelling, while established exposure-response relationships for other noise sources typically do not distinguish between annoyance indoors or outdoors. In the present study, exposure-response relationships between the exposure metric L_{den} and self-reported annoyance indoors as well as outdoors due to wind turbines were derived using the method previously used to derive the exposure-response relationships for transportation and industrial noise. The analysis was done on available data that were collected during previous studies in Sweden and the Netherlands.

2 Methods

2.1 Study design and sample

Data from two studies conducted in Sweden [1] (2000 and 2005) and one study in the Netherlands [2] (2007) were used. Both Swedish studies were conducted during the summer and had cross-sectional designs with a sample of respondents who were exposed to varying levels of wind turbine noise. The 2000 study was conducted in the south of Sweden in an area characterized primarily by agriculture in an overall flat, even landscape. The 2005 Swedish study was conducted in areas characterized by different types of terrain (i.e. even/flat vs. complex) and varying degrees of urbanization (i.e. rural vs. built-up). In both studies questionnaires were used. Of the 513 questionnaires sent to residents in the 2000 study, 351 (68%) usable questionnaires were returned. In the 2005 study 1309 questionnaires were sent to residents, of which 754 (58%) usable questionnaires were returned.

The study in the Netherlands included a sample of the population living within a 2.5 km radius of a wind turbine, stratified according to: 1) wind turbine immission levels (25-30, 30-35, 35-40, 40-45 dB(A)), 2) environment type (A. Rural, quiet, B. Rural with main roads, C. Built-up). At a response rate of at least 30%, a minimum of 50 respondents per stratum (4 x 3 = 12 strata) was envisaged. A postal questionnaire, based on the Swedish questionnaire, was sent during April 2007. Of the 1948 questionnaire posted, 725 (37%) usable questionnaires were returned. All respondents received a gift voucher. A non-response analysis found no significant difference in the reported annoyance due to wind turbines between respondents and non-respondents.

2.2 Noise exposure

Annual day-evening-night A-weighted equivalent noise level (L_{den}) was defined in accordance with EU environmental noise guidelines. L_{den} was calculated from the immission levels determined in the original studies [1-2]. For each respondent, outdoor A-weighted sound power levels from the nearest wind turbine(s) were determined for a neutral atmosphere at a constant wind velocity of 8 m/s at a height of 10 meters in the direction towards the respondent, which is the reference wind velocity by convention (e.g. Swedish Environmental Protection Agency, 2001). To these data, a correction of +4.7 dB(A) was applied, calculated by van den Berg [5] as the mean difference between L_{den} and the immission level at a wind velocity of 8 m/s. While in principle the correction depends on the wind velocity distribution at a specific location, the type of wind turbine and the hub height, statistical wind velocity data

was not available for all study locations. Furthermore, using a variable correction factor for the situation in the Netherlands did not provide a better prediction of annoyance in comparison to L_{den} calculated with the fixed correction factor. Figure 1 shows the distribution of the noise exposure levels in L_{den} within each of the three studies. The highest wind turbine noise exposure levels (L_{den}) were encountered in the study in the Netherlands. The majority of Swedish respondents were exposed to levels between L_{den} 35 – 40 dB(A), while a relatively large proportion of respondents in the Netherlands were exposed to levels below L_{den} 35 dB(A) and levels over 45 dB(A). This may partly be attributed to differences in study design: in the Netherlands the stratification was based on noise exposure levels, whereas in Sweden locations were selected mainly on the basis of geographical areas.

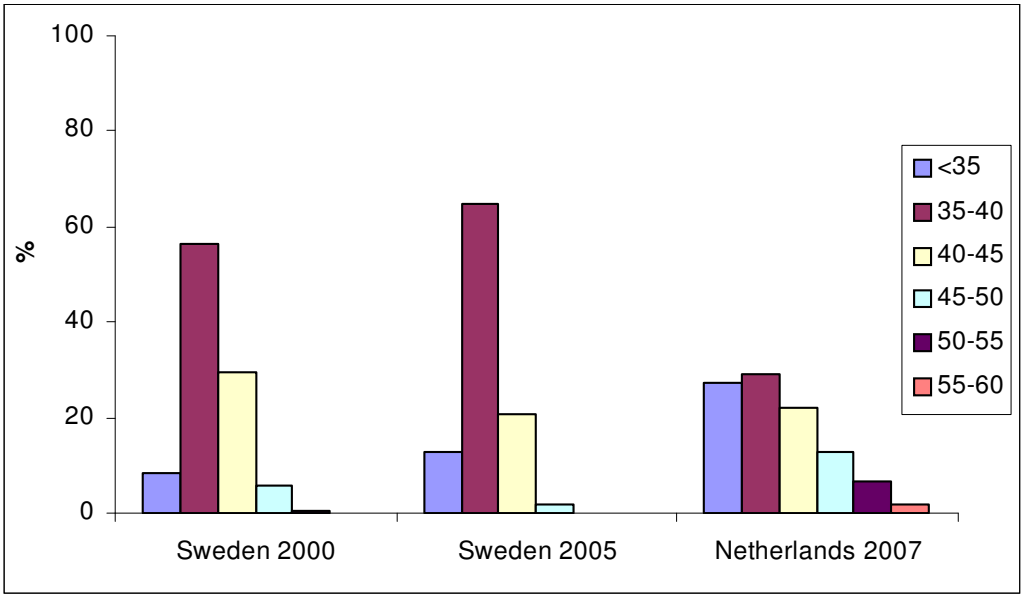

Figure 1 - Distribution of wind turbine noise exposure levels (L_{den}) within the three studies.

2.3 Questionnaire

In all three studies, annoyance due to wind turbines and other environmental stressors were assessed with the following question: “The list below summarizes a number of aspects that you may be aware of and/or be annoyed by when inside your home. Please indicate for each aspect whether you are aware of it and whether it annoys you?” The response to each aspect was registered on a 5-point scale: 1 = “Do not notice”, 2 = “Notice, but not annoyed”, 3 = “Slightly annoyed”, 4 = “Rather annoyed” and 5 = “Very annoyed”. The same question was repeated for annoyance outside the home. To assess whether respondents benefitted economically from wind turbines, the question “Do you (partly) own one or more wind turbines?” was present in the questionnaire, to which the answers “Yes” or “No” could be given. In the present study, data of the 5-point annoyance scale were recoded and assessed as an index of self-reported annoyance indoors and outdoors. The 5-point scale was recoded to a 4-point scale: categories 1 and 2 were combined to obtain a new category 1 = “Not annoyed”. Subsequently, the annoyance response categories were converted into scales ranging from 0 to 100. This conversion is based on the assumption that a set of categories divides the range of 0 to 100 in equally spaced intervals. The general rule that gives the position of an inner category boundary on the scale of 0 to 100 is: $\text{score}_{\text{boundary } i} = 100 \cdot i/m$, where i is the rank number of the category boundary, starting from 1 for the upper boundary

of the lowest category, and *m* is the number of categories. The percentage of responses exceeding a certain cut-off point on the scale may be reported. Following convention, if the cut-off is 72 on a 0-100 scale, the result is called the percentage of "highly annoyed" persons (%*HA*). Likewise, a cut-off of 50 indicates the percentage of "annoyed" persons (%*A*).

2.4 Statistical model

The statistical model applied previously for predicting community annoyance response to other sources [6,7] was employed here to derive a model for both indoor and outdoor annoyance due to wind turbine noise. An exposure-response relationship between annoyance and L_{den} was derived based on the combined data from Sweden and the Netherlands. In line with van den Berg et al. [2], exposure-response relationships were derived only for respondents who did not benefit economically from wind turbines. Since respondents with economical benefit hardly reported any annoyance despite living primarily in the highest exposure categories, including this relatively small number of residents was expected to contaminate the relationship over the total range of exposure.

3 Results

At a given exposure level, the expected percentage of annoyed persons indoors by wind turbine noise is higher than that due to other stationary sources of industrial noise, and also increases faster with increasing noise levels. Furthermore, the expected percentage of annoyed or highly annoyed persons due to wind turbine noise across the exposure range is higher than the expected percentages due to each of the three modes of transportation noise at the same exposure levels. Although the comparison may be hampered by differences between sources in exposure range, and the confidence intervals at the high end of the wind turbine noise range are large, the results indicate that a given percentage of annoyance by wind turbine noise is expected at much lower levels of L_{den} than the same percentage of annoyance by for instance road traffic noise (see Figure 2).

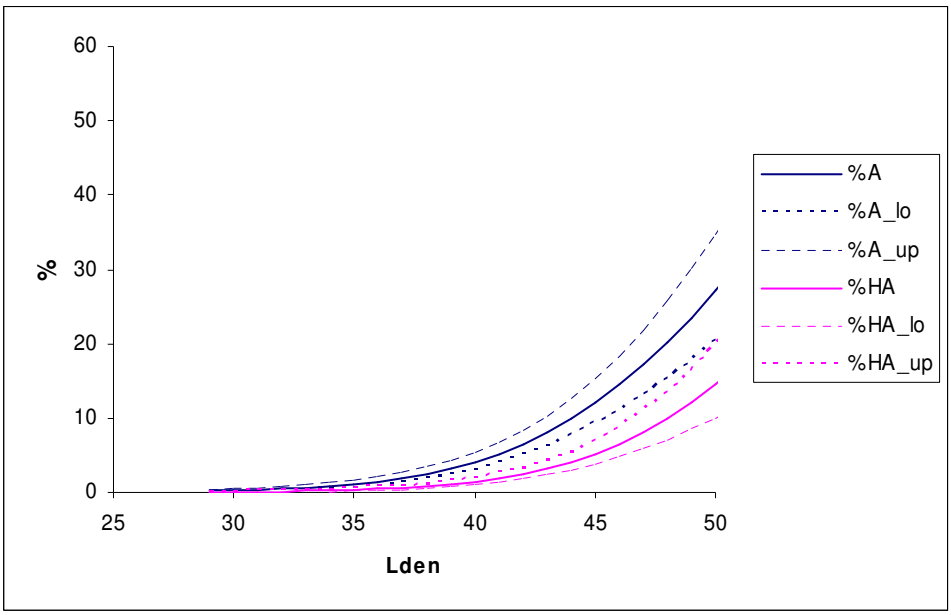

Figure 2 – Expected percentages annoyed (*%A*) and highly annoyed (*%HA*) indoors by wind turbine noise, with 95% confidence intervals.

4 Conclusions

In comparison to other sources of noise, annoyance due to wind turbine noise is found at relatively low noise exposure levels. The proposed exposure-response relationships for annoyance by wind turbine noise are only based on three studies and more studies are undeniably needed. Still, they may already serve as indicative for suitable regulations, or for the evaluation of existing legislation. However, it should be noted that situational factors, as well as possible cultural differences, may lead to considerable deviation from the curve in specific cases.

Acknowledgments

The authors would like to thank Dr. Frits van den Berg of the Amsterdam Public Health Service (formerly of the University of Groningen) for his much valued advice and for making his research data available to the authors. The present study was funded by the Ministry of Housing, Spatial Planning, and the Environment (VROM) of the Netherlands.

References

[1] Pedersen, E. *Human response to wind turbine noise: Perception, annoyance and moderating factors.* Thesis, Göteborg University (Sweden), 2007.

[2] van den Berg, F.; Pedersen, E.; Bouma, J.; Bakker, R. *WINDFARMperception: Visual and acoustic impact of wind turbine of wind turbine farms on residents.* Report FP6-2005-Science-and-Society-20. University of Groningen (Netherlands), Göteborg University (Sweden), 2008.

[3] Pedersen, E.; van den Berg, F.; Bakker, R. Response to noise from modern wind farms in the Netherlands, *Journal of the Acoustical Society of America*, Vol 126, 2009, pp 634-643.

[4] Pedersen, E.; Persson Waye, K. Perception and annoyance due to wind turbine noise – a dose-response relationship, *Journal of the Acoustical Society of America,* Vol 116, 2004, pp 3460-3470.

[5] van den Berg, F. Criteria for wind farm noise: Lmax and Lden. *Acoustics'08*, Paris, France, June 29-July 4, 2008.

[6] Miedema, H.M.E.; Oudshoorn, C.G.M. Annoyance from transportation noise: Relationships with exposure metrics DNL and DENL and their confidence intervals, *Environmental Health Perspectives,* Vol 109, 2001, pp 409-416.

[7] Groothuis-Oudshoorn, C. G. M.; Miedema, H. M. E. Multilevel grouped regression for analyzing self-reported health in relation to environmental factors: The model and its application, *Biometrical Journal,* Vol 48, 2006, pp 67-82.

THE "HOW TO" GUIDE
TO
SITING WIND TURBINES
TO PREVENT HEALTH RISKS FROM SOUND

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"A subset of society should not be forced to bear the cost of a benefit for the larger society."[1]

I. Introduction

A new source of community noise is spreading rapidly across the rural U.S. countryside. Industrial-scale wind turbines (WT), a common sight in many European countries, are now actively promoted by federal and state governments in the U.S. as a way to reduce coal-powered electrical generation and global warming. The presence of industrial wind projects is expected to increase dramatically over the next few years, given the tax incentives and other economic and political support currently available for renewable energy projects in the U.S.

As a part of the widespread enthusiasm for renewable energy, state and local governments are promoting "Model Ordinances" for siting industrial wind farms which establish limits for noise and other potential hazards. These are used to determine where wind projects can be located in communities, which are predominantly rural and often extremely quiet during the evening and night. Yet, complaints about noise from residents near existing industrial wind turbine installations are common. This raises serious questions about whether current state and local government siting guidelines for noise are sufficiently protective for people living close to the wind turbine developments. Research is emerging that suggests significant health effects are associated with living too close to modern industrial wind turbines. Research into the computer modeling and other methods used to determine the layout of wind turbine developments, including the distance from nearby residences, is at the same time showing that the output of the models may not accurately predict sound propagation. The models are used to make decisions about how close a turbine can be to a home or other sensitive property. The errors in the predicted sound levels can easily result in inadequate setback distances thus exposing the property owner to noise pollution and potential health risks. Current information suggests the models should not be used for siting decisions unless known errors and tolerances are applied to the results.

Our formal presentation and paper on this topic (*Simple guidelines for siting wind turbines to prevent health risks*) is an abbreviated version of this essay. The formal paper was presented to the Institute of Noise Control Engineers (INCE) at its July Noise-Con 2008 conference in Detroit, MI, A copy of

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[1] George S. Hawkins, Esq., "*One Page Takings Summary: U.S Constitution and Local Land Use*," Stony Brook-Millstone Watershed Association; *"…nor shall private property be taken for public use, without just compensation."* Fifth Amendment, US Constitution.

the paper is included at the end of this document. The formal paper covered the community noise studies performed in response to complaints, research on health issues related to wind turbine noise, critiques of noise studies performed by consultants working for the wind developer, and research/technical papers on wind turbine sound immissions and related topics. The formal paper also reviewed sound studies conducted by consultants for governments, the wind turbine owner, or the local residents for a number of sites with known health or annoyance problems. The purpose was to determine if a set of simple guidelines using dBA and dBC sound levels can serve as the 'safe' siting guidelines for noise and its effects on communities and people. The papers considered in our review included, but were not limited to, those listed in Tables 1-4 on pages 2 through 4 of the Noise-Con document.

This essay expands upon the Noise–Con paper and includes information to support the findings and recommended criteria. We are proposing very specific, yet reasonably simple to implement and assess criteria for audible and non-audible sound on adjacent properties and also present a sample noise ordinance and the procedures needed for pre-construction sound test, computer model requirements and follow-up tests (including those for assessing compliance).

The purpose of this expanded paper is to outline a rational, evidence-based set of criteria for industrial wind turbine siting in rural communities, using:

1) A review of the European and other wind turbine siting criteria and existing studies of the prevalence of noise problems after construction;
2) Primary review of sound studies done in a variety of locations in response to wind turbine noise complaints (Table 1);
3) Review of publications on health issues for those living in close proximity to wind turbines (Table 2);
4) Review of critiques of pre-construction developer noise impact statements (Table 3); and
5) Review of technical papers on noise propagation and qualities from wind turbines (Table 4).

The Tables are on pages 2-4 of the formal paper. We also cite standard international criteria for community noise levels and allowances for low-frequency noise.

The specific sections are:

1. Introduction (This section)
2. Results of Literature Review and Sound Studies
3. Development of Siting Criteria
4. Proposed Sound Limits
5. How to Include the Recommended Criteria in Local or State Noise Ordinances
6. Elements of a Wind Energy System Licensing Ordinance
7. Measurement Procedures (Appendix to Ordinance)
8. The Noise-Con 2008 paper "Simple guidelines for siting wind turbines to prevent health risks" with revisions not in the paper included in the conference's Proceedings.

The construction of large WT (industrial wind turbines) projects in the U.S. is a relatively recent phenomenon, with most projects built after 2000. Other countries, especially in Europe, have been using wind energy systems (WES) since the early 1990's or earlier. These earlier installations generally used turbines of less than 1 MW capacity with hub heights under 61 m (200 feet). Now, many of these earlier turbines reaching the end of their useful life, are being replaced with the

larger 1.5 to 3 MW units. Thus, the concepts and recommendations in this article, developed for the 1.5 MW and larger turbines being build in the U.S, may also be applicable abroad.

II. Results of Literature Review and Sound Studies

In the U.K. there are currently about 133 operating WT developments. Many of these have been in operation for over 10 years. The Acoustic Ecology Institute[2] (AEI) reported that a Special Report for the British government titled "Wind Energy Noise Impacts,"[3] found that about 20% of the wind farms in the U.K. generated most of the noise complaints. Another study commissioned by British government, from the consulting firm Hayes, McKensie, reported that only five of 126 wind farms in the U.K. reported problems with the noise phenomenon known as aerodynamic modulation.[4] Thus, experience in the U. K. shows that not all WT projects lead to community complaints. AEI posed an important question: "**What are the factors in *those* wind farms that may be problematic, and how can we avoid replicating these situations elsewhere?"**

As experienced industrial noise consultants ourselves, we would have expected the wind industry, given the U.K. experience, to have attempted to answer this question, conducting extensive research -- using credible independent research institutions -- before embarking on wind power development in the U.S. The wind industry was aware, or should have been aware, that 20% of British wind energy projects provoked complaints about noise and/or vibration, even in a country with more stringent noise limits than in the U.S.

The wind industry complies with stricter noise limits in the U.K. and other countries than it does in the U.S., for example[5]:

- Australia: higher of 35 dBA or L_{90} + 5 dBA
- Denmark: 40 dBA
- France: L_{90} + 3 dBA (night) and L_{90} + 5 dBA (day)
- Germany: 40 dBA
- Holland: 40 dBA
- United Kingdom: 40 dBA (day) and 43 dBA or L_{90} + 5 dBA (night)
- Illinois: Octave frequency band limits of about 50 dBA (day) and about 46 dBA (night)
- Wisconsin: 50 dBA
- Michigan: 55 dBA

Industry representatives on state governmental committees have worked to establish sound limits and setbacks that are lenient and favor the industry. In Michigan, for example, the State Task Force (working under the Department of Labor and Economic Growth) recommended in its "Siting Guidelines for Wind Energy Systems" that the limits be set at 55 dBA or L_{90} + 5 dBA, whichever is higher. In Wisconsin, the State Task Force has recommended 50 dBA.

When Wisconsin's Town of Union wind turbine committee made an open records request to find out the scientific basis for the sound levels and setbacks in the state's draft model ordinance, it found that no scientific or medical data was used at all. Review of the meeting minutes provided

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[2] (http://www.acousticecology.org/srwind.html)

[3] AEI is a 501(c)3 non-profit organization based in Santa Fe, New Mexico, USA. The article is available at http://www.acousticecology.org/srwind.html

[4] Study review available at: http://www.berr.gov.uk/files/file35592.pdf

[5] Ramakrishnan, Ph. D., P. Eng., Ramani, "Wind Turbine Facilities Noise Issues" Dec. 2007 Prepared for the Ontario Ministry of Environment.

under the request showed that the limits had been set by Task Force members representing the wind industry.[6] This may explain why state level committees or task forces have drafted ordinances with upper limits of 50 dBA or higher instead of the much lower limits applied to similar projects in other countries. There is no independent, scientific or medical support for claims that locating 400+ foot tall wind turbines as close as 1000 feet (or less) to non-participating properties will not create noise disturbances, economic losses or other risks.[7] But, there is considerable independent research supporting that this will result in public health risks and other negative impacts on people and property.

To illustrate the way a typical WT developer responds to a question raised by a community committee about noise and health the following example is presented and discussed:

> **Q: 19. What sound standards will EcoEnergy ensure that the turbines will be within, based on the setbacks EcoEnergy plans to implement, and what scientific and peer reviewed data do you have to ensure and support there will be no health and safety issues to persons within your setbacks?**
>
> **Answer**: As mentioned, turbines are sited to have maximum sound level of 45dBA. These sound levels are well below levels causing physical harm. Medical books on sound indicate sound levels above 80-90dBA cause physical (health) effects. The possible effects to a person's health due to "annoyance" are impossible to study in a scientific way, as these are often mostly psychosomatic, and are not caused by wind turbines as much as the individuals' obsession with a new item in their environment.
>
> **From EcoEnergy's "Response to the Town of Union Health & Safety Research Questionnaire"**
> By Curt Bjurlin, M.S., Wes Slaymaker, P.E., Rick Gungel, P.E., EcoEnergy, L.L.C., submitted to Town of Union, Wisconsin and Mr. Kendall Schneider, on behalf of the Town of Union

A serious question was asked and it deserves a responsible answer. The committee, charged with fact-finding, sought answers they presumed would be based on independent, peer-reviewed studies. Instead, the industry response was spurious and misleading, and did not address the question. It stated that the turbines will be located so as to produce maximum sound levels of 45 dBA, the tone and context implying that 45 dBA is fully compatible with the quiet rural community setting. No acknowledgement is made of the dramatic change this will be for the noise environment of nearby families. No mention is made of how the WT, once in operation, will raise evening and nighttime background sound levels from the existing background levels of 20 to 30 dBA to 45 dBA. There is no disclosure of the considerable low frequency content of the WT sound; in fact, there are often claims to the contrary. They fail to warn that the home construction techniques used for modern wood frame homes result in walls and roofs that cannot block out WT low frequencies.

There is no mention of the nighttime sound level recommendations set by the World Health Organization (WHO) in its reports, *Guidelines for Community Noise* [8] and "Report on the third

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[6] Lawton, Catharine M., Letter to Wisconsin's "Guidelines and Model Ordinances Ad Hoc Subcommittee of the Wisconsin Wind Power Siting Collaborative" in Response to Paul Helgeson's 9/20/00 "Wisconsin Wind Ordinance Egroups E-Mail Message," Sept. 20, 2000, a Public Record obtained through Open Meetings Act request by the Town of Union, Wisconsin, Large Wind Turbine Citizens Committee.

[7] It is worth noting that the 2007-06-29 version of the Vestas Mechanical Operating and Maintenance Manual for the model V90 – 3.0 MW VCRS 60 Hz turbine includes this warning for technicians and operators:

> **"2. Stay and Traffic by the Turbine**
>
> Do not stay within a radius of 400m (1300ft) from the turbine unless it is necessary. If you have to inspect an operating turbine from the ground, do not stay under the rotor plane but observe the rotor from the front.
> Make sure that children do not stay by or play nearby the turbine. …."

[8] Available at http://www.who.int/docstore/peh/noise/guidelines2.html.

meeting on night noise guidelines.[9]" In these documents WHO recommends that **sound levels during nighttime and late evening hours should be less than 30 dBA during sleeping periods to protect children's health**. They noted that a child's autonomic nervous system is 10 to 15 dB more sensitive to noise than is an adult. Even for adults, health effects are first noted in some studies when the sound levels exceed 32 dBA L_{max}. These sounds are 10-20 dBA lower than the sound levels needed to cause awakening.

For sounds that contain a strong low frequency component, which is typical of wind turbines, WHO says that the limits may need to be even lower than 30 dBA to avoid health risks. Further, they recommend that the criteria use dBC frequency weighting instead of dBA for sources with low frequency content. When WT sound levels are 45 dBA outside a home, we may find that the interior sound levels will drop to the 30 dBA level recommended for sleeping areas but low frequency noise only decreased 6-7 dBC from outside to inside. That could create a sleep problem because the low frequency content of the noise can penetrate the home's walls and roof with little reduction. An example demonstrating how WT sound is affected by walls and windows is provided later in this document.

The wind turbine developers in the excerpt above do not disclose that the International Standards Organization (ISO) in ISO 1996-1971 recommends 25 dBA as the maximum night-time limit for rural communities. As can be seen in the table below, sound levels of 40 dBA and above are only appropriate in suburban communities during the day and urban communities during day and night. There are no communities where 45 dBA is considered acceptable at night.

ISO 1996-1971 Recommendations for Community Noise Limits (dBA)			
District Type	Daytime Limit	Evening Limit 7-11pm	Night Limit 11pm-7am
Rural	35dB	**30dB**	**25dB**
Suburban	40dB	35dB	**30dB**
Urban residential	45dB	40dB	35dB
Urban mixed	50dB	45db	40dB

Further, the wind industry claims, "*These sound levels are well below levels causing physical harm. Medical books on sound indicate sound levels above 80-90dBA cause physical (health) effects.*" Concern about sound levels in the 80-90 dBA range is for hearing health (your ears) and not the health-related issues of sleep disturbance and other symptoms associated with prolonged exposure to low levels of noise with low frequency and amplitude modulation such as the sound emitted by modern wind turbines. This type of response is a non-answer. It is an overt attempt to mislead while giving the appearance of providing a legitimate response.

Furthermore, the statement, "*The possible effects to a person's health due to 'annoyance' are impossible to study in a scientific way, as these are often mostly psychosomatic, and are not caused by wind turbines as much as the individuals' obsession with a new item in their environment,*" is both inaccurate and misleading. It ignores the work of researchers such as Pedersen, Harry, Phipps, and Pierpont on wind turbine effects specifically, and the numerous medical research studies reviewed by Frey and Hadden. The studies belie the claims of the wind industry. This "failure to locate" published

[9] Available at: http://www.euro.who.int/Noise/activities/20040721_1 References found in Report on third meeting at pages 13 and others

studies that are readily available on the internet as to make some interpret the claim of "no medical research" as a conscious decision to not look for it. Those companies that do acknowledge the existence of medical research take the position that it is not credible for one or another reason and thus can be ignored.

Making statements outside their area of competence, wind industry advocates, without medical qualifications, label complaints of health effects as "psychosomatic" in a pejorative manner that implies the complaints can be discounted because they are not "really medical" conditions. Such a response cannot be considered to be based in fact. It is, at best, an opinion. It ignores the work of many researchers, including the World Health Organizations, on the effect of sounds during nighttime hours that result in sleep disturbance and other disorders with physical, not just psychological, pathologies.[10,11] Many people find it difficult to articulate what has changed. They know something is different from before the wind turbines were operating and they may express it as feeling uncomfortable, uneasy, sleepless, or some other symptom, without being able to explain why it is happening.

Our review of the studies listed in Tables 1-4 of our Noise-Con paper show that some residents living as far as 3 km (1.86 mi) from a wind farm complain of sleep disturbance from the noise. Many residents living 1/10 of this distance (300 m or 984 ft) from wind farms experience major sleep disruption and other serious medical problems from nighttime wind turbine noise. The peculiar acoustic characteristics of wind turbine noise immissions[12] cause the sounds at the receiving properties to be more annoying and troublesome than the more familiar noise from traffic and industrial factories. Limits used for these other community noise sources are not appropriate for siting modern industrial wind turbines. The residents who are annoyed by wind turbine noise complain of the repetitive, approximately once-per-second (1 Hz) "swoosh-boom-swoosh-boom" sound of the turbine blades and of "low frequency" noise. It is not clear to us whether the complaints about "low frequency" noise are about the audible low frequency part of the "swoosh-boom" sound, the once-per-second amplitude modulation (amplitude modulation means that the sound varies in loudness and other characteristics in a rhythmic pattern) of the "swoosh-boom" sound, or some combination of the two.

Figure 1 of our Noise Con paper, reproduced as Figure 1, below, shows the data from one of the complaint sites plotted against the sound immission spectra for a modern 2.5 MWatt wind turbine; A home in the United States at 2km distance, Young's threshold of perception for the 10% most sensitive population (ISO 0266); and a spectrum obtained for a rural community during a three hour, 20 minute test from 11:45 pm until 3:05 am on a windless June evening near Ubly, Michigan. This is a quiet rural community located in central Huron County (also called Michigan's Thumb). It is worth noting that this sound measurement sample demonstrates how quiet a rural community can be when located at a distance from industry, highways, and airport related noise emitters.

The line representing the threshold of perception is the focus of this graph. The remaining graphs show sound pressure levels (dB) at each of the frequency ranges from the lowest inaudible sounds at the left, to sounds that "rumble" (20Hz to about 200 Hz) and then those in the range of communication (200Hz through about 4000Hz) through high pitched sounds (up to 10,000 Hz). At

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[10] WHO European Centre for Environment and Health, Bonn Office, "Report on the third meeting on night noise guidelines," April 2005.

[11] According to Online Etymology Dictionary, *psychosomatic* means "pertaining to the relation between mind and body, … applied from 1938 to physical disorders with psychological causes."

[12] *Emissions* refer to acoustic energy from the viewpoint of the sound emitter, while *immissions* refer to acoustic energy from the viewpoint of the receiver.

each frequency where the graphs of sound pressures are above (exceed) the graph showing perception the wind turbine sounds would be perceptible or audible. The more the wind turbine sound exceeds the perception curve the more pronounced it will be. When it exceeds the quiet rural background sound level (L_{A90}) it will not be masked or obscured by the rural soundscape.

The over-all sounds from each of the frequency bands are summed and presented on the right hand side of the graph. These are presented with corrections for A-weighting (dBA) and C-weighting (dBC). These show that if only dBA criteria are used to assess and limit wind turbine sound the low frequency content of the wind turbines emissions are not revealed. Note that in many cases the values for dBC are almost 20 dB higher than the dBA values. This is the basis for the WHO warning that when low frequency sound content is present outside a home dBA is not an appropriate method of describing predicted noise impacts, sound limits, or criteria.

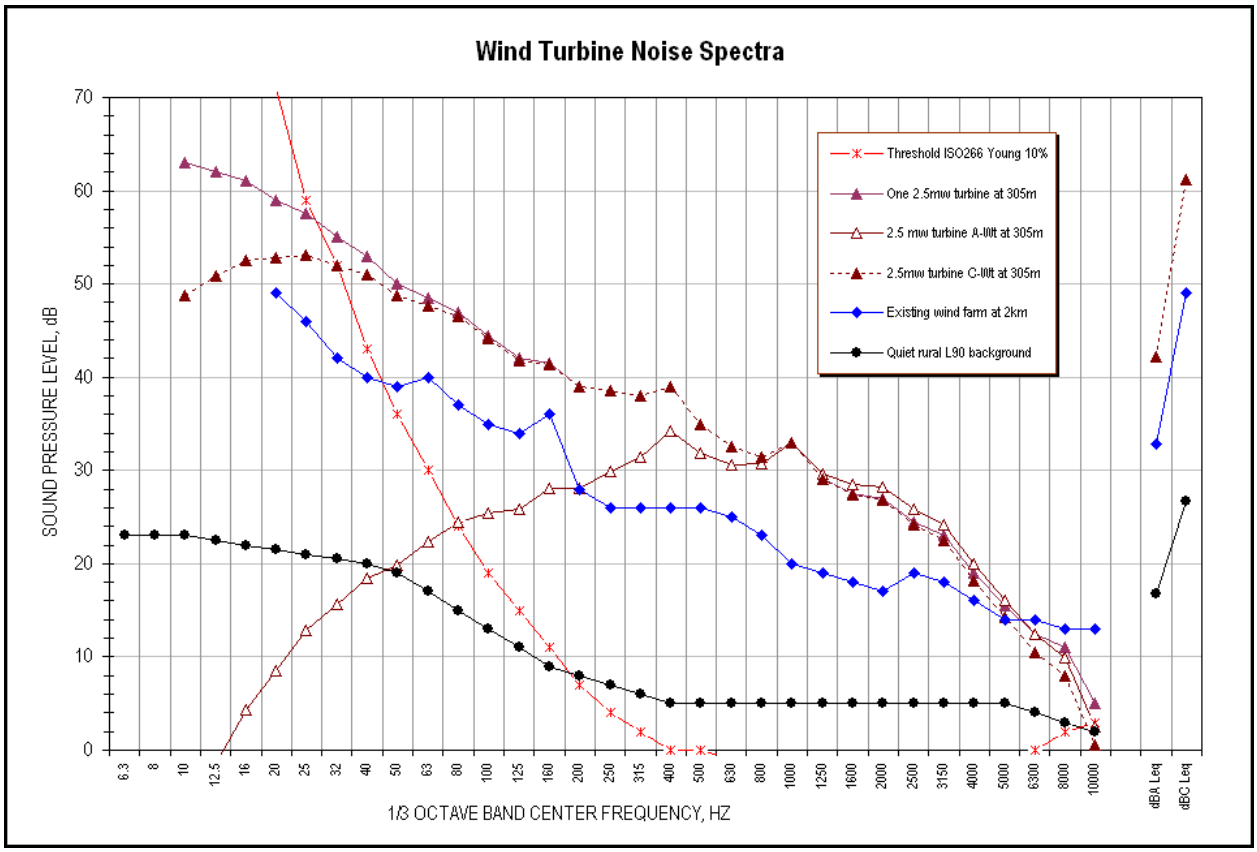

Figure 1-Graph Of Wind Turbine Sounds Vs. Rural Background And Threshold Of Perception

(Note: The lowest L_{Aeq} and L_{Ceq} shown at right are measured background L_{A90} and L_{C90} . The Leq values could be 0-5 dB higher)

Our review of the studies listed in Tables 1-4 in the Noise-Con paper at the end of this document, provided answers to a number of significant questions we had, as acoustical engineers, regarding the development of siting guidelines for industrial-scale wind turbines. They are provided below for easy of reading and continuity:

Do international, national, or local community noise standards for siting wind turbines near dwellings address the low frequency portion of the wind turbines' sound immissions? No. State and local governments are in the process of establishing wind farm noise limits and/or wind turbine setbacks from nearby residents, but the standards incorrectly assume that limits based on dBA levels are sufficient to protect the residents.

Do wind farm developers have noise limit criteria and/or wind turbine setback criteria that apply to nearby dwellings? Yes. But the industry-recommended wind turbine noise levels (typically 50-55 dBA) are too high for the quiet nature of the rural communities and may be unsafe for the nearest residents. An additional concern is that some of the methods for pre-construction computer modeling may predict sound levels that are too low. These two factors combined can lead to post-construction complaints and health risks.

An example of a condition that complies with

Are all residents living near wind farms equally likely to be affected by wind turbine noise? No. Children, people with certain pre-existing medical conditions, and the elderly are likely to be the most susceptible. Some people are unaffected while nearby neighbors develop serious health problems caused by exposure to the same wind turbine noise.

How does wind turbine noise impact nearby residents? Wind turbine-associated symptoms include sleep disturbance, headache, ringing in the ears, dizziness, nausea, irritability, and problems with memory, concentration, and problem solving, as described in the first paper in this volume.

What are the technical options for reducing wind turbine noise immission at residences? There are only two options: 1) increase the distance between the source and receiver, or 2) reduce the source sound power emission. Either solution is incompatible with the objective of the wind farm developer, which is to maximize the wind power electrical generation within the land available.

Is wind turbine noise at a residence much more annoying than traffic noise? Yes. Researchers have found that, "Wind turbine noise was … found to cause annoyance at sound pressure levels lower than those known to be annoying for other community noise sources, such as road traffic. …Living in a clearly rural area in comparison with a suburban area increases the risk of annoyance with wind turbine noise.[13]" In other papers by Pedersen wind turbine noise was perceived by about 85% of respondents to the study at sound levels as low as 35.0–37.5 dBA.[14] Currently, this increased sensitivity is believed to be due to the presence of amplitude modulation in the wind turbine's sound emissions which limits the masking effect of other ambient sounds and the low frequency content which is associated with the sounds inside homes and other buildings.

Amplitude modulation is a continuing change in the sound level in synchronization with the turning of the wind turbine's blades. An example of amplitude modulation is shown in the figure 2 below. This figure shows the constantly varying dBA sound level in the graph at the top. The sound level varies from a low of 40 dBA to a high of 45 dBA repeating every 1.3 seconds continuously when the turbine is operating. The turbine is located approximately 1200 feet from the farmhouse. The photo shows the turbine that was dominant during this test.

[13] Pedersen E, Bouma J, Bakker R and Van den Berg F, "Wind Farm perception- A study on acoustic and visual impact of wind turbines on residents in the Netherlands;" 2nd International Meeting on Wind Turbine Noise, Lyon France; Sept. 20-21, 2007 (Pages 2 and 3)

[14] Pedersen E and Persson Waye K. 2004. Perceptions and annoyance due to wind turbine noise -- a dose-response relationship. J Acoust Soc Am 116(6): 3460-3470

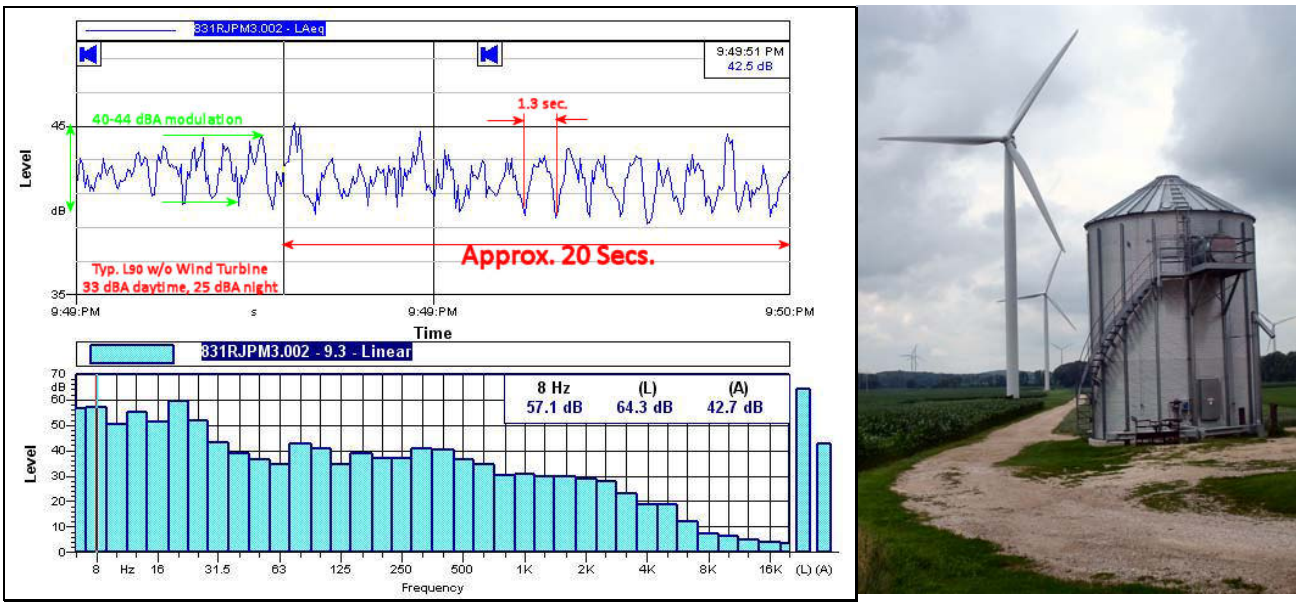

Figure 2 Amplitude Modulation at a farmhouse (Study sponsored by CCCRE, Calumet, Wisconsin)

It is worth noting that this measurement averages about 43 dBA (L_{eq}) which is very close to the sound level predicted for a single turbine at 1000 feet in Figure 1 (solid red line with solid triangle markers). The lower graph shows the frequency spectrum at approximately 9:49 PM at a low point in the amplitude modulation. (The frequency chart's cursor is the vertical line at the upper graph's midpoint.) Note the dominance of sound energy in the lower frequency range. This was also present in the model's predictions in Figure 1.

It is not hard to understand why many people in this community feel that they have been forced to accept noise pollution as a side effect of the wind project. Even though the 40 to 45 dBA sound levels in this example may comply with the 50 dBA limits adopted by the host county from the Wisconsin Model Ordinance the impact on the people near the wind project are subjected to noise pollution. This example demonstrates why criteria set at 50 dBA or higher do not protect the health and economic welfare of people living in the host communities. Adopting criteria such as those recommended later in this essay can prevent these situations from occurring.

Low frequency noise is a problem inside buildings

When low frequency sound is present outside homes and other occupied structures, it is often more an indoor problem than an outdoor one. This is very true for wind turbine sounds.

Why do wind turbine noise immissions of only 35 dBA disturb sleep at night? Affected residents complain of the middle- to high-frequency, repetitive swooshing sounds of the rotating turbine blades at a constant rate of about 1 Hz, plus low frequency noise. The amplitude modulation of the "swooshing" sound changes continuously. Residents also describe a thump or low frequency banging sound that varies in amplitude up to 10 dBA in the short interval between the swooshing sounds. This may be a result of sounds from multiple wind turbines with similar spectral content combining to increase and decrease the sound over and above the effects of modulation. [Note: These effects (e.g. phasing and coherence effects) are not normally considered in predictive models.] It may also be a result of turbulence of the air and wind on wind turbine operations when the blades are not at an optimum angle for noise emissions and/or power generation. It is also a result of sounds penetrating homes and other buildings at night and at other times where quiet is needed. When low frequency sound is present outside homes and other occupied structures, it is

often more likely to be an indoor problem than an outdoor one. This is very true for wind turbine sounds.

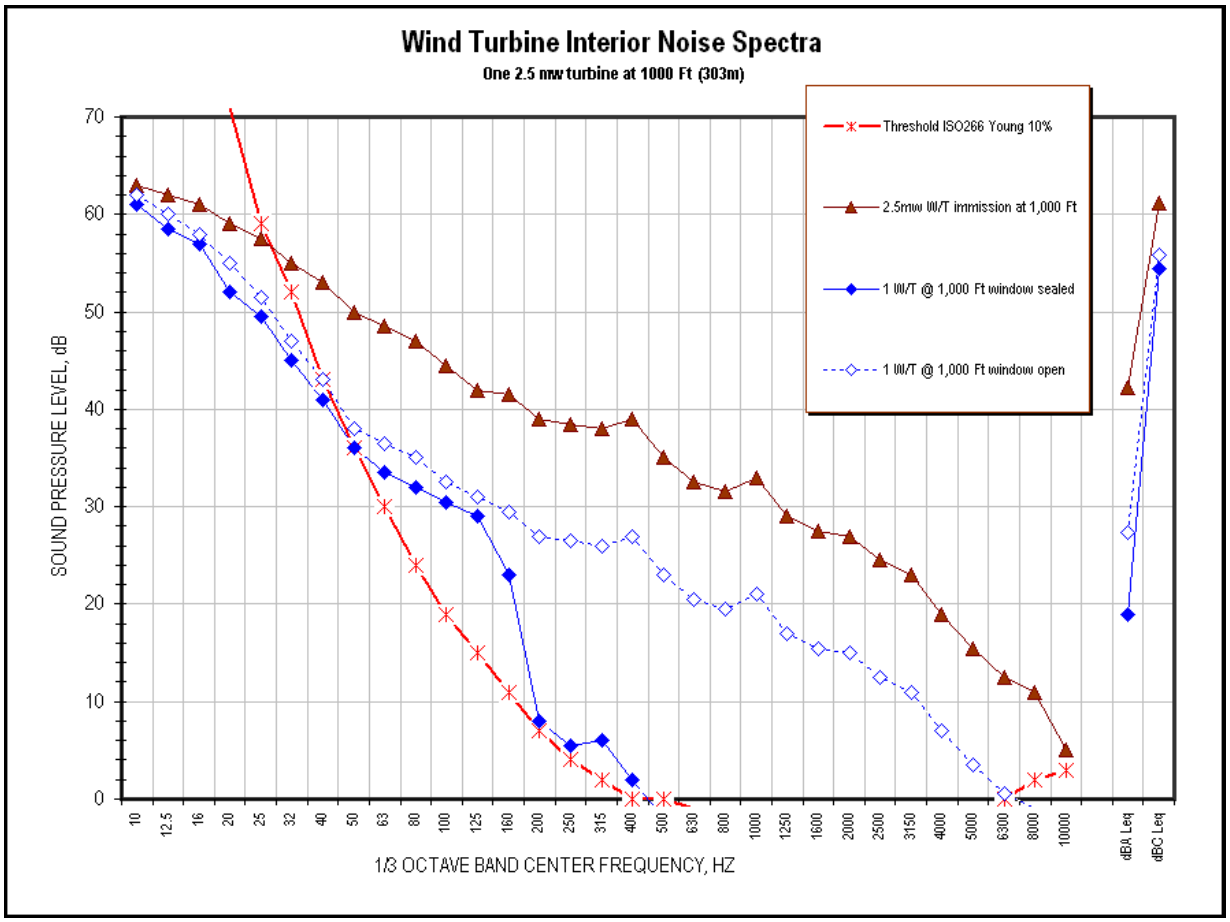

Figure 3-A Single Wind Turbine Sound Inside Home @ 1000 Feet

The usual assumption about wall and window attenuation being 15 dBA or more, which is valid for most sources of community noise, may not be sufficiently protective given the relatively high amplitude of the wind turbines' low frequency immission spectra. Figures 2 and 3 demonstrate the basis for this concern.

To demonstrate the effects of outdoor low frequency content from wind turbines we prepared Figure 1 showing the effect of a single turbine (propagation model based on sound power level test data) at 1000 feet and then in Figure 4 projected the impact of ten (10) similar turbines at one (1) mile. We applied the façade sound isolation data from the Canada Research Council to the wind turbine example used in our Noise-Con 2008 paper and shown in Figure 1 above. The graphs each show the outdoor sound pressure levels predicted for the distance of 1000 feet and one mile as the upper graph line respectively. The curve showing the threshold of human perception for sounds at each 1/3 octave band center is also plotted. When the graphs representing wind turbine sound have data points above this threshold curve the sounds will be perceptible to at least 10% of the population (which includes most children).

In addition to the top graph line representing the sounds outside the home there are two other graph lines for the sounds inside the home[15]. One curve represents the condition of no open windows and the other represents one open window.

With just one turbine at 1,000 feet there is a significant amount of low frequency noise above hearing threshold within rooms having exterior walls without windows or very well sealed windows. Even with the windows closed the sound pressure levels in the 63 Hz to 200 Hz one-octave bands still exceed the perception curve, in many cases by more than 10 dB. Note the perceptible sound between 50 and 200 Hz with a wall resonance frequency at 125 Hz (2 X 4 studs on 16 inch centers) for the "windows closed" condition. This would be perceived as a constant low rumble, which would be present inside homes whenever the turbines are operating.

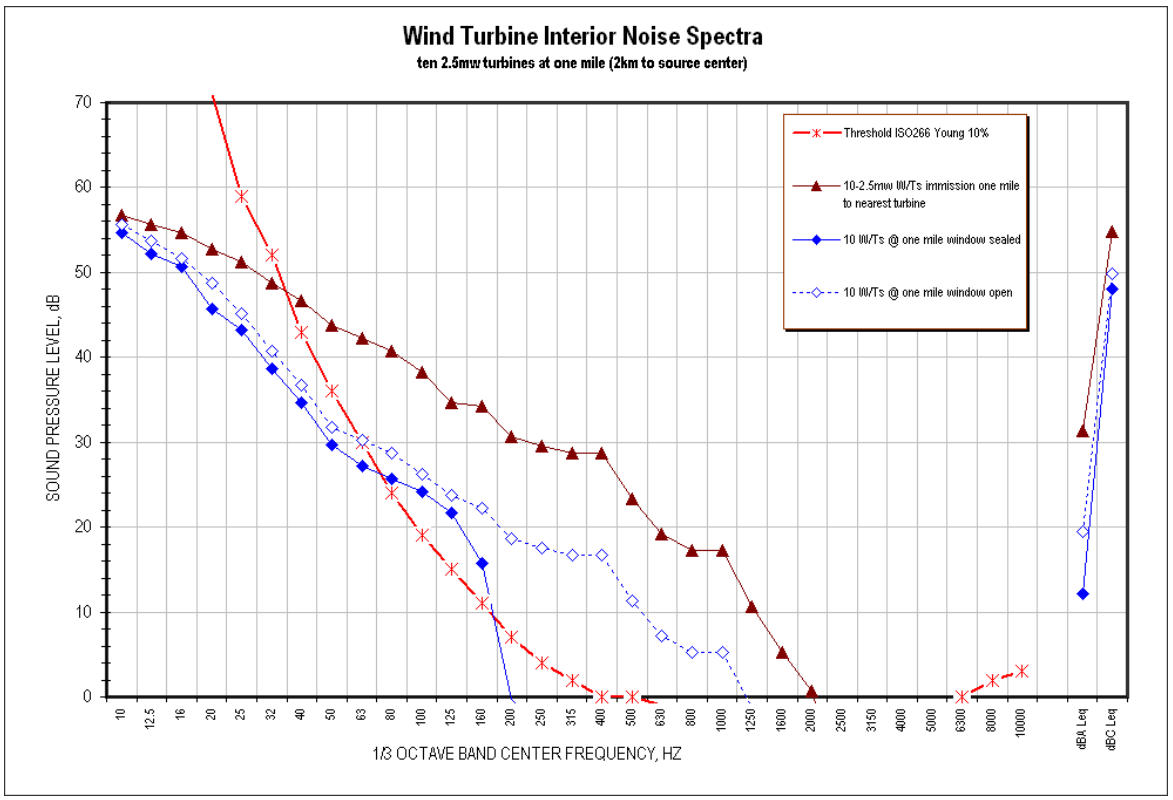

Figure 4-Sound from Ten (10) Wind Turbines inside home at One Mile

When comparing the dBC values the difference between inside sounds and outside is much less. The maximum difference in this example is only 7 dBC and that is for the situation with windows closed. With windows open the sound inside the home would be 56 dBC while it is 61 dBC outside; a difference of only 5 dBC[16],[17],[18]. If we looked only at dBA it would appear that the home's

[15] The typical wood stud exterior used in modern home construction is vinyl siding over 1/2 inch OSB or rigid fiberglass board applied to 2 X 4 studs with the stud space filled with thermal and 1/2 inch gypsum board applied on the exposed interior side. This has a mass of about 3-4 lbs/sq ft and low 26 STC.

[16] The basis for these predictions includes reports on aircraft sound insulation for dwellings and façade sound isolation data from the Canada Research Council.

[17] "On the sound insulation of wood stud exterior walls" by J. S. Bradley and J. S. Birta, institute for Research in Construction, National Research Council, Montreal Road, Ottawa K1A 0R6, Canada, published: J.Acoust. Soc. Am. 110 (6), December 2001

walls and roof provide a reduction of 15 dBA or more. But, that that would be misleading because it ignores the effects of low frequency sound.

We next increased the number of 2.5 Mw turbines from one to ten and moved the receiver one mile from the closest turbine. We assumed the acoustic center for the ten turbines to be 2km (1-1/4 miles) from the receiver. These results are presented in Figure 4. We were surprised to find that the one mile low frequency results are only 6.3 dB below the 1,000 foot one turbine example.

There is one other characteristic of wind turbine sound that increases the sleep disturbance potential above that of other long-term noise sources. The amplitude modulation of the sound emissions from the wind turbines create a repetitive rise and fall in sound levels synchronized to the blade rotation speed. Many common weather conditions increase the magnitude of amplitude modulation. Most of these occur at night. The graph in Figure 5 shows this effect in the first floor bedroom of a farm home in the U.K. The home is located 930 meters (3,050 feet) from the nearest turbine. The conditions documented by an independent acoustical consultant show the sound level varying over 9 dBA range from 28 to 37 dBA. The pattern repeats approximately every second often for hours at a time. For many people, especially seniors, children and those with pre-existing medical conditions, this represents a major challenge to restful sleep.

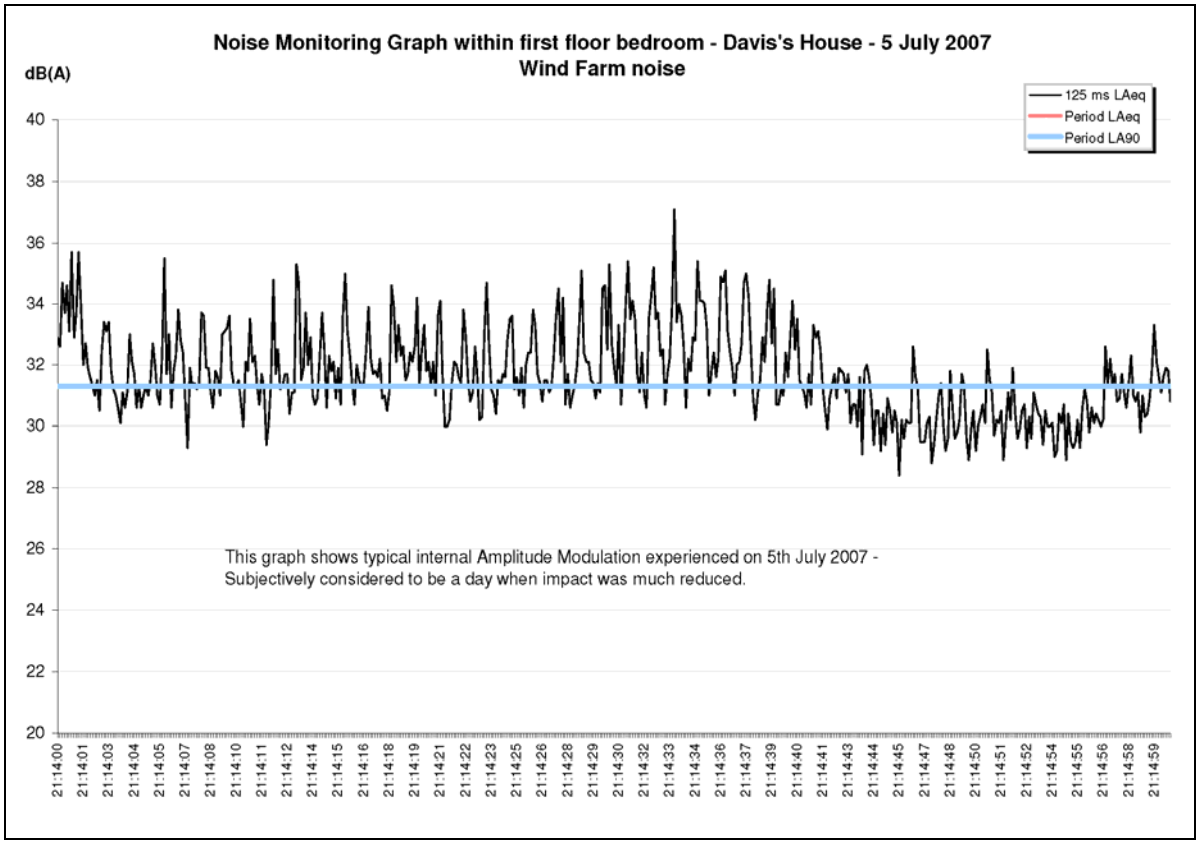

Figure 5- Amplitude modulation in a home 930 meters (3000 feet) from the nearest turbine.[19]

This may explain why some residents as far as two (2) miles from a wind farm find the wind turbines sounds highly annoying. It also demonstrates the primary reason why relying on dBA

[18] Dan Hoffmeyer, Birger Plovsing: "Low Frequency Noise from Large Wind Turbines, Measurements of Sound Insulation of Facades." Journal no. AV 1097/08, Client: Danish Energy Authority, Amaliegade 44, 1256 Copenhagen

[19] This chart used with permission of Mike Stigwood, MIOA, FRSH, MAS Environmental, U.K. and the Davis family.

alone will not work for community noise criteria. It is the low frequency phenomena associated with wind turbine emissions that makes the dBC test criteria an important part of the proposed criteria[20].

III. Development of Siting Criteria

Basis For Using L_{A90} To Determine Pre-Construction Long-Term Background Sound

We began our research into guidelines for proper siting by reviewing guidelines used in other countries to limit WT sound emissions. A recent compendium of these standards was presented in the report "Wind Turbine Facilities Noise Issues."[21] We found common ground in many of them. Some set explicit not-to-exceed sound level limits, for example, in Germany, 40 dBA nighttime in residential areas and 35 dBA nighttime in rural and other noise-sensitive areas. Other countries use the existing background sound levels for each community as the basis for establishing the sound level limits for the WES project. This second method has the advantage of adjusting the allowable limits for various background soundscapes. It makes use of a standard method for assessing background sound levels by measuring over a specified period of observation to determine the sound level exceeded 90% of the time (L_{90}) during the night. The night is important because it is the most likely time for sleep disturbance. Then, using the background sound level as the base, the WES project is allowed to increase it by 5 dBA. It is this second method (L_{90} + 5 dBA) that was adopted for the criteria in this document. It has the advantage of adjusting the criteria for each community without the need for tables of allowable limits for different community types. The focus is only on the nighttime criteria. This is because the WES will operate 24 hours a day and the nighttime limits will be the controlling limits whether or not there are other limits for daytime.

Wind turbine noise is more annoying than other noises and needs lower limits

Since many rural communities are very quiet, it is possible that some will have L_{90} values of 25 dBA or lower. This may seem extreme when compared to limits usually imposed on other sources of community noise. However, wind turbine sounds are not comparable to the more common noise sources of vehicles, aircraft, rail, and industry. Several studies have shown that annoyance to wind turbine sounds begins at levels as low as 30 dBA.[22] This is especially true in quiet rural communities that have not had previous experience with industrial noise sources. This increased sensitivity may be due to the periodic 'swoosh' from the blades in the quiet rural soundscape, or it may be more complex. In either case, it is a legitimate response to wind turbine sound documented in peer-reviewed research.

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[20] Hessler Jr., George F., "Proposed criteria in residential communities for low-frequency noise emissions from industrial sources," 52(4), 179-185, (July-Aug 2004)

[21] Ramani Ramakrishnan, Ph.D., P. Eng., "Wind Turbine Facilities Noise Issues," December 2007. Prepared for the Ontario Ministry of Environment.

[22] Eja Pedersen, "Human response to wind turbine noise: perception, annoyance and moderating factors." Dissertation, Occupational and Environmental Medicine, Department of Public Health and Community Medicine, Goteborg University, Goteborg, Sweden, 2007, and

Van den Berg F, Pedersen E, Bouma J, and Bakker R, Wind Farm Perception, Final Report Project no. 044628, University of Gothenburg and Medical Center Groningen, Netherlands June 3, 2008

Noise criteria need to take into account low frequency noise

In the table to the right are a series of observations and recommendations by the World Health Organization (WHO) supporting the need for stricter limits when there is substantial low frequency content in outdoor sound. Our review of other studies, and our own measurements, has demonstrated that wind turbine sound includes considerable low frequency content. We include a dBC limit in our guidelines to address the WHO recommendation that when low frequency sound may be present, criteria based on measurements using a C-weighting filter on the sound level meter (dBC) are needed in addition to dBA criteria.

The World Health Organization recognizes the special place of low frequency noise as an environmental problem. Its publication "Community Noise" (Berglund et al., 2000) makes a number of references to low frequency noise, some of which are as follows:

- "It should be noted that low frequency noise… can disturb rest and sleep even at low sound levels.
- For noise with a large proportion of low frequency sounds a still lower guideline (than 30dBA) is recommended.
- When prominent low frequency components are present, noise measures based on A-weighting are inappropriate.
- Since A-weighting underestimates the sound pressure level of noise with low frequency components, a better assessment of health effects would be to use C-weighting.
- It should be noted that a large proportion of low frequency components in a noise may increase considerably the adverse effects on health."

WHO also states: "The evidence on low frequency noise is sufficiently strong to warrant immediate concern."

Available at http://www.who.int/docstore/peh/noise/guidelines2.html, References found at pages ix, xii through xv and others.

IV. Proposed Sound Limits

The simple fact that so many residents complain of low frequency noise from wind turbines is clear evidence that the single A-weighted (dBA) noise descriptor used in most jurisdictions for siting turbines is not adequate. The only other simple audio frequency weighting that is standardized and available on sound level meters is C-weighting or dBC. A standard sound level meter set to measure dBA is increasingly less sensitive to low frequency below 500 Hz (one octave above middle-C). The same sound level meter set to measure dBC is equally sensitive to all frequencies above 32 Hz (lowest note on grand piano). It is generally accepted that dBC readings are more predictive of perceptual loudness than dBA readings if low frequency sounds are significant.

We are proposing to use the commonly accepted dBA criteria that is based on the pre-existing background sound levels allowing the wind turbine development to increase this by 5 dB (e.g. L_{90A} +5) by the audible sounds from wind turbines. According to the New York State Energy Research & Development Authority:

- "… A change in sound level of 5 dB will typically result in a noticeable community response; and
- "… A 10 dB increase is subjectively heard as an approximate doubling in loudness, and almost always causes an adverse community response." [23]

To address the lower frequencies that are not considered in A-weighted measurements we are proposing to add limits based on dBC that follow the same scheme as used for dBA limits. The Proposed Sound Limits are presented in the text box at the end of this section.

For the current industrial grade wind turbines in the 1.5 to 3 MWatt (or over) range, the addition of the dBC requirement may result in an increased distance between wind turbines and the nearby

[23] (*Wind Energy Development: A Guide for Local Authorities in New York*; page 30; New York State Energy Research & Development Authority, Albany, NY October 2002)

residents. For the conditions shown in Figure 1, the distances would need to be increased significantly. This would result in setbacks in the range of 1 km or greater for the current generation of wind turbines if they are to be located in rural areas with little or no low frequency sound from man-made noise sources and where the L_{A90} background sound levels are 30 dBA or lower. In areas with higher background sound levels, turbines could be located somewhat closer, but still at a distance greater than the 305 m (1000 ft.) or smaller setbacks commonly seen in U.S. based wind turbine standards set by many states and used for wind turbine developments.

Following are some additional Questions and Answers that summarize the major points of this discussion relevant to criteria.

What are the typical wind farm noise immission criteria or standards? Limits are not consistent and may vary even within a particular country. Examples are listed above in the section on Results of Literature and Sound Studies.

What is a reasonable wind farm sound immission limit to protect the health of residences? We are proposing a not-to-exceed immission limit of 35 L_{Aeq} and a site-specific limit of L_{A90} + 5 dBA at the closest property line, whichever is exceeded first. We also propose the use of C-weighted criteria to address complaints of wind turbine low frequency noise. For the C-weighted criteria, we propose a site-specific limit of L_{C90} + 5 dBC. We also require that the site-specific L_{Ceq} (dBC) sound level at a receiving property line not exceed the pre-existing L_{A90} dB background sound level + 5dB by more than 20 dB. In other words, the dBC operating immission limit (as L_{Ceq}) at the receiving property line should not be more than 20 dB above the measured dBA (as L_{A90}) pre-construction long-term background sound level + 5dB.[24] This criterion prevents an Immission Spectra Imbalance that often leads to complaints about rumble or other low frequency problems. We also include a not-to-exceed immission limit of 55 and 60 L_{Ceq} at the receiving property line.[25] Use of the multiple metrics and weightings will address the audible and inaudible low frequency portions of wind turbine sound emissions. Exceedances of any of the limits establish non-compliance.

Why should the dBC immission limit not be permitted to be more than 20 dB above the background measured L_{A90}+5 dB? The World Health Organization and others[26] have determined that if a noise has a measured difference between dBC and dBA more than 20 dB, the noise is highly likely to create an annoyance because of the low frequency component.

Isn't L_{A90} the <u>minimum</u> background noise level? Not exactly. This is the sound level that represents the quietest 10% of the time. It is often considered to be the sound level that represents the sounds one hears late in the evening or at night when there are no near-by or short term sounds present. It is very important to establish this "long term background" noise environment at the property line for a potentially impacted residence (L_{A90}) during the **quietest** sleeping hours of the night, between 10 p.m. and 4 a.m.. Why? Because nighttime sleep disturbance has generated the majority of wind farm noise complaints throughout the world those conditions should guide the design of wind projects. ANSI standards define the "long term background sound" as excluding all short term sounds from the test sample using carefully selected sampling times and conditions using ten (10) minute long samples. This means that nature sounds not present during all seasons and wind noise are not to be included in the measurement. Following the procedures in ANSI S12.9, Part 3 for long term background sound the L_{A90} and L_{C90} can be measured with one or more 10-minute

[24] Hessler Jr., George F., Proposed criteria in residential communities for low-frequency noise emissions from industrial sources, Noise Control Engineering Journal; 52(4), pg. 180 in "2. Purpose of Proposed Criteria," (July-Aug 2004)
[25] Ibid, pg. 180 in "3. Proposed Criteria."
[26] Ibid

measurements during any night when the atmosphere is classified as stable with a light wind from the area of the proposed wind farm. The basis for the immission limits for the proposed wind farm would then be the Nighttime Immission Limits, which we propose to be the minimum ten (10) minute nighttime L_{A90} and L_{C90} plus 5 dB, a test for Spectra Imbalance, and not-to-exceed limits for the period of 10 p.m. to 7 a.m. Daytime Limits (7 a.m. to 10 p.m.) could be set using daytime measurements, but unless the wind utility only operates during the day, the nighttime limit will always be the limiting sound level. Thus, daytime limits are not normally needed.

A nearby industrial scale wind utility meeting these noise immission criteria would occasionally be audible to the residents during nighttime and daytime. However, it would be unlikely for it to be an indoor problem.

The method used for establishing the background sound level at a proposed wind farm in many of the studies in Table 1, does not meet the requirements set by ANSI S12.9 Part 3 for outdoor measurements and determination of long-term background sound levels. Instead, they use unattended noise monitors to record hundreds of 10-minute or one-hour un-observed measurements that include the short term sounds from varying community and wind conditions over a period of days or weeks. The results for daytime and nighttime are usually combined to determine the average wind noise at the microphone as a function of wind velocity measured at a height of ten (10) meters. This provides an enormous amount of data, but the results have little relationship to wind turbine sound immissions or to potential for turbine noise impacts on nearby residents. They also do not comply with ANSI standards for methodology or quality and as such are not suitable for use in measurements that will be used to assess compliance with other standards and guidelines. This exhaustive exercise often only demonstrates how much 'pseudo-noise' is generated by instruments located in a windy environment that exceeds the capability of the instrument's wind screen to protect the microphone. In many cases, this unqualified data is used to support a claim that the wind noise masks the turbines' sound immissions.

The major complaints of residents living near wind farms is sleep disruption at night when there is little or no wind near ground level and the wind turbines located at a much higher elevation are turning and generating near or at maximum power and maximum noise emission. There is usually more surface wind and turbulence during daytime caused by solar radiation. Thus, the use of averaged data involving one or more 24-hour periods is of little value in predicting conditions that will result in people who cannot sleep in their homes during the night because of loud intrusive wind turbine noise.

The methodology used to predict the sound propagation from the turbines into the community also fails to represent the conditions of maximum turbine noise impact on nearby residents. This should be expected given the limitations of models based on ISO 9613-2[27]. They also do not consider the effects of a frequent nighttime condition when winds at the ground are calm and the winds at the hub are at or above nominal operating speed. This condition is often referred to as a "stable" atmosphere. During this condition, the wind turbines can be producing the maximum or near maximum power while the wind at ground level is calm and the background noise level is low. The Michigan rural night test data in the earlier figure shows how quiet a night can be in the absence of wind at the ground. This common condition is known to directly cause chronic sleep

[27] The ISO 9613-2 sound propagation model formulas have known errors of 3 dB even when the conditions being modeled are a perfect match to the limiting conditions specified in the standard. Wind turbines operate far outside the limits for wind speed, height of the noise source above the ground, and other factors identified in the standard thus increasing the likelihood for error above the specified 3 dB. In addition, there are known measurement errors in the IEC61400-11 test that add another 2 dB of uncertainty to the model's predictions.

disruption. Further, the studies report average sound levels and do not disclose the effects of amplitude modulation or low frequency sound which makes the turbine's sound more objectionable and likely to cause sleep problems.

Are there additional noise data to be recorded for a pre-wind turbine noise survey near selected dwellings? Yes. The precision measuring sound level meter(s) need to be programmed to include measurement of L_{Aeq}, L_{A10}, L_{A90}, L_{Ceq}, L_{C10}, and L_{C90}, with starting time and date for each 10-minute sample. The L_{10} results will be used to validate the L_{90} data. For example, on a quiet night one might expect L_{10} and L_{90} to show similar results within 5 to 10 dB between L_{10} and L_{90} for each weighting scale. On a windy night or one with nearby short term noise sources the difference between L_{10} and L_{90} may be more than 20 dB. There is also often a need to obtain a time-averaged, one-third octave band analysis over the frequency range from 6.3 Hz to 10 kHz during the same ten minute sample. The frequency analysis is very helpful for identifying and correcting for extraneous sounds such as interfering insect noise. An integrating averaging sound level meter meeting ANSI or IEC Type 1 standards has the capability to perform all of the above acoustic measurements simultaneously and store the results internally. There is also a requirement for measurement of the wind velocity near the sound measurement microphone continuously throughout each 10-minute recorded noise sample. The 10-minute maximum wind speed near the microphone must be less than 2 m/s (4.5 mph) during measurements of background noise (L_{90}), and the maximum wind speed for noise measurements during turbine operation must be less than 4 m/s (9 mph). Measurements should be observed (without contaminating the data) and notes identifying short-term noises should be taken for these tests.

Is there a need to record weather data during the background noise recording survey? One weather monitor is required at the proposed wind farm on the side nearest the residents. The weather station sensors are at the standard 10 meter height above ground. It is critical that the weather be recorded every 10 minutes, synchronized with the clocks in the sound level recorders without ambiguity, at the start and end time of each 10 minute period. The weather station should record wind speed and direction, temperature, humidity and rain.

Why do Canada and some other countries base the permitted wind turbine noise immission limits on the operational wind velocity at the 10m height wind speed instead of a maximum dBA or L_{90} + 5 dBA immission level? First, it appears that the wind turbine industry will take advantage of every opportunity to elevate the maximum permitted noise immission level to reduce the setback distance from the nearby dwellings. Including wind as a masking source in the criteria is one method for elevating the permissible limits. The background noise level does indeed increase with surface wind speed. When this happens, it can be argued that the increased wind noise provides some masking of wind turbine noise. However, this is not true if the surface winds are calm. After sunset, when the ground cools (e.g. in the middle of the night), the lower level atmosphere can separate from the higher-level atmosphere. Then, the winds at the ground will be calm while wind at the turbine hub is very strong. Under this condition, the wind velocity at a 10-meter high wind monitoring station (such as those often used for weather reporting) may be ¼ to ½ the speed of the wind at the hub, yet drop to calm at ground level. The result is that no ground level wind noise is present to mask the sound of the wind turbines, which can be operating at or close to full capacity.

This condition is one of the major causes of wind turbine related noise complaints for residents within 3 km (1.86 miles) of a wind farm. When the turbines are producing high sound levels, it is quiet outside the surrounding homes. The PhD thesis of G.P. van den Berg, *The Sounds of High*

Winds, is very enlightening on this issue (Table 3). See also the letter by John Harrison in Ontario "On Wind Turbine Guidelines.[28]"

What sound monitor measurements would be needed for enforcement of the wind turbine sound ordinance? A similar set of sound tests using the ten (10) minute series of measurements would be repeated, with and without the operation of the wind turbines, at the location where noise was measured before construction, which is closest to the resident registering the wind turbine noise complaint. If the nighttime background (L_{90}) noise level (turbines off) was found to be slightly higher than the measured background prior to the wind farm installation, then the results with the turbines operating must be corrected using standard acoustical engineering methods to determine compliance with the pre-turbine established sound limits.

Who should conduct the sound measurements? An independent acoustics expert should be retained who reports to the County Board or other responsible governing body. This independent acoustics expert should be responsible for all the acoustic measurements including setup and calibration of instruments and interpretation of recorded results. He or she should perform all pre-turbine background noise measurements and interpretation of results to establish the nighttime (and daytime, if applicable) industrial wind turbine sound immission limits, and to monitor compliance.

At present, the acoustical consultants are retained by, and work directly for, the wind farm developers. This presents a serious problem with conflict of interest on the part of the consultants. The wind farm developer would like to show that a significant amount of wind noise is present to mask the sounds of the wind turbine immissions. The community is looking for authentic results showing that the wind turbine noise will be only barely perceptible, and then only occasionally, during the night or daytime.

Is frequency analysis required either during the pre-construction background noise survey or for compliance measurements? Normally one-third octave or narrower band analysis would only be required if there is a complaint of tones immission from the wind farm. Although only standardized dBA and dBC measurements are required to meet the proposed criteria, the addition of one-third octave band analysis is often useful to validate the dBA and dBC results.

The following summarizes the criteria necessary when siting wind turbines to minimize the risk of adverse impacts from noise on the adjacent community[29]. For those not familiar with acoustical annotation the table and its formulas may seem overly complex, but the criteria are defined in this manner to be as unambiguous as possible. They will be clear for those who are familiar with acoustical terminology. Definitions are provided in a later section of this essay.

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[28] Harrison, J., *Wind Turbine Guidelines,* available at http://amherstislandwindinfo.com/

[29] The authors have based these criteria, procedures, and language on their current understanding of wind turbine sound emissions, land-use compatibility, and the effects of sound on health. However, use of the following, in part or total, by any party is strictly voluntary and the user assumes all risks. Please seek professional assistance in applying the recommendations of this document to any specific community or WES development.

NOISE CRITERIA FOR SITING WIND TURBINES TO PREVENT HEALTH RISKS[29]

1. Establishing Long-Term Background Noise Level

a. Instrumentation: ANSI or IEC Type 1 Precision Integrating Sound Level Meter plus meteorological instruments to measure wind velocity, temperature and humidity near the sound measuring microphone. Measurement procedures must meet ANSI S12.9, Part 3 except as noted in Section 4. below.

b. Measurement location(s): Nearest property line(s) from proposed wind turbines representative of all non-participating residential property within 2.0 miles.

c. Time of measurements and prevailing weather: The atmosphere must be classified as stable with no vertical heat flow to cause air mixing. Stable conditions occur in the evening and middle of the night with a clear sky and very little wind near the surface. Sound measurements are only valid when the measured wind speed at the microphone is less than 2 m/s (4.5 mph).

d. Long-Term Background sound measurements: All data recording shall be a series of contiguous ten (10) minute measurements. The measurement objective is to determine the quietest ten minute period at each location of interest. Nighttime test periods are preferred unless daytime conditions are quieter. The following data shall be recorded simultaneously for each ten (10) minute measurement period: dBA data includes L_{A90}, L_{A10}, L_{Aeq} and dBC data includes L_{C90}, L_{C10}, and L_{Ceq}. Record the maximum wind speed at the microphone during the ten minutes, a single measurement of temperature and humidity at the microphone for each new location or each hour whichever is oftener shall also be recorded. A ten (10) minute measurement contains valid data provided: Both L_{A10} minus L_{A90} and L_{C10} minus L_{C90} are not greater than 10 dB and the maximum wind speed at the microphone is less than 2 m/s during the same ten (10) minute period as the acoustic data.

2. Wind Turbine Sound Immission Limits

No wind turbine or group of turbines shall be located so as to cause wind turbine sound immission at any location on non-participating property containing a residence in excess of the limits in the following table:

Table of Not-To-Exceed Property Line Sound Immission Limits [1]			
Criteria	**Condition**	**dBA**	**dBC**
A	Immission above pre-construction background:	$L_{Aeq} = L_{A90} + 5$	$L_{Ceq} = L_{C90} + 5$
B	Maximum immission:	35 L_{Aeq}	55 L_{Ceq} for quiet[2] rural environment 60 L_{Ceq} for rural-suburban environment
C	Immission spectra imbalance	L_{Ceq} (immission) minus (L_{A90} (background) +5) $\leq$ 20 dB	
D	Prominent tone penalty:	5 dB	5 dB
Notes			
1	Each Test is independent and exceedances of any test establishes non-compliance. Sound "immission" is the wind turbine noise emission as received at a property.		
2	A "Quiet rural environment" is a location >2 miles from a major transportation artery without high traffic volume during otherwise quiet periods of the day or night.		
3	Prominent tone as defined in IEC 61400-11. This Standard is not to be used for any other purpose.		

[1] Procedures provided in Section 7. Measurement Procedures (ANSI 12.9 Part 3 with Amendments) of the most recent version of "**The How To Guide To Siting Wind Turbines To Prevent Health Risks From Sound**" by Kamperman and James and the apply to this table.

3. Wind Farm Noise Compliance Testing

All of the measurements outlined above in 1. Establishing Nighttime Background Noise Level must be repeated to determine compliance with 2. Wind Turbine Sound Immission Limits. The compliance test location is to be the pre-turbine background noise measurement location nearest to the home of the complainant in line with the wind farm and nearer to the wind farm. The time of day for the testing and the wind farm operating conditions plus wind speed and direction must replicate the conditions that generated the complaint. Procedures of ANSI S12.9- Part 3 apply except as noted in Section 4. The effect of instrumentation limits for wind and other factors must be recognized and followed.

4. ANSI S12.9 Part 3 Selected Options and Requirement Amendments

For measurements taken to assess the preceding criteria specific options provided for in ANSI S12.9-Part 3 (2008) shall be followed along with any additional requirements included below:

5.2 Background Sound: Use definition (1): 'long-term'

5.2 long-term background sound: The L_{90} excludes short term background sounds

5.3 basic measurement period: Ten (10) minutes $L_{90(10\ min)}$

5.6 Sound Measuring Instrument: Type 1 Precision meeting ANSI S1.43 or IEC 61672-1. The sound level meter shall cover the frequency range from 6.3 Hz to 20k Hz and simultaneously measure dBA L_N and dBC L_N. The instrument must also be capable of accurately measuring low-level background sounds down to 20 dBA.

6.5 Windscreen: Required

6.6(a) An anemometer accurate to ± 10% at 2m/s to full-scale accuracy. The anemometer shall be located 1.5 to 2 meters above the ground and orientated to record maximum wind velocity. The maximum wind velocity, wind direction, temperature and humidity shall be recorded for each ten (10) minute sound measurement period observed within 5 m. of the measuring microphone.

7.1 Long-term background sound

7.2 Data collection Methods: Second method with observed samples to avoid contamination by short term sounds (purpose: to avoid loss of statistical data)

8. Source(s) Data Collection: All requirements in ANSI S12.18 Method #2, Precision to the extent possible while still permitting testing of the conditions that lead to complaints. The meteorological requirements in ANSI S12.18 may not be applicable for some complaint tests. For sound measurements in response to a complaint, the compliance sound measurements should be made under conditions that replicate the conditions that caused the complaint without exceeding instrument and windscreen limits and tolerances.

8.1(b) Measuring microphone with windscreen shall be located 1.2m to 1.8m (1.5 preferred) above the ground and greater than 8 m. from large sound reflecting surface.

8.3(a) All meteorological observations required at both (not either) microphone and nearest 10 m. weather reporting station.

8.3(b) For a ten (10) minute background sound measurement to be valid the wind velocity shall be less then 2m/s (4.5 mph) measured less than 5 m. from the microphone. Compliance sound measurements shall be taken when winds are less than 4m/s at the microphone.

8.3(c) In addition to the required acoustic calibration checks, the sound measuring instrument internal noise floor, including microphone, must also be checked at the end of each series of ten minute measurements and no less frequently than once per day. Insert the microphone into the acoustic calibrator with the calibrator signal off. Record the observed dBA and dBC reading on the sound level meter to determine an approximation of the instrument self noise. Perform this test before leaving the background measurement location. The calibrator-covered microphone must demonstrate the results of this test are at least 5 dB below the immediately previous ten (10) minute acoustic test results, for the acoustic background data to be valid. This test is necessary to detect undesired increase in the microphone and sound level meter internal self-noise. As a precaution sound measuring instrumentation should be removed from any air conditioned space at least an hour before use. Nighttime measurements are often performed very near the meteorological dew point. Minor moisture condensation inside a microphone or sound level meter can increase the instrument self noise and void the measured background data.

8.4 The remaining sections, starting at 8.4 in ANSI S12.9 Part 3 Standard do not apply.

V. How to Include the Recommended Criteria in Ordinances and/or Community Noise Limits

The following two sections present the definitions, technical requirements, and complaint resolution processes that support the recommended criteria. Following the formal elements is a section discussing the measurement procedures and requirements for enforcement of these criteria. For the purpose of the following sections the government authority will be referred to as the Local Government Authority (LGA) as a place marker for State, County, Township or other authorized authority. The abbreviation 'WES' is used for industrial scale wind energy system.

The authors have based these criteria, procedures, and language on their current understanding of wind turbine sound emissions, land-use compatibility, and the effects of sound on health. However, use of the following, in part or total, by any party is strictly voluntary and the user assumes all risks. Please seek professional assistance in applying the recommendations of this document to any specific community or WES development.

VI. ELEMENTS OF A WIND ENERGY SYSTEMS LICENSING ORDINANCE FOR SOUND

I. Purpose and Intent.

Based upon the findings stated above, it is the intended purpose of the LGA to regulate Wind Energy Systems to promote the health, safety, and general welfare of the citizens of the Town and to establish reasonable and uniform regulations for the operation thereof so as to control potentially dangerous effects of these Systems on the community.

II. Definitions.

The following terms have the meanings indicated:

"**Aerodynamic Sound**" means a noise that is caused by the flow of air over and past the blades of a WES.

"**Ambient Sound"** Ambient sound encompasses all sound present in a given environment, being usually a composite of sounds from many sources near and far. It includes intermittent noise events, such as, from aircraft flying over, dogs barking, wind gusts, mobile farm or construction machinery, and the occasional vehicle traveling along a nearby road. The ambient also includes insect and other nearby sounds from birds and animals or people. The near-by and transient events are part of the ambient sound environment but are not to be considered part of the long-term background sound.

"American National Standards Institute (ANSI)" Standardized acoustical instrumentation and sound measurement protocol shall meet all the requirements of the following ANSI Standards:

ANSI S1.43 Integrating Averaging Sound Level Meters: Type-1 (or IEC 61672-1)

ANSI S1.11 Specification for Octave and One-third Octave-Band Filters (or IEC 61260)

ANSI S1.40 Verification Procedures for Sound Calibrators

ANSI S12.9 Part 3 Procedures for Measurement of Environmental Sound

ANSI S12.18 Measurement of Outdoor Sound Pressure Level

IEC 61400-11 Wind turbine generator systems –Part 11: Acoustic noise measurements

"**Anemometer**" means a device for measuring the speed and direction of the wind.

"**Applicant**" means the individual or business entity that seeks to secure a license under this section of the Town municipal code.

"**A-Weighted Sound Level (dBA)**" A measure of over-all sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. It is used to describe sound in a manner representative of the human ear's response. It reduces the effects of the low with respect to the frequencies centered around 1000 Hz. The resultant sound level is said to be "A-weighted" and the units are "dBA." Sound level meters have an A-weighting network for measuring A-weighted sound levels (dBA) meeting the characteristics and weighting specified in ANSI Specifications for Integrating Averaging Sound Level Meters, S1.43-1997 for Type 1 instruments and be capable of accurate readings (corrections for internal noise and microphone response permitted) at 20 dBA or lower. In this document dBA means L_{Aeq} unless specified otherwise.

"**Background Sound (L_{90})**" refers to the sound level present at least 90% of the time. Background sounds are those heard during lulls in the ambient sound environment. That is, when transient sounds from flora, fauna, and wind are <u>not</u> present. Background sound levels vary during different times of the day and night. Because WES operates 24/7 the background sound levels of interest are those during the quieter periods which are often the evening and night. Sounds from the WES of interest, near-by birds and animals or people must be excluded from the background sound test data. Nearby electrical noise from streetlights, transformers and cycling AC units and pumps etc must also be excluded from the background sound test data.

Background sound level (dBA and dBC (as L_{90})) is the sound level present 90% of the time during a period of observation that is representative of the quiet time for the soundscape under evaluation and with duration of ten (10) continuous minutes. Several contiguous ten (10) minute tests may be performed in one hour to determine the statistical stability of the sound environment. Measurement periods such as at dusk when bird and insect activity is high or the early morning hours when the 'dawn chorus' is present are not acceptable measurement times. Longer term sound level averaging tests, such as 24 hours or multiple days are not at all appropriate since the purpose is to define the quiet time background sound level. It is defined by the $L_{A\,90}$ and $L_{C\,90}$ descriptors. It may be considered as the quietest one (1) minute during a ten (10) minute test. $L_{A\,90}$ results are valid only when $L_{A\,10}$ results are no more than 10 dB above $L_{A\,90}$ for the same period. $L_{C\,10}$ less $L_{C\,90}$ are not to exceed 10 dB to be valid.

The background noise environment consists of a multitude of distant sources of sound. When a new nearby source is introduced the new background noise level would be increased. The addition of a new source with a noise level 10 below the existing background would increase the new background 0.4 dB. If the new source has the same noise level as the existing background then the new background is increased 3.0 dB. Lastly, if the new source is 3.3 dB above the existing background then the new background would have increased 5 dB. For example, to meet the requirement of L_{90A} + 5 dB = 31 dBA if the existing quiet nighttime background sound level is 26 dBA, the maximum wind turbine noise immission contribution independent of the background cannot exceed 29.3 dBA L_{eq} at a dwelling. When adding decibels, a 26 dBA background combined with 29.3 dBA from the turbines (without background) results in 31 dBA.

Further, background L_{90} sound levels documenting the pre-construction baseline conditions should be determined when the ten (10) minute maximum wind speed is less than 2 m/s (4.5 mph) near ground level/microphone location 1.5 m height.

"**Blade Passage Frequency**" (BPF) means the frequency at which the blades of a turbine pass a particular point during each revolution (e.g. lowest point or highest point in rotation) in terms of

events per second. A three bladed turbine rotating at 28 rpm would have a BPF of 1.4 Hz. [E.g. ((3 blades times 28rpm)/60 seconds per minute = 1.4 Hz BPF)]

"**C-Weighted Sound Level (dBC)**" Similar in concept to the A-Weighted sound Level (dBA) but C-weighting does not de-emphasize the frequencies below 1k Hz as A-weighting does. It is used for measurements that must include the contribution of low frequencies in a single number representing the entire frequency spectrum. Sound level meters have a C-weighting network for measuring C-weighted sound levels (dBC)meeting the characteristics and weighting specified in ANSI S1.43-1997 Specifications for Integrating Averaging Sound Level Meters for Type 1 instruments. In this document dBC means L_{Ceq} unless specified otherwise.

"**Decibel (dB)**" A dimensionless unit which denotes the ratio between two quantities that are proportional to power, energy or intensity. One of these quantities is a designated reference by which all other quantities of identical units are divided. The sound pressure level (Lp) in decibels is equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 MicroPascals.

"**Emission**" Sound energy that is emitted by a noise source (wind farm) is transmitted to a receiver (dwelling) where it is immitted (see "immission).

"**Frequency**" The number of oscillations or cycles per unit of time. Acoustical frequency is usually expressed in units of Hertz (Hz) where one Hz is equal to one cycle per second.

"**Height**" means the total distance measured from the grade of the property as existed prior to the construction of the wind energy system, facility, tower, turbine, or related facility at the base to its highest point.

"**Hertz (Hz)**" Frequency of sound expressed by cycles per second.

"**Immission**" Noise immitted at a receiver (dwelling) is transmitted from noise source (wind turbine) that emitted sound energy (see "emission").

"Immission spectra imbalance" The spectra are not in balance when the C-weighted sound level is more than 20 dB greater than the A-weighted sound level. For the purposes of this requirement, the A-weighted sound level is defined as the long-term background sound level (L_{A90}) +5 dBA. The C-weighted sound level is defined as the L_{Ceq} measured during the operation of the wind turbine operated so as to result in its highest sound output. A Complaint test provided later in this document is based on the immission spectra imbalance criteria.

"**Infra-Sound**" sound with energy in the frequency range of 0-20 Hz is considered to be infra-sound. It is normally considered to not be audible for most people unless in relatively high amplitude. However, there is a wide range between the most sensitive and least sensitive people to perception of sound and perception is not limited to stimulus of the auditory senses. The most significant exterior noise induced dwelling vibration occurs in the frequency range between 5 Hz and 50 Hz. Moreover, levels below the threshold of audibility can still cause measurable resonances inside dwelling interiors. Conditions that support or magnify resonance may also exist in human body cavities and organs under certain conditions. Although no specific test for infrasound is provided in this document, the test for immission spectra imbalance will limit low frequency sound and thus, indirectly limit infrasound. See low-frequency noise (LFN) for more information.

"**Low Frequency Noise (LFN)**" refers to sounds with energy in the lower frequency range of 20 to 200 Hz. LFN is deemed to be excessive when the difference between a C-weighted sound level and an A-weighted sound level is greater than 20 decibels at any measurement point outside a residence or

other occupied structure. The criteria for this condition is the "Immission Spectra Imbalance" entry in the **Table of Not-To-Exceed Property Line Sound Immission Limits**."

"**Measurement Point (MP)**" means location where sound measurements are taken such that no significant obstruction blocks sound from the site. The Measurement Point should be located so as to not be near large objects such as buildings and in the line-of-sight to the nearest turbines. Proximity to large buildings or other structures should be twice the largest dimension of the structure, if possible. Measurement Points should be at quiet locations remote from street lights, transformers, street traffic, flowing water and other local noise sources.

"**Measurement Wind Speed**" For measurements conducted to establish the background noise levels ($L_{A90\ 10\ min}$, $L_{C90\ 10\ min}$, and etc.) the maximum wind speed, sampled within 5m of the microphone and at its height, shall be less than 2 m/s (4.5 mph) for valid background measurements. For valid wind farm noises measurements conducted to establish the post-construction sound level the maximum wind speed, sampled within 5m of the microphone and at its height, shall be less than 4m/s (9 mph). The wind speed at the WES blade height shall be at or above the nominal rated wind speed and operating in its highest sound output mode. For purposes of enforcement, the wind speed and direction at the WES blade height shall be selected to reproduce the conditions leading to the enforcement action while also restricting maximum wind speeds at the microphone to less than 4 m/s (9 mph).

For purposes of models used to predict the sound levels and sound pressure levels of the WES to be submitted with the Application, the wind speed shall be the speed that will result in the worst-case L_{Aeq} and L_{Ceq} sound levels at the nearest non-participating properties to the WES. If there may be more than one set of nearby sensitive receptors, models for each such condition shall be evaluated and the results shall be included in the Application.

"**Mechanical Noise**" means sound produced as a byproduct of the operation of the mechanical components of a WES(s) such as the gearbox, generator and transformers.

"**Noise**" means any unwanted sound. Not all noise needs to be excessively loud to represent an annoyance or interference.

"**Project Boundary**" means the external property boundaries of parcels owned by or leased by the WES developers. It is represented on a plot plan view by a continuous line encompassing all WES(s) and related equipment associated with the WES project.

"**Property Line**" means the recognized and mapped property parcel boundary line.

"**Qualified Independent Acoustical Consultant**" Qualifications for persons conducting baseline and other measurements and reviews related to the application for a WES or for enforcement actions against an operating WES include, at a minimum, demonstration of competence in the specialty of community noise testing. An example is a person with Full Membership in the Institute of Noise Control Engineers (INCE). There are scientists and engineers in other professional fields that have been called upon by their local community for help in the development of a WES Noise Ordinance. Many of these scientists and engineers have recently spent hundreds of hours learning many important aspects of noise related to the introduction of WES into their communities. Then with field measurement experience with background data and wind turbine noise emission, they have become qualified independent acoustical consultants for WES siting. Certifications such as Professional Engineer (P.E.) do not test for competence in acoustical principles and measurement and are thus not, without further qualification, appropriate for work under this document. The Independent Qualified Acoustical Consultant can have no financial or other connection to a WES developer or related company.

"**Sensitive Receptor**" means places or structures intended for human habitation, whether inhabited or not, public parks, state and federal wildlife areas, the manicured areas of recreational establishments designed for public use, including but not limited to golf courses, camp grounds and other nonagricultural state or federal licensed businesses. These areas are more likely to be sensitive to the exposure of the noise, shadow or flicker, etc. generated by a WES or WESF. These areas include, but are not limited to: schools, daycare centers, elder care facilities, hospitals, places of seated assemblage, non-agricultural businesses and residences.

"**Sound**" A fluctuation of air pressure which is propagated as a wave through air

"**Sound Power**" The total sound energy radiated by a source per unit time. The unit of measurement is the watt. Abbreviated as L_w. This information is determined for the WES manufacturer under laboratory conditions specified by IEC 61400-11 and provided to the local developer for use in computer model construction. There is known measurement error in this test procedure that must be disclosed and accounted for in the computer models. Even with the measurement error correction it cannot be assumed that the reported L_w values represent the highest sound output for all operating conditions. They reflect the operating conditions required to meet the IEC 61400-11 requirements. The lowest frequency is 50 Hz for acoustic power (L_w) requirement (at present) in IEC 61400-11. This Ordinance requires wind turbine certified acoustic power (L_w) levels at rated load for the total frequency range from 6.3 Hz to 10k Hz in one-third octave frequency bands tabulated to the nearest 1 dB. The frequency range of 6.3 Hz to 10k Hz shall be used throughout this Ordinance for all sound level modeling, measuring and reporting.

"**Sound Pressure**" The instantaneous difference between the actual pressure produced by a sound wave and the average or barometric pressure at a given point in space.

"**Sound Pressure Level (SPL)**" 20 times the logarithm, to the base 10, of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micronewtons per square meter. In equation form, sound pressure level in units of decibels is expressed as SPL (dB) = 20 log p/pr.

"**Spectrum**" The description of a sound wave's resolution into its components of frequency and amplitude. The WES manufacturer is required to supply a one-third octave band frequency spectrum of the wind turbine sound emission at 90% of rated power. The published sound spectrum is often presented as A-weighted values but C-weighted values are preferred. This information is used to construct a model of the wind farm's sound immission levels at locations of interest in and around the WES. The frequency range of interest for wind turbine noise is approximately 6 Hz to 10k Hz.

"**Statistical Noise Levels**" Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{NA}, where L_{NA} is the A-weighted sound level exceeded for N% of a given measurement period. For example, L_{10} is the noise level exceeded for 10% of the time. Of particular relevance, are: L_{A10} and L_{C10} the noise level exceed for 10% of the ten (10) minute interval. This is commonly referred to as the average maximum noise level. L_{A90} and L_{C90} are the A-weighted and C-weighted sound levels exceeded for 90% of the ten (10) minute sample period. The L_{90} noise level is defined by ANSI as the long-term background sound level (i.e. the sounds one hears in the absence of the noise source under consideration and without short term or near-by sounds from other sources), or simply the "background level." L_{eq} is the A or C-weighted equivalent noise level (the "average" noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

"**Tonal sound or tonality**" Tonal audibility. A sound for which the sound pressure is a simple sinusoidal function of the time, and characterized by its singleness of pitch. Tonal sound can be simple or complex.

"**Wind Energy Systems (WES)**" means equipment that converts and then transfers energy from the wind into usable forms of electrical energy.

"**Wind Turbine" or "Turbine" (WT)** means an industrial scale mechanical device which captures the kinetic energy of the wind and converts it into electricity. The primary components of a wind turbine are the blade assembly, electrical generator and tower.

III. APPLICATION PROCEDURE FOR WIND ENERGY SYSTEMS AND TECHNICAL REQUIREMENTS FOR LICENSING

This ordinance is intended to promote the safety and health of the community through criteria limiting sound emissions during operation of Wind Energy Systems. It is recognized that the requirements herein are neither exclusive, nor exhaustive. In instances where a health or safety concern is known to the wind project developer or identified by other means with regard to any application for a Wind Energy System, additional and/or more restrictive conditions may be included in the license to address such concerns. All rights are reserved to impose additional restrictions as circumstances warrant. Such additional or more restrictive conditions may include, without limitation (a) greater setbacks, (b) more restrictive noise limitations, or (c) limits restricting operation during night time periods or for any other conditions deemed reasonable to protect the community.

A. Application

Any Person desiring to secure a Wind Energy Systems license shall file an application form provided by the LGA Clerk, together with two additional copies of the application with the LGA Clerk.

B. Information to be submitted with Application

1. Information regarding the:

- Make and model of all turbines potentially used in this project,
- Sound Power Levels (L_w) for each 1/3 octave band from 6.3 Hz to 10,000 Hz, and
- A sound propagation model predicting the sound levels immitted into the community computed using at minimum 1/1 octave band sound power levels to compute the L_{Ceq} and L_{Aeq} levels to generate L_{Aeq} and L_{Ceq} contours in 5 dB increments overlaying an aerial view and property survey map from the WES property out to a distance to include all residential property within two (2) miles of the WES Property. Appropriate corrections for model algorithm error, IEC61400-11 test measurement accuracy, and directivity patterns of for each model of WT shall be disclosed and accounted for in the model(s). Predictions shall be made at all property lines within and outward for two (2) miles from the project boundary for the wind speed, direction and operating mode that would result in the worst case WT nighttime sound emissions.

The prediction model shall assume that the winds at hub height are sufficient for the highest sound emission operating mode. The projection shall include a description of all assumptions made in the model's construction and algorithms. If the model does not consider the effects of wind direction, geography of the terrain, and/or the effects of reinforcement from coherent sounds or tones from

the turbines all these items should be identified and all other means used to adjust the model's output to account for these factors. The results shall be displayed as a contour map of the predicted levels as over-all L_{Aeq} and L_{Ceq} contours out to 2 miles from the WES property, and shall also include a table showing the 1/3 or 1/1 octave band sound pressure as L_{Ceq} levels for the nearest property line(s) for sensitive receptor sites (including residences) within the model's boundaries. The predicted values must include the over-all sound levels and 1/1 or 1/3 octave band sound pressure levels from 6 Hz to 10k Hz in data tables that include the location of each receiving point by GPS location or other repeatable means.

C. Preconstruction Background Noise Survey

1. The Town reserves the right to require the preparation of (a) a preconstruction noise survey for each proposed Wind Turbine location conducted per procedures provided in the section on Measurement Procedures showing long-term background L_{A90} and L_{C90} sound levels. This must be completed and accepted prior to approval of the final layout and issuance of project permits.

    a. If any proposed wind farm project locates a WES within two miles of a sensitive receptor these studies are mandatory. The preconstruction baseline studies shall be conducted by an Independent Qualified Acoustical Consultant selected and hired by the LGA.

    b. The applicant shall be responsible for paying the consultant's fees and costs associated with conducting the study. These fees and cost shall be negotiated with the consultant and determined prior to any work being done on the study. The applicant shall be required to set aside 100% of these fees in an escrow account managed by the LGA, before the study is commenced by the consultant. Payment for this study does not require the WES developer's acceptance of the study's results.

    c. If the review shows that the predicted L_{Aeq} and L_{Ceq} sound levels exceed any of the criteria specified in the **Table of Not-To-Exceed Property Line Sound Immission Limits** then the application cannot be approved.

2. The LGA will refer the application to the LGA engineer (if qualified in acoustics) or an independent qualified acoustical consultant for further review and comparison of the long-term background sound levels against the predicted L_{Aeq} and L_{Ceq} sound levels reported for the model using the criteria in the **Table of Not-To-Exceed Property Line Sound Immission Limits**. The reasonably necessary costs associated with such a review shall be the responsibility of the applicant, in accord with the terms of this ordinance.

D. Post Construction Noise Measurement Requirements

1. **Sound Regulations Compliance**: A WES shall be considered in violation of the conditional use permit unless the applicant demonstrates that the project complies with all sound level limits using the procedures specified in this ordinance. Sound levels in excess of the limits established in this ordinance shall be grounds for the LGA to order immediate shut down of all non-compliant WT units.

2. **Post-Construction Sound Measurements**: Within twelve months of the date when the project is fully operational, and within four weeks of the anniversary date of the pre-construction background noise measurements, repeat the existing sound environment measurements taken before the project approval. Post-construction sound level measurements shall be taken both with all WES's running and with all WES's off. At the discretion of the Town, the Pre-construction background sound levels (L_{A90} and L_{C90}) can be substituted for the "all WES off' tests if a random sampling of 10% of the pre-construction study sites shows that background L_{90A} and L_{90C} conditions have increased less than 3 dB from those measured under the pre-

construction nighttime conditions. The post-construction measurements will be reported to the LGA (available for public review) using the same format as used for the preconstruction sound studies. Post-construction noise studies shall be conducted by a firm chosen and hired by the LGA. Costs of these studies are to be reimbursed by the Licensee in a similar manner to that described above. The wind farm developer's may ask to have its own consultant observe the publicly retained consultant at the convenience of the latter. The WES Licensee shall provide all technical information and wind farm data required by the qualified independent acoustical consultant before, during, and/or after any acoustical studies required by this document and for acoustical measurements.

3. Sound Limits

1. Establishing Long-Term Background Sound Level

a. Instrumentation: ANSI or IEC Type 1 Precision Integrating Sound Level Meter plus meteorological instruments to measure wind velocity, temperature and humidity near the sound measuring microphone. Measurement procedures must meet ANSI S12.9, Part 3 and Measurement Procedures Appendix to Ordinance following next Section.

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b. Measurement location(s): Nearest property line(s) from proposed wind turbines representative of all non-participating residential property within 2.0 miles.

c. Time of measurements and prevailing weather: The atmosphere must be classified as stable with no vertical heat flow to cause air mixing. Stable conditions occur in the evening and middle of the night with a clear sky and very little wind near the surface. Sound measurements are only valid when the measured maximum wind speed at the microphone must be less than 2 m/s (4.5 mph).

d. Long-Term Background sound measurements: All data recording shall be a series of contiguous ten (10) minute measurements. The measurement objective is to determine the quietest ten minute period at each location of interest. Nighttime test periods are preferred unless daytime conditions are quieter. The following data shall be recorded simultaneously for each ten (10) minute measurement period: dBA data includes L_{A90}, L_{A10}, L_{Aeq} and dBC data includes L_{C90}, L_{C10}, and L_{Ceq}. The maximum wind speed at the microphone during the ten minutes, a single measurement of temperature and humidity at the microphone for each new location or each hour whichever is oftener shall also be recorded. A ten (10) minute measurement contains valid data provided: Both L_{A10} minus L_{A90} and L_{C10} minus L_{C90} are not greater than 10 dB and the maximum wind speed at the microphone is less than 2 m/s during the same ten (10) minute period as the acoustic data.

2. Wind Turbine Sound Immission Limits

No wind turbine or group of turbines shall be located so as to cause wind turbine sound immission at any location on non-participating property containing a residence in excess of the limits in the following table:

Table of Not-To-Exceed Property Line Sound Immission Limits [1]			
Criteria	**Condition**	**dBA**	**dBC**
A	Immission above pre-construction background:	$L_{Aeq} = L_{A90} + 5$	$L_{Ceq} = L_{C90} + 5$
B	Maximum immission:	35 L_{Aeq}	55 L_{Ceq} for quiet[2] rural environment 60 L_{Ceq} for rural-suburban environment
C	Immission spectra imbalance (C - A $\leq$ 20dB)	L_{Ceq} (immission) minus (L_{A90} (background) +5 dB) $\leq$ 20 dB	
D	Prominent tone penalty:	5 dB	5 dB
Notes			
1	Each Test is independent and exceedances of any test establishes non-compliance Sound "immission" is the wind turbine sound emission as received at a property.		
2	A "quiet rural environment" is a location 2 miles from a major transportation artery without high traffic volume during otherwise quiet periods of the day or night.		
3	Prominent tone as defined in IEC 61400-11. This Standard is not to be used for any other purpose.		
[1] Required Procedures provided in VIII Reference Standards including ANSI 12.9 Part 3 as Amended			

3. Wind Farm Noise Compliance Testing

All of the measurements outlined above in 1. Establishing Long Term Background Noise Level must be repeated to determine compliance with 2. Wind Turbine Sound Immission Limits. The compliance test location is to be the pre-turbine background noise measurement location nearest to the home of the complainant in line with the wind farm and nearer to the wind farm. The time of day for the testing and the wind farm operating conditions plus wind speed and direction must replicate the conditions that generated the complaint. Procedures of ANSI S12.9- Part 3 apply as amended in the Appendix to Ordinance. The effect of instrumentation limits for wind and other factors must be recognized and followed.

3. Operations

The WES/WT is non-compliant and must be shut down immediately if it exceeds any of the limits in the **Table of Not-To-Exceed Property Line Sound Immission Limits**.

4. Complaint Resolution

1. The owner/operator of the WES shall respond within five (5) business days after notified of a noise complaint by any property owner within the project boundary and a one-mile radius beyond the project boundary.
2. The tests shall be performed by a qualified independent acoustical consultant acceptable to the complainant and the local agency charged with enforcement of this ordinance.
3. Testing shall commence within ten (10) working days of the request. If testing cannot be initiated within ten (10) days, the WES(s) in question shall be shut down until the testing can be started.
4. A copy of the test results shall be sent to the property owner, and the LGA's Planning or Zoning department within thirty (30) days of test completion.
5. If a Complaint is made, the presumption shall be that it is reasonable. The LGA shall undertake an investigation of the alleged operational violation by a qualified individual mutually acceptable to the LGA.

a) The reasonable cost and fees incurred by the LGA in retaining said qualified individual shall be reimbursed by the owner of the WESF.

b) Funds for this assessment shall be paid or put into an escrow account prior to the study and payment shall be independent of the study findings.

6. After the investigation, if the LGA reasonably concludes that operational violations are shown to be caused by the WESF, the licensee/operator/owner shall use reasonable efforts to mitigate such problems on a case-by-case basis including such measures as not operating during the nighttime or other noise sensitive period if such operation was the cause of the complaints.

5. Reimbursement of Fees and Costs.

Licensee/operator/owner agrees to reimburse the LGA 's reasonable fees and costs incurred in the preparation, negotiation, administration and enforcement of this Ordinance, including, without limitation, the LGA 's attorneys' fees, engineering and/or consultant fees, LGA meeting and hearing fees and the costs of public notices. If requested by the LGA the funds shall be placed in an escrow account under the management of the LGA. The preceding fees are payable within thirty (30) days of invoice. Unpaid invoices shall bear interest at the rate of 1% per month until paid. The LGA may recover all reasonable costs of collection, including attorneys' fees.

VII. MEASUREMENT PROCEDURES

SUPPLEMENT TO WIND ENERGY SYSTEMS LICENSING ORDINANCE FOR SOUND

I. Introduction

The potential impact of sound and sound induced building vibration associated with the operation of wind powered electric generators is often a primary concern for citizens living near proposed wind energy systems (WES(s)). This is especially true of projects located near homes, residential neighborhoods, businesses, schools, and hospitals in quiet residential and rural communities. Determining the likely sound and vibration impacts is a highly technical undertaking and requires a serious effort in order to collect reliable and meaningful data for both the public and decision makers.

This protocol is based in part on criteria published in American National Standards S12.9 –Part 3 Quantities and Procedures for Description and Measurement of Environmental Sound, and S12.18 and for the measurement of sound pressure level outdoors.

The purpose is to first, establish a consistent and scientifically sound procedure for evaluating existing background levels of audible and low frequency sound in a WES project area, and second to use the information provided by the Applicant in its Application showing the predicted over-all sound levels in terms of L_{Aeq} and L_{Ceq} and 1/3 or 1/1 octave bands as part of the required information submitted with the application.

The over-all values shall be presented as overlays to the applicant's iso-level plot plan graphics and, for 1/1 or 1/3 octave data, in tabular form with location information sufficient to permit comparison of the baseline results to the predicted levels. This comparison will use the level limits of the ordinance to determine the likely impact operation of a new wind energy system project will have on the existing community soundscape. If the comparison demonstrates that the WES project will not exceed any of the level limits the project will be considered to be within allowable limits for safety and health. If the Applicant submits only partial information required for this comparison

the application cannot be approved. In all cases the burden to establish the operation as meeting safety and health limits will be on the Applicant.

Next, it covers requirements for the sound propagation model to be supplied with the application.

Finally, if the project is approved, this section covers the study needed to compare the post-build sound levels to the predictions and the baseline study. The level limits in the ordinance apply to the post-build study. In addition, if there have been any complaints about WES sound or low frequency noise emissions or wind turbine noise induced dwelling vibration by any resident of an occupied dwelling that property will be included in the post-build study for evaluation against the rules for sound level limits and compliance.

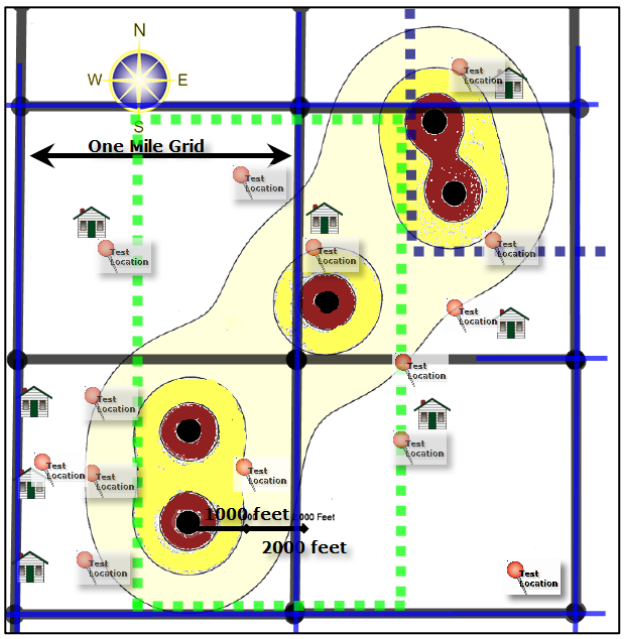
The characteristics of the proposed WES project and the features of the surrounding environment will influence the design of the sound and vibration study. Site layout, types of WES(s) selected and the existence of other significant local audible and low frequency sound sources and sensitive receptors should be taken into consideration when designing a sound study. The work will be performed by a qualified independent acoustical consultant for both the pre-construction background and post-construction sound studies as described in the body of the ordinance.

II. Instrumentation

All instruments and other tools used to measure audible, inaudible and low frequency sound shall meet the requirements for ANSI or IEC Type 1 Integrating Averaging Sound Level Meter Standards The principle standard reference for this document is ANSI 12.9/Part 3 with important additional specific requirements for the measuring instrumentation and measurement protocol.

III. Measurement of Pre-Construction Sound Environment (Base-line)

An assessment of the proposed WES project areas existing sound environment is necessary in order to predict the likely impact resulting from a proposed project. The following guidelines must be used in developing a reasonable estimate of an area's existing background sound environment. All testing is to be performed by an independent qualified acoustical consultant approved by the LGA as provided in the body of the ordinance. The WES applicant may file objections detailing any concerns it may have with the LGA's selection. These concerns will be addressed in the study. Objections must be filed prior to the start of the noise study. All measurements are to be conducted with ANSI or IEC Type 1 certified and calibrated test equipment per reference specification at the end of this section. Test results will be reported to the LGA or its appointed representative.



Sites with No Existing Wind Energy Systems (Base-line Sound Study)

Sound level measurements shall be taken as follows:

The results of the model showing the predicted worst case L_{Aeq} and L_{Ceq} sound emissions of the proposed WES project will be overlaid on a map (or separate L_{Aeq} and L_{Ceq} maps) of the project area. An example (right) shows an approximately two (2) mile square section with iso-level contour lines prepared by the

applicant, sensitive receptors (homes) and locations selected for the baseline sound tests whichever are the controlling metric. The test points shall be located at the property line bounding the property of the turbine's host closest to the wind turbine. Additional sites may be added if appropriate. A grid comprised of one (1) mile boundaries (each grid cell is one (1) square mile) should be used to assist in identifying between two (2) to ten (10) measurement points per cell. The grid shall extend to a minimum of two (2) miles beyond the perimeter of the project boundary. This may be extended to more than two (2) miles at the discretion of the LGA. The measurement points shall be selected to represent the noise sensitive receptor sites based on the anticipated sound propagation from the combined WT in the project. Usually, this will be the closest WT. If there is more than one WT near-by then more than one test site may be required.

The intent is to anticipate the locations along the bounding property line that will receive the highest sound immissions. The site that will most likely be negatively affected by the WES project's sound emissions should be given first priority in testing. These sites may include sites adjacent to occupied dwellings or other noise sensitive receptor sites. Sites shall be selected to represent the locations where the background soundscapes reflect the quietest locations of the sensitive receptor sites. Background sound levels (and 1/3 octave band sound pressure levels if required) shall be obtained according to the definitions and procedures provided in the ordinance and recognized acoustical testing practice and standards.

All properties within the proposed WES project boundaries will be considered for this study.

One test shall be conducted during the period defined by the months of April through November with the preferred time being the months of June through August. These months are normally associated with more contact with the outdoors and when homes may have open windows during the evening and night. Unless directed otherwise by the LGA the season chosen for testing will represent the background soundscape for other seasons. At the discretion of the LGA, tests may be scheduled for other seasons.

All measurement points (MPs) shall be located with assistance from the LGA staff and property owner(s) and positioned such that no significant obstruction (building, trees, etc.) blocks sound and vibration from the nearest proposed WES site.

Duration of measurements shall be a minimum of ten (10) continuous minutes for all criteria at each location. The duration must include at least six (6) minutes that are not affected by transient sounds from near-by and non-nature sources. Multiple ten (10) minute samples over longer periods such as 30 minutes or one (1) hour may be used to improve the reliability of the L_{A90} and L_{C90} values. The ten (10) minute sample with the lowest valid L_{90} values will be used to define the background sound.

The tests at each site selected for this study shall be taken during the expected 'quietest period of the day or night' as appropriate for the site. For the purpose of determining background sound characteristics the preferred testing time is from 10pm until 4 am. If circumstances indicated that a different time of the day should be sampled the test may be conducted at the alternate time if approved by the Town.

Sound level measurements shall be made on a weekday of a non-holiday week. Weekend measurements may also be taken at selected sites where there are weekend activities that may be affected by WT sound.

Measurements must be taken with the microphone at 1.2 to 1.5 meters above the ground and at least 15 feet from any reflective surface following ANSI 12.9 Part 3 protocol including selected options and other requirements outlined later in this Section.

Reporting

1. For each Measurement Point and for each qualified measurement period, provide each of the following measurements:

a. L_{Aeq}, L_{A10}, and L_{A90}, and

b. L_{Ceq} , L_{C10}, and L_{C90}

2. A narrative description of any intermittent sounds registered during each measurement. This may be augmented with video and audio recordings.

3. A narrative description of the steady sounds that form the background soundscape. This may be augmented with video and audio recordings.

4. Wind speed and direction at the microphone (Measurement Point), humidity and temperature at time of measurement will be included in the documentation. Corresponding information from the nearest 10 meter weather reporting station shall also be obtained.

Measurements taken only when wind speeds are less than 2m/s (4.5 mph) at the microphone location will be considered valid for this study. A windscreen of the type recommended by the monitoring instrument's manufacturer must be used for all data collection.

5. Provide a map and/or diagram clearly showing (Using plot plan provided by LGA or Applicant):

- The layout of the project area, including topography, the project boundary lines, and property lines.
- The locations of the Measurement Points.
- The distance between any Measurement Points and the nearest WT(s).
- The location of significant local non-WES sound and vibration sources.
- The distance between all MPs and significant local sound sources. And,
- The location of all sensitive receptors including but not limited to: schools, day-care centers, hospitals, residences, residential neighborhoods, places of worship, and elderly care facilities.

Sites with Existing Wind Energy Systems

Two complete sets of sound level measurements must be taken as defined below:

1. One set of measurements with the wind generator(s) off unless the LGA elects to substitute the sound data collected for the background sound study. Wind speeds must be suitable for background sound tests as specified elsewhere in this ordinance.

2. One set of measurements with the wind generator(s) running with wind speed at hub height sufficient to meet nominal rated power output or higher and less than 2 m/s below at the microphone location. Conditions should reflect the worst case sound emissions from the WES project. This will normally involve tests taken during the evening or night when winds are calm (less than 2m/sec) at the ground surface yet, at hub height, sufficient to power the turbines.

Sound level measurements and meteorological conditions at the microphone shall be taken and documented as discussed above.

Sound level Estimate for Proposed Wind Energy Systems (when adding more WT to existing project)

In order to estimate the sound impact of the proposed WES project on the existing environment an estimate of the sound produced by the proposed WES(s) under worst-case conditions for

producing sound emissions must be provided. This study may be conducted by a firm chosen by the WES operator with oversight provided by the LGA.

The qualifications of the firm should be presented along with details of the procedure that will be used, software applications, and any limitations to the software or prediction methods as required elsewhere in this ordinance for models.

Provide the manufacturer's sound power level (L_{Aw}) and (L_{Cw}) characteristics for the proposed WES(s) operating at full load utilizing the methodology in IEC 61400-11 Wind Turbine Noise Standard. Provide one-third octave band sound power level information from 6.3 Hz to 10k Hz. Furnish the data using no frequency weighting. A-weighted data is optional. Provide sound pressure levels predicted for the WES(s) in combination and at full operation and at maximum sound power output for all areas where the predictions indicate L_{Aeq} levels of 30 dBA and above. The same area shall be used for reporting the predicted L_{Ceq} levels. Contour lines shall be in increments of 5 dB.

Present tables with the predicted sound levels for the proposed WES(s) as L_{Aeq} and L_{Ceq} and at all octave band centers (8 Hz to 10k Hz) for distances of 500, 1000, 1500, 2000, 2500 and 5000 feet from the center of the area with the highest density of WES(s). For projects with multiple WES(s), the combined sound level impact for all WES(s) operating at full load must be estimated.

The above tables must include the impact (increased dBA and dBC (L_{eq}) above baseline L_{90} background sound levels) of the WES operations on all residential and other noise sensitive receiving locations within the project boundary. To the extent possible, the tables should include the sites tested (or likely to be tested) in the background study.

Provide a contour map of the expected sound level from the new WES(s), using 5dB L_{Aeq} and L_{Ceq} increments created by the proposed WES(s) extending out to a distance of two (2) miles from the project boundary, or other distance necessary, to show the 25 L_{Aeq} and 50 L_{Ceq} boundaries.

Provide a description of the impact of the proposed sound from the WES project on the existing environment. The results should anticipate the receptor sites that will be most negatively impacted by the WES project and to the extent possible provide data for each MP that are likely to be selected in the background sound study (note the sensitive receptor MPs):

1. Report expected changes to existing sound levels for L_{Aeq} and L_{A90}
2. Report expected changes to existing sound levels for L_{Ceq} and L_{C90}
3. Report the expected changes to existing sound pressure levels for each of the 1/1 or 1/3 octave bands in tabular form from 8 Hz to 10k Hz.
4. Report all assumptions made in arriving at the estimate of impact, any limitations that might cause the sound levels to exceed the values of the estimate, and any conclusions reached regarding the potential effects on people living near the project area. If the effects of coherence, worst case weather, or operating conditions are not reflected in the model a discussion of how these factors could increase the predicted values is required.
5. Include an estimate of the number of hours of operation expected from the proposed WES(s) and under what conditions the WES(s) would be expected to run. Any differences from the information filed with the Application should be addressed.

IV. Post-Construction Measurements

Post Construction Measurements should be conducted by a qualified noise consultant selected by and under the direction of the LGA. The requirements of this Appendix for Sites with Existing Wind Energy Systems shall apply

1. Within twelve months of the date when the project is fully operational, preferably within two weeks of the anniversary date of the pre-construction background sound measurements, repeat the measurements. Post-construction sound level measurements shall be taken both with all WES(s) running and with all WES(s) off except as provided in this ordinance.

2. Report post-construction measurements to the LGA using the same format as used for the background sound study.

VIII. REFERENCE Standards and ANSI S12.9 Part 3 with Required Amendments

ANSI/ASA S12.9-1993/Part 3 (R2008) - American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound, Part 3: Short-Term Measurements with an Observer Present.

This standard is the second in a series of parts concerning description and measurement of outdoor environmental sound. The standard describes recommended procedures for measurement of short-term, time-average environmental sound outdoors at one or more locations in a community for environmental assessment or planning for compatible land uses and for other purposes such as demonstrating compliance with a regulation. These measurements are distinguished by the requirement to have an observer present. Sound may be produced by one or more separate, distributed sources of sound such as a highway, factory, or airport. Methods are given to correct the measured levels for the influence of background sound.

Wind Turbine Siting Acoustical Measurements
ANSI S12.9 Part 3 Selected Options and Requirement Amendments

For the purposes of this ordinance specific options provided in ANSI S12.9-Part 3 (2008) shall apply with the additional following requirements to Sections in ANSI S12.9/Part 3:

5.2 background sound: Use definition (1) 'long-term'
5.2 long-term background sound: The L_{90} excludes short term background sounds
5.3 basic measurement period: Ten (10) minutes $L_{90(10\ min)}$
5.6 Sound Measuring Instrument: Type 1 Integrating Meter meeting ANSI S1.43 or IEC 61672-1. The sound level meter shall cover the frequency range from 6.3 Hz to 20k Hz and simultaneously measure dBA L_N and dBC L_N. The instrument must also be capable of accurately measuring low-level background sounds down to 20 dBA.
6.5 Windscreen: Required
6.6(a) An anemometer accurate to ± 10% at 2m/s. to full scale accuracy. The anemometer shall be located 1.5 to 2m above the ground and orientated to record maximum wind velocity. The maximum wind velocity, wind direction, temperature and humidity shall be recorded for each ten (10) minute sound measurement period observed within 5 m. of the measuring microphone..
7.1 Long-term background sound
7.2 Data collection Methods: Second method with observed samples to avoid contamination by short term sounds (purpose: to avoid loss of statistical data)
8 Source(s) Data Collection: All requirements in ANSI S12.18 Method #2 precision to the extent possible while still permitting testing of the conditions that lead to complaints. The

meteorological requirements in ANSI S12.18 may not be applicable for some complaints. For sound measurements in response to a complaint, the compliance sound measurements should be made under conditions that replicate the conditions that caused the complaint without exceeding instrument and windscreen limits and tolerances.

8.1(b) Measuring microphone with windscreen shall be located 1.2m to 1.8m (1.5m preferred) above the ground and greater than 8m from large sound reflecting surface.

8.3(a) All meteorological observations required at both (not either) microphone and nearest 10m weather reporting station.

8.3(b) For a 10 minute background sound measurement to be valid the wind velocity shall be less then 2m/s (4.5 mph) measured less than 5m from the microphone. Compliance sound measurements shall be taken when winds shall be less than 4m/s at the microphone.

8.3(c) In addition to the required acoustic calibration checks, the sound measuring instrument internal noise floor, including microphone, must also be checked at the end of each series of ten minute measurements and no less frequently than once per day. Insert the microphone into the acoustic calibrator with the calibrator signal off. Record the observed dBA and dBC reading on the sound level meter to determine an approximation of the instrument self noise. Perform this test before leaving the background measurement location. This calibrator-covered microphone must demonstrate the results of this test are at least 5 dB below the immediately previous ten-minute acoustic test results, for the acoustic background data to be valid. This test is necessary to detect undesired increase in the microphone and sound level meter internal self-noise. As a precaution sound measuring instrumentation should be removed from any air-conditioned space at least an hour before use. Nighttime measurements are often performed very near the meteorological dew point. Minor moisture condensation inside a microphone or sound level meter can increase the instrument self noise and void the measured background data.

8.4 The remaining sections starting at 8.4 in ANSI S12.9 Part 3 Standard do not apply.

ANSI S12.18-1994 (R2004) American National Standard Procedures for Outdoor Measurement of Sound Pressure Level

This American National Standard describes procedures for the measurement of sound pressure levels in the outdoor environment, considering the effects of the ground, the effects of refraction due to wind and temperature gradients, and the effects due to turbulence. This standard is focused on measurement of sound pressure levels produced by specific sources outdoors. The measured sound pressure levels can be used to calculate sound pressure levels at other distances from the source or to extrapolate to other environmental conditions or to assess compliance with regulation. This standard describes two methods to measure sound pressure levels outdoors. METHOD No. 1: general method; outlines conditions for routine measurements. METHOD No. 2: precision method; describes strict conditions for more accurate measurements. This standard assumes the measurement of A-weighted sound pressure level or time-averaged sound pressure level or octave, 1/3-octave or narrow-band sound pressure level, but does not preclude determination of other sound descriptors.

ANSI S1.43-1997(R2007) American National Standard Specifications for Integrating Averaging Sound Level Meters

This Standard describes instruments for the measurement of frequency-weighted and time-average sound pressure levels. Optionally, sound exposure levels may be measured. This standard is consistent with the relevant requirements of ANSI S1.4-1983(R 1997) American National Standard Specification for Sound Level Meters, but specifies additional characteristics that are necessary to

measure the time-average sound pressure level of steady, intermittent, fluctuating, and impulsive sounds.

ANSI S1.11-2004 American National Standard 'Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters'

This standard provides performance requirements for analog, sampled-data, and digital implementations of band-pass filters that comprise a filter set or spectrum analyzer for acoustical measurements. It supersedes ANSI S1.11-1986 (R1998) American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters, and is a counterpart to International Standard IEC 61260:1995 Electroacoustics - Octave-Band and Fractional-Octave-Band Filters. Significant changes from ANSI S1.11-1986 have been adopted in order to conform to most of the specifications of IEC 61260:1995. This standard differs from IEC 61260:1995 in three ways: (1) the test methods of IEC 61260 clauses 5 is moved to an informative annex, (2) the term 'band number,' not present in IEC 61260, is used as in ANSI S1.11-1986, (3) references to American National Standards are incorporated, and (4) minor editorial and style differences are incorporated.

ANSI S1.40-2006 American National Standard Specifications and Verification Procedures for Sound Calibrators

IEC 61400-11

Second edition 2002-12, Amendment 1 2006-05

IEC 61400-11

Second edition 2002-12, Amendment 1 2006-0

Wind turbine generator systems –Part 11: Acoustic noise measurement techniques

The purpose of this part of IEC 61400 is to provide a uniform methodology that will ensure consistency and accuracy in the measurement and analysis of acoustical emissions by wind turbine generator systems. The standard has been prepared with the anticipation that it would be applied by:

- the wind turbine manufacturer striving to meet well defined acoustic emission performance requirements and/or a possible declaration system;
- the wind turbine purchaser in specifying such performance requirements;
- the wind turbine operator who may be required to verify that stated, or required, acoustic performance specifications are met for new or refurbished units;
- the wind turbine planner or regulator who must be able to accurately and fairly define acoustical emission characteristics of a wind turbine in response to environmental regulations or permit requirements for new or modified installations.

This standard provides guidance in the measurement, analysis and reporting of complex acoustic emissions from wind turbine generator systems. The standard will benefit those parties involved in the manufacture, installation, planning and permitting, operation, utilization, and regulation of wind turbines. The measurement and analysis techniques recommended in this document should be applied by all parties to insure that continuing development and operation of wind turbines is carried out in an atmosphere of consistent and accurate communication relative to environmental concerns. This standard presents measurement and reporting procedures expected to provide accurate results that can be replicated by others.

End of Measurement Procedure

VIII. Noise-Con 2008 Paper

Dearborn, Michigan

NOISE-CON 2008

2008 July 28-31

Simple guidelines for siting wind turbines to prevent health risks[30]

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Revision: 2.1[31]

Industrial scale wind turbines are a familiar part of the landscape in Europe, U.K. and other parts of the world. In the U.S., however, similar industrial scale wind energy developments are just beginning operation. The presence of industrial wind projects will increase dramatically over the next few years given the push by the Federal and state governments to promote renewable energy sources through tax incentives and other forms of economic and political support. States and local governments in the U.S. are promoting what appear to be lenient rules for how industrial wind farms can be located in communities, which are predominantly rural and often very quiet. Studies already completed and currently in progress describe significant health effects associated with living in the vicinity of industrial grade wind turbines. This paper reviews sound studies conducted by consultants for governments, the wind turbine owner, or the local residents for a number of sites with known health or annoyance problems. The purpose is to determine if a set of simple guidelines using dBA and dBC sound levels can serve as the 'safe' siting guidelines. Findings of the review and recommendations for sound limits will be presented. A discussion of how the proposed limits would have affected the existing sites where people have demonstrated pathologies apparently related to wind turbine sound will also be presented.

Background

A relatively new source of community noise is spreading rapidly across the rural U.S. countryside. Industrial grade wind turbines, a common sight in many European countries, are now being promoted by Federal and state governments as the way to minimize coal powered electrical energy and its effects on global warming. But, the initial developments using the newer 1.5 to 3 MWatt wind turbines here in the U.S. has also led to numerous complaints from

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[31] The criteria table at the end of this paper and portions of the narrative have been revised to reflect our current understanding of how to specify the sound limits with less ambiguity and to use the new format for presenting them.

residents who find themselves no longer in the quiet rural communities they were living in before the wind turbine developments went on-line. Questions have been raised about whether the current siting guidelines being used in the U.S. are sufficiently protective for the people living closest to the developments. Research being conducted into the health issues using data from established wind turbine developments is beginning to appear that supports the possibility there is a basis for the health concerns. Other research into the computer modeling and other methods used for determining the layout of the industrial wind turbine developments and the distances from residents in the adjacent communities are showing that the output of the models should not be considered accurate enough to be used as the sole basis for making the siting decisions.

The authors have reviewed a number of noise studies conducted in response to community complaints for wind energy systems sited in Europe, Canada, and the U.S. to determine if additional criteria are needed for establishing safe limits for industrial wind turbine sound immissions in rural communities. In several cases, the residents who filed the complaints have been included in studies by medical researchers who are investigating the potential health risks associated with living near industrial grade wind turbines 365 days a year. These studies were also reviewed by the authors to help in identifying what factors need to be considered in setting criteria for 'safe' sound limits at receiving properties. Due to concerns about medical privacy, details of these studies are not discussed in this paper. Current standards used in the U.S. and in most other parts of the world rely on not-to-exceed dBA sound levels, such as 50 dBA, or on not-to-exceed limits based on the pre-construction background sound level plus an adder (e.g. L_{90A} + 5 dBA).

Our review covered the community noise studies performed in response to complaints, research on health issues related to wind turbine noise, critiques of noise studies performed by consultants working for the wind developer, and research/technical papers on wind turbine sound immissions and related topics. The papers are listed in Tables 1-4.

Table 1-List of Studies Related to Complaints

Resource Systems Engineering, Sound Level Study – Ambient & Operations Sound Level Monitoring, Maine Department of Environmental Protection Order No. L-21635-26-A-N, June 2007
ESS Group, Inc., Draft Environmental Impact Statement For The Dutch Hill Wind Power Project – Town of Cohocton, NY, November 2006
David M. Hessler, Environmental Sound Survey and Noise Impact Assessment – Noble Wethersfield Wind park – Towns of Wethersfield and Eagle NY For: Noble Environmental Power, LLC January 2007
George Hessler, "Report Number 101006-1, Noise Assessment Jordanville Wind Power Project," October 2006
HGC Engineering, "Environmental Noise Assessment Pubnico Point Wind Farm, Nova Scotia, Natural Resources Canada Contract NRCAN-06-0046," August 23, 2006
John I. Walker, Sound Quality Monitoring, East Point, Prince Edward Island" by Jacques Whitford, Consultants for Prince Edward Island Energy Corporation, May 28, 2007

Table 2- List of Studies related to Health

Nina Pierpont, "Wind Turbine Syndrome – Abstract" from draft article and personal conversations. www.ninapierpont.com
Nina Pierpont, "Letter from Dr. Pierpont to a resident of Ontario, Canada, re: Wind Turbine Syndrome," Autumn 2007
Amanda Harry, "Wind Turbine Noise and Health" (2007)
Barbara J. Frey and Peter J. Hadden, "Noise Radiation from Wind Turbines Installed Near Homes, Effects on Health" (2007)
Eja Pedersen, "Human response to wind turbine noise – Perception, annoyance and moderating factors, Occupational and Environmental Medicine," The Sahlgrenska Academy, Gotenborg 2007
Robin Phipps, "In the Matter of Moturimu Wind Farm Application, Palmerston North, Australia," March 2007
WHO European Centre for Environment and Health, Bonn Office, "Report on the third meeting on night noise guidelines," April 2005

Table 3-List of Studies that review Siting Impact Statements

Richard H. Bolton, "Evaluation of Environmental Noise Analysis for 'Jordanville Wind Power Project,'" December 14, 2006 Rev 3.
Clifford P. Schneider, "Accuracy of Model Predictions and the Effects of Atmospheric Stability on Wind Turbine Noise at the Maple Ridge Wind Power Facility," Lowville, NY – 2007

Table 4-List of Research and Technical papers included in review process

Anthony L. Rogers, James F. Manwell, Sally Wright, "Wind Turbine Acoustic Noise," Renewable Energy Research Laboratory, Dept. of ME and IE, U of Mass, Amherst, amended June 2006
ISO. 1996. Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation. International Organization of Standardization. ISO 9613-2. p. 18.
G.P. van den Berg, "The Sounds of High Winds – the effect of atmospheric stability on wind turbine sound and microphone noise," Ph.D. thesis, 2006
Fritz van den Berg, "Wind Profiles over Complex Terrain," Proceedings of Second International Meeting on Wind Turbine Noise, Lyons, France, Sept. 2007
William K. G. Palmer, "Uncloaking the Nature of Wind Turbines-Using the Science of Meteorology," Proceedings of Second International Meeting on Wind Turbine Noise, Lyons, France, Sept. 2007
Soren Vase Legarth, "Auralization and Assessment of Annoyance from Wind Turbines," Proceedings of Second International Meeting on Wind Turbine Noise, Lyons, France, Sept. 2007
Julian T. and Jane Davis, "Living with aerodynamic modulation, low frequency vibration

and sleep deprivation - how wind turbines inappropriately placed can act collectively and destroy rural quietitude," Proceedings of Second International Meeting on Wind Turbine Noise, Lyons, France, Sept. 2007
James D. Barnes, "A Variety of Wind Turbine Noise Regulations in the United States - 2007," Proceedings of Second International Meeting on Wind Turbine Noise, Lyons, France, Sept. 2007
M. Schwartz and D. Elliott, Wind Shear Characteristics at Central Plains Tall Towers, NREL 2006
IEC 61400 "Wind turbine generator systems, Part 11: Acoustic noise measurement techniques,".rev:2002

Discussion

After reviewing the materials in the tables; we have arrived at our current understanding of wind turbine noise and its impact on the host community and its residents. The review showed that some residents living as far as 3 km (two (2) miles) from a wind farm complain of sleep disturbance from the noise. Many residents living one-tenth this distance (300 m. or 1000 feet) from a wind farm are experiencing major sleep disruption and other serious medical problems from nighttime wind turbine noise. The peculiar acoustic characteristics of wind turbine noise immissions cause the sounds heard at the receiving properties to be more annoying and troublesome than the more familiar noise from traffic and industrial factories. Limits used for these other community noise sources do not appear to be appropriate for siting industrial wind turbines. The residents who are annoyed by wind turbine noise complain of the approximately one (1) second repetitive swoosh-boom-swoosh-boom sound of the turbine blades and "low frequency" noise. It is not apparent to these authors whether the complaints that refer to "low frequency" noise are about the audible low frequency part of the swoosh-boom sound, the one hertz amplitude modulation of the swoosh-boom sound, or some combination of both acoustic phenomena.

To assist in understanding the issues at hand, the authors developed the 'conceptual' graph for industrial wind turbine sound shown in Figure 1. This graph shows the data from one of the complaint sites plotted against the sound immission spectra for a modern 2.5 MWatt wind turbine; Young's threshold of perception for the 10% most sensitive population (ISO 0266); and a spectrum obtained for a rural community during a three hour, 20 minute test from 11:45 pm until 3:05 am on a windless June evening in near Ubly, Michigan a quiet rural community located in central Huron County. (Also called: Michigan's "Thumb.") It is worth noting that this rural community demonstrates how quiet a rural community can be when located at a distance from industry, highways, and airport related noise emitters.

During our review we posed a number of questions to ourselves related to what we were learning. The questions (italics) and our answers are:

Do National or International or local community Noise Standards for siting wind turbines near dwellings address the low frequency portion of the wind turbine's sound immissions?[32] No! State and Local governments are in the process of establishing wind farm noise limits and/or wind turbine

[32] Emissions refer to acoustic energy from the 'viewpoint' of the sound emitter, while immissions refer to acoustic energy from the viewpoint of the receiver.

setbacks from nearby residents, but the standards incorrectly presume that limits based on dBA levels are sufficient to protect the residents.

Do wind farm developers have noise limit criteria and/or wind turbine setback criteria that apply to nearby residents? Yes! But the Wind Industry recommended residential wind turbine noise levels (typically 50-55 dBA) are too high for the quiet nature of the rural communities and may be unsafe for the nearest residents. An additional concern is that some of the methods for implementing pre-construction computer models may predict sound levels that are too low. These two factors combined can lead to post-construction complaints and health risks.

Are all residents living near wind farms equally affected by wind turbine noise? No, children, people with pre-existing medical conditions, especially sleep disorders, and the elderly are generally the most susceptible. Some people are unaffected while some nearby neighbors develop serious health effects caused by exposure to the same wind turbine noise.

How does wind turbine noise impact nearby residents? Initially, the most common problem is chronic sleep deprivation during nighttime. According to the medical research documents, this may develop into far more serious physical and psychological problems

What are the technical options for reducing wind turbine noise immission at residences? There are only two options: 1) increase the distance between source and receiver, and/or 2) reduce the source sound power immission. Either solution is incompatible with the objective of the wind farm developer to maximize the wind power electrical generation within the land available.

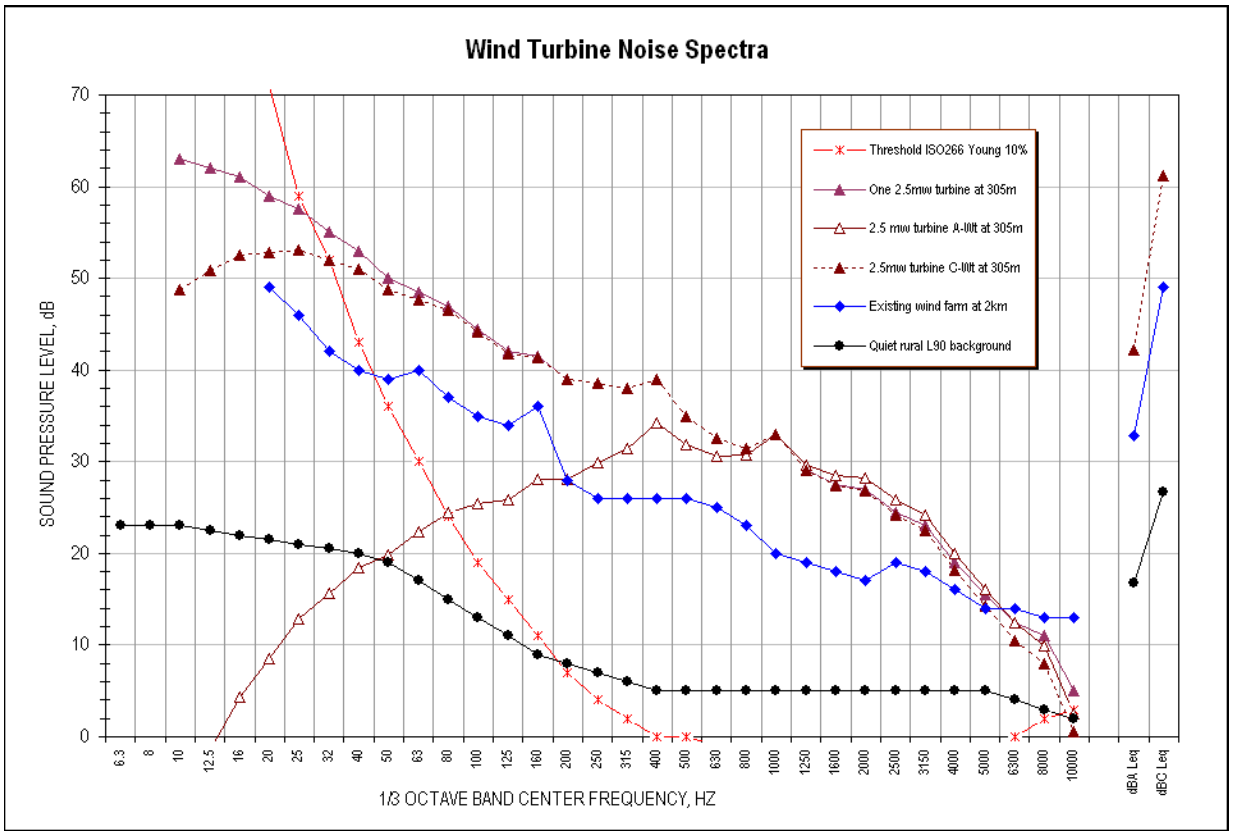

Figure 1-Generalized Sound Spectra vs. perception and rural community L_{90A} background 1/3 octave SPL

Is wind turbine noise at a residence much more annoying than traffic noise? Yes, researchers have found that "Wind turbine noise was perceived by about 85% of the respondents even when the calculated A-weighted SPL were as low as 35.0–37.5 dB. This could be due to the presence of

amplitude modulation in the noise, making it easy to detect and difficult to mask by ambient noise." [JASA 116(6), December 2004, pgs 3460-3470, "Perception and annoyance due to wind turbine noise-a dose-relationship" Eja Pedersen and Kerstin Persson Waye, Dept of Environmental Medicine, Goteborg University, Sweden]

Why do wind turbine noise immissions of only 35 dBA disturb sleep at night? This issue is now being studied by the medical profession. The affected residents complain of the middle to high frequency swooshing sounds of the rotating turbine blades at a constant repetitive rate of about 1 hertz plus low frequency noise. The amplitude modulation of the swooshing sound changes continuously. The short time interval between the blade's swooshing sounds described by residents as sometimes having a thump or low frequency banging sound that varies in amplitude up to 10 dBA. This may be a result of phase changes between turbine emissions, turbulence, or an operational mode.. The assumptions about wall and window attenuation being 15 dBA or more may not be sufficiently protective considering the relatively high amplitude of the wind turbine's low frequency immission spectra.

What are the typical wind farm noise immission criteria or standards? Limits are not consistent and may vary even within a particular country. Example criteria include: Australia-the lower of 35 dBA or L_{90} + 5 dBA, Denmark-40 dBA, France L_{90} + 3 (night) and L_{90} + 5 (day), Germany-40 dBA, Holland-40 dBA, United Kingdom-40 dBA (day) and 43 dBA (night) or L_{90} + 5 dBA, Illinois-55 dBA (day) and 51 dBA (night), Wisconsin-50 dBA and Michigan-55 dBA. Note: Illinois statewide limits are expressed only in nine contiguous octave frequency bands and no mention of A-weighting for the hourly l_{eq} limits. Typically, wind turbine noise just meeting the octave band limits would read 5 dB below the energy sum of the nine octave bands after applying A-weighting. So the Illinois limits are approximately 50 dBA (daytime 7 AM to 10 PM) and 46 dBA at night, assuming a wind farm is a Class C Property Line Noise Source.

What is a reasonable wind farm sound immission limit to protect the health of residences? We are proposing an immission limit of 35 dBA or L_{90A} + 5 dBA whichever is lower and also a C-weighted criteria to address the impacted resident's complaints of wind turbine low frequency noise: For the proposed criteria the dBC sound level at a receiving property shall not exceed L_{90A} + 20dB. In other words, the dBC operating immission limit shall not be more than 20 dB above the measured dBA (L_{90A}) pre-construction nighttime background sound level. A maximum not-to-exceed limit of 50 dBC is also proposed.

Why should the dBC immission limit not be permitted to be more than 20 dB above the background measured L_{90A}? The World Health Organization and others have determined a sound emitter's noise that results in a difference between the dBC and dBA value greater than 20 dB will be an annoying low frequency issue.

Is not L_{90A} the minimum dBA background noise level? This is not exactly correct. The L_{90} is the statistical descriptor representing the quietest 10% of the time. It may be understood as the sounds one hears when there are no nearby or short-term sounds from man-made or natural sources. It excludes sounds that are not part of the soundscape during all seasons. It is very important to establish the statistical average background noise environment outside a potentially impacted residence during the quietest (10 pm to 4 am) sleeping hours of the night. This nighttime sleep disturbance has generated the majority of the wind farm noise complaints throughout the world. The basis for a community's wind turbine sound immission limits would be the minimum 10 minute nighttime L_{90A} plus 5 dB for the time period of 10 pm to 7 am. This would become the Nighttime Immission Limits for the proposed wind farm. This can be accomplished with one or several ten (10) minute measurements during any night when the

atmosphere is classified stable with a light wind from the area of the proposed wind farm. The Daytime Limits (7 am to 7 pm) could be set 10 dB above the minimum nighttime L_{90A} measured noise, but the nighttime criteria will always be the limiting sound levels.

A nearby wind farm meeting these noise immission criteria will be clearly audible to the residents occasionally during nighttime and daytime. Compliance with this noise standard would be determined by repeating the initial nighttime minimum nighttime L_{90A} tests and adding the dBC (L_{eqC}) noise measurement with the turbines on and off. If the nighttime background noise level (turbines off) was found to be slightly higher than the measured background prior to the wind farm installation, then the results with the turbines on must be corrected to determine compliance with the pre-turbine established sound limits.

The common method used for establishing the background sound level at a proposed wind farm used in many of the studies in Table 1 was to use unattended noise monitors to record hundreds of ten (10) minute measurements to obtain a statistically significant sample over varying wind conditions or a period of weeks. The measured results for daytime and nighttime are combined to determine the statically average wind noise as a function of wind velocity measured at a height of ten (10) meters. This provides an enormous amount of data but the results have little relationship to the wind turbine sound immission or turbine noise impact in nearby residents. The purpose of this exhaustive exercise often only demonstrates how much noise is generated by the wind. In some cases it appears that the data is used to 'prove' that the wind noise masks the turbine's sound immissions.

The most glaring failure of this argument occurs during the frequent nighttime condition of a stable atmosphere. Then, the wind turbines operate at full or near full power and noise output while the wind at ground level is calm and the background noise level is low. This is the condition of maximum turbine noise impact on nearby residents. It is the condition which most directly causes chronic sleep disruption. Furthermore, the measurement methodology is usually faulty, as much of the wind noise measured by unattended sound monitors is the pseudo-wind noise generated by failure of the microphone's windscreen. This results in totally erroneous background sound levels being used for permitting and siting decisions. (See studies in Table 3, esp. Van den Berg)

Are there additional noise data to be recorded for a pre-wind turbine noise survey near selected dwellings? Yes, The measuring sound level meter(s) need document the L_{Aeq} , L_{A10}, L_{A90} and L_{Ceq} , L_{C10}, L_{C90} sound levels plus start time & date for each 10 minute sample. The L_{10} results will be utilized to help validate that conditions were appropriate for measuring the L_{90} long term background sound levels. For example, on a quiet night one would expect L_{A10} to be less than 10 dB higher than the L_{A90} long-term background sound level. On a windy night or day the difference may be more than 20 dB. There is a requirement for measurement of the wind velocity near the sound measurement microphone continuously throughout each ten (10) minute recorded noise sample. The ten (10) minute average of the wind speed near the microphone shall not exceed 2 m/s (4.5 mph) and the maximum wind speed for operational tests shall not exceed 4 m/s (9 mph). It is strongly recommended that observed samples be used for these tests.

Is there a need to record weather data during the background noise recording survey? One weather monitor is required at the proposed wind farm on the side nearest the residents. The weather station sensors are at standard ten (10) meter height above ground. It is critical the weather be recorded every ten (10) minutes synchronized with the clocks in the sound level recorders without ambiguity in the start and end time of each ten (10) minute period. The weather station should record wind speed and direction, temperature, humidity and rain.

Why do Canada and some other countries base the permitted wind turbine noise immission limits on the operational wind velocity at the 10m height wind speed instead of a maximum dBA or L_{A90} + 5 dBA immission level? First, it appears that the wind turbine industry will take advantage of every opportunity to elevate the maximum permitted noise immission level to reduce the setback distance from the nearby dwellings. Including wind as a masking source in the criteria is one method for elevating the permissible limits. Indeed the background noise level does increase with surface wind speed. When it does occur, it can be argued that the increased wind noise provides some masking of the wind farm turbine noise emission. However, in the middle of the night when the atmosphere is defined as stable (no vertical flow from surface heat radiation) the layers of the lower atmosphere can separate and permit wind velocities at the turbine hubs to be 2 to 4 times the wind velocity at the 10m high wind monitor but remain near calm at ground level. The result is the wind turbines can be operating at or close to full capacity while it is very quiet outside the nearby dwellings.

This is the heart of the wind turbine noise "problem" for residents within 3 km (approx. two miles) of a wind farm. When the turbines are producing the sound from operation it is quietest outside the surrounding homes. The PhD thesis of P.G. van den Berg "The Sounds of High Winds" is very enlightening on this issue. See also the letter by John Harrison in Ontario "On Wind Turbine Guidelines."

What sound monitor measurements would be needed for enforcement of the wind turbine sound ordinance? A similar sound and wind 10 minute series of measurements would be repeated at the pre-wind farm location nearest the resident registering the wind turbine noise complaint, with and without the operation of the wind turbines. An independent acoustics expert should be retained who reports to the County Board or other responsible governing body. This independent acoustics expert shall be responsible for all the acoustic measurements including instrumentation setup, calibration and interpretation of recorded results. An independent acoustical consultant shall also perform all pre-turbine background noise measurements and interpretation of results to establish the Nighttime (and Daytime if applicable) industrial wind turbine sound immission limits. At present the acoustical consultants are retained by, and work directly for, the wind farm developer.

This presents a serious problem with conflict of interest on the part of the consultant. The wind farm developer would like to show the significant amount of wind noise that is present to mask the sounds of the wind turbine immissions. The wind farm impacted community would like to know that wind turbine noise will be only barely perceptible and then only occasionally during the night or daytime.

Is frequency analysis required either during pre-wind farm background survey or for compliance measurements? Normally one-third octave or narrower band analysis would only be required if there is a complaint of tones immission from the wind farm.

Proposed Sound Limits

The simple fact that so many residents complain of low frequency noise from wind turbines is clear evidence that the single A-weighted (dBA) noise descriptor used in most jurisdictions for siting turbines is not adequate. The only other simple audio frequency weighting that is standardized and available on all sound level meters is C-weighting or dBC. A standard sound level meter set to measure dBA is increasingly less sensitive to low frequency below 500 Hz (one octave above middle-C). The same sound level meter set to measure dBC is equally sensitive to all frequencies above 32 Hz (lowest note on grand piano). It is well accepted that dBC readings

are more predictive of perceptual loudness than dBA readings if low frequency sounds are significant.

We are proposing to use the commonly accepted dBA criteria that is based on the pre-existing background sound levels plus a 5 dB allowance for the wind turbine's immissions (e.g. L_{90A} +5) for the audible sounds from wind turbines. In addition, to address the lower frequencies that are not considered in A-weighted measurements we are proposing to add limits based on dBC. The Proposed Sound Limits are presented in the text box at the end of this paper.

For the current industrial grade wind turbines in the 1.5 to 3 MWatt range, the addition of the dBC requirement will result in an increased distance between wind turbines and the nearby residents. For the generalized graphs shown in Figure 1, the distances would need to be approximately double the current distance. This will result in setbacks in the range of 1 km or greater for the current generation of wind turbines if they are to be located in rural areas where the L_{90A} background sound levels are 30 dBA or lower. When no man-made sounds are audible they can even be under 20 dBA. In areas with higher background sound levels, turbines could be located somewhat closer, but still at a distance greater than the 305 m (1000 ft.) or less setbacks commonly seen in U.S. based wind turbine standards set by many states and used for wind turbine developments.

1. Establishing Long-Term Background Noise Level

a. Instrumentation: ANSI or IEC Type 1 Precision Integrating Sound Level Meter plus meteorological instruments to measure wind velocity, temperature and humidity near the sound measuring microphone. Measurement procedures must meet ANSI S12.9, Part 3.

b. Measurement location(s): Nearest property line(s) from proposed wind turbines representative of all non-participating residential property within 2.0 miles.

c. Time of measurements and prevailing weather: The atmosphere must be classified as stable with no vertical heat flow to cause air mixing. Stable conditions occur in the evening and middle of the night with a clear sky and very little wind near the surface. Sound measurements are only valid when the measured wind speed at the microphone does not exceed 2 m/s (4.5 mph).

d. Long-Term Background sound measurements: All data recording shall be a series of contiguous ten (10) minute measurements. The measurement objective is to determine the quietest ten minute period at each location of interest. Nighttime test periods are preferred unless daytime conditions are quieter. The following data shall be recorded simultaneously for each ten (10) minute measurement period: dBA data includes L_{A90}, L_{A10}, L_{Aeq} and dBC data includes L_{C90}, L_{C10}, and L_{Ceq}. The maximum wind speed at the microphone during the ten minutes, a single measurement of temperature and humidity at the microphone for each new location or each hour whichever is oftener shall also be recorded. A ten (10) minute measurement contains valid data provided: Both L_{A10} minus L_{A90} and L_{C10} minus L_{C90} are not greater than 10 dB and the maximum wind speed at the microphone did not exceed 2 m/s during the same ten (10) minute period as the acoustic data.

2. Wind Turbine Sound Immission Limits

No wind turbine or group of turbines shall be located so as to cause wind turbine sound immission at any location on non-participating property containing a residence in excess of the limits in the following table:

Table of Not-To-Exceed Property Line Sound Immission Limits [1]

Criteria	Condition	dBA	dBC
A	Immission above pre-construction background:	$L_{Aeq} = L_{A90} + 5$	$L_{Ceq} = L_{C90} + 5$
B	Maximum immission:	35 L_{Aeq}	55 L_{Ceq} for quiet[2] rural environment 60 L_{Ceq} for rural-suburban environment
C	Immission spectra imbalance	L_{Ceq} (immission) minus (L_{A90} (background)+5) $\leq$ 20 dB	
D	Prominent tone penalty:	5 dB	5 dB

Notes	
1	Each Test is independent and exceedances of any test establishes non-compliance Sound "immission" is the wind turbine noise emission as received at a property
2	A "Quiet rural environment" is a location 2 miles from a state road or other major transportation artery without high traffic volume during otherwise quiet periods of the day or night.
3	Prominent tone as defined in IEC 61400-11. This Standard is not to be used for any other purpose.

[1] Procedures provided in Section 7. Measurement Procedures (Appendix to Ordinance) of the most recent version of "**The How To Guide To Siting Wind Turbines To Prevent Health Risks From Sound**" by Kamperman and James apply to this table.

3. Wind Farm Noise Compliance Testing

All of the measurements outlined above in 1. Establishing the Long-Term Background Noise Level must be repeated to determine compliance with 2. Wind Turbine Sound Immission Limits. The compliance test location is to be the pre-turbine background noise measurement location nearest to the home of the complainant in line with the wind farm and nearer to the wind farm. The time of day for the testing and the wind farm operating conditions plus wind speed and direction must replicate the conditions that generated the complaint. Procedures of ANSI S12.9-Part 3 apply as amended. Instrumentation limits for wind and other factors must be recognized and followed.

Infrasound

The Hidden Annoyance of Industrial Wind Turbines

BY

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(NO DATE)

English trans. by Elizabeth Chafer (2/28/11)

Edited by Calvin Luther Martin, PhD (2/28/11)

Introduction

This article is an updated summary of a lecture given by the author in 1997, entitled "Infrasound: Quiet, Pernicious Pollution." At that time, it was given in response to concerns arising from the marketing in Sweden of a non-lethal infrasound weapon designed for riot control, the recognition of "Sick Building Syndrome" (SBS) caused by infrasound emitted by air conditioning systems, and the increase in the number of wind turbine installations in Brittany.

The rural areas of this region have a high population density, and the nuisances caused by infrasound would be as great or even greater than that of the visual pollution or radio interference preventing television reception!

In the weeks that followed, several points of information came to light, revealing that, in the first Airbus 340 planes, the setting of the pressurisation was such that it caused infrasound that affected the passengers. It was also disclosed that a "Euralille" high-rise block in Lille (France) had been evacuated due to vibrations on the 5th floor. Reports revealed that 644 agents of the new "Archet" hospital in Nice (France) had suffered from nausea and headaches. Some had even had to be admitted to the hospital. In 2005, there were accounts of similar health problems at the "Nord" hospital in Marseille.

This article has now been published in response to some good news: The (French) Académie de Médecine has recommended to the (French) government that the construction of wind turbines exceeding 2.5 MW at less than 1500 m from dwellings should from now be suspended.

This is good news, but not very good news. The writer is concerned that this venerable institution has only taken into account the ”annoyance” caused by audible noise (hissing of the blades, the noise from the gearings in the multiplier), and not the annoyance caused by infrasound. In view of this omission, the aim of this article is to inform the public about these inaudible but harmful noises.

In this article, the word “decibel” (dB) is not used, as it can lead to confusion. In fact, acoustic engineers use a different decibel than underwater acoustic engineers, because it relates to a different power reference level. In addition, they use decibels with an “A” weighting (dBA) as well as weighting for average sound levels over a given period of time: Leq dBA. (Infrasound is not included [in A-weighting].)

Longitudinal Waves

Humans are sensitive to longitudinal waves. These waves have their point of origin in a homogenous medium (air or water) as soon as there is a variation in pressure at any point in this medium. The wave is therefore characterised by its frequency N in Hertz (Hz), which corresponds to the number of times per second the pressure oscillates at any given point. The amplitude of this wave corresponds to the value of the increase or decrease in pressure expressed in Pascals (Pa).

The wave has the effect of compressing and then expanding the medium gradually in the direction of propagation. The molecules of the medium vibrate on the spot and gradually, through elasticity, induce vibration of the adjacent molecules in the direction of propagation of the wave. This is why these waves are also described as elastic waves.

The speed of the propagation of energy C in metres per second (m/s) (proportional to the square of the amplitude) is about 340 m/s in ambient air, and does not vary as a function of the static atmospheric pressure. In water, the speed is about 1500 m/s.

The amplitude of a longitudinal wave decreases as it gets farther away from its source, inversely to the distance D (in metres) travelled. This is divergence attenuation (the wave is spherical). A decay exponential for fading must be added to this attenuation, with the distance D multiplied by a coefficient specific to the medium and proportional to the square of the frequency N.

Another property of these waves is that they can be reflected at the point of change of medium, for example when moving from air to water. They can also be refracted if the medium changes the speed C of the waves during their propagation, for example where there is a localised change in air temperature. The ray paths can be curved where there are temperature gradients.

In addition, if there is a current in the medium of propagation, such as wind in the atmosphere, for example, ray paths propagating in an upwind direction will be lifted from the ground and curved up towards the zenith, and those propagated downwind will be driven towards the ground and curved down towards the nadir.

When longitudinal waves reach a human body and are able to cause the eardrums to vibrate significantly, they can be heard if the frequency N is between 20 and 20,000 Hz.

Audible Sound Waves

It follows that audible sound waves are longitudinal waves that have frequencies between 20 Hz and 20 kHz. The human ear starts to perceive them over and above a threshold of hearing. This threshold depends on the frequency of the wave.

The ear is surprisingly sensitive between 1 kHz and 3 kHz, as it can hear sounds of 2 / 100,000ths Pascal, whereas normal atmospheric pressure is 101,500 Pa. On the other hand, at 50 Hz the threshold is only 2 / 1,000ths Pascal. The ear is therefore 100 times less sensitive at this frequency.

During a conversation, the sound level is about 1 / 100ths to 2 / 100ths Pascal between 100 Hz and 4 kHz.

In addition, if the amplitude of the sound intensifies, over and above a certain level known as the threshold of pain, people suffer very sharp pain in the head and nausea. If a person stays in this environment, lesions to the cochlea in the ear will appear. This threshold is around 60 Pa.

It is possible to stay in a noisy environment without ear protection for a certain period of time a day without getting lesions, provided the intensity of the sound is lower than the threshold of pain. For example, at 2 Pa, it would be for 2 hours a day, and at 1 Pa for 4 hours a day.

In less noisy environments, people can suffer from noise annoyance which prevents them from sleeping, from thinking, or concentrating on a task, etc. In practice, it is not believed there is annoyance under 5 / 1,000ths Pascal. (This is the field of psychoacoustic studies.)

Just as humans are almost blind, in that they don't see ultraviolet or infrared light, they are also nearly deaf, as they do not hear ultrasounds (N > 20 kHz)—unlike dogs and bats, for example—or infrasound (N < 20 Hz), which is used by certain animals such as elephants and giraffes for communicating.

As we have seen, the attenuation of sounds is proportional to the square of their frequency N. Ultrasounds will not be dealt with in the rest of this article, since they are very quickly absorbed or reflected. However, this is not the case in respect to infrasound, which is also perceived by humans, though in a different way.

The Propagation of Infrasound

An audible wave of 1 kHz will be attenuated 10,000 times more than an infrasonic wave of 10 Hz under the same conditions of emission and reception, and following the same propagation path.
The wave length L in metres (m), being the distance separating two successive peaks during the propagation of a wave, is equal to the ratio of the speed C in m/s to the frequency N in Hz, (L = C / N).

For infrasound having a frequency N of less than 20 Hz, this wavelength is much longer than that of audible sounds, and diffraction by obstacles such as trees and bushes is greatly reduced. The same applies to additional attenuation due to atmospheric turbulence.

For this reason, infrasound propagates over considerable distances and will therefore be affected by slow variations in the physical parameters of the medium. For example, in an adiabatic atmosphere where the temperature drops by 9.8° Celsius for every 1,000 m of altitude, an infrasonic ray emitted

horizontally will curve up towards the zenith and will be capable of going over an obstacle of one metre at a distance of 316 m from its source, or an obstacle 10 m high at a distance of 1,000 m. It could also go over a hill 100 m high situated at a distance of 3.16 km.

Generally speaking, infrasonic rays move upwards until they reach an altitude where they encounter either a temperature gradient which inverts (inversion zone) or a wind gradient. In both instances, as we have already seen, the ray path will curve downwards towards the ground (or the sea), where it can be reflected very easily despite the vegetation (or the waves), and gradually rebound.

In this way, infrasound is guided far away from its source, which explains why, for example, the explosion of Mount St. Helens (USA) on 19th May 1980 was felt all over the world. It is also the way in which elephants are able to communicate with each other over tens of kilometres thanks to the temperature inversion zone that forms from sunset to sunrise.

Knowing that infrasound can be perceived at great intensity even when it is far from the source that produced it, we are now going to look at the perturbations they can cause to humans who cannot hear them.

The Physiological Effects of Infrasound

It was a Frenchman, V. Gavreau, who, during the Sixties, first reported human health problems caused by exposure to infrasound. The symptoms resembled seasickness, accompanied by headache, nausea, and dizziness which led to “deep nervous fatigue.” He was also the first to mention eye problems and the impossibility of concentrating on a task.

In the Seventies, a Dane, P.V. Brüel, manufacturer of acoustic metrology equipment, showed that symptoms were felt after only 5 minutes of exposure to infrasound of an amplitude of 1 Pa and a frequency of 12 Hz. He also demonstrated by measurements taken in an estate car travelling at a speed of 100 km/h that the level of infrasound which was almost constantly at 1 Pa between 4 and 16 Hz contributed to “car sickness.”

In addition, P.V. Brüel carried out some very interesting measurements of the level of infrasound on the top floor of a sixteen-floor high-rise block when there was a fairly strong wind blowing. The infrasound reached 6 Pa at 1 Hz and dropped to 0.2 Pa at 16 Hz. The signal spectrum showed resonances at 4 Hz (2 Pa), 8 Hz (1 Pa) and 12 Hz (0.4 Pa).

In the USA in 1975, D.L. Johnson defined the threshold levels above which people feel unwell : 0.2 Pa at 20 Hz, 0.6 Pa at 10 Hz, 2 Pa at 5 Hz, 20 Pa at 2 Hz, and 60 Pa at 1 Hz.

In Japan in 1991, H.Takigawa reported that infrasound of 1 Pa between 3 and 7 Hz had an influence on the vestibule of the ear and lead to ocular reflexes (nystagmus), spinal reflexes (tremors), and autonomic reflexes (dyspnoea).

In 1991, the Russian, B. Fraiman, noted the effect of infrasound of 2 Pa on blood pressure, which confirmed the problems of diastolic pressure mentioned in 1974 by Borredon (1 Pa = the pressure of a column of water 10 cm high).

To summarise, infrasound is capable of causing:

- Headaches
- Dizziness
- Nausea
- Nystagmus
- Tremors
- Dyspnoea
- Circulation problems

Sources of Infrasound

Other than infrasound emitted by animals, the sources of infrasound are either natural or manmade. Periodic natural sources are caused by the volcanic eruption, supersonic booms, storms and fractures such as during earthquakes, avalanches and calving of icebergs from glaciers.

Other transient sources are caused by tornadoes (whirlwinds), the flow of wind over natural (mountains) or man-made obstacles (wind turbines, bridges, towers, churches, houses). Oceans and waterfalls are continual natural sources. There are other man-made sources, such as internal combustion engines and ventilation or air conditioning installations.

The remainder of this article deals with sources which are mainly due to noises of turbulent flow of air on obstacles. This causes the formation of Von Karman swirling paths (called Von Karman vortices), which are made up of a series of eddies swirling alternately in one direction and then the other. They emit both audible and inaudible sound, which is either jet sounds for which the frequency N (in Hz) is given by the Krüger and Marsherer formula: N = (0.055), V/E, where V is the wind speed (in m/s) and E the distance (in m) between the two obstacles limiting the jet, or trail sounds on an obstacle having a thickness or diameter E, for which the emission frequency is given by the Strouhal and Krüger formula: N = (0.2), V/E. In the latter case, the eddies are alternately emitted by one edge and then the other of this long obstacle. Depending on the speed of the wind, these phenomena can become audible and cause the whistling emitted by windows that are badly closed, or by electric wires or cables.

The infrasound produced by wind turbines (the tower and the rotor blades) falls under this category. M.L. Legerton's team (*Inter-Noise 96*) showed that, at 100 m from a wind turbine, the infrasound had peaks of 1.4 Pa emitted every 0.65 sec. as the rotor blades passed the wind turbine tower.

Today, the audible sound produced by the blade tips is considerably less, due to improved blade design. The infrasound produced by centrifugal or axial fans is caused by the “flow separation” (pumping) phenomenon. This causes pressure variations which are amplified by the pipe work.

Conclusion

The information given above is enough to understand that it is better not to be exposed to infrasound which propagates far from its point of origin and against which it is impossible to protect oneself due to the long wavelengths.

Those most affected by exposure to infrasound are rural inhabitants living in proximity to wind turbines, and those working in air-conditioned offices.

The people in the former category are exposed to the infrasound 24 hours a day, whereas people in the latter category are only exposed to infrasound 6 hours a day.

The most important issue is therefore to know what intensity of infrasound can be tolerated without inconvenience over these periods of time.

We do not have the answer to this question. During the Seventies, many studies were carried out by army physiologists to find out how long it was possible to stay in a tank where the level of infrasound is in the region of 20 Pa, in the engine room of a ship where there can be levels exceeding 100 Pa at 5 to 20 Hz, and in a space capsule where the level is between 400 and 600 Pa at 1 to 20 Hz. Their problem was in fact to know how long military personnel could carry out their duties under these conditions. The results were kept secret.

In 1976, Von Gierke put forward a limit of 20 Pa between 1 and 20 Hz below which a human being could be exposed for 24 hours without harmful effects. In fact, those who live near waterfalls or by the sea, where levels of infrasound can vary from 1 to several Pascals, can confirm this.

It would seem that infrasonic noise that does not contain particular frequencies (white noise) is easier to tolerate. It is therefore better to concentrate attention on the power spectral density expressed in Pascals squared per Hertz. In 1993, B.J. Fraimann measured on the Pacific coast a power density G varying 1/N with the frequency signature of the atmospheric turbulence.

It is clear that there is wide scope for further research, which we would like the appropriate government ministries to initiate. In addition, research on the effects of infrasound on animals needs to be carried out.

In the meantime, the application of the Precautionary Principle would be appropriate, in particular with respect to the decision to install wind turbines.

Bibliography

F. Cordier «Le mystère de l'hôpital Nord de Marseille» Le Quotidien du Medecin du 1er Septembre 2005.

M. Rossi «Electro-acoustique» Dunod éditeur 1986 p 34 et p 115 à 148.

«Lemonde des sons» Dossier hors série de pour la Science, Juillet/Octobre 2001.

V. Gavreau, R. Condrat & H. Saul «Infra-sons: Générateurs, détecteurs, propriétés physiques, effets biologiques» Acoustica vol 17, no. 1, 1966, p 1 à 10.

V. Bruel & H.P. Olensen «Mesures infrasonores» Technical Review Brüel & Kjaer No. 3, 1973, p 14 à 26.

D.L. JOHNSON «Auditory and physiological effects of infrasound» Internoise 75 , 1975, p 475 à 482.

H. Takigawa, H. Sakamoto & M. Murata «Effects of infrasound on vestibular function» Journal of Sound and Vibration, vol 151 (3), 1991, p 455 à 460.

B.J. Fraiman, A.N. Ivannikov, V.I. Pavlov «The experimental investigations of low frequency noises in the everyday life» Internoise 93 , 1993, p 1157 à 1160.

P. Borredon, J. Nathie «Effets physiologiques observés chez l'homme exposé à des niveaux infrasonores de 130 dB» In L. Pimonov, ed., Colloque international sur les Infrasons, C.N.R.S. Paris 1974, p 59 à 84.

A. Foch «Acoustique» Collection Armand Colin, 1947, p 184 à 187.

M.L. Legerton et al. «Low frequency noise & vibration levels at modern wind farms» Internoise 96, 1996, p 460 à 462.

William T.D. Cory «Le décollement tournant et le choix des ventilateurs pour les unités de traitement d'air» Acoustique & Techniques No. 8, Janvier 1997, p 11 à 15.

H.E. von Gierke, C.W. Nixon «Effects of intense infrasound on man» in Infrasound and Low Frequency Vibration, ed. W. Tempest, Londres et New-York: Academic Press, 1976.

4. The reported effects of being subjected to long and frequent periods of pulsating low-frequency noise, particularly at night, are not difficult to imagine, they include: depression, chronic stress, migraines, nausea, exhaustion, anger, dizziness, memory loss and cognitive difficulties - children and the elderly are especially affected by the latter. This constellation of symptoms has been given the clinical term, "wind-turbine syndrome". Measured physiologic consequences of exposure to noise during sleep include cardiac arrhythmias, increased heart rate and blood pressure (WHO, 1999, Guidelines for Community Noise, pp 42-44). The WHO guidelines also note that noise with low-frequency components is particularly bothersome in areas with low background noise (p.46), i.e. the countryside, where large wind-turbine plants are multiplying in Ontario.

5. By far the most complete, accurate and sobering summary of the public-health concerns surrounding the negligent siting of wind turbines is contained in a report by Frey and Hadden - " Noise Radiation from Wind Turbines Installed near Homes: Effects on Health" (Feb., 2007 - available at www.windturbinenoisehealthhumanrights.com), which should be mandatory reading for all involved in the regulation of wind turbines.

6. "The Darmstadt Manifesto" (1998), endorsed by over 100 German university professors, described the health concerns that were emerging with wind turbines in Germany ten years ago:

"More and more people are describing their lives as unbearable when they are directly exposed to the acoustic and optical effects of wind farms. There are reports of people being signed off sick and unfit for work, there are a growing number of complaints about symptoms such as pulse irregularities and states of anxiety which are known from the effects of infrasound."

7. The situation has not improved. Nina Pierpont, M.D, PhD, has studied the health effects of wind turbines and treated patients suffering from them in New York State, where she practices. In a letter to Kim Isles of Chatham, Ontario, dated February 16, 2008, Dr. Pierpont had this to say:

"Yes, there are indeed medical problems caused by noise and vibration from current, upwind, three-bladed industrial wind turbines. I am in the process of preparing a paper for publication in a medical journal documenting the consistency of these problems from family to family, the study subjects being a collection of families in several countries who have been driven from their homes by problems with sleep, headaches, tinnitus, equilibrium, concentration, memory, learning, mood, and child behavior - problems which started when the turbines went into operation and which resolved when the family is away from the turbines. These problems all occur in proximity to recently built industrial turbines, put into operation in 2005, 2006, and 2007…..Based on my 3½ years of researching Wind Turbine Syndrome (WTS), including interviews with scores of people around the world who clearly suffer from WTS, it is my strong clinical recommendation (in line with the French National Academy of Medicine) that industrial wind turbines be

Comment Letter D32

From: Moreno, Sonia <SMoreno@foley.com>
Sent: Friday, March 04, 2011 3:05 PM
To: ECOSUB; catulewind@blm.gov
Cc: Rosenbaum, S. Wayne; Cason, Elizabeth A.
Subject: DEIR/DEIS Comment Letter from Invenergy
Attachments: Comment Letter from Invenergy 3-4-11.pdf

Please see attached comment letter from Invenergy Wind California LLC. Thank you.

D32-1

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Re: Comment Letter from Invenergy

To Whom It May Concern:

Thank you for the opportunity to provide comment on the December 2010 draft project level Environmental Impact Report/Environmental Impact Statement ("DEIR/DEIS") for the East County Substation, Tule Wind, and Energia Sierra Juarez Gen-Tie Projects and programmatic level DEIR/DEIS for the Campo, Manzanita and Jordan Projects (collectively, the "PROJECT"). On behalf of Invenergy Wind California LLC ("Invenergy"), a partner in the Campo wind energy project ("Campo project"), we would like to state our support for SDG&E's efforts to build a new substation in Jacumba and to reconstruct and modernize the existing Boulevard substation that was initially built more than fifty years ago. Making these necessary improvements will help SDG&E meet its goal of providing 33 percent of its power from renewable sources by 2020. These improvements are also crucial in meeting the requirements of AB 32, the California Global Warming Solutions Acts passed and signed into law in 2006, which was developed to reduce greenhouse gas emissions to 1990 levels by 2020. The Campo project alone has the potential to reduce carbon dioxide emissions by nearly 505 million pounds per year.

D32-1 Cont.

The ECO Substation Project is important for a number of renewable energy projects in the area, including the Campo project. By making these necessary infrastructure improvements, the Campo project will be able to generate and transmit renewable energy from the wind farm proposed to be construction on the Campo Reservation. The renewable energy created from the Campo project will serve approximately 40,000 homes every year within the state of California. As the region has been identified as one of the country's premier locations for renewable energy development, we have a responsibility to use those resources in an efficient and responsible manner in order to move toward a new clean energy future. Invenergy is excited to be a part of this transition, and is committed to developing and constructing a safe project that will protect the environment, will bring 10 to 12 permanent jobs to the community, and will provide an important economic development opportunity for the Campo Band.

The electric public utility system upgrades contemplated in the DEIR/DEIS, do not just benefit SDG&E, the Campo project or the other proposed renewable energy project in the area, they benefit the entire region. By providing interconnection opportunities for renewable energy projects, the ECO Substation will create new jobs and ensure that we have a balanced and diversified energy portfolio to sustain economic competitiveness and a high quality of life in the San Diego region. These renewable energy projects will be an important contribution to the goals of the state of California to obtain an increasingly larger percentage of its energy from renewable sources. This goal is made all the more pressing and prudent as the unrest in the Middle East of the past few weeks, and the subsequent sharp rises in crude oil prices, have demonstrated.

D32-1 Cont.

In addition to providing its support for the Project, Invenergy wants to ensure that the information contained in the DEIR/DEIS accurately reflects information as it pertains to the Campo project, which we anticipate will be the subject of subsequent environmental review by the Bureau of Indian Affairs under the National Environmental Policy Act. We therefore propose the following clarifications to the information contained in the DEIR/DEIS. The information contained in this letter "merely clarifies or amplifies" existing information within the DEIR/DEIS and as such, does not constitute significant new information, but rather allows for accuracy in the record:

- At various points in the DEIR/DEIS, including but not limited to pages ES-11, and B-9, it is stated "SDG&E proposes to construct and operate approximately 106 turbines capable of generating 160 Megawatts ("MW") of electricity…", that turbines will be 1.5 MW, and that turbines will be approximately 450 feet tall from ground to tip of the fully extended turbine blade. This information should be clarified: instead, as is currently contemplated, Invenergy and the Campo Band are proposing to construct and operate the Campo project, and the current proposal for the Campo project consists of an initial phase of up to 80 turbines (e.g., 26 less than identified in the DEIR/EIS) each capable of producing between 2.0 and 3.0 MW for a total of 160 MW. Turbines will be up to approximately 500 feet tall.

D32-2

- Page ES-11 of the Executive Summary, and page B-10 of the Project Description state "it is expected that the Campo and Manzanita wind energy projects would develop a switchyard for both facilities on non-tribal grounds, and a new 138 kV line would be constructed along the existing ROW of the 69 kV corridor that currently connects to the existing Boulevard substation…"[1] It is currently anticipated that San Diego Gas & Electric will develop and construct the aforementioned power line and switchyard facilities. As noted in the Draft EIR/EIS, the power line will likely run in the

D32-3

[1] Under GO 131-D, Section I, a 'power line' is defined as a line designed to operate between 50 and 200kV.

existing ROW of the 69 kV power line corridor from the existing Boulevard substation, cross the Campo project toward the west and terminate at a switchyard for the Campo and Manzanita projects, which will likely be located directly west of Campo on non-tribal lands. A second line would connect switchyard to the Manzanita wind energy project.

D32-3 Cont.

- Table A-1 (located on page A-15) states that the "Campo Band of Mission Indians **and CPUC**" have jurisdiction over the "Wind Turbines" component of the Campo project. The CPUC has jurisdiction over state, county and private lands. The CPUC has jurisdiction over federal lands when there is a nexus for connection to a transmission facility in the State of California. We ask that Table A-1 be clarified to indicate that CPUC will have jurisdiction only over those portions of the project located on state, county, private or federal lands.

D32-4

- Figure D-2.9 depicts the area of Quino Checkersport Butterfly critical habitat that includes areas within the Campo Reservation boundary. Our understanding, as confirmed by the U.S. Fish and Wildlife Service, is that this figure reflects all areas that were *proposed* to be designated as critical habitat for the Quino Checkersport Butterfly in 2009, but fails to account for the fact that the final rule designation of critical habitat included *no lands* that are part of the Campo Reservation. Please revise the figure to accurately reflect the critical habitat area for the Quino Checkersport Butterfly, as identified in the final rule by the U.S. Fish and Wildlife Service. [Federal Register: June 17, 2009 (Volume 74, Number 115)][Rules and Regulations][Page 28775-28862]

D32-5

- At various points in the DEIR/DEIS, including but not limited to pages D3-13 D3-15, D8-34, the document analyzes visual and noise simulations for the Campo project. As noted above, the Campo project will use turbines with capacity between 2.0 and 3.0 MW rather than 1.5 MW wind turbines, and this information should be clarified throughout the DEIR/DEIS. As stated above these turbines will be slightly larger than the 1.5 MW turbines, but there is an overall reduction in turbines by moving to a larger machine. We feel this counterbalance does not significantly change the visual and noise impacts as currently described in the DEIR/DEIS, and in fact reduces these impacts due to the fewer number of turbines. The DEIR/DEIS has already disclosed that visual impacts from the PROJECT are Class 1. Additionally, with respect to noise impacts, we note that the DEIR/DEIS assumes impacts are similar to the Tule Wind Project, which identifies turbines in the 1.5 to 3.0 MW range. Therefore this information does not constitute new information that would require recirculation because the impacts have already been evaluated and

D32-6

disclosed. *See, e.g.*, DEIR/DEIS at B-90 (description of Tule wind turbines, which are also approximately 500 feet in height); D.8-28, 29, 34, 35 (PROJECT noise analysis); D.3-62 (PROJECT with Class I visual impacts). D32-6 Cont.

- Page D9-12 states that it is unknown whether the Campo wind energy project "would use helicopters during construction." The Campo project does not anticipate using helicopters for construction of the wind energy facility. D32-7

- In several places in the DEIS/DEIR, including but not limited to Pages D11-30 and D18-20, it is stated that the Campo project "is expected to be online in August 2012, which would probably require construction in 2011 to 2012 based on the installation of 106 wind turbines; however, no specific construction schedule has been identified by the applicant." As noted above, the initial phase of the Campo project will consist of up to 80 turbines rather than 106, and Invenergy anticipates that the Campo project will be online in 2014, rather than 2012, with construction commencing some time in 2013. D32-8

- Pages D12-38 and 39 state that the Campo project "would also be required to prepare and implement Stormwater Pollution Plans and Stormwater Management Plans…" This implies that the Campo project would be subject to the San Diego County General Municipal Permit; however, because the wind energy project is located entirely on the Campo Indian Reservation, the project will not in fact be subject to the Municipal Permit requirements. D32-9

- Page D15-58 states that the Campo wind project will install fire suppression systems on its wind turbines. The Campo project is currently consulting with technical experts to determine the most effective mitigation measures to address fire impacts. These mitigation measures will be fully analyzed in the project level DEIS for the Campo project. Therefore, at this time we believe this statement to be premature. D32-10

We appreciate the opportunity to provide our comments and proposed clarifications to the DEIR/DEIS.

Very truly yours,

S. Wayne Rosenbaum

Comment Letter D33

11.142.01

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March 4, 2011

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Re: Comments of Backcountry Against Dumps, The Protect Our Communities Foundation, East County Community Action Coalition and Donna Tisdale on the Draft Environmental Impact Report/Draft Environmental Impact Statement for East County Substation Project, the Tule Wind Project and the Energia Sierra Juarez Gen-Tie Project

Dear Officials:

Pursuant to the California Environmental Quality Act ("CEQA"), California Public Resources Code ("P.R.C.") section 21000 *et seq.*, and the National Environmental Policy Act ("NEPA"), 42 U.S.C. section 4321 *et seq.*, and in accordance with the public notices provided by the California Public Utilities Commission ("CPUC") and the Bureau of Land Management ("BLM") (collectively "reviewing agencies"), Backcountry Against Dumps, The Protect Our Communities Foundation, East County Community Action Coalition and Donna Tisdale (hereinafter "Conservation Groups") submit the following Comments on the reviewing agencies' joint Draft Environmental Impact Report/Draft Environmental Impact Statement ("DEIR") for the East County ("ECO") Substation Project, the Tule Wind Project and the Energia Sierra Juarez Gen-Tie Project ("ESJ Project") (collectively, "the Project"). These comments follow Conservation Groups' scoping comments on the Project, submitted on February 15, 2010 (attached hereto as Exhibit 1). D33-1

At the outset, Conservation Groups wish to express their opposition to this Project as an unnecessary industrialization of pristine desert wilderness areas. Echoing a growing chorus of opinions on this subject, Conservation Groups reiterate their suggestion that the reviewing agencies adopt as an alternative to the proposed project the development of wide-spread non-fossil fuel distributed generation projects near demand centers in already-disturbed areas.[1] The reviewing D33-2

[1] Distributed generation has been recently referred to by CPUC as electricity provided by "non-centralized electricity power production facilities less than 20 MW interconnected at the distribution side of the electricity system. [Distributed generation] technologies include solar,

agencies dismiss this alternative in the DEIR as being infeasible and unable to fulfill the Project objectives, but as discussed below these conclusions are erroneous. The EIR must provide a robust analysis of DG alternatives that would obviate the need for all three components of the project.

D33-2 Cont.

Additionally, Conservation Groups believe that this environmental review process will not adequately address impacts because it has been improperly segmented from the environmental reviews of other energy development and transmission projects, including, most notably, the Sunrise Powerlink Transmission Line ("Powerlink") EIR/EIS, which was approved by CPUC on December 18, 2008 and by BLM on January 20, 2009. The projects here are intimately linked to the Powerlink project and other large-scale energy development projects in the works. Conservation Groups therefore request that, before continuing with the environmental review and approval process for the Project, the reviewing agencies prepare a comprehensive, programmatic-level EIR/EIS. The programmatic EIR/EIS should (1) study the impacts of widespread industrial-scale energy developments in the southern California deserts and elsewhere in the Southwest, (2) provide guidance on where, if anywhere, to locate the developments, and (3) analyze alternatives to developing renewable energy facilities in sensitive desert ecosystems far from load centers, including locally distributed generation such as roof-top solar arrays. In further expression of these two major concerns and others, Conservation Groups offer the following comments on the DEIR.

D33-3

I. Project Description

In its description of the ESJ Project, the DEIR asserts that "[o]nly renewable energy would be transmitted via the gen-tie line." DEIR at ES-11. At best, this statement is entirely unsupported by evidence. At worst, it is erroneous and misleading. While Sempra Generation (ESJ's parent company) requested in an August 28, 2009 letter to the federal Department of Energy ("DOE") that "power on [the gen-tie] line be limited to renewable energy projects," there is no evidence in the DEIR – or the Draft EIS prepared by DOE on the ESJ Project – that any such limitation has been or would be imposed.[2] Moreover, there are currently no CPUC-approved contracts for wind power in the Baja area. It thus appears that the statement is erroneous. The reviewing agencies must either strike the statement – and any conclusions based on it – from the EIR or explain its accuracy.

D33-4

II. Project Purpose and Need

D33-5

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wind and water-powered energy systems; and renewable and fossil-fueled internal combustion (IC) engines, small gas turbines, micro-turbines and fuel cells." CPUC, "Impacts of Distributed Generation, Final Report," January 2010, p. 3-3, available at: http://www.cpuc.ca.gov/NR/rdonlyres/750FD78D-9E2B-4837-A81A-6146A994CD62/0/ImpactsofDistributedGenerationReport_2010.pdf

[2] Sempra's letter is available at: http://esjprojecteis.org/docs/DOE_Presidential_Permit_clarification.pdf

NEPA requires EISs to show the "underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." 40 C.F.R. § 1502.13. BLM must not "adopt[] private interests to draft a narrow purpose and need statement" because "the Department of Interior has promulgated no regulations emphasizing the primacy of private interests." *National Parks & Conservation Assn. v. U.S. Bureau of Land Mgmt* ("*NPCA v. BLM*"), 606 F.3d 1058, 1071, 1072 (9th Cir. 2010). The Department of the Interior's "NEPA handbook explains that the 'purpose and need statement for an externally generated action must describe the BLM purpose and need, *not an applicant's or external proponent's purpose and need.*'" *Id.* at 1071 n. 9 (emphasis in original).

Here, the DEIR states that BLM's purpose and need is merely to "respond to [San Diego Gas and Electric Company's ("SDG&E's")] and Pacific Wind Development's applications under Title V of the Federal Land Policy Management Act (FLPMA, 43 U.S.C. 1701 et seq.) for [a right-of-way ("ROW")] grant to construct, operate, and decommission a wind energy facility (Tule Wind Project) and a 138 kV transmission line on public lands (ECO Substation Project) in compliance with FLPMA, BLM ROW regulations, and other applicable federal laws." DEIR at ES-3. This is entirely inadequate for NEPA purposes. It is not enough for BLM to reiterate its statutory duty to review applications submitted to it. BLM must actually show the "*underlying* purpose and need" for the Project itself (40 C.F.R. section 1502.13 (emphasis added)), based on the agency's *own* purposes and needs, not those of the Project applicants. *NPCA v. BLM*, 606 F.3d at 1071.

D33-5 Cont.

III. A Programmatic EIR/EIS Should Be Prepared

In addition to requiring analysis of connected actions in project-specific EISs, such as the Project DEIR here, NEPA requires agencies to prepare a programmatic EIS where the agency is considering a group of related actions, including actions that are connected, cumulative or similar. *Piedmont Environmental Council v. Federal Energy Regulatory Commission*, 558 F.3d 304 (4th Cir. 2009) (citing 40 C.F.R. § 1508.25(a)(1)-(3)); *see also* 14 Cal. Code Regs. ("CEQA Guidelines") § 15168 (discussing when a "Program EIR" can be prepared under CEQA). Agencies may not "unreasonably constrict[] the scope of . . . environmental evaluation" by segmenting review of an overall program or group of related actions. *National Wildlife Federation v. Appalachian Regional Commission*, 677 F.2d 883, 888 (D.C. Cir. 1981).

D33-6

As discussed above, the Project is intimately linked to the Powerlink project and other energy development and transmission projects in the area. The ECO Substation Project, Tule Wind Project and ESJ Project are just three of the many proposed renewable energy projects in the southern deserts of California that either require BLM, CPUC and/or San Diego County's approval, or could not proceed without approval by one of those agencies of a related facility (such as the Powerlink). Other such projects include, *inter alia*, the Powerlink, the Ivanpah Solar Electric Generating System, the Esmeralda-San Felipe Geothermal Project, the Genesis Solar Energy Project, the Chevron Energy Solutions Lucerne Valley Solar Project, the Calico Solar Project, the Blythe Solar Project, and the Wind Zero Project.

These projects are interrelated in multiple ways. For one, as mentioned, all the projects are located in whole or in part in the California desert and require some form of BLM, CPUC and/or San Diego County approval. Additionally, all the projects would connect to the high-voltage wholesale power grid managed by the California Independent System Operator. Further, they are all intended to help California – and the utilities therein – meet their Renewables Portfolio Standard. The projects are also intended to help fulfill the Obama Administration's goal of harnessing renewable energy resources. Indeed, most of the projects are reliant on federal funds made available for renewable energy facilities by American Recovery and Reinvestment Act of 2009.

Before continuing with project-specific environmental review and approval processes for each of these interrelated renewable energy projects, like the Project here, BLM and CPUC should have, and must now, prepare a programmatic EIR/EIS to (1) study the impacts of widespread industrial-scale energy developments in the southern California deserts and elsewhere in the Southwest, (2) provide guidance on where, if anywhere, to locate the developments, and (3) analyze alternatives to developing renewable energy facilities in sensitive desert ecosystems far from load centers, including locally distributed generation such as roof-top solar arrays. Without such a programmatic EIR/EIS, BLM and CPUC have improperly segmented – and will continue to improperly segment – their environmental review of the unprecedented development of renewable energy facilities in the deserts of southern California and the greater Southwest.

D33-6 Cont.

BLM, along with the Office of Energy Efficiency and Renewable Energy, is currently developing a Solar Energy Development Programmatic EIS, but its zones of analysis do not include the Tule Wind Project site or many of the other sites in California for which renewable energy developments have been or are likely to be proposed. Thus, while commendable, the Solar Energy Development Programmatic EIS cannot satisfy NEPA with respect to the Project here and many other similar projects in California.

IV. Alternatives

NEPA requires that an EIS "[r]igorously explore and objectively evaluate all reasonable alternatives" so that "reviewers may evaluate their comparative merits." 42 U.S.C. §4332; 40 C.F.R. § 1502.14. "The existence of a viable but unexamined alternative renders an environmental impact statement inadequate." *Friends of Yosemite Valley v. Kempthorne*, 520 F.3d 1024, 1038 (9th Cir. 2008). Similarly, to comply with CEQA, agencies must consider a "reasonable range" of alternatives. CEQA Guidelines §15126.6(a); *Village of Laguna Beach, Inc. v. Board of Supervisors* (1982) 134 Cal.App.3d 1022, 1028. A project *cannot* be approved if its significant impacts can be feasibly reduced to insignificance through project alternatives or mitigation measures. P.R.C §§ 21002, 21081.

D33-7

Here, the reviewing agencies unacceptably eliminated feasible – and less environmentally damaging – alternatives from careful review. Most notably, they dismissed the ECO System

Alternative 6 and the Distributed Generation alternative. DEIR at C-18 to 19, 24. As elucidated in the Declaration of Bill Powers (attached hereto as Exhibit 2), both of these alternatives are commercially and technically feasible. Moreover, they would both meet the Project objectives of increasing renewable energy development, meeting state Renewables Portfolio Standards and federal renewable energy mandates, and improving the reliability of power delivery to Boulevard, Jacumba and other nearby communities. DEIS at A-11. Engineer Bill Powers' expert conclusions are summarized and further substantiated below.

D33-7 Cont.

A. The ECO System Alternative 6

The ECO System Alternative 6 was proposed as an alternative to the ECO Substation and ESJ Project. The ECO System Alternative 6 is described in the DEIR as follows:

> Use existing Comision Federal de Electricidad (CFE) 230 kV line located in northern Mexico and Path 45 to transmit ESJ Energy, and upgrade East County 69 kV substations combined with upgrading existing East County 69 kV substation(s) and lines to accommodate local wind development combined with microgrid reinforcement of local transmission infrastructure to meet load requirements from rooftop solar or other local, small-scale resources.

DEIR at C-18. The DEIR dismisses this alternative because (1) there is not enough capacity on the CFE 230 kV line and Path 45 to "interconnect all of the ESJ Wind Project" in the La Rumorosa area of Mexico, or "all the region's planned renewable generation;" (2) the alternative "would not meet reliability objectives;" (3) upgrades to the CFE and Path 45 systems "may pose substantial regulatory and legal constraints to achieving delivery of renewable energy;" and (4) the "alternative may not meet environmental criteria because up to 100 miles of reconductering or rebuilding projects would be required to integrate planned renewable generation in the Boulevard area." *Id.* The DEIR is wrong; the ECO System Alternative 6 is feasible and would meet the Project objectives.

D33-8

First, there is ample capacity. It is undisputed that Path 45 has at least 800 MW in unused capacity. *See* DEIR at C-18; Exhibit 2 at ¶¶ 3-6. However, the available capacity could be doubled if the lines were reconductered with composite conductors.[3] With a capacity of 1,600 MW, the "planned generation of 1,200 MW from the ESJ Wind Project" would be easily accommodated. DEIR at C-18. As for the other renewable generation planned in the region, some of it could be accommodated via upgrades to existing East County substations. *See* DEIR at C-55. And local distributed generation could supplant the need for any additional industrial-scale renewable generation facilities in the

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[3] *See* Bill Powers, "San Diego Smart Energy 2020: The 21st Century Alternative," October 2007, pp. 54-55, available at: http://www.sdsmartenergy.org/20-may-08_Smart%20Energy%202020_2nd%20printing_complete.pdf

region. *See* Exhibit 2 at ¶¶ 8-17.

Second, the alternative would meet the reliability objectives for the Boulevard and Jacumba area. As noted, upgrading the existing East County substations would improve reliability, as would increased distributed generation in the area. Further, as Bill Powers explains, the "reliability of the combined Boulevard/Jacumba area load could be completely assured with a 3 MW peak gas turbine at a cost of less than $4 million." Exhibit 2 at ¶ 7.

Third, the legal and regulatory barriers to implementation of the ECO System Alternative 6 are significantly overblown in the DEIR. As Bill Powers ably explains, "Sempra is clearly comfortable operating in the Baja California legal and regulatory environment," and "[i]t is not credible for CPUC and BLM to claim in the DEIR that there are sufficient capacity, legal, or regulatory impediments to exporting wind power from Baja California over Path 45 to make its use infeasible." Exhibit 2 at ¶ 6; *see also id.* at ¶¶ 3-5. Furthermore, jurisdictional irregularities are not enough to allow dismissal of an otherwise feasible alternative. Agencies are required by NEPA to consider alternatives they do not have the authority to implement. *Sierra Club v. Lynn*, 502 F.2d 43, 62 (5th Cir. 1974). D33-8 Cont.

Fourth, the reviewing agencies provide no evidentiary support for their bare conclusion that the "alternative may not meet environmental criteria because up to 100 miles of reconductering or rebuilding projects would be required to integrate planned renewable generation in the Boulevard area." DEIR at C-55. It is unclear how the upgrading and reusing of existing infrastructure would be more environmentally damaging than the construction of new gen-tie lines, transmission lines, substations and other associated facilities.

In sum, the ECO System Alternative 6 is feasible and would meet the Project objectives. The reviewing agencies must fully examine this alternative.

B. The Distributed Generation Alternative

The DEIR describes the distributed generation alternative as follows:

> Under this alternative, the ECO Substation, Tule Wind and ESJ Gen-Tie projects would not be built. Instead, distributed generation including but not limited to residential and commercial rooftop solar panels, biofuels, hydrogen fuel cells, and other renewable distributed energy sources would be installed in the place of the Proposed PROJECT. D33-9

DEIR at C-60. The DEIR dismisses the distributed generation alternative on the grounds that it would (1) not meet renewable energy goals within the 2010-2020 time horizon; (2) only partially solve reliability issues to Boulevard and Jacumba communities; and (3) would be infeasible from a technical and commercial standpoint within the 2010-2020 time horizon. DEIR at C-24, 60 to 62. The DEIR is wrong; distributed generation is feasible and would meet the Project objectives.

First, as Bill Powers explains, "800-1,000 MW of distributed [photovoltaic solar generation] will be installed in SDG&E territory [by 2020] if the current 80-100 MW per year distributed PV installation rate is maintained." Exhibit 2 at ¶ 10; *see also id.* at ¶¶ 8-9. Furthermore, there is significantly more distributed generation potential with other sources, such as combined heat and power plants, of which there is "nearly 400 MW of cost-effective . . . potential in SDG&E's service territory" according to a 2005 study. *Id.* at ¶ 15. Combined, these and other distributed generation sources could meet renewable energy goals within the 2010-2020 time horizon.

Second, as Bill Powers' analysis shows, distributed generation sources – at least solar photovoltaics and combined heat and power plants – are more cost effective than most other generation sources, including those that the Project would tap. *Id.* at ¶¶ 11-17. Furthermore, distributed generation reduces the vulnerability of SDG&E's electrical grid to fires and other natural disasters. *Id.* at ¶¶ 11, 14.

D33-9 Cont.

Finally, as discussed above, distributed generation would aid the reliability of power supply in the Boulevard and Jacumba area. Moreover, the "reliability of the combined Boulevard/Jacumba area load could be completely assured with a 3 MW peak gas turbine at a cost of less than $4 million." Exhibit 2 at ¶ 7.

In sum, a distributed generation alternative is feasible and would meet the Project objectives. The reviewing agencies must fully examine this alternative.

V. Environmental Impacts

The EIR/EIS must take a "hard look" at the environmental impacts of proposed major federal actions and provide a "full and fair discussion" of those impacts. 40 C.F.R. § 1502.1; *see also National Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 733 (9th Cir. 2001). From a CEQA point of view, the EIR must inform the public and agency decisionmakers of all potentially significant environmental impacts prior to project approval. As the California Supreme Court has previously explained, "[t]he environmental impact report is the heart of CEQA and the environmental alarm bell whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return." *Sierra Club v. State Board of Forestry* (1994) 7 Cal.4th 1215, 1229 (quotations and citations omitted).

D33-10

Here, the reviewing agencies must fully analyze all of the environmental impacts of the project. Accordingly, CPUC and BLM must evaluate the effects of the Project in both the United States *and* Mexico. *See, e.g., Hirt v. Richardson*, 127 F. Supp. 2d 833 (W.D. Mich. 1999); *National Organization for Reform of Marijuana Laws v. United States Department of State*, 452 F. Supp. 1226, 1232-33 (D.D.C. 1978); *cf.* Exec. Order No. 12114, 44 Fed. Reg. 1957 (1979), reprinted in 42 U.S.C.A. § 4321 app. However, the DEIR entirely fails to discuss the Project's effects in Mexico. Furthermore, its discussion of many environmental impacts in the United States is absent or inadequate, as explained below.

A. Noise Impacts

One of the DEIR's most glaring inadequacies is its omission of *any* analysis of infra- and low-frequency noise ("ILFN"), particularly as would be produced by the Tule Wind Project's wind turbines. The DEIR not only fails to analyze the impacts of ILFN, it fails to even calculate or discussion how much ILFN the Project would produce. The Project – and particularly the Tule Wind Project – is likely to produce enough ILFN to cause a significant adverse environmental impact, and the reviewing agencies' failure to identify, let alone analyze and mitigate, this impact flouts both CEQA and NEPA.

Wind turbine noise expert Richard James has submitted to CPUC and BLM an extensive wind turbine noise impact review of the Project. Carmen Krogh has also submitted comments on the DEIR detailing the adverse health impacts of industrial wind turbines. Conservation Groups generally agree with, and therefore incorporate by reference, Richard James' March 4, 2011 review and Carmen Krogh's March 1, 2011 comments. Conservation Groups also provide the following discussion of wind turbine noise impacts.

1. ILFN Can Produce Significant Adverse Health and Environmental Impacts

Health impacts from wind turbine noise can be severe. And as emerging research is consistently showing, the noise does not even have to be audible to cause substantial health impacts. As one researcher concluded, "non-aural physiological and psychological effects may be caused by levels of low frequency noise below the individual hearing threshold."[4] As another wind turbine noise research stated, "[t]here is no doubt that some humans exposed to infrasound experience abnormal ear, [central nervous system], and resource induced symptoms that are real and stressful."[5]

D33-11

Health impacts from ILFN can include sleep disturbance, visceral vibratory vestibular disturbance, vertigo, headaches, dizziness, unsteadiness, tinnitus, ear pressure or pain, external

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[4] M. Schust, "Effects of low frequency noise up to 100 Hz," *Noise & Health*, 23(6):73-85, 2004, p. 73, available at: http://www.noiseandhealth.org/article.asp?issn=1463-1741;year=2004;volume=6;issue=23;spage=73;epage=85;aulast=Schust. *See also* Alec N. Salt & Timothy E. Hullar, "Responses of the ear to low frequency sounds, infrasound and wind turbines," *Hearing Research*, 268 (2010) 12-21 (attached hereto as Exhibit 3).

[5] Geoff Leventhal, "Review of Published Research on Low Frequency Noise and Its Effects," *prepared for* Defra (U.K. Department of Environment, Food and Rural Affairs), May 2003, p. 60, available at: http://www.defra.gov.uk/environment/quality/noise/research/lowfrequency/documents/lowfreqnoise.pdf.

auditory canal sensation, fatigue, irritability, memory and concentration effects, loss of motion, cardiac arrhythmias, stress and hypertension, among others.[6] "The energy generated by large turbines can be especially disturbing to the vestibular systems of some people, as well as cause other troubling sensations of the head, chest, or other parts of the body." Exhibit 4 at 24.

Here, there are dozens of residences within 1.25 miles of the Tule Wind Farm (*see* DEIR at D.10-109, D.8-25 to 27), a distance within which experts are increasingly finding wind turbine noise impacts, as discussed below. Thus, the impacts described above are likely to significantly and adversely impact Project area residents. Just because ILFN "is not yet [explicitly] recognized as a disease agent, is not covered by legislation" and "permissible exposure levels have not yet been established" does not mean the DEIR can *entirely* ignored this issue. *See Berkeley Keep Jets Over the Bay Committee v. Board of Port Commissioners* (2001) 91 Cal.App.4th 1344, 1370 ("The fact that a single methodology does not currently exist that would provide" the reviewing agencies with a "precise, or 'universally accepted,' quantification" of the Project's ILFN noise impacts "does not excuse the preparation of any health risk assessment"). CPUC and BLM must analyze and mitigate the Project's ILFN impacts.

D33-11 Cont.

2. A-Weighted and Averaged Noise Measurements Are Insufficient to Capture ILFN

As shown in DEIR Section D.8, all the noise measurements presented and analyzed are A-weighted. Furthermore, many of them are time-averaged. These types of measurements are inadequate for evaluating ILFN production and exposure.

With respect to A-weighting, as the DEIR itself states "the A-weighted scale . . . correlates well with human *perceptions* of the annoying aspects of noise." DEIR at D.8-2 (emphasis added). It does not correlate well with the impacts caused by inaudible sound pressures. Instead, the research uniformly shows that A-weighting underestimates the sound pressure level of noise with low-

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[6] *See, e.g.,* Punch, Jerry, Richard James & Dan Pabst, 2010, "Wind-Turbine Noise: What Audiologists Should Know," *Audiology Today*, July/August 2010, pp. 20-31 (attached to these comments as Exhibit 4); Pierpont, Nina, 2009, *Wind Turbine Syndrome: A Report on a Natural Experiment*, K-Selected Books: Santa Fé, NM; The Society for Wind Vigilance, January 2010, *Wind Industry Acknowledgment of Adverse Health Effects: An Analysis of the American/Canadian Wind Energy Association Sponsored "Wind Turbine Sound and Health Effects: An Expert Panel Review, December 2009*, available at http://www.windvigilance.com/awea_media.aspx.

frequency components. Exhibit 3 at 19.[7]

The problem with time-averaged measurements is that through them "information on fluctuations [is] lost."[8] This is an significant issue in measuring ILFN because "[m]any complaints of low frequency noise refer to its throbbing or pulsing nature."[9] Numerous studies have confirmed that "amplitude-modulated sound is more easily perceived an more annoying than constant-level sounds and that sounds that are unpredictable and uncontrollable are more annoying than any other sounds." Exhibit 4 at 23.

Thus, in order to better measure ILFN and fully take into account the impacts of inaudible sound pressures, the reviewing agencies should (1) use non-averaged noise measurements in addition to the averaged measurements they use for other purposes, and (2) use C-, G- and/or Z-weighted measurements, which give more weight to infrasound and lower frequencies, in addition to A-weighted measurements (which are useful for measuring audible noise impacts).

3. Even the A-Weighted Noise Impacts Will be Significant

Evidence demonstrates that "[a]nnoyance and sleep disruption are common when sound levels are 30 to 45 dBA."[10] And as Richard James explains on page 23 of his review, the "San Diego County

D33-11 Cont.

[7] *See also,* World Health Organization, "Guidelines for Community Noise," 1999, section 2.3.3, available at: http://www.who.int/docstore/peh/noise/guidelines2.html; Minnesota Department of Health, Environmental Health Division, "Public Health Impacts of Wind Turbines," May 22, 2009, available at: http://www.health.state.mn.us/divs/eh/hazardous/topics/windturbines.pdf; M. Schust, "Effects of low frequency noise up to 100 Hz," *Noise & Health*, 23(6):73-85, 2004; HG Leventhall, "Low frequency noise and annoyance," *Noise & Health*, 23(6):59-72, 2004, available at: http://www.noiseandhealth.org/article.asp?issn=1463-1741;year=2004;volume=6;issue=23;spage=59;epage=72;aulast=Leventhall.

[8] Geoff Leventhal, "Review of Published Research on Low Frequency Noise and Its Effects," *prepared for* Defra (U.K. Department of Environment, Food and Rural Affairs), May 2003, p. 35.

[9] *Id.*

[10] Karen Rideout, Ray Copes and Constance Bos, "Wind Turbines and Health," *National Collaborating Centre for Environmental Health*, January 2010, p. 4, available at: http://www.ncceh.ca/sites/default/files/Wind_Turbines_January_2010.pdf. *See also* Eja Pedersen & Kerstin Persson Waye, "Perception and annoyance due to wind turbine noise – a does-response relationship," *Journal of the Acoustical Society of America*, 116(6), December

CNEL limit of 45 dBA for sensitive receivers will be exceeded at any location [where] the nighttime L_{Aeq} exceeds 38 dBA. This is likely to be most of the area within 1.25 miles of the perimeter of the Project." Since, there are dozens if not hundreds of sensitive receivers such as residences within 1.25 miles of the perimeter of the Project (*see* DEIR at D.8-25 to 27, D.10-107 to 109), the Project is likely to have significant *long-term* noise impacts. The DEIR is wrong in its conclusion that the ECO Substation and Tule Wind projects would only have *short-term* significant and adverse impacts, and that the ESJ projects would have *no* significant noise impacts. CPUC and BLM must revise their analysis to take these long-term noise impacts into account and mitigate them to the extent feasible.

4. Greater Mitigation Is Required

As shown in DEIR Section D.8, Project facilities, including wind turbines, the ECO Substation and others would be located well within 1.25 miles of residences and other sensitive receptors. As discussed above, this is an inadequate setback. To avoid the negative health impacts from wind turbines, Dr. Nina Pierpont recommends setbacks from large wind projects of at least *1.25 miles.*[11] A similar setback has been called for by the French National Academy of Medicine.[12] In his report for the Academy, Claude-Henri Chouard writes:

> The harmful effects of sound related to wind turbines are insufficiently assessed .... The sounds emitted by the blades being low frequency, which therefore travel easily and vary according to the wind, ... constitute a permanent risk for the people exposed to them. ... The Academy recommends halting wind turbine construction closer than 1.5 km from residences.[13]

Here too the setbacks should be 1.25 miles – at least the setbacks from the Tule Wind Project wind turbines.

D33-11 Cont.

B. Public Health Impacts – Dirty Electricity

D33-12

2004, available at: http://maine.gov/dep/blwq/docstand/sitelaw/Selected%20developments/Spruce_Mountain/additional_information/9_24_2010/fsm/exhibit_17.pdf.

[11] Nina Pierpont, 2009, *Wind Turbine Syndrome: A Report on a Natural Experiment*, K-Selected Books: Santa Fé, NM.

[12] Chouard, Claude-Henri, 2006, *Rapport: Le Retentissement du Fonctionnement des Éoliennes sur la Santé de l'Homme.*

[13] *Id.*

Another impact overlooked in the DEIR is that of dirty electricity. As electrical pollution expert David Colling describes in his Declaration (attached hereto as Exhibit 5), "dirty electricity refers to the electromagnetic energy that flows along a conductor and deviates from a pure 60-Hz sine wave." Exhibit 5 at 1. Mr. Colling has tested for electrical pollution at multiple wind farms and substations and has found that "[w]ind turbines can produce significant electrical pollution in the form of dirty electricity. Additionally, if not adequately filtered, dirty electricity can be propagated through the substations and onto transmission and distribution lines." Exhibit 5 at 8. As Mr. Colling has discovered, dirty electricity can travel significant distances both along power lines and through the ground, commonly impacting people and structures for more than 0.5 miles from the source (e.g. a wind turbine). Exhibit 5 at 3.

The impacts of dirty electricity, like those of ILFN, can be severe. Until recently, dirty electricity had not been widely studied by the scientific community, but this is beginning to change. Recent studies have linked dirty electricity with an increase in ailments such as diabetes, fibromyalgia, chronic fatigue syndrome and attention deficit disorder, among others.[14] Anecdotal evidence, such as the horrific stories recounted by Paul Thompson in his comments on the DEIR, also bears out the negative effects of dirty electricity.

D33-12 Cont.

Nonetheless, the DEIR "does not consider [electromagnetic frequencies ("EMFs")] in the context of CEQA/NEPA for determination of environmental impact because there is no agreement among scientists that EMFs create a health risk and because there are no defined or adopted CEQA/NEPA standards for defining health risks from EMFs." DEIR at D.10-93. However, as discussed above, "[t]he fact that a single methodology does not currently exist that would provide" the reviewing agencies with a "precise, or 'universally accepted,' quantification" of the Project's dirty electricity impacts "does not excuse the preparation of any health risk assessment." *Berkeley Keep Jets Over the Bay Committee v. Board of Port Commissioners* (2001) 91 Cal.App.4th 1344, 1370

Furthermore, even the "non-CEQA/NEPA" discussion that follows that pronouncement focuses solely on *magnetic fields* and not *electrical fields*, such as those propagated by dirty electricity. Thus, the DEIR omits any analysis of dirty electricity and lacks an adequate rationale for its omission. To comply with CEQA and NEPA, the reviewing agencies must analyze the Project's dirty electricity output and its impacts on people and the environment.

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[14] *See, e.g.,* Magda Havas, "Electromagnetic Hypersensitivity: Biological Effects of Dirty Electricity with Emphasis on Diabetes and Multiple Sclerosis," *Electromagnetic Biology and Medicine*, 25:259-268, 2006, available at: http://www.next-up.org/pdf/Magda_Havas_EHS_Biological_Effets_Electricity_Emphasis_Diabetes_Multiple_Sclerosis.pdf; The National Foundation for Alternative Medicine, "The health effects of electrical pollution," available at: http://d1fj3024k72gdx.cloudfront.net/health_effects.pdf.

C. Visual Impacts – Wind Turbine Shadow Flicker

Shadow flicker is one of the many side effects of wind turbines.[15] A Michigan State University paper describes shadow flicker thusly:

> Shadow flicker is caused by the sun rising or setting behind the rotating blades of a turbine. The shadow created by the rotating blades can cause alternating light and dark shadows to be cast on roads or nearby premises, including the windows of residences, resulting in distraction and annoyance to the residents. A related phenomenon, strobe effect, is caused by the chopping of sunlight behind moving blades, similar to the effect of the setting sun behind trees when driving along a roadway in the winter.[16]

D33-13

The Minnesota Department of Health has also found that the "[r]hythmic light flicker from the blades of a wind turbine casting intermittent shadows has been reported to be annoying in many locations."[17] Shadow flicker can also present numerous dangers, such as distracting drivers on roads close to turbines. As a result of this road hazard, Ireland established guidelines requiring wind turbines to be set back at least 300 meters from roads.[18] Other mitigation measures for shadow flicker include shutting down the wind turbines during the time when shadow flicker would occur.

Here, the DEIR entirely fails to analyze shadow flicker, let alone mitigation measures to reduce the impact. CPUC and BLM must now do so.

D. Biological Impacts

There are numerous biological impacts the reviewing agencies failed to adequately analyze in the DEIR. First, the DEIR improperly dismisses impacts to the Peninsular bighorn sheep, stating that the "Proposed PROJECT area is located outside of [the regional Peninsular bighorn sheep corridors]." DEIR D.2-59. Contrary to the DEIR's statement, the ESJ Project and the associated wind energy

D33-14

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[15] For a video of shadow flicker at a rural residence in Illinois, see: http://lifewithdekalbturbines.blogspot.com/2010/05/shadow-flicker-videos.html.

[16] Michigan State University, "Land Use and Zoning Issues Related to Site Development for Utility Scale Wind Turbine Generators," 2004, p. 1, available at: http://web1.msue.msu.edu/cdnr/otsegowindflicker.pdf.

[17] Minnesota Department of Health, Environmental Health Division, "Public Health Impacts of Wind Turbines," May 22, 2009, p. 14.

[18] Michigan State University, "Land Use and Zoning Issues Related to Site Development for Utility Scale Wind Turbine Generators," 2004, p. 1.

projects in the La Rumorosa region of Baja California would be located adjacent to and, in some places, on top of an international migration corridor for the Peninsular bighorn sheep. The ESJ gen-tie transmission route and portions of the three phases of the ESJ Wind Project in Baja California would be located directly adjacent to and/or overlap with the Peninsular Ranges of Mexico, an area which the United States Fish and Wildlife Service views as "the *only possible route* for a natural connection with other bighorn sheep populations for the [distinct population segment of sheep] in the U.S." 74 Fed.Reg. 17288, 17311 (2009) (emphasis added). For example, the two Mexican lease areas where the subsequent phases of the ESJ Wind Project would occur are situated on the Sierra de Juarez and Cordillera Molina mountain ranges, both of which are part of the Peninsular Ranges of Mexico. Thus, both the ESJ Gen-Tie Project and the related ESJ Wind Project in Baja California have the potential to substantially impact Peninsular bighorn sheep genetic diversity and long-term population viability in the United States.

D33-14 Cont.

Second, the DEIR fails to properly analyze the Project's noise impact on birds. As discussed in DEIR Section D.8, the Project's construction noise levels would be very high, reaching 80 dBA at a distance of 50 feet from the ECO Substation construction equipment and 75 dBA within 200-feet of various construction activities for the ECO Substation Southwest Powerlink Loop-in, for example. In addition, the Project's operation noise levels could exceed 60 dBA at close distances and during storms. These noise levels present a potentially significant adverse effect for avian species in the area.

The threshold for noise significance is substantially lower for some sensitive avian species than what the Project will likely produce. Particularly sensitive species in – or potentially in – the Project area include the horned lark, loggerhead shrike, least Bell's vireo, gray vireo and Southwestern willow flycatcher. DEIR Appendix 1-37 to 39, 42, 43. Expert testimony from Dr. Travis Longcore, given in the CPUC proceeding on the SDG&E's application for a certificate of public convenience and necessity for the Powerlink and attached as Exhibit 6 hereto, shows that the threshold for significant negative impacts on bird species similar to the birds just listed is much lower than 60 dBA. After summarizing studies of other small passerine birds, like the California horned lark, loggerhead shrike, least Bell's vireo and southwestern willow flycatcher, Dr. Longcore concludes that "[f]rom the published literature . . . a reasonable threshold based on similar species for least Bell's vireo and southwestern willow flycatcher would be 40 dB(A) or below." Exhibit 6 at 12. Dr. Loncore then goes on to discuss empirical data from California "indicating with certainty that territory occupancy is reduced by sound levels in the 50 - 60 Db(A) range" for the southwestern willow flycatcher (*id.* at 13), which is similarly susceptible to noise impacts as the California horned lark and loggerhead shrike since all three species are "small songbirds that rely on hearing songs to attract mates and defend territories." *Id.* at 12.

D33-15

These noise impacts on birds must be taken particularly seriously given that all five species listed above are special-status species that have been observed or are reasonably likely to occur the Project site. DEIR Appendix 1-37 to 39, 42, 43. Unless the Project's noise levels are reduced much

below 60 dBA, the Project would have significant impacts on these and other avian species, impacts that must be analyzed and mitigated. D33-15 Cont.

Another consideration that should have been omitted from the DEIR's biological impact analysis is the color of the Tule Wind Project wind turbines. While lighter color turbines may be visually preferable for humans, at least one report concludes that white, light gray and yellow turbines may attract the most flying insects – and hence birds and bats that feed on those insects.[19] The report found that purple was the color least likely to attract insects. The reviewing agencies should further analyze the choice of Project facility colors. D33-16

A final inadequacy of the DEIR's biological resources analysis is its deferral of Quino checkerspot butterfly protocol surveys until "within 1 year prior to project construction acitivities in occupied habitat." DEIR at ES-30. D33-17

E. Conservation Initiatives

The DEIR fails to discuss the Project's negative impacts on the region's conservation initiatives. The construction of the Project, and all of the other energy production facilities dependent upon the ESJ gen-tie line and the ECO and Boulevard substations, would substantially impair the ecological value of the ECO Substation, Tule Wind and ESJ project sites themselves as well as miles of surrounding mountains and high desert. This degradation of the mountain and desert ecosystems in the region will likely affect conservation decisionmaking, turning money and protection away from the area as conservationists look for less-developed lands to preserve. Some of the conservation initiatives that could be affected by the Project but were not discussed in the DEIR include The Nature Conservancy's purchase of the Jacumba-Eade property in January 2008 for inclusion into the Anza Borrego State Park, the Las Californias Binational Conservation Initiative, and the Parque to Park proposal, which seeks to connect Anza Borrego State Park (and the Jacumba property purchased for the Park mentioned above) with Baja Mexico's Parque Nacional Constitucion de 1857 and the Parque Nacional San Pedro Martir. This omission violates CEQA and NEPA and must be remedied by the reviewing agencies. D33-18

F. Fire Impacts

As discussed in the DEIR, the ECO Substation, Tule Wind and ESJ projects would all have significant adverse environmental impacts. DEIR at Section D.15. Conservation Groups agree with, D33-19

[19] Laura Roberts, "Wind turbines should be painted purple to deter bats, scientists claim," *The Telegraph*, October 15, 2010, available at: http://www.telegraph.co.uk/earth/earthnews/8066012/Wind-turbines-should-be-painted-purple-to-deter-bats-scientists-claim.html.

and therefore incorporate by reference, the February 8, 2001 comments of Boulevard/Jacumba/La Posta Fire Safe Council on additional fire dangers and mitigation measures that CPUC and BLM should analyze in their environmental review of the Project.

D33-19 Cont.

G. Hydrological Impacts

The proposed location of the ECO Substation, Tule Wind and ESJ projects is very arid and water supplies are limited. Therefore it is critically important that the reviewing agencies ensure that the Project would have minimal impacts to the region's surface and groundwater supplies. This entails analysis and mitigation of the Project's potential water quality impacts, as well as identification of sufficient water supplies to meet the Project's needs and analysis of the impacts of procuring that water. *See Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 446 (EIRs must "demonstrate a reasonable likelihood that water will be available for the project from an identified source").

With respect to water supplies, the DEIR is deficient because it does not demonstrate with reasonable certainty that water will be available for the Project. For instance, the only somewhat assured source of water identified for the ECO Substation Project is the Sweetwater Authority's "[c]onfirmation" that it has "sufficient water capacity to provide 25-million-gallons of water to [the project] during construction." DEIR at D.12-27. However, this is *5 million gallons less* than the identified water demand during construction. *Id.* Furthermore, the DEIR says nothing about the ECO Substation Project's operational water demands except that the "insulators" would not need to be washed. This is unacceptable. The DEIR also fails to identify a reasonably assured water source for the ESJ Project, noting that if the Jacumba Community Services District does not provide the requisite water a well could be sunk instead, but failing to discuss the feasibility of doing so. *See* DEIR at B-162.

D33-20

Instead of fully analyzing the Project's water supplies, the DEIR merely includes a mitigation measure providing that "[p]rior to construction, the applicant will prepare comprehensive documentation that identifies one or more confirmed, reliable water sources that when combined meet the project's full water supply *construction* needs." DEIR at 12-28 (emphasis added). This is inadequate – water supplies must be identified *now* for both construction *and* operational demand for the ECO Substation, Tule Wind and ESJ projects.

With respect to water quality, the DEIR states that the ECO Substation would involve the construction of two retention ponds, the lining of which would "either be removed or punctured to allow water seepage into the ground." DEIR at B-22. However, nowhere does the DEIR discuss the potential for groundwater pollution when the liners are removed, exposing the soils to potentially toxics-laden water, sludge and/or residual dust. The reviewing agencies must analyze this impact.

H. Climate Change Impacts

D33-21

The reviewing agencies assert in the DEIR that the ESJ Project would only transmit "renewable energy." DEIR at ES-11. However, as discussed, this statement is left wholly unsupported and is likely false. Unless the reviewing agencies provide concrete evidence that the ESJ Project would only transmit renewable energy, they must address the likelihood that the gen-tie lines and the ECO and Boulevard substations would cause more fossil-fuel-based generating facilities to be built in Mexico or near the substation in the United States. Notably, Sempra's Bajanorte Gasducto liquified natural gas ("LNG") line and a newly constructed water line run through Sempra's leased land directly south of the proposed location for the ECO Substation. With the construction of the ESJ gen-tie line, Sempra will have all the necessary ingredients for a new gas-fired power plant on the Mexican side of the international border: gas, water, and transmission. Sempra has previously indicated that LNG will serve as its primary fuel for decades to come and has invested billions in its LNG infrastructure in Baja, including the construction of the Energia Costa Azul LNG terminal near Ensenada, Mexico. The reviewing agencies should fully investigate the potential for the Project to increase fossil fuel consumption and analyze the consequent effects on greenhouse gas emissions, global warming, and air quality in the Project area and elsewhere.

D33-21 Cont.

I. Cultural Resource Impacts

As the DEIR states, there are at least 40 previously recorded archaeological sites within the right-of-way proposed for the Tule Wind Project, and more than 30 archaeological investigations that have taken place previously within the proposed right-of-way. DEIR at D.7-3. There are "traditional cultural properties" in the footprints of all three projects, and the DEIR states that the impacts to those cultural resources would be significant and unmitigable. DEIR at D.7-113.

D33-22

To help mitigate these devastating and tragic impacts, the reviewing agencies should analyze the feasible mitigation measure of creating a permanent fund for the creation and continued operation of one or more museums in San Diego County. The museums would contain cultural artifacts discovered in the Project area and surrounding lands that would otherwise be removed and sent to museums, universities and government offices elsewhere. The Native Americans in and around the Project area have the right to preserve their cultural heritage and it is the government's duty to ensure that it is not taken from them.

J. Economic Impacts

Environmental reviews under CEQA and NEPA cannot ignore economic impacts. Under CEQA, a "social or economic change related to a physical change may be considered in determining whether the physical change is significant." CEQA Guidelines § 15382; *see also Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1208 (court concluded that the proposed Supercenter project could result in business closures and economic problems that would potentially cause "urban decay," which the respondent city had failed to consider in the EIR). Similarly, under NEPA "[w]hen an environmental impact statement is prepared and economic or social

D33-23

and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment." 40 C.F.R. § 1508.14.

Here, the Project would have significant and adverse noise, EMF and visual impacts. As a result of and hence intimately "interrelated" with these impacts, property values in the Project area would likely decline substantially. These likely property value declines are thoroughly analyzed in property appraisal expert Michael McCann's evaluation of the Project (attached hereto as Exhibit 7). In his professional opinion, the "Project will cause substantial diminution and injury to property values in the area, averaging approximately 25% as far as 2 to 3 miles, and with approximately 5% value loss from the nearest turbines [of the Tule Wind Project] out to as far as 5 miles." Exhibit 7 at 2. Furthermore, Michael McCann explains how the literature review relied on by the reviewing agencies to discount the property value impacts of wind turbines actually *supports* the conclusion that this Project *would have substantial impacts*. Exhibit 7 at 12-15. Moreover, as the DEIR notes, at least one residence would be destroyed and its occupants relocated. DEIS at D.16-13. D33-23 Cont.

These property value and forced relocation impacts are significant and must be identified and analyzed as such by the reviewing agencies. Instead, the DEIR states that "social and economic effects are not treated as significant effects on the environment in this analysis and, therefore, no CEQA significance conclusions are presented for such effects." DEIR at D.16-11. Further, the DEIR states that any "decrease in property values" occasioned by all the construction and operation of the three projects would be "Not Adverse." DEIR at D.16-12. This flouts CEQA, NEPA and common sense.

K. Growth-Inducing Impacts

The DEIR's discussion of growth related to the provision of additional electric power consists of just one short paragraph. DEIR at G-2 to 3. The DEIR admits that "the Proposed PROJECT is an important element in developing additional renewable energy resources required to meet the current and future California Renewable Portfolio Standard and federal Energy Policy Act goals for developing renewable energy." *Id.* Nonetheless, the DEIR omits any analysis of the type, number and impacts of the energy development the Project would induce. Instead, the DEIR concludes that "the Proposed Project would not directly induce growth related to provision of additional electric power in a predictable manner or defined location." DEIR at G-3. This is evasive maneuver is unacceptable. It impermissibly sidesteps both NEPA's and CEQA's requirement that growth-inducing impacts be discussed. 40 C.F.R. § 1508.8(b); CEQA Guidelines § 15126.2(d). D33-24

At the very least, the EIR must acknowledge the extent to which the Project would enable future development of energy facilities, as well as the type of such facilities. As the DEIR states, the ECO Substation would be designed to ultimately expand to include "[f]our 500/230 kV, 1,120 megavolt ampere (MVA) transformer banks with two single-phase operational spares." DEIR at B-21. This equates to the capacity to accommodate as much energy throughput as 4,480 MW. Yet the DEIR

never discusses this fact, nor the substantial energy-related development it would induce. BLM and CPUC must remedy this gross omission. D33-24 Cont.

VI. Improper Deferred Specification of Mitigation Measures

The DEIR improperly deferred specification of numerous mitigation measures until after the completion of environmental review. The improperly deferred measures include, among others, the Noxious Weeds and Invasive Species Control Plan, Habitat compensation, the Stormwater Pollution Prevention Plan, the Dust Control Plan, Avian Protection Plans, the Cultural Resources Treatment Program, the traffic control plan, the Construction Fire Prevention/Protection Plan and site-specific noise mitigation plans. This flouts CEQA and NEPA and must be remedied by CPUC and BLM. D33-25

VII. Conclusion

Conservation Groups again emphasize their concern that the environmental impacts of the projects that threaten to industrialize eastern San Diego County and western Imperial County must be comprehensively reviewed in a programmatic EIR/EIS before any further project-specific actions are taken. The combined effects of all of the energy projects proposed in the deserts of Southern California and the Southwest in general, including the present Project, the Powerlink project, and all other reasonably foreseeable energy developments in the area will fundamentally alter the region in ways that have not been fully revealed or analyzed to date. The best way to provide for the future energy needs of Southern Californians – and the United States as a whole – is not through destructive development of their irreplaceable wildlands, but rather through the deployment of distributed generation facilities at already disturbed locations within or near the urban demand centers. D33-26 D33-27

Sincerely,

Stephan C. Volker

Attorney for Backcountry Against Dumps,

The Protect Our Communities Foundation, East County Community Action Coalition and Donna Tisdale

Exhibit 1 is considered Comment D33-28.

EXHIBIT 1

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February 15, 2010

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Re: Scoping Comments of Backcountry Against Dumps, The Protect Our Communities Foundation, East County Community Action Coalition and Donna Tisdale on the East County (ECO) Substation Project, the Energia Sierra Juarez Generator Tie-Line Project, and the Tule Wind Project

Dear Officials:

In accordance with the public notices provided by the California Public Utilities Commission ("CPUC") and the Bureau of Land Management ("BLM") (collectively "reviewing agencies"), Backcountry Against Dumps, The Protect Our Communities Foundation, East County Community Action Coalition and Donna Tisdale (hereinafter "Conservation Groups") submit the following Scoping Comments on the East County ("ECO") Substation Project, the Energia Sierra Juarez Generator Tie-Line Project ("ESJ Project"), and the Tule Wind Project (collectively, "ECO/ESJ/Tule Project" or the "project").

Out the outset, Conservation Groups wish to express their opposition to this project as an unnecessary industrialization of pristine desert wilderness areas. Echoing a growing chorus of opinions on this subject, Conservation Groups suggest as an alternative to the proposed project wide-spread non-fossil fuel distributed generation ("DG") projects near demand centers in already-disturbed areas.[1] The Environmental Impact Report/Environmental Impacts Statement ("EIR/EIS") should

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[1] Distributed generation has been recently referred to by the CPUC as electricity provided by "non-centralized electricity power production facilities less than 20 MW interconnected at the distribution side of the electricity system. DG technologies include solar, wind and water-powered energy systems; and renewable and fossil-fueled internal combustion (IC) engines, small gas turbines, micro-turbines and fuel cells." *Impacts of Distributed Generation, Final Report*, California Public Utilities Commission, January 2010, p. 3-3, available at: http://www.cpuc.ca.gov/NR/rdonlyres/750FD78D-9E2B-4837-A81A-6146A994CD62/0/ImpactsofDistributedGenerationReport_2010.pdf

provide a robust analysis of DG alternatives that would obviate the need for all three components of the project.

Additionally, Conservation Groups believe that this environmental review process will not adequately address impacts because it has been improperly segmented from the environmental reviews of other energy development and transmission projects, including, most notably, the Sunrise Powerlink Transmission Line ("Powerlink") EIR/EIS, which was approved by the CPUC on December 18, 2008 and by BLM on January 20, 2009. The projects here are intimately linked to the Powerlink project and other large-scale energy development projects in the works, and thus all of these should be addressed together in a single EIR/EIS process. Conservation Groups therefore ask the reviewing agencies to prepare a comprehensive, programmatic-level EIR/EIS that will reveal all of the intense, wide-spread impacts of the near-future industrial development of desert areas of Eastern San Diego County and Imperial County. In further expression of these two major concerns, Conservation Groups offer the following scoping comments.

I. Project Purpose and Need

The reviewing agencies must discuss and take a hard look at the purpose of and need for the ECO/ESJ/Tule project in the EIR/EIS. 40 C.F.R. § 1502.13; *see also Colorado Environmental Coalition v. Dombeck*, 185 F.3d 1162, 1175 (10th Cir. 1999) (the permitting agency retains the ultimate "responsibility for defining the objectives of [and need for the] action"). Among other things, the CPUC and BLM must analyze where the electricity transported by the project would be used and whether there is in fact an existing or projected capacity shortfall or other condition in that area that necessitates importation of energy.

A discussion of supply and demand should address the growing consensus that energy production facilities must be located near urban centers – not in remote, sparsely populated, and ecologically valuable areas like Eastern San Diego County. Large-scale, urban, photovoltaic projects are being proposed and approved in SDG&E's and Southern California Edison's territories. The increasing importance of these locally distributed generation projects should be thoroughly reviewed and analyzed in the environmental review of the project.

The EIR/EIS must also fully address the reliability issues with wind energy production and fully analyze recent events at the Campo Indian Reservation, which caused operators to shut down 25 turbines for the past two months because of weather-related damage.[2] A comprehensive reliability analysis should be conducted comparing these large-scale energy production facilities and DG alternatives prior to approval of the project.

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[2] http://www.eastcountymagazine.org/node/2734

In addition, in regard to the ESJ component of the project, reviewing agencies must explain why there is a need for additional transmission infrastructure when it is eminently feasible to transmit electricity produced in the La Rumorosa area along *existing* transmission lines that are already interconnected directly to the SDG&E electrical grid and have at least 800 MW of spare transmission capacity[3] – a number that could likely be doubled if the lines were reconductored with composite conductors.[4] These transmission lines are jointly owned and operated by SDG&E and the Comisión Federal de Electricidad ("CFE") and comprise one tie connecting CFE's Tijuana Uno Substation to SDG&E's Miguel Substation and one joining CFE's La Rosita Substation with SDG&E's Imperial Valley Substation. Together, the ties are called Western Electricity Coordinating Council ("WECC") Path 45. The EIR/EIS must fully analyze current transmission capacity and analyze whether and to what extent the ESJ project it necessary.

Finally, the reviewing agencies must clarify whether the purpose of the ESJ project is to facilitate the importation into the United States of *solely* wind energy and/or other renewable energy. The EIR/EIS must make clear whether the cross-border transmission line could and potentially would be used to transmit energy produced from natural gas, coal or other fossil fuel-based resources. Comprehensive coordination with all Mexican governmental agencies with jurisdiction over the project, related developments, and their environmental effects should be conducted as early as feasible in the planning process to assure that the project's stated purpose and need are accurate and realistic, and are accepted as such by the relevant Mexican regulatory bodies.

II. Sunrise Powerlink

As discussed above, the project is intimately linked to the Powerlink project and other energy development and transmission projects in the area. Environmental review of all of the proposed projects should have been conducted on a programmatic level prior to more focused reviews of the individual projects. In light of the fact that no programmatic review has taken place, Conservation Groups ask that the present review process include a comprehensive treatment of cumulative impacts, which would include discussion of the Powerlink impacts in combination with the impacts from the present project on the desert resources of Eastern San Diego County and Imperial County.

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[3] *See* California Energy Commission Report No. CEC-600-2008-004, June 2008, "Challenges and Opportunities to Deliver Renewable Energy from Baja California Norte to California" (CEC Report), prepared by KEMA Inc. and Bates-White, LLC, *available at* http://www.energy.ca.gov/2008publications/CEC-600-2008-004/CEC-600-2008-004.PDF.

[4] *See* Bill Powers, October 2007, "San Diego Smart Energy 2020: The 21st Century Alternative," *available at* http://www.etechinternational.org/new_pdfs/smartenergy/52008_SmE2020_2nd.pdf, pp. 54-55.

III. Project and Alternatives Descriptions

The project description must be clear, concise, and accurate from the start. Descriptions of complex, multifaceted projects such as the present project often fail to meet this standard. Further, descriptions of alternatives similarly should be complete and comprehensive or the comparative analysis can easily become excessively confusing and incomplete, as exemplified by the alternatives analysis in the EIR/EIS for the Powerlink project. Thus, Conservation Groups urge the reviewing agencies to clearly describe the proposed project and alternatives thereto in the EIR/EIS.

IV. Alternatives

The EIR/EIS must address a reasonable range of alternatives. *City of Carmel-by-the-Sea v. U.S. Department of Transportation*, 123 F.3d 1142, 1155 (9th Cir. 1997). The reasonable range of alternatives required by NEPA should include a "reasonable number of examples covering the full range of alternatives." CEQ Forty Questions, No. 1b. Furthermore, an agency may not limit its consideration to only those alternatives it believes it has the authority to implement. Rather, the alternatives should be wide-ranging and include options that may require additional approvals or participation by others. *Sierra Club v. Lynn*, 502 F.2d 43, 62 (5th Cir. 1974); *see also Alaska Wilderness Recreation and Tourism Ass'n v. Morrison*, 67 F.3d 723, 729 (9th Cir. 1995). The reviewing agencies' analysis of the full range of alternatives to the proposed project should include, among others, the alternatives discussed below.

First, the CPUC and BLM should consider the alternative of providing and promoting increased distributed generation and increasing conservation measures in the urban load centers that would be served by the project. Expanding distributed generation would serve the same purposes as the project, including increased electricity generation and supply of renewable energy. Increasing conservation decreases demand to further close any forecast gaps between supply and demand. This alternative is eminently feasible, as the California Renewable Energy Transmission Initiative ("RETI") has determined that there is up to 27,500 MW of potential distributed generation in small-scale (1-20 MW projects on less than 160 acres) photovoltaic facilities alone (in California).[5]

Furthermore, developing distributed generation facilities would have fewer environmental impacts and be far less expensive than constructing and operating the project's new wind farms, transmission lines, and substations. As CPUC Commissioner John Bohn has acknowledged, "[u]nlike other generation sources, [distributed generation] projects can get built quickly and without the need for expensive new transmission lines. And . . . these projects are extremely benign from an

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[5] California RETI, January 2009, "Phase 1B Final Report," *available at* http://www.energy.ca.gov/reti/documents/index.html, p. 1-12.

environmental standpoint, with neither land use, water, or air emission impacts."[6] Further, the cost for most DG installations continues to plummet, making DG the economically preferably option. Moreover, distributed generation facilities pose a significantly lower risk of shut-offs and damage from wildfire and thus would improve electrical reliability.

Second, the EIR/EIS should analyze the alternative of undergrounding all or portions of the proposed transmission lines. The benefits of this alternative include reduced fire danger, risk to aircraft, avian mortality and other biological impacts, and improved aesthetics.

Third, specifically related to the ESJ component of the project, CPUC and BLM must examine the alternative of transmitting the wind power from the La Rumorosa area along existing CFE and SDG&E lines (the WECC Path 45) instead of through a newly constructed generation tie and substation (the ECO Substation and expanded Boulevard Substation). As discussed in the Purpose and Need section of these scoping comments, the CFE lines are *already* directly connected to the SDG&E electrical grid and have at least 800 MW of *spare* transmission capacity. Furthermore, the amount of spare capacity could likely be doubled if the lines were reconductored with composite conductors. While CFE would charge a small wheeling fee for use of its lines, the charge could be reduced in exchange for Energia Sierra Juarez U.S. Transmission, LLC ("ESJ" - formerly Baja Wind U.S. Transmission, LLC, and a subsidiary of Sempra Energy) reconductoring the lines. In addition, by using the existing lines ESJ would be saving substantially on construction costs. Overall, this alternative is eminently feasible and would likely have fewer environmental impacts and cost less than the proposed project.

Fourth, the reviewing agencies should evaluate the possibility of limiting the use of the project's transmission infrastructure to only allow transmission of power from renewable energy projects, particularly wind and solar, and not from fossil fuel-based generation. Placing such a condition in the project approvals would not only be feasible and environmentally beneficial, it has already been supported, at least in part, by ESJ and its parent corporation, Sempra Energy.[7]

V. Environmental Impacts

The EIR/EIS must take a "hard look" at the environmental impacts of proposed major federal actions and provide a "full and fair discussion" of those impacts. 40 C.F.R. § 1502.1; *see also National Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 733 (9th Cir. 2001). From a CEQA

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[6] CPUC, 6/18/2009, "CPUC Approves Edison Solar Roof Program," Press Release, *available at* http://docs.cpuc.ca.gov/published/News_release/102580.htm.

[7] *See* U.S. Department of Energy, 9/22/2009, "Energia Sierra Juarez Transmission Line Project: Scoping Report" (Scoping Report), *available at* http://www.esjprojecteis.org/documents.htm, p. 5.

point of view, the EIR must inform the public and agency decisionmakers of all potentially significant environmental impacts prior to project approval. As the California Supreme Court has previously explained, "[t]he environmental impact report is the heart of CEQA and the environmental alarm bell whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return." *Sierra Club v. State Board of Forestry* (1994) 7 Cal.4th 1215, 1229, quotations and citations omitted. Here, the reviewing agencies must fully analyze all of the environmental impacts of the project. Accordingly, the CPUC and BLM must evaluate the effects of the project in both the United States *and* Mexico. *See, e.g., Hirt v. Richardson*, 127 F. Supp. 2d 833 (W.D. Mich. 1999); *National Organization for Reform of Marijuana Laws v. United States Department of State*, 452 F. Supp. 1226, 1232-33 (D.D.C. 1978); *cf.* Exec. Order No. 12114, 44 Fed. Reg. 1957 (1979), reprinted in 42 U.S.C.A. § 4321 app. Among others, the EIR/EIS must thoroughly analyze the impacts discussed below.

A. Fire

Ironically, SDG&E recently sought permission from the CPUC to turn off electrical power in the area of the ECO and Boulevard substations when fire dangers are high – a drastic measure from any perspective – yet it claims in its August 10, 2009 Proponent's Environmental Assessment ("PEA" or "ECO PEA") for the ECO project that construction of extensive, additional electricity infrastructure in the exact same area will not present a significant fire hazard. If existing lines are dangerous enough that SDG&E wants to shut off the power to thousands of people on windy days (potentially causing school shutdowns, disrupting emergency alert systems, and disabling hospital operations), how can the construction of even *more* substations and transmission lines be properly categorized as having an *insignificant* impact? Clearly, the fire dangers presented by this project are significant and must be subjected to a full and accurate analysis in an EIS/EIR.

In their review of fire hazards, the reviewing agencies must incorporate all relevant wildfire occurrence information, including historic fire frequency, duration, and magnitude data. The agencies should ensure that a complete understanding of the fire hazards in light of the region's fire history is produced in the EIS/EIR.

In addition to the direct impacts of the described components of the project, the EIR/EIS will also have to address the indirect fire hazard impacts of the multiple wind farm or other energy production projects that the ECO substation will accommodate. The indirect fire hazard impacts could potentially devastate the area and therefore must be categorized as significant.

The fire risk analysis must also include thorough discussion of the cumulative impacts of the project with all other relevant projects in the area, including the Powerlink project and related energy development projects dependent on that transmission line. The cumulative impacts of the industrialization of the East County area have the potential to permanently alter the fragile desert ecosystem through a process called type conversion, described below:

> Plant invasions are widely recognized as significant threats to biodiversity conservation worldwide. One way invasions can affect native ecosystems is by changing fuel properties, which can in turn affect fire behavior and, ultimately, alter fire regime characteristics such as frequency, intensity, extent, type, and seasonality of fire. If the regime changes subsequently promote the dominance of the invaders, then an invasive plant–fire regime cycle can be established. As more ecosystem components and interactions are altered, restoration of preinvasion conditions becomes more difficult.[8]

In short, once the fire-resistant native chaparral is converted to invasive annual grasses and other highly flammable plants that become tinder-dry each summer, the fire regime shifts – irrevocably – to a much shorter fire recurrence interval, potentially as short as every year. Once established, a short fire recurrence regime effectively destroys wildlife habitat and creates such an extreme annual fire danger as to preclude safe human habitation. The EIR/EIS must therefore present a comprehensive analysis of the effects of past and future fires on the vitality of the remaining acreage of native chaparral and other disappearing mountain and desert ecosystems in light of the cumulative impacts of the project and other energy development and transmission projects that are planned in Eastern San Diego County and Imperial County.

Additionally, the project could present significant obstacles to firefighters responding to wildfires. For example, the proposed transborder transmission line for the ESJ component of the project would create a substantial hazard for low-flying spotter and bomber aircraft that apply aerial retardant or water. It would be impossible to see those power lines in smoke filled canyons, and either pilots would be forced to risk their lives by flying when the lines are not clearly visible or aerial fire suppression would be stymied. Furthermore, in some cases the transborder line and other project-related transmission lines would need to be de-energized before firefighters could enter certain areas, giving the fire more time to spread.

In light of the many fire-related impacts, reviewing agencies should give serious consideration to an alternative that avoids these impacts, such as the undergrounding of the new transmission lines or the preferably, pursuit of DG alternatives as discussed more thoroughly above.

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[8] *Effects of Invasive Alien Plants on Fire Regimes*, Brooks, M.L., C.M. D'Antonio, D.M. Richardson, J.M. DiTomaso, J.B. Grace, R.J. Hobbs, J.E. Keeley, M. Pellant, D. Pyke, 2004, Bioscience 54:677-688, available at: http://www.californiachaparral.com/images/Brooks_et_al_Effects_of_Invasives_on_Fire_Regimes.pdf

B. Biological Impacts

There are many potential biological impacts of the project that the reviewing agencies must address in the EIR/EIS. In all of their biological analyses, the CPUC and BLM should develop and utilize current population and habitat surveys and up-to-date scientific studies. Similarly, all required surveys of the proposed project areas must be completed before preparation of the EIR/EIS, not afterward as occurred with the majority of the biological surveys for the Powerlink project. The EIR/EIS must analyze the impacts of the project on threatened, endangered or special status species, including the Quino checkerspot butterfly and the Peninsular bighorn sheep, both of which have proposed, suitable, inhabited, and/or designated critical habitat that overlaps with or is adjacent to the proposed project sites. Tragically for the Peninsular bighorn sheep, the proposed La Rumorosa wind projects and ESJ project transmission route would be located directly adjacent to (and perhaps overlap with) the Peninsular Ranges of Mexico, an area which the U.S. Fish and Wildlife Service views as "the *only* possible route for a natural connection with other bighorn sheep populations for the [distinct population segment of sheep] in the U.S." 74 Fed. Reg. 17288, 17311 (2009) (emphasis added).

Additionally and relatedly, the EIR/EIS must also evaluate the effects of the project on avian injury and mortality, including impacts on both special status birds (such as the California condor) and others (such as the golden eagle, which is protected by the Bald and Golden Eagle Protection Act). In its discussion of avian impacts, the EIR/EIS must address risks associated with wind turbines and power lines (e.g. electrocution). It must also assess how the light and noise pollution associated with the project would impact birds and other species.

Specific to the Tule Wind Project, construction and operation of the project will adversely affect numerous endangered or threatened species in the McCain Valley, including but not limited to the Arroyo toad, Quino checkerspot butterfly, Peninsular bighorn sheep, least Bell's Vireo, barefoot banded gecko, Swainson's hawk, and southwestern willow flycatcher. There is also additional sensitive and locally important wildlife in the area that must be evaluated. Furthermore, there are endangered, rare, and sensitive plant species in the area that must be protected as well.

The EIR/EIS must not only identify the species that may be affected, but it must also analyze the potential impacts and provide for mitigation where feasible. First and foremost, highly trained and experienced biologists should be involved in the entire process to survey for and mitigate damage to all biological resources in the area. It is extremely important that those surveying for these resources be knowledgeable and have up-to-date information on the species being surveyed. For example, there have been recent scientific discoveries regarding the distribution and habitat needs of the Quino checkerspot butterfly. New host plants for the Quino checkerspot butterfly have just been discovered. 74 FR 28775, 28776. The butterfly has been documented at higher elevations than ever before, as well as near granitic rather than clay soils. *Id.* Most biologists do not have experience surveying under the newly developed survey guidelines. *Id.* These factors must be taken into account as the reviewing agencies prepare the EIR/EIS.

C. Habitat Fragmentation and Related Edge Effects

Habitat fragmentation is the breaking up contiguous natural habitats into small patches that are isolated from intact areas of habitat. The project's plans for construction, staging, and building of access roads and structures will result in direct loss of habitat, division of the remaining habitat into isolated patches, and reduced size of habitat patches. These fragmentation impacts, when spread across a large area, are almost invariably accompanied by localized extirpation of species. Here, the project will fragment scrub and chaparral habitats. Local species sensitive to the developed or altered edge and species that have large area requirements are among the first to disappear from habitat fragments, triggering cascading impacts to ecological communities. The fragmentation of habitats inhibits movement of species and disrupts necessary interactions among species. These adverse impacts decrease the viability of species in the area and degrade habitat value as species become more isolated in contained areas. The project will fragment habitat within the project area, particularly through the construction of access roads, and will potentially cause significant impacts to may species within the area. These impacts must be fully discussed in the EIR/EIS.

Further, fragmentation causes edge effects that also degrade the local habitat near power lines and maintenance roads. An edge marks where natural habitat conditions transition to a human-altered condition. Edge effects decrease the net, biologically functional area of habitats left undeveloped within landscapes fragmented by roads, cleared areas, or development structures. These edge effects further reduce available habitat for native species, while creating new habitats for non-native, human-tolerant species. The construction of the project will cut directly through acres of important habitat currently undisturbed by human activity. The EIR/EIS must therefore thoroughly discuss the fragmentation and edge effect impacts of the project.

D. Soil and Invasive Species

An estimated 140,000 cubic yards of soil may be imported to fill the ECO project site alone. The EIR/EIS must analyze the project's likely importation of invasive plant species within the fill soil. Further, invasive species may be transported through construction and maintenance vehicle use and increased public access. The reviewing agencies must identify, analyze, and, if necessary, develop mitigation measures for these impacts in their environmental study of the project.

E. Visual and Aesthetic Impacts

The project will severely diminish the serene aesthetics and expansive unobstructed vistas in the region. The EIR/EIS must consider these impacts, including the sheer height and overall size of the facilities, the wide geographic scope and visual incongruity of the project, and the obtrusive effects of the facilities' nighttime lighting fixtures. The reviewing agencies should analyze these viewshed impacts from multiple vantage points, including popular scenic vistas as well as the places (homes, roads, etc.) frequented by residents of the region, such as the citizens of Boulevard, California.

Further, as discussed above, the EIR/EIS should give serious consideration to an alternative that undergrounds any new transmission lines or preferably to a DG alternative, which would obviate the need for this project altogether.

F. Noise

The introduction of industrial noise levels during construction, operation, and maintenance of the project will be significant. These significant noise impacts will disturb adjacent property owners and the endangered and sensitive species that occupy and pass through the area. These noise impacts are even more significant given Eastern San Diego County's quiet, rural setting.

In addition to the immediate noise impacts of the project itself, the EIR/EIS must address the noise impacts of the construction of the multiple additional energy generation facilities that will connect to the ECO, ESJ and Tule components of the project. The cumulative construction impacts of the project with the Powerlink project and other area projects will be significant and should be fully analyzed in an EIR/EIS.

G. Visual & Night Sky Resources

The EIR/EIS should address the significant impacts of the project on visual and night sky resources. First, the project will significantly affect the area's visual resources by introducing massive new industrial projects – including most prominently the enormous wind turbines planned for the ESJ and Tule components of the project – with industrial-scale lighting, new roads, graded pads, water tanks, and 10-foot-high barbed wire fencing into a scenic, rural area. The scarring of the landscape will be visible from many locations as graded portions of the desert never resume their natural appearance once cleared. The project will affect scenic and historic roadways and will detract from local, small businesses that rely on a tourist- and recreation-based economy, including the nearby Desert View Tower and the Jacumba Hot Springs Spa.

Additionally, the EIR/EIS must fully address the combined aesthetic effects of the project with the Powerlink project and other proposed energy production facilities in the area. Maps and photo simulations must fully reveal the intensive visual impacts of the proposed Powerlink infrastructure and related wind farms, including the industrial-scale wind turbines that will be located directly behind the ECO Substation. When added together, the Powerlink, the various new wind and solar facilities, the existing Southwest Power Link ("SWPL"), and the proposed project will drastically degrade the visual context of the area's rural communities and vast undeveloped public lands. These cumulative visual impacts must be thoroughly evaluated by the reviewing agencies.

Further, the EIR/EIS must fully account for the significant impacts of the project on night skies. The fifty, 300-watt tungsten-quartz lamps proposed for the ECO substation will significantly impair the night skies in one of the last dark sky areas left in Southern California. As with visual resources,

the EIR/EIS should address all of the other indirect night sky impacts from the other planned energy production facilities that will connect to the SWPL through the ECO and Boulevard substations. These light pollution impacts will likely be individually and cumulatively significant.

H. Geology

The EIR/EIS should fully review and evaluate the geological impacts of placing wind turbines in the project area. Despite having small footprints relative to other types of energy developments, wind turbines require high levels of slope stability and a solid foundation to prevent safety disasters. In order to safely site wind turbines, a significant amount of drilling is often required. The EIR/EIS must evaluate the impact of such drilling on seismic, slope, and soil stability, as well as groundwater contamination that may be caused by deep penetration drilling.

I. Conservation Initiatives

The EIR/EIS must discuss the project's negative impacts on the region's conservation initiatives. The construction of the project and all of the other energy production facilities dependent on the ECO and Boulevard substations will impair the ecological value of the project sites themselves as well as miles of surrounding mountains and high desert. This degradation of the mountain and desert ecosystems in the region will likely affect conservation decisionmaking, turning money and protection away from the area as conservationists look for less-developed lands to preserve. Some of the conservation initiatives that could be affected by the project include The Nature Conservancy's purchase of the Jacumba-Eade property in January 2008 for inclusion into the Anza Borrego State Park, preservation programs in the County of San Diego's East County Multiple Species Conservation Plan, the Las Californias Binational Conservation Initiative, and the Parque to Park proposal, which seeks to connect Anza Borrego State Park (and the Jacumba property purchased for the Park mentioned above) with Baja Mexico's Parque Nacional Constitucion de 1857 and the Parque Nacional San Pedro Martir.

J. Economic Consequences and Rural Blight

Local tourism and recreation are a major source of income for the region's local businesses. The project's threatened transformation of the area from an open-space, recreational mecca to an industrial landscape will cause the closure of many small businesses that provide recreation-based services. These empty storefronts and deserted commercial areas present significant impacts in the form of rural blight. The fall in property values in the area due to the degraded rural landscape may cause homes and neighborhoods to become abandoned, further exacerbating rural blight. These impacts should be discussed in the reviewing agencies' EIR/EIS.

K. Wilderness Experience

The EIR/EIS must also evaluate the project's effects on the region's wilderness areas. Of particular concern are impacts to the Carrizo Gorge Wilderness area, which is located north of both the proposed ECO Substation and Boulevard Substation expansion. Other potentially impacted wilderness and environmentally sensitive areas include the Jacumba Wilderness Area, the Table Mountain Area of Critical Environmental Concern, and the Anza Borrego Desert State Park.

L. Recreational Resources and Public Access

Because the project will involve the cutting of new roads into previously inaccessible areas, public use of these areas, whether authorized or unauthorized, may increase dramatically. This increase in use is likely to result in increased fire danger, invasive species distribution, vandalism, and disruption of habitat in remote, currently unaltered natural resource areas. These impacts due to increased public access should be fully addressed in the EIR/EIS.

Relatedly, the EIR/EIS must clearly and consistently describe the public's recreational access to the project sites and accurately analyze the impacts of that designated level of access. For example, the Tule Wind Project proponent asserts that a mere 2% of the land in the project area will be occupied by wind power production equipment and the rest will remain open for existing recreational uses. But access for recreational users may in fact be limited. In the Powerlink approval, mitigation measures require that current and new access roads are to be closed to the public due to safety, invasive species, and fire hazard concerns. If reviewing agencies follow the Powerlink example, then large portions of the project area will be closed to recreational activities, limiting the ability of recreationists to legally use and enjoy the area. On the other hand, if these newly constructed access roads are not closed to the public, the additional public access will increase fire hazards, the risk of introducing invasive species, and the likely degradation of the surrounding environment, as discussed above. Furthermore, there is no guarantee that the public will remain on the access roads; resulting off-road vehicle use will in turn cause further habitat destruction in and around the project area.

M. Cultural Resources

The project location is rich with significant cultural resources, including Native American sacred sites, burial/cremation areas, and traditional cultural properties. For example, there are at least 40 previously recorded archeological sites within the right of way proposed for the Tule Wind Project. Furthermore, there are more than 30 archaeological investigations that have previously taken place within that proposed right of way. Disruption of these areas will result in significant impacts that must be fully explained in the EIR/EIS, and analyzed in an appropriate National Historic Preservation Act review process. The reviewing agencies must evaluate and set forth mitigation measures to address these significant impacts to cultural and archaeological resources.

N. Rural Character and Quality of Life of Backcountry Communities

The EIR/EIS must thoroughly discuss the effects of the project on the rural character and quality of life of backcountry communities. The industrialization of Eastern San Diego County will adversely affect the lives of the residents who have chosen to live in rural communities in part because of their close connection to nature. The reviewing agencies should therefore address this important issue.

O. Environmental Justice

The reviewing agencies should assess the environmental justice issues raised by the construction of massive, industrial facilities and infrastructure for the provision of power to urban consumers within and surrounding low-income, rural communities. These important and often-overlooked issues are critical here, where urban electricity users seek to export the environmental costs of their electricity usage to poor rural communities.

P. Climate Change Impacts

1. Use of Excess Capacity to Transport Fossil-fuel Based Electricity

The EIR/EIS must also address the likelihood that the new substation and transmission lines will cause more fossil-fuel-based generating facilities to be built in Mexico or near the substation in the United States. Notably, Sempra's Bajanorte Gasducto LNG line and a newly constructed water line run through Sempra's leased land directly south of the new ECO substation. With the construction of the project's new cross-border ESJ tie-line, Sempra will have all the necessary ingredients for a new gas-fired power plant on the Mexican side of the international border: gas, water, and transmission. Sempra has previously indicated that LNG will serve as its primary fuel for decades to come and has invested billions in its LNG infrastructure in Baja, including the construction of the Energia Costa Azul LNG terminal near Ensenada, Mexico. The reviewing agencies should fully investigate the potential for the project to increase fossil fuel consumption and analyze the consequent effects on greenhouse gas emissions, global warming, and air quality in the project area.

2. Additional Climate Change Impacts

In addition to the potential increase in fossil-fuel based energy production, the EIR/EIS must also address other climate change impacts. For example, SDG&E's ECO PEA admits that "fugitive emissions of SF6 — a potent [greenhouse gas] with a [global warming potential] of 23,900—will result from the operation of transmission-line equipment that will be installed at the ECO and Boulevard substations." ECO PEA, p. 4.3-24. SDG&E plans to implement a SF6 monitoring and reduction plan, but the plan will only "reduce emissions of SF6 by approximately 5 percent." *Id.* The ECO PEA concludes that the plan will mitigate the impact of SF6 emissions to less-than-significant

levels, but a reduction by 5 percent does not mitigate this significant impact to a less-than-significant level. A full discussion of SF6 emissions by all components of the project must be present in the EIR/EIS. Further the environmental review should discuss the cumulative impacts of these emission on climate change.

Additionally, studies have begun to show that undisturbed alkaline desert areas, such as the Mojave Desert, eastern San Diego County and western Imperial County, sequester carbon-dioxide in surprising quantities.[9] This new understanding of deserts as important carbon sinks should be discussed in the reviewing agencies' analysis of this project's impacts on greenhouse gas emissions. The project will disturb and open up vast stretches of currently untrammeled desert lands to large-scale industrial development. These huge desert areas may do more good in reversing global warming if left alone than if they are fully developed into renewable energy generation facilities. This is particularly true where, as here, distributed photovoltaic energy production near the energy demand centers could eliminate or substantially reduce the need for the project. A complete analysis of this indirect adverse impact of the project should be conducted prior to the reviewing agencies' decision.

Q. Air Quality

In addition to greenhouse gases, the EIR/EIS must also evaluate the impacts of the project on local air quality and public health. Most specifically, the reviewing agencies must analyze the particulate matter emissions that would occur during construction of the project from, among other things, excavation, grading and off-road vehicle use.

R. Ground and Surface Water

The EIR/EIS must contain an adequate analysis of the impacts of the project on ground and surface water resources. As for groundwater, the project's short- and long-term demands on the region's groundwater resources will be a key part of the analysis. If the project draws down groundwater levels to a significant degree, neighbors' wells will be negatively affected. Such a drop in groundwater could also adversely impact any local springs or seeps connected to the aquifer, which could, in turn, affect desert animals reliant on those springs and seeps. These impacts must be thoroughly studied.

Further, the EIR/EIS must adequately analyze the potential for contamination of the underlying aquifers from the 569,800 gallons of oil that will be used at the ECO substation and the 25,660 gallons at the Boulevard substation due to operator error, equipment malfunction, fire, earthquake, windstorm, landslide, vandalism, sabotage, or other causes. Contamination of the fractured rock aquifers in Eastern San Diego County is notoriously difficult, if not impossible, to remediate. Contamination can

[9] http://www.ecostudies.org/press/Schlesinger_Science_13_June_2008.pdf

be transported off site via high-flow fractures at unknown rates and in unknown directions. The reviewing agencies must analyze these potentially significant impacts in the EIR/EIS prior to making a decision on the project.

Turning to surface water, the project's impacts on local water courses should be fully evaluated. Construction of the ECO substation component of the project alone will require 30 million gallons of water. Even if this water is to be pumped out of the aquifer, purchased from nearby water districts, or trucked in from the City of El Centro, surface water supplies affected by these sources may be compromised. The ECO PEA does not analyze the availability of water for construction or the project's impacts on surface water supplies. Further, apart from short-term construction water needs, it is not clear to what extent long-term *operation* of the facility will require surface water supplies. In an area as dry as the proposed project site, water supply and demand must be very carefully evaluated prior to approval of any new project.

Also, construction of the project has the potential to affect surface runoff. By altering the slope and changing the topography where the project's wind turbines are to be placed, the traditional path that water follows in the area may be obstructed. This will not only cause changes in the quantity of runoff that reaches downslope streams and watercourses, but it will certainly affect the quality of such water as well. Runoff following construction activities will pick up large amounts of sediment, subsequently degrading the downslope streams. The EIR/EIS must address all of these hydrologic impacts.

S. Impacts on Boulevard

The Boulevard Substation will increase in size by approximately 600 percent *See, e.g.,* ECO PEA, Figure 3-17. This increase in size is particularly significant since the property is located in a residentially zoned area. The reviewing agencies must conduct a complete study of the impacts of the much larger substation on the community of Boulevard.

VI. Other Projects that Should Be Considered in this EIR/EIS

The ECO PEA states that it will be designed to "accommodate additional renewable generation in the future, beyond what is currently in the CAISO Queue." ECO PEA, p. 2-7. To the extent that the impacts from these projects and their generation tie-lines are "reasonably foreseeable," they must be addressed in the EIR/EIS as indirect impacts. CEQA Guidelines §§ 15064, 15126.2, 15130. As noted above, the large-scale projects (in addition to the ESJ and Tule Wind Projects) that are dependent on the construction of the ECO substation will have significant impacts on the region's environment, prompting the need for thorough and comprehensive environmental review of all such related projects, such as Invenergy's plans to construct a 160 MW wind energy project on the Campo Indian

Reservation.[10] Massive wind farms such as this have the proven capacity to kill thousands of birds each year. Similarly, large scale solar-thermal projects that may tie in to the ECO substation can create superheated zones around the collector towers that can reach ambient temperatures of 800 degrees, hot enough to literally cook birds in mid-flight. Endangered species, such as the Peninsular bighorn sheep and the Quino checkerspot butterfly, inhabit the area and will be adversely affected by the construction and operation of these types of renewable energy projects. The EIR/EIS must accordingly address these and many other significant indirect impacts.

VII. Cumulative Impacts

As discussed throughout these comments, the cumulative impacts of this project, along with the Powerlink and the multiple other planned energy production facilities that will rely on its new infrastructure, will be significant. The EIR/EIS must fully address these cumulative impacts. Previous attempts to address the cumulative impacts of the energy developments proposed in this remote region have failed. Most notably, the Powerlink EIR/EIS did not discuss and analyze the substantial environmental changes that the proposed development of eastern San Diego County and Imperial County for energy production will cause.

One of the most important impacts to address is the increased cumulative fire danger. Southern California is already struggling to develop solutions to its rapidly growing fire vulnerability. Each year, massive wildfires devastate vast areas of Southern California. Many of these fires have been caused by electricity generation and transmission facilities. SDG&E's recent proposal to turn off the power to Eastern San Diego residents during high fire danger periods is further proof of the depth of the fire hazard problem. An explosion of new energy facilities in this fire-prone area presents an extreme danger to the health and welfare of the area's citizens and threatens the very existence of small, rural communities such as Boulevard and Jacumba. These impacts are significant and should be addressed appropriately.

Also important, the cumulative construction impacts of the project together with all of the other related infrastructure and energy development are likely to disturb sensitive desert animals, including the Peninsular bighorn sheep, which require the areas contemplated for development for their continued survival. Similarly, the Quino checkerspot butterfly's critical habitat will be directly impacted by the construction of both the new transmission lines for this project and the Powerlink as well as other potential new energy development facilities in the area. These impacts should be avoided by relocating or disapproving these facilities.

The project's cumulative impacts to visual, water, soil, biological, air quality, noise, and cultural resources will be significant. The EIR/EIS must not ignore these cumulative impacts – as the

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[10] http://www.signonsandiego.com/news/2009/jun/11/wind-farm-project-set-campo-reservation/

Powerlink EIR/EIS did – or otherwise attempt to trivialize the proposed energy developments' potential to transform much of eastern San Diego County and western Imperial County into a permanently scarred, ecologically degraded, industrial zone.

VIII. Growth Inducing Impacts

The EIR/EIS must address the industrial growth that the project will spur. The reviewing agencies must consider the impacts of all future projects that may connect to or depend upon the Tule Wind and ESJ projects, or with the increased capacity of the ECO and Boulevard substations. If the reviewing agencies determine that the impacts of these projects are not indirect impacts, then they must consider these impacts in a separate chapter on growth-inducing impacts. The effects of the new energy development projects will be significant and pervasive and must be addressed in an EIS/EIR prior to approval of the project.

In particular, the reviewing agencies must examine the ESJ project's capacity to induce increased population, as well as the industrial growth the project would spur, including an evaluation of the likelihood of and impacts from the future use of the project's transboundary transmission line to carry electricity generated from fossil fuels. As discussed above, unless the CPUC or BLM places a condition in the permit prohibiting the transmission over the new line of fossil-fuel-based electricity, there is a distinct possibility that a new *gas-fired* power plant would be built in the vicinity of the La Rumorosa area and transport electrical output to the U.S. via the ESJ project transmission line and ECO and Boulevard Substations. These potential growth inducing impacts of the new transmission capacity provided by this project must be full described and analyzed by the reviewing agencies.

IX. Mitigation

Should this project be approved notwithstanding its potentially catastrophic effects on the natural ecosystems of a vast area of eastern San Diego County, every economically and legally feasible mitigation measure that might reduce these impacts should be given thorough consideration and, if found effective, implemented fully. Such mitigations would include, but not be limited to, requiring the complete decommissioning of these projects, and restoration of the surrounding environment to its preexisting, natural condition, once the projects have reached the end of their useful life. Given the rapid emergence of new and improved technologies for the generation and conservation of energy, including DG alternatives such as the installation of thin-film photovoltaic rooftop solar systems, early retirement of these projects due to their obsolete technology and excessive cost should be anticipated. Substantial bonds should be required of all project proponents in order to secure complete removal of the projects and restoration of the natural environment promptly after these projects are retired.

Additional mitigations required during the operation of the project should include acquisition of the replacement habitat on at least a 3-to-1 ratio for wildlife habitat disturbed by the project. Under no circumstances should habitat for any threatened or endangered species be reduced or degraded for the project, however.

X. Consultation

The EIR/EIS must list and discuss all "Federal permits, licenses, and other entitlements which must be obtained in implementing the proposal" (40 C.F.R. § 1502.25(b)), and analyze the consistency of the project with state and local laws and conduct joint environmental review with state and local agencies to the "fullest extent possible." 40 C.F.R. § 1506.2. Formal consultation under ESA will be required. The project's proposed transmission line will cut directly through Quino checkerspot butterfly critical habitat. Also, the project location overlaps with or is immediately adjacent to critical habitat for Peninsular bighorn sheep. As noted in the ECO PEA, the effects of the substation on the continued survival of these endangered species must be fully analyzed in coordination with the California Department of Fish and Game ("DFG"), BLM, and the U.S. Fish and Wildlife Service ("FWS"). Conservation Groups request that such consultation take place at the earliest point possible in the planning process so that the views of DFG and FWS on the project's effects on endangered species can be fully integrated into the CEQA and NEPA review for this project. Similarly, consultation with local Native American tribes should commence early in the review process given the importance of the cultural resources in the area.

The project will need to obtain multiple additional permits or other entitlements before it can proceed. For example, approvals will be necessary from San Diego County, the U.S. Army Corps of Engineers, and the San Diego or Colorado River Regional Water Quality Control Board under the federal Clean Water Act and the California Porter-Cologne Water Quality Control Act. The reviewing agencies must describe these and other required permits and explicate the anticipated interagency review of the project.

XI. Conclusion

Conservation Groups again emphasize their concern that the environmental impacts of the projects that threaten to industrialize eastern San Diego County and western Imperial County must be comprehensively reviewed in a programmatic EIR/EIS. The combined effects of all of the projects proposed, including the present project, the Powerlink project, and all other reasonably foreseeable energy developments in the area will fundamentally alter the region in ways that have not been fully

revealed or analyzed to date. The best way to provide for the future energy needs of Southern Californians is not through destructive development of their irreplaceable wildlands, but rather through the deployment of distributed generation facilities at already disturbed locations within or near the urban demand centers.

Sincerely,

Stephan C. Volker
Attorney for Backcountry Against Dumps, The Protect Our Communities Foundation, East County Community Action Coalition and Donna Tisdale

SCV:taf

Exhibit 2 is considered Comment D33-29.

EXHIBIT 2

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Application of SAN DIEGO GAS & ELECTRIC COMPANY (U902 E) for a Permit to Construct Electrical Facilities with Voltages between 50 kV and 200 kV and New Substations with High Side Voltages Exceeding 50 kV: The East County Substation Project	Application 09-08-003 (Filed August 10, 2009)

DECLARATION OF BILL POWERS IN SUPPORT OF BACKCOUNTRY AGAINST DUMPS' COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT FOR THE EAST COUNTY SUBSTATION, TULE WIND AND ENERGIA SIERRA JUAREZ GEN-TIE PROJECTS

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March 4, 2011

I, Bill Powers, declare as follows:

Qualifications:

1. I am a principal of Powers Engineering. I hold a masters degree in environmental sciences from the University of North Carolina, Chapel Hill and a bachelors degree in mechanical engineering from Duke University. I have been a registered professional mechanical engineer in California since 1986. I am a member of two professional organizations, the Air & Waste Management Association and the American Society of Mechanical Engineers. I have extensive expertise in power generation systems and regional energy planning. I am the author of a report entitled "San Diego Smart Energy 2020: The 21st Century Alternative," which presents a comprehensive, peer-reviewed plan to provide clean, reliable, affordable energy for San Diego. San Diego Smart Energy 2020 emphasizes local photovoltaic ("PV") power and high efficiency distributed gas-fired generation to reduce San Diego's greenhouse gas footprint from power generation by 50 percent by 2020.[1] My curriculum vitae is attached hereto as Exhibit 1

2. I have reviewed the California Public Utilities Commission's ("CPUC's") and the Bureau of Land Management's ("BLM's") joint Draft Environmental Impact Report/Draft Environmental Impact Statement ("DEIR") for the East County ("ECO") Substation Project, the Tule Wind Project and the Energia Sierra Juarez ("ESJ") Gen-Tie Project (collectively, "the Project") and offer the following professional evaluation of the viability of two Project alternatives that the DIER dismisses: (1) using the existing Comision Federal de Electricidad ("CFE") 230 kV lines and the Western Electricity Coordinating Council ("WECC") Path 45 instead of the ESJ gen-tie line and the ECO Substation to transport Baja wind energy to San Diego Gas & Electric Company's ("SDG&E's") electrical grid, and (2) developing distributed generation as an alternative

[1] The report is available at: http://www.sdsmartenergy.org/20-may-08_Smart%20Energy%202020_2nd%20printing_complete.pdf

to the Project as a whole.

Using CFE's 230 kV Line and the WECC Path 45 Is a Viable Project Alternative:

3. It its initial December 18, 2007 application to the Department of Energy ("DOE") to build the ESJ gen-tie line, Sempra (ESJ's parent company) specifically stated it would use the Mexican transmission lines to move wind power from Baja California to SDG&E.[2] Sempra states "As an initial activity, Baja Wind, a wholly-owned subsidiary of Sempra Energy Mexico, will install up to 10 MW of wind generation, consisting of up to five wind turbines, interconnected locally to the CFE electrical grid (the Jacumbe Project). These generators will not interconnect to the proposed 230/500 kV transformer substation in Mexico, or to any transmission lines connected to the United States transmission system, and therefore, the Presidential Permit is not required for the Jacumbe Project." The CFE electrical grid Sempra identified in this statement is Path 45, and the CFE transmission lines are electrically connected to the SDG&E system.[3] Path 45 connects the SDG&E and CFE transmission systems at two points, Mexicali and Tijuana.[4]

4. The export limit on the existing CFE 230 kV system passing through the ESJ wind development area in Mexico to the SDG&E system is 800 MW. These lines

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[2] Sempra Generation, Submittal of Baja Wind U.S. Transmission LLC Application for Presidential Permit, December 18, 2007, p. 3. Application available at: http://esjprojecteis.org/docs/Sempra_Application_(PP-334).pdf

[3] See Western Electricity Coordinating Council, Historic Path Data Description, p. 2, available at: http://www.wecc.biz/library/WECC%20Documents/Historical%20Path%20Data/Historical%20Path%20Data%20Description.pdf. Path 45, CAISO (California Independent System Operator) – CFE, 800 MW transfer limit, south-to-north.

[4] CFE, *Generation and Transmission Expansion Plan Baja California System 2003-2007*, March 2003, p. 14 (attached hereto as Exhibit 2). Green line on map is SDG&E's 500 kV Southwest Powerlink. The two 230 kV brown lines between Valley and Coast are the two CFE lines that pass though the ESJ wind development. The CFE lines are electrically interconnected with the SDG&E system as shown. The existing Sempra 600 MW natural gas-fired power plant in Mexicali is also shown on the map, along with a proposed second 600 MW Sempra plant that has not yet been built.

are used by U.S. electricity suppliers to transmit electricity to the SDG&E/U.S. grid.[5] As reported in the California energy trade press, "For exports alone, developers could move (wind) power along Path 45, which CFE and Coral Energy use for short-term exports to California. The report estimated that Path 45 has 800 MW in unused capacity, but developers would have to execute long-term wheeling contracts through CFE's system."[6]

5. Transmission wheeling contracts are routine. "Wheeling" means moving electricity through one or more interim transmission operator territories in route to a final delivery destination. The California Independent System Operator, the entity responsible for maintaining grid reliability in California, publishes wheeling rates. The wheeling rate in force as of January 1, 2011 between SDG&E and CFE is $6.5672/MWh.[7]

6. It is not credible for CPUC and BLM to claim in the DEIR that there are sufficient capacity, legal, or regulatory impediments to exporting wind power from Baja California over Path 45 to make its use infeasible. The existing unused export capacity is 800 MW. There is an existing protocol and wheeling fee schedule between SDG&E and CFE for exports over the CFE transmission system to SDG&E. SDG&E's parent company Sempra Energy owns a liquefied natural gas plant, a natural gas pipeline network, and a 600 MW power plant in Baja California. Sempra is clearly comfortable operating in the Baja California legal and regulatory environment. Sempra has been a public advocate for placing electricity generation assets in Baja California.[8]

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[5] Ibid. See map on p. 10, titled "WECC Path 45 Capability."

[6] California Energy Markets, Mexico Could Be Wind Hotspot If Wires, Border Issues Are Solved, June 17, 2008 (attached hereto as Exhibit 3)

[7] CAISO, Wheeling Access Charges – Rates Effective January 1, 2011, available at: http://www.caiso.com/2b33/2b33847338d0.pdf

[8] Gas Turbine World, Sempra Energy - Mexicali plant spurs surge of capacity, Vol. 34, No. 2, April – May 2004, p. 36 (attached hereto as Exhibit 4).

Neither the WECC 45 Alternative nor the Distributed Generation Alternative Would Preclude Reliability Improvements in the Boulevard Area:

7. The combined population of Boulevard and Jacumba is approximately 2,000. SDG&E serves a population of over 3 million.[9] On a proportionate basis, the combined populations of Boulevard and Jacumba represent less than 0.1 percent of SDG&E's total demand. The highest 1-hour load every recorded in SDG&E service territory was 4,643 MW from 2-3 pm on September 27, 2010.[10] The proportionate peak load for Boulevard and Jacumba would be (2,000/3,000,000) x 4,643 MW = 3 MW. The reliability of the combined Boulevard/Jacumba area load could be completely assured with a 3 MW peaking gas turbine at a cost of less than $4 million.[11] It is not credible to assert that the 500 kV ECO substation, costing hundreds of millions of dollars, is necessary to assure the reliability of such a small load.

Distributed Solar PV Generation Alone Could Satisfy Most of SDG&E's Load Demand and Renewables Portfolio Standard Goals by 2020:

8. SDG&E's service territory has approximately 7,000 MW of urban and suburban PV potential.[12] As noted previously, the highest peak load recorded to date in SDG&E's service territory is 4,643 MW.

9. SDG&E received authorization from CPUC in September 2010 to

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[9] U.S. Census Bureau, 2009 statistics, San Diego County, available at: http://quickfacts.census.gov/qfd/states/06/06073.html. SDG&E also serves a portion of Orange County.

[10] CAISO OASIS database, September 27, 2010, available at http://oasis.caiso.com/mrtu-oasis/home.jsp?doframe=true&serverurl=http%3a%2f%2farptp10%2eoa%2ecaiso%2ecom%3a8000&volume=OASIS

[11] California Energy Commission ("CEC"), *Comparative Costs of California Central Station Electricity Generation – Final Staff Report*, January 2010, Table 14, p. 54, available at: http://www.energy.ca.gov/reports/2003-06-06_100-03-001F.PDF. Capital cost of small simple cycle gas turbine is $1,292/kW. Therefore, a 3 MW (3,000 kW) simple cycle gas turbine would cost: 3,000 kW x $1,292/kW = $3.9 million.

[12] Powers, *San Diego Smart Energy 2020: The 21st Century Alternative*, October 2007, p. 48.

construct 100 MW of distributed PV over the next four years.[13] CPUC approved a statewide 1,000 MW distributed PV program in December 2010 known as the Renewable Auction Mechanism (RAM) program. SDG&E's RAM program allotment is 80 MW. This capacity will be built over the next 3-4 years.[14] The tariffs under the 750 MW SB 32 feed-in tariff distributed PV program are in development and expected to be finalized sometime in 2011.[15] SDG&E's allotment under SB 32 will be approximately 50 MW.[16] Approximately 180 MW of distributed PV capacity will be added in SDG&E territory by the end of 2016 under the ongoing California Solar Initiative "million solar roofs" program.[17] In total, approximately 410 MW of distributed PV capacity will be added to SDG&E territory through existing approved distributed PV programs. This is a PV installation rate of 80 – 100 MW per year over the next 4 – 5 years.

10. 800 – 1,000 MW of distributed PV will be installed in SDG&E territory over the next decade if the current 80 - 100 MW per year distributed PV installation rate is maintained in SDG&E territory over the entire 2011 – 2020 period.

Distributed Solar PV Generation Is Commercially Feasible and Would Improve System Reliability:

11. SDG&E currently imports approximately two-thirds of the San Diego

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[13] CPUC September 2, 2010 press release, available at: http://docs.cpuc.ca.gov/PUBLISHED/NEWS_RELEASE/122975.htm

[14] CPUC Decision Adopting the Renewable Auction Mechanism, December 16, 2010, p. 30, available at: http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/128432.pdf

[15] CPUC feed-in tariff website, description of SB 32, available at: http://www.cpuc.ca.gov/PUC/energy/Renewables/feedintariffssum.htm

[16] CEC, 2007 Integrated Energy Policy Report, December 2007, Figure 1-11, p. 27, available at: available at: http://www.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF.PDF. SDG&E accounts for 7 percent of statewide electricity demand. Therefore 750 MW x 0.07 = 52.5 MW.

[17] California Center for Sustainable Energy, Overview of Solar Incentive Programs, October 9, 2009, p. 7, available at: http://www.slideshare.net/ccsemedia/overview-of-solar-incentive-programs

region's power needs.[18] This high ratio of imported power leaves little robustness in the current SDG&E system to meet unexpected emergency conditions. The firestorms that occurred in late October 2007 temporarily forced both major transmission import corridors off-line at a time when the SDG&E load reached approximately 3,200 MW.[19] SDG&E was forced to import several hundred MW of power from CFE, along Path 45, to avoid partial blackouts due to insufficient local generation.[20] Major blackouts in SDG&E's service territory would have been unavoidable had the October 2007 firestorm occurred during a period of peak load with loads well above 4,000 MW.

12. SDG&E's parent company Sempra Energy identifies solar PV as less costly than other forms of solar power.[21] The added benefit of local solar PV is that it is reliable distributed local power that will remain available during fire emergencies. A case in point is the 500 MW urban PV project proposed by Southern California Edison and approved by CPUC on June 18, 2009. CPUC Commissioner John Bohn is quoted in CPUC press release on the decision stating:[22]

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[18] Powers, *San Diego Smart Energy 2020: The 21st Century Alternative*, October 2007, p. 23.

[19] California Independent System Operator OASIS, System Forecast Database – by Utility, 2007 (attached hereto as Exhibit 5). Peak one-hour load on October 22, 2007 was 2,972 MW. Peak one-hour load on October 23, 2007 was 3,003 MW. Peak one-hour load on October 24, 2007 was 3,180 MW.

[20] See Craig D. Rose, "Power links in peril? Fires nearly caused electricity crisis for which San Diego wasn't prepared," *San Diego* Tribune, November 13, 2007, available at: http://www.signonsandiego.com/uniontrib/20071113/news_1n13grid.html

[21] Ucilia Wang, "Sempra Wants 300 MW Plus of Solar in Arizona," *Greentech Media*, April 22, 2009, available at: http://www.greentechmedia.com/articles/read/sempra-wants-300-megawatts-plus-of-solar-in-arizona-6074/. "Sempra has also evaluated solar thermal power technologies, which use a field of mirrors to concentrate the sunlight to produce heat for electricity generation. The company has found that using solar panels is the cheaper option, (Sempra Generation president) Allman said. He noted that some of the solar thermal power technologies, such as the use of a central tower for harvesting the heat and generating steam, have yet to be proven commercially."

[22] CPUC Press Release - Docket #: A.08-03-015, *CPUC Approves Edison Solar Roof Program*, June 18, 20 (attached hereto as Exhibit 6).

"Unlike other generation resources, these projects can get built quickly and without the need for expensive new transmission lines. And since they are built on existing structures, these projects are extremely benign from an environmental standpoint, with neither land use, water, or air emission impacts."

Other Technically, Commercially and Legally Feasible Distributed Generation Exists that Would Help Meet Project Objectives:

13. Distributed biogas-fired generation is also a viable, Renewables Portfolio Standard ("RPS")-eligible, and cost-effective alternative for the San Diego area that has been largely ignored by SDG&E. The California Energy Action Plan prioritizes distributed combined heat and power ("CHP") plants over conventional utility central plants.[23] These are small distributed gas-fired projects that typically produce on the order of a few MW at hospitals, campuses, and office complexes. Biogas or biomethane-fired CHP plants are RPS-eligible. There is up to 1,700 MW of biogas and/or biomethane potential in California to provide fuel to these CHP plants.[24]

14. Local CHP demonstrated its value in the October 2007 firestorm when the University of California San Diego CHP plant began exporting to SDG&E to provide grid stability when SDG&E's two main transmission corridors were simultaneously down due to fire.[25]

15. The Electric Power Research Institute identified nearly 400 MW of cost-effective CHP potential in SDG&E's service territory in a 2005 study.[26] The state's AB

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[23] See CEC California Energy Action Plan webpage: http://www.energy.ca.gov/energy_action_plan/index.html

[24] CEC PIER Program, *Distributed Renewable Energy Assessment – Final Report*, August 11, 2009, Appendix Bio-Power, p. 49, available at: http://www.clean-coalition.org/storage/references/11-aug-09_Navigant_distributed%20renewable%20energy%20assessment_final%20report.pdf.

[25] San Diego Union Tribune, *Generation of power outside of SDG&E grid* (letter by UCSD Vice-Chancellor Gary Matthews), November 17, 2007 (attached hereto as Exhibit 7).

[26] In the Matter of the Application of San Diego Gas & Electric Company (U 902-E) for a

32 greenhouse gas compliance strategy calls for 4,000 MW of new CHP by 2020.[27] SDG&E supplies about 7 percent of the state's electricity.[28] As a result, about 280 MW of new CHP should be added in SDG&E territory by 2020 to comply with the AB 32 CHP target. Yet SDG&E currently projects no significant growth in CHP in its service territory.[29]

16. CHP is a base load, round-the-clock generation resource intended to operate at or near its rated capacity on a continuous basis. Wind power is intermittent, and even at good to excellent wind sites only produces power at rate equivalent to its full capacity operating about one-third of the time.. The California Energy Commission and California Public Utilities Commission assign a capacity factor of 92 percent to CHP.[30] CPUC assigns a capacity factor of 33 percent to wind resources.[31] What this means in practical terms is that the annual electrical output from 280 MW of base load CHP capacity is equivalent to the annual electrical output from 781 MW of wind power.[32]

Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project, Application A.06-08-010, *Phase II Reply Brief of Powers Engineering on Behalf of Bill Powers, P.E.*, June 13, 2008, p. 9, (excerpts attached hereto as Exhibit 8)

[27] CPUC Decision D.10-12-035, Decision Adopting Qualifying Facility and CHP Program Settlement Agreement, December 16, 2010. See attachment - CHP Program Settlement Agreement Term Sheet, October 8, 2010, p. 31.

[28] CEC, *2007 Integrated Energy Policy Report*, Figure 1-11, p. 27.

[29] See Powers, *San Diego Smart Energy 2020: The 21st Century Alternative*, October 2007, pp. 60-61.

[30] CEC/CPUC, AB 32 Scoping Plan assumptions, January 13, 2010, available at: http://www.energy.ca.gov/reti/steering/2010-01-19_meeting/documents/04-Load-modifier_Assumptions_for_33-Percent_RPS_Planning_2010-01-14.pdf

[31] Energy and Environmental Economics, Inc., *Inputs and Assumptions to 33% Renewables Portfolio Standard Implementation Analysis*, prepared For CPUC, July 1, 2009 (updated January 2010), Table 7, p. 12, available at: http://www.cpuc.ca.gov/NR/rdonlyres/932CFFAA-0610-474E-905D-30CD1D76C651/0/InputsandAssumptions_UPDATE.pdf.

[32] (92/33) x 280 MW = 781 MW.

17. Examples are the biogas-fired fuel cell CHP plants at the University of California San Diego ("UCSD") and City of San Diego. A 2.8 MW biogas-fired fuel cell will be online at UCSD by mid-2011 to supply power to the campus electrical grid. A 1.4 MW biogas-fired fuel cell will also come online at the City of San Diego's South Bay Water Reclamation Plant. UCSD will use the byproduct heat from the fuel cell generation as a continuous source for 320 tons of chilling capacity (air conditioning) for its buildings.[33] The UCSD fuel cell will be paired with an additional 2.8 MW advanced energy storage system, which will allow UCSD to store off-peak power and discharge the energy during peak-demand hours. These projects receive the maximum Self Generator Incentive Program fuel cell incentive because they use renewable fuel. Biogas from the City of San Diego Point Loma wastewater treatment facility will be piped to UCSD and the South Bay Water Reclamation Plant for use in the fuel cells. The cost of electricity will be in the range of $0.12/kWh under a long-term power purchase agreement with the turnkey supplier of the fuel cell systems.[34] The base SDG&E residential retail electricity rate is approximately $0.14 to 0.16/kWh.[35]

Conclusions:

18. Based on the foregoing evidence and analysis, it is my professional opinion that it would be technically, commercially and legally feasible to (1) use the existing CFE 230 kV line and the WECC Path 45 instead of the ESJ gen-tie line and the

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[33] California Center for Sustainable Energy (San Diego) press release, San Diego Gets Clean Energy - $23.5 million secured to fund nation's largest fuel cell project, December 14, 2010, available at: https://energycenter.org/index.php/incentive-programs/self-generation-incentive-program/sgip-news/2399-san-diego-gets-clean-energy.

[34] Telephone communication between B. Powers, Powers Engineering, and F. Mazanec, Biofuels Energy LLC, January 12, 2011.

[35] See SDG&E webpage: http://www.sdge.com/nem/rates.shtml

ECO Substation to transport Baja wind energy to SDG&E's electrical grid, and (2) develop sufficient distributed generation in San Diego County to meet the Project objectives without developing the Project.

I declare, under penalty of perjury, that the foregoing is true and correct based on my personal knowledge and best professional judgment, and that this declaration was executed on March 4, 2011 in San Diego, California.

Bill Powers, P.E.

BILL POWERS, P.E.

EXHIBIT 1

BILL POWERS, P.E.

PROFESSIONAL HISTORY

Powers Engineering, San Diego, CA 1994-
ENSR Consulting and Engineering, Camarillo, CA 1989-93
Naval Energy and Environmental Support Activity, Port Hueneme, CA 1982-87
U.S. Environmental Protection Agency, Research Triangle Park, NC 1980-81

EDUCATION

Master of Public Health – Environmental Sciences, University of North Carolina
Bachelor of Science – Mechanical Engineering, Duke University

PROFESSIONAL AFFILIATIONS

Registered Professional Mechanical Engineer, California (Certificate M24518)
American Society of Mechanical Engineers
Air & Waste Management Association

TECHNICAL SPECIALTIES

Twenty-five years of experience in:

- Power plant air emission control system and cooling system assessments
- Regional renewable energy planning
- Combustion equipment permitting, testing and monitoring
- Air pollution control equipment retrofit design/performance testing
- Petroleum refinery air engineering and testing
- Latin America environmental project experience

POWER PLANT EMISSION CONTROL AND COOLING SYSTEM CONVERSION ASSESSMENTS

Biomass Plant NO_x and CO Air Emissions Control Evaluation. Lead engineer for evaluation of available nitrogen oxide (NO_x) and carbon monoxide (CO) controls for a 45 MW Aspen Power biomass plant in Texas where proponent had identified selective non-catalytic reduction (SNCR) for NO_x and good combustion practices for CO as BACT. Identified the use of tail-end SCR for NO_x control at several operational U.S. biomass plants, and oxidation catalyst in use at two of these plants for CO and VOC control, as BACT for the proposed biomass plant. Administrative law judge concurred in decision that SCR and oxidation catalyst is BACT. Developer added SCR and oxidation catalyst to project in subsequent settlement agreement.

Biomass Plant Air Emissions Control Consulting. Lead expert on biomass air emissions control systems for landowners that will be impacted by a proposed 50 MW biomass to be built by the local East Texas power cooperative. Public utility agreed to meet current BACT for biomass plants in Texas, SCR for NOx and oxidation catalyst for CO, in settlement agreement with local landowners.

Combined-Cycle Power Plant Startup and Shutdown Emissions. Lead engineer for analysis of air permit startup and shutdown emissions minimization for combined-cycle power plant proposed for the San Francisco Bay Area. Original equipment was specified for baseload operation prior to suspension of project in early 2000s. Operational profile described in revised air permit was load following with potential for daily start/stop. Recommended that either fast start turbine technology be employed to minimize start/stop emissions or that "demonstrated in practice" operational and control software modifications be employed to minimize startup/shutdown emissions.

IGCC as BACT for Air Emissions from Proposed 960 MW Coal Plant. Presented testimony on IGCC as BACT for air emissions reduction from 960 MW coal plant. Applicant received air permit for a pulverized coal plant to be equipped with a baghouse, wet scrubber, and wet ESP for air emissions control. Use of IGCC technology at the emission rates permitted for two recently proposed U.S. IGCC projects, and demonstrated in practice at a Japanese IGCC plant firing Chinese bituminous coal, would substantially reduce potential emissions of NO_x, SO_2, and PM. The estimated control cost-effectiveness of substituting IGCC for pulverized coal technology in this case was approximately $3,000/ton.

Analysis of Proposed Air Emission Limits for 600 MW Pulverized Coal Plant. Project engineer tasked with evaluating sufficiency of air emissions limits and control technologies for proposed 600 MW coal plant Arkansas. Determined that the applicant had: 1) not properly identified SO_2, sulfuric acid mist, and PM BACT control levels for the plant, and 2) improperly utilized an incremental cost effectiveness analysis to justify air emission control levels that did not represent BACT.

Eight Pulverized Coal Fired 900 MW Boilers – IGCC Alternative with Air Cooling. Provided testimony on integrated gasification combined cycle (IGCC) as a fully commercial coal-burning alternative to the pulverized coal (PC) technology proposed by TXU for eight 900 MW boilers in East Texas, and East Texas as an ideal location for CO2 sequestration due to presence of mature oilfield CO2 enhanced oil recovery opportunities and a deep saline aquifer underlying the entire region. Also presented testimony on the major increase in regional consumptive water use that would be caused by the evaporative cooling towers proposed for use in the PC plants, and that consumptive water use could be lowered by using IGCC with evaporative cooling towers or by using air-cooled condensers with PC or IGCC technology. TXU ultimately dropped plans to build the eight PC plants as a condition of a corporate buy-out.

Utility Boilers – Conversion of Existing Once-Through Cooled Boilers to Wet Towers, Parallel Wet-Dry Cooling, or Dry Cooling. Provided expert testimony and preliminary design for the conversion of four natural gas and/or coal-fired utility boilers (Unit 4, 235 MW; Unit 3, 135 MW; Unit 2, 65 MW; and Unit 1,65 MW) from once-through river water cooling to wet cooling towers, parallel wet-dry cooling, and dry cooling. Major design constraints were available land for location of retrofit cooling systems and need to maintain maximum steam turbine backpressure at or below 5.5 inches mercury to match performance capabilities of existing equipment. Approach temperatures of 12 °F and 13 °F were used for the wet towers. SPX Cooling Technologies F-488 plume-abated wet cells with six feet of packing were used to achieve approach temperatures of 12 °F and 13 °F. Annual energy penalty of wet tower retrofit designs is approximately 1 percent. Parallel wet-dry or dry cooling was determined to be technically feasible for Unit 3 based on straightforward access to the Unit 3 surface condenser and available land adjacent to the boiler.

Utility Boiler – Assessment of Air Cooling and Integrated Gasification/Combined Cycle for Proposed 500 MW Coal-Fired Plant. Provided expert testimony on the performance of air-cooling and IGCC relative to the conventional closed-cycle wet cooled, supercritical pulverized coal boiler proposed by the applicant. Steam Pro™ coal-fired power plant design software was used to model the proposed plant and evaluate the impacts on performance of air cooling and plume-abated wet cooling. Results indicated that a conservatively designed air-cooled condenser could maintain rated power output at the design ambient temperature of 90 °F. The IGCC comparative analysis indicated that unit reliability comparable to a conventional pulverized coal unit could be achieved by including a spare gasifier in the IGCC design, and that the slightly higher capital cost of IGCC was offset by greater thermal efficiency and reduced water demand and air emissions.

Utility Boiler – Assessment of Closed-Cycle Cooling Retrofit Cost for 1,200 MW Oil-Fired Plant. Prepared an assessment of the cost and feasibility of a closed-cycle wet tower retrofit for the 1,200 MW Roseton Generating Station. Determined that the cost to retrofit the Roseton plant with plume-abated closed-cycle wet cooling was well established based on cooling tower retrofit studies performed by the original owner (Central Hudson Gas & Electric Corp.) and subsequent regulatory agency critique of the cost estimate.

Also determined that elimination of redundant and/or excessive budgetary line items in owners cost estimate brings the closed-cycle retrofit in line with expected costs for comparable new or retrofit plume-abated cooling tower applications.

Nuclear Power Plant – Assessment of Closed-Cycle Cooling Retrofit Cost for 2,000 MW Plant. Prepared an assessment of the cost and feasibility of a closed-cycle wet tower retrofit for the 2,000 MW Indian Point Generating Station. Determined that the most appropriate arrangement for the hilly site would be an inline plume-abated wet tower instead of the round tower configuration analyzed by the owner. Use of the inline configuration would allow placement of the towers at numerous sites on the property with little or need for blasting of bedrock, greatly reducing the cost of the retrofit. Also proposed an alternative circulating cooling water piping configuration to avoid the extensive downtime projected by the owner for modifications to the existing discharge channel.

Kentucky Coal-Fired Power Plant – Pulverized Coal vs IGCC. Expert witness in Sierra Club lawsuit against Peabody Coal Company's plan to construct a 1,500 MW pulverized-coal fired power plant in Kentucky. Presented case that Integrated Gasification Combined Cycle (IGCC) is a superior method for producing power from coal, from environmental and energy efficiency perspective, than the proposed pulverized-coal plant. Presented evidence that IGCC is technically feasible and cost competitive with pulverized coal.

Power Plant Dry Cooling Symposium – Chair and Organizer. Chair and organizer of the first symposium held in the U.S. (May 2002) that focused exclusively on dry cooling technology for power plants. Sessions included basic principles of wet and dry cooling systems, performance capabilities of dry cooling systems, case studies of specific installations, and reasons why dry cooling is the predominant form of cooling specified in certain regions of North America (Massachusetts, Nevada, northern Mexico).

Utility Boiler – Best Available NO_x Control System for 525 MW Coal-Fired Circulating Fluidized Bed Boiler Plant. Expert witness in dispute over whether 50 percent NO_x control using selective non-catalytic reduction (SNCR) constituted BACT for a proposed 525 MW circulating fluidized bed (CFB) boiler plant. Presented testimony that SNCR was capable of continuous NO_x reduction of greater than 70 percent on a CFB unit and that tail-end selective catalytic reduction (SCR) was technically feasible and could achieve greater than 90 percent NO_x reduction.

Utility Boilers – Evaluation of Correlation Between Opacity and PM_{10} Emissions at Coal-Fired Plant. Provided expert testimony on whether correlation existed between mass PM_{10} emissions and opacity during opacity excursions at large coal-fired boiler in Georgia. EPA and EPRI technical studies were reviewed to assess the correlation of opacity and mass emissions during opacity levels below and above 20 percent. A strong correlation between opacity and mass emissions was apparent at a sister plant at opacities less than 20 percent. The correlation suggests that the opacity monitor correlation underestimates mass emissions at opacities greater than 20 percent, but may continue to exhibit a good correlation for the component of mass emissions in the PM_{10} size range.

Utility Boilers – Retrofit of SCR and FGD to Existing Coal-Fired Units.
Expert witness in successful effort to compel an existing coal-fired power plant located in Massachusetts to meet an accelerated NO_x and SO_2 emission control system retrofit schedule. Plant owner argued the installation of advanced NO_x and SO_2 control systems would generate > 1 ton/year of ancillary emissions, such as sulfuric acid mist, and that under Massachusetts Dept. of Environmental Protection regulation ancillary emissions > 1 ton/year would require a BACT evaluation and a two-year extension to retrofit schedule. Successfully demonstrated that no ancillary emissions would be generated if the retrofit NO_x and SO_2 control systems were properly sized and optimized. Plant owner committed to accelerated compliance schedule in settlement agreement.

Utility Boilers – Retrofit of SCR to Existing Natural Gas-Fired Units.
Lead engineer in successful representation of interests of California coastal city to prevent weakening of an existing countywide utility boiler NO_x rule. Weakening of NO_x rule would have allowed a merchant utility boiler plant located in the city to operate without installing selective catalytic reduction (SCR) NO_x control systems. This project required numerous appearances before the county air pollution control hearing board to successfully defend the existing utility boiler NO_x rule.

REGIONAL RENEWABLE ENERGY PLANNING

San Diego Smart Energy 2020 Plan. Author of October 2007 "San Diego Smart Energy 2020," an energy plan that focuses on meeting the San Diego region's electric energy needs through accelerated integration of renewable and non-renewable distributed generation, in the form of combined heat and power (CHP) systems and solar photovoltaic (PV) systems. PV would meet approximately 28 percent of the San Diego region's electric energy demand in 2020. CHP systems would provide approximately 47 percent. Annual energy demand would drop 20 percent in 2020 relative to 2003 through use all cost-effective energy efficiency measures. This target is based on City of San Diego experience. San Diego has consistently achieved energy efficiency reductions of 20 percent on dozens of projects. Existing utility-scale gas-fired generation would continue to be utilized to provide power at night, during cloudy whether, and for grid reliability support.

Photovoltaic technology selection and siting for SDG&E Solar San Diego project. Served as PV technology expert in California Public Utilities Commission proceeding to define PV technology and sites to be used in San Diego Gas & Electric (SDG&E) $250 million "Solar San Diego" project. Recommendations included: 1) prioritize use of roof-mounted thin-film PV arrays similar to the SCE urban PV program to maximize the installed PV capacity, 2) avoid tracking ground-mounted PV arrays due to high cost and relative lack of available land in the urban/suburban core, 3) and incorporate limited storage in fixed rooftop PV arrays to maximizing output during peak demand periods. Suitable land next to SDG&E substations capable of supporting 5 to 40 MW of PV (each) was also identified by Powers Engineering as a component of this project.

Photovoltaic arrays as alternative to natural gas-fired peaking gas turbines, Chula Vista. Served as PV technology expert in California Energy Commission (CEC) proceeding regarding the application of MMC Energy to build a 100 MW peaking gas turbine power plant in Chula Vista. Presented testimony that 100 MW of PV arrays in the Chula Vista area could provide the same level of electrical reliability on hot summer days as an equivalent amount of peaking gas turbine capacity at approximately the same cost of energy. The preliminary decision issued by the presiding CEC commissioner in the case recommended denial of the application in part due to failure of the applicant or CEC staff to thoroughly evaluate the PV alternative to the proposed turbines. No final decision has yet been issued in the proceeding (as of May 2009).

San Diego Area Governments (SANDAG) Energy Working Group. Public interest representative on the SANDAG Energy Working Group (EWG). The EWG advises the Regional Planning Committee on issues related to the coordination and implementation of the Regional Energy Strategy 2030 adopted by the SANDAG Board of Directors in July 2003. The EWG consists of elected officials from the City of San Diego, County of San Diego and the four subareas of the region. In addition to elected officials, the EWG includes stakeholders representing business, energy, environment, economy, education, and consumer interests.

Development of San Diego Regional Energy Strategy 2030. Participant in the 18-month process in the 2002-2003 timeframe that led to the development of the San Diego Regional Energy Strategy 2030. This document was adopted by the SANDAG Board of Directors in July 2003 and defines strategic energy objectives for the San Diego region, including: 1) in-region power generation increase from 65% of peak demand in 2010 to 75% of peak demand in 2020, 2) 40% renewable power by 2030 with at least half of this power generated in-county, 3) reinforcement of transmission capacity as needed to achieve these objectives. The SANDAG Board of Directors voted unanimously on Nov. 17, 2006 to take no position on the Sunrise Powerlink proposal primarily

because it conflicts the Regional Energy Strategy 2030 objective of increased in-region power generation. The Regional Energy Strategy 2030 is online at: http://www.energycenter.org/uploads/Regional_Energy_Strategy_Final_07_16_03.pdf

COMBUSTION EQUIPMENT PERMITTING, TESTING AND MONITORING

EPRI Gas Turbine Power Plant Permitting Documents – Co-Author.
Co-authored two Electric Power Research Institute (EPRI) gas turbine power plant siting documents. Responsibilities included chapter on state-of-the-art air emission control systems for simple-cycle and combined-cycle gas turbines, and authorship of sections on dry cooling and zero liquid discharge systems.

Air Permits for 50 MW Peaker Gas Turbines – Six Sites Throughout California.
Responsible for preparing all aspects of air permit applications for five 50 MW FT-8 simple-cycle turbine installations at sites around California in response to emergency request by California state government for additional peaking power. Units were designed to meet 2.0 ppm NO_x using standard temperature SCR and innovative dilution air system to maintain exhaust gas temperature within acceptable SCR range. Oxidation catalyst is also used to maintain CO below 6.0 ppm.

Kauai 27 MW Cogeneration Plant – Air Emission Control System Analysis. Project manager to evaluate technical feasibility of SCR for 27 MW naphtha-fired turbine with once-through heat recovery steam generator. Permit action was stalled due to questions of SCR feasibility. Extensive analysis of the performance of existing oil-fired turbines equipped with SCR, and bench-scale tests of SCR applied to naphtha-fired turbines, indicated that SCR would perform adequately. Urea was selected as the SCR reagent given the wide availability of urea on the island. Unit is first known application of urea-injected SCR on a naphtha-fired turbine.

Microturbines – Ronald Reagan Library, Ventura County, California.
Project manager and lead engineer or preparation of air permit applications for microturbines and standby boilers. The microturbines drive the heating and cooling system for the library. The microturbines are certified by the manufacturer to meet the 9 ppm NO_x emission limit for this equipment. Low-NO_x burners are BACT for the standby boilers.

Hospital Cogeneration Microturbines – South Coast Air Quality Management District.
Project manager and lead engineer for preparation of air permit application for three microturbines at hospital cogeneration plant installation. The draft Authority To Construct (ATC) for this project was obtained two weeks after submittal of the ATC application. 30-day public notification was required due to the proximity of the facility to nearby schools. The final ATC was issued two months after the application was submitted, including the 30-day public notification period.

Gas Turbine Cogeneration – South Coast Air Quality Management District. Project manager and lead engineer for preparation of air permit application for two 5.5 MW gas turbines in cogeneration configuration for county government center. The turbines will be equipped with selective catalytic reduction (SCR) and oxidation catalyst to comply with SCAQMD BACT requirements. Aqueous urea will be used as the SCR reagent to avoid trigger hazardous material storage requirements. A separate permit will be obtained for the NO_x and CO continuous emissions monitoring systems. The ATCs is pending.

Industrial Boilers – NO_x BACT Evaluation for San Diego County Boilers.
Project manager and lead engineer for preparation of Best Available Control Technology (BACT) evaluation for three industrial boilers to be located in San Diego County. The BACT included the review of low NO_x burners, FGR, SCR, and low temperature oxidation (LTO). State-of-the-art ultra low NO_x burners with a 9 ppm emissions guarantee were selected as NO_x BACT for these units.

Peaker Gas Turbines – Evaluation of NO_x Control Options for Installations in San Diego County.
Lead engineer for evaluation of NO_x control options available for 1970s vintage simple-cycle gas turbines proposed for peaker sites in San Diego County. Dry low-NO_x (DLN) combustors, catalytic combustors, high-

temperature SCR, and NO_x absorption/conversion ($SCONO_x$) were evaluated for each candidate turbine make/model. High-temperature SCR was selected as the NOx control option to meet a 5 ppm NO_x emission requirement.

Hospital Cogeneration Plant Gas Turbines – San Joaquin Valley Unified Air Pollution Control District. Project manager and lead engineer for preparation of air permit application and Best Available Control Technology (BACT) evaluation for hospital cogeneration plant installation. The BACT included the review of DLN combustors, catalytic combustors, high-temperature SCR and $SCONO_x$. DLN combustion followed by high temperature SCR was selected as the NO_x control system for this installation. The high temperature SCR is located upstream of the heat recovery steam generator (HRSG) to allow the diversion of exhaust gas around the HRSG without compromising the effectiveness of the NO_x control system.

1,000 MW Coastal Combined-Cycle Power Plant – Feasibility of Dry Cooling. Expert witness in on-going effort to require use of dry cooling on proposed 1,000 MW combined-cycle "repower" project at site of an existing 1,000 MW utility boiler plant. Project proponent argued that site was two small for properly sized air-cooled condenser (ACC) and that use of ACC would cause 12-month construction delay. Demonstrated that ACC could easily be located on the site by splitting total of up to 80 cells between two available locations at the site. Also demonstrated that an ACC optimized for low height and low noise would minimize or eliminate proponent claims of negative visual and noise impacts.

Industrial Cogeneration Plant Gas Turbines – Upgrade of Turbine Power Output. Project manager and lead engineer for preparation of Best Available Control Technology (BACT) evaluation for proposed gas turbine upgrade. The BACT included the review of DLN combustors, catalytic combustors, high-, standard-, and low-temperature SCR, and $SCONO_x$. Successfully negotiated air permit that allowed facility to initially install DLN combustors and operate under a NO_x plantwide "cap." Within two major turbine overhauls, or approximately eight years, the NO_x emissions per turbine must be at or below the equivalent of 5 ppm. The 5 ppm NO_x target will be achieved through technological in-combustor NO_x control such as catalytic combustion, or SCR or SCR equivalent end-of-pipe NO_x control technologies if catalytic combustion is not available.

Gas Turbines – Modification of RATA Procedures for Time-Share CEM. Project manager and lead engineer for the development of alternate CO continuous emission monitor (CEM) Relative Accuracy Test Audit (RATA) procedures for time-share CEM system serving three 7.9 MW turbines located in San Diego. Close interaction with San Diego APCD and EPA Region 9 engineers was required to receive approval for the alternate CO RATA standard. The time-share CEM passed the subsequent annual RATA without problems as a result of changes to some of the CEM hardware and the more flexible CO RATA standard.

Gas Turbines – Evaluation of NO_x Control Technology Performance. Lead engineer for performance review of dry low-NO_x combustors, catalytic combustors, high-, standard-, and low-temperature selective catalytic reduction (SCR), and NO_x absorption/conversion ($SCONO_x$). Major turbine manufacturers and major manufacturers of end-of-pipe NO_x control systems for gas turbines were contacted to determine current cost and performance of NO_x control systems. A comparison of 1993 to 1999 "$/kwh" and "$/ton" cost of these control systems was developed in the evaluation.

Gas Turbines – Evaluation of Proposed NO_x Control System to Achieve 3 ppm Limit. Lead engineer for evaluation for proposed combined cycle gas turbine NO_x and CO control systems. Project was in litigation over contract terms, and there was concern that the GE Frame 7FA turbine could not meet the 3 ppm NO_x permit limit using a conventional combustor with water injection followed by SCR. Operations personnel at GE Frame 7FA installatins around the country were interviewed, along with principal SCR vendors, to corroborate that the installation could continuously meet the 3 ppm NO_x limit.

Gas Turbines – Title V "Presumptively Approvable" Compliance Assurance Monitoring Protocol. Project manager and lead engineer for the development of a "presumptively approval" NO_x parametric emissions monitoring system (PEMS) protocol for industrial gas turbines. "Presumptively approvable" means that any gas turbine operator selecting this monitoring protocol can presume it is acceptable to the U.S. EPA. Close interaction with the gas turbine manufacturer's design engineering staff and the U.S. EPA Emissions Measurement Branch (Research Triangle Park, NC) was required to determine modifications necessary to the current PEMS to upgrade it to "presumptively approvable" status.

Environmental Due Diligence Review of Gas Turbine Sites – Mexico. Task leader to prepare regulatory compliance due diligence review of Mexican requirements for gas turbine power plants. Project involves eleven potential sites across Mexico, three of which are under construction. Scope involves identification of all environmental, energy sales, land use, and transportation corridor requirements for power projects in Mexico. Coordinator of Mexican environmental subcontractors gathering on-site information for each site, and translator of Spanish supporting documentation to English.

Development of Air Emission Standards for Gas Turbines - Peru. Served as principal technical consultant to the Peruvian Ministry of Energy in Mines (MEM) for the development of air emission standards for Peruvian gas turbine power plants. All major gas turbine power plants in Peru are currently using water injection to increase turbine power output. Recommended that 42 ppm on natural gas and 65 ppm on diesel (corrected to 15% O_2) be established as the NO_x limit for existing gas turbine power plants. These limits reflect NO_x levels readily achievable using water injection at high load. Also recommended that new gas turbine sources be subject to a BACT review requirement.

Gas Turbines – Title V Permit Templates. Lead engineer for the development of standardized permit templates for approximately 100 gas turbines operated by the oil and gas industry in the San Joaquin Valley. Emissions limits and monitoring requirements were defined for units ranging from GE Frame 7 to Solar Saturn turbines. Stand-alone templates were developed based on turbine size and NO_x control equipment. NO_x utilized in the target turbine population ranged from water injection alone to water injection combined with SCR.

Gas Turbines – Evaluation of NO_x, SO_2 and PM Emission Profiles. Performed a comparative evaluation of the NO_x, SO_2 and particulate (PM) emission profiles of principal utility-scale gas turbines for an independent power producer evaluating project opportunities in Latin America. All gas turbine models in the 40 MW to 240 MW range manufactured by General Electric, Westinghouse, Siemens and ABB were included in the evaluation.

Stationary Internal Combustion Engine (ICE) RACT/BARCT Evaluation. Lead engineer for evaluation of retrofit NO_x control options available for the oil and gas production industry gas-fired ICE population in the San Joaquin Valley affected by proposed RACT and BARCT emission limits. Evaluation centered on lean-burn compressor engines under 500 bhp, and rich-burn constant and cyclically loaded (rod pump) engines under 200 bhp. The results of the evaluation indicated that rich burn cyclically-loaded rod pump engines comprised 50 percent of the affected ICE population, though these ICEs accounted for only 5 percent of the uncontrolled gas-fired stationary ICE NO_x emissions. Recommended retrofit NO_x control strategies included: air/fuel ratio adjustment for rod pump ICEs, Non-selective catalytic reduction (NSCR) for rich-burn, constant load ICEs, and "low emission" combustion modifications for lean burn ICEs.

Development of Air Emission Standards for Stationary ICEs - Peru. Served as principal technical consultant to the Peruvian Ministry of Energy in Mines (MEM) for the development of air emission standards for Peruvian stationary ICE power plants. Draft 1997 World Bank NO_x and particulate emission limits for stationary ICE power plants served as the basis for proposed MEM emission limits. A detailed review of ICE

emissions data provided in PAMAs submitted to the MEM was performed to determine the level of effort that would be required by Peruvian industry to meet the proposed NO_x and particulate emission limits. The draft 1997 WB emission limits were revised to reflect reasonably achievable NO_x and particulate emission limits for ICEs currently in operation in Peru.

Air Toxics Testing of Natural Gas-Fired ICEs. Project manager for test plan/test program to measure volatile and semi-volatile organic air toxics compounds from fourteen gas-fired ICEs used in a variety of oil and gas production applications. Test data was utilized by oil and gas production facility owners throughout California to develop accurate ICE air toxics emission inventories.

AIR ENGINEERING/AIR TESTING PROJECT EXPERIENCE – GENERAL

Reverse Air Fabric Filter Retrofit Evaluation – Coal-Fired Boiler. Lead engineer for upgrade of reverse air fabric filters serving coal-fired industrial boilers. Fluorescent dye injected to pinpoint broken bags and damper leaks. Corrosion of pneumatic actuators serving reverse air valves and inadequate insulation identified as principal causes of degraded performance.

Pulse-Jet Fabric Filter Performance Evaluation – Gold Mine. Lead engineer on upgrade of pulse-jet fabric filter and associated exhaust ventilation system serving an ore-crushing facility at a gold mine. Fluorescent dye used to identify bag collar leaks, and modifications were made to pulse air cycle time and duration. This marginal source was in compliance at 20 percent of emission limit following completion of repair work.

Pulse-Jet Fabric Filter Retrofit - Gypsum Calciner. Lead engineer on upgrade of pulse-jet fabric filter controlling particulate emissions from a gypsum calciner. Recommendations included a modified bag clamping mechanism, modified hopper evacuation valve assembly, and changes to pulse air cycle time and pulse duration.

Wet Scrubber Retrofit – Plating Shop. Project engineer on retrofit evaluation of plating shop packed-bed wet scrubbers failing to meet performance guarantees during acceptance trials, due to excessive mist carryover. Recommendations included relocation of the mist eliminator (ME), substitution of the original chevron blade ME with a mesh pad ME, and use of higher density packing material to improve exhaust gas distribution. Wet scrubbers passed acceptance trials following completion of recommended modifications.

Electrostatic Precipitator (ESP) Retrofit Evaluation – MSW Boiler. Lead engineer for retrofit evaluation of single field ESP on a municipal solid waste (MSW) boiler. Recommendations included addition of automated power controller, inlet duct turning vanes, and improved collecting plate rapping system.

ESP Electric Coil Rapper Vibration Analysis Testing - Coal-Fired Boiler. Lead engineer for evaluation of ESP rapper effectiveness test program on three field ESP equipped with "magnetically induced gravity return" (MIGR) rappers. Accelerometers were placed in a grid pattern on ESP collecting plates to determine maximum instantaneous plate acceleration at a variety of rapper power setpoints. Testing showed that the rappers met performance specification requirements.

Aluminum Remelt Furnace Particulate Emissions Testing. Project manager and lead engineer for high temperature (1,600 °F) particulate sampling of a natural gas-fired remelt furnace at a major aluminum rolling mill. Objectives of test program were to: 1) determine if condensable particulate was present in stack gases, and 2) to validate the accuracy of the in-stack continuous opacity monitor (COM). Designed and constructed a customized high temperature (inconel) PM_{10}/Mtd 17 sampling assembly for test program. An onsite natural gas-fired boiler was also tested to provide comparative data for the condensable particulate portion of the test program. Test results showed that no significant levels of condensable particulate in the remelt furnace exhaust gas, and indicated that the remelt furnace and boiler had similar particulate emission rates. Test results also showed that the COM was accurate.

Aluminum Remelt Furnace CO and NO_x Testing. Project manager and lead engineer for continuous week-long testing of CO and NO_x emissions from aluminum remelt furnace. Objective of test program was to

characterize CO and NO_x emissions from representative remelt furnace for use in the facility's criteria pollution emissions inventory. A TECO Model 48 CO analyzer and a TECO Model 10 NO_x analyzer were utilized during the test program to provide ± 1 ppm measurement accuracy, and all test data was recorded by an automated data acquisition system.

PETROLEUM REFINERY AIR ENGINEERING/TESTING EXPERIENCE

Big West Refinery Expansion EIS. Lead engineer on comparative cost analysis of proposed wet cooling tower and fin-fan air cooler for process cooling water for the proposed clean fuels expansion project at the Big West Refinery in Bakersfield, California. Selection of the fin-fin air-cooler would eliminate all consumptive water use and wastewater disposal associated with the cooling tower. Air emissions of VOC and PM_{10} would be reduced with the fin-fan air-cooler even though power demand of the air-cooler is incrementally higher than that of the cooling tower. Fin-fan air-coolers with approach temperatures of 10 °F and 20 °F were evaluated. The annualized cost of the fin-fin air-cooler with a 20 °F approach temperature is essentially the same as that of the cooling tower when the cost of all ancillary cooling tower systems are considered.

Criteria and Air Toxic Pollutant Emissions Inventory for Proposed Refinery Modifications. Project manager and technical lead for development of baseline and future refinery air emissions inventories for process modifications required to produce oxygenated gasoline and desulfurized diesel fuel at a California refinery. State of the art criteria and air toxic pollutant emissions inventories for refinery point, fugitive and mobile sources were developed. Point source emissions estimates were generated using onsite criteria pollutant test data, onsite air toxics test data, and the latest air toxics emission factors from the statewide refinery air toxics inventory database. The fugitive volatile organic compound (VOC) emissions inventories were developed using the refinery's most recent inspection and maintenance (I&M) monitoring program test data to develop site-specific component VOC emission rates. These VOC emission rates were combined with speciated air toxics test results for the principal refinery process streams to produce fugitive VOC air toxics emission rates. The environmental impact report (EIR) that utilized this emission inventory data was the first refinery "Clean Fuels" EIR approved in California.

Development of Air Emission Standards for Petroleum Refinery Equipment - Peru. Served as principal technical consultant to the Peruvian Ministry of Energy in Mines (MEM) for the development of air emission standards for Peruvian petroleum refineries. The sources included in the scope of this project included: 1) SO_2 and NO_x refinery heaters and boilers, 2) desulfurization of crude oil, particulate and SO_2 controls for fluid catalytic cracking units (FCCU), 3) VOC and CO emissions from flares, 4) vapor recovery systems for marine unloading, truck loading, and crude oil/refined products storage tanks, and 5) VOC emissions from process fugitive sources such as pressure relief valves, pumps, compressors and flanges. Proposed emission limits were developed for new and existing refineries based on a thorough evaluation of the available air emission control technologies for the affected refinery sources. Leading vendors of refinery control technology, such as John Zink and Exxon Research, provided estimates of retrofit costs for the largest Peruvian refinery, La Pampilla, located in Lima. Meetings were held in Lima with refinery operators and MEM staff to discuss the proposed emission limits and incorporate mutually agreed upon revisions to the proposed limits for existing Peruvian refineries.

Air Toxic Pollutant Emissions Inventory for Existing Refinery. Project manager and technical lead for air toxic pollutant emissions inventory at major California refinery. Emission factors were developed for refinery heaters, boilers, flares, sulfur recovery units, coker deheading, IC engines, storage tanks, process fugitives, and catalyst regeneration units. Onsite source test results were utilized to characterize emissions from refinery combustion devices. Where representative source test results were not available, AP-42 VOC emission factors were combined with available VOC air toxics speciation profiles to estimate VOC air toxic emission rates. A risk assessment based on this emissions inventory indicated a relatively low health risk associated with refinery operations. Benzene, 1,3-butadiene and PAHs were the principal health risk related pollutants emitted.

Air Toxics Testing of Refinery Combustion Sources. Project manager for comprehensive air toxics testing program at a major California refinery. Metals, Cr^{+6}, PAHs, H_2S and speciated VOC emissions were measured from refinery combustion sources. High temperature Cr^{+6} stack testing using the EPA Cr^{+6} test method was performed for the first time in California during this test program. Representatives from the California Air Resources Board source test team performed simultaneous testing using ARB Method 425 (Cr^{+6}) to compare the results of EPA and ARB Cr^{+6} test methodologies. The ARB approved the test results generated using the high temperature EPA Cr^{+6} test method.

Air Toxics Testing of Refinery Fugitive Sources. Project manager for test program to characterize air toxic fugitive VOC emissions from fifteen distinct process units at major California refinery. Gas, light liquid, and heavy liquid process streams were sampled. BTXE, 1,3-butadiene and propylene concentrations were quantified in gas samples, while BTXE, cresol and phenol concentrations were measured in liquid samples. Test results were combined with AP-42 fugitive VOC emission factors for valves, fittings, compressors, pumps and PRVs to calculate fugitive air toxics VOC emission rates.

Oil and Gas Production Air Engineering/Testing Experience

Air Toxics Testing of Oil and Gas Production Sources. Project manager and lead engineer for test plan/test program to determine VOC removal efficiency of packed tower scrubber controlling sulfur dioxide emissions from a crude oil-fired steam generator. Ratfisch 55 VOC analyzers were used to measure the packed tower scrubber VOC removal efficiency. Tedlar bag samples were collected simultaneously to correlate BTX removal efficiency to VOC removal efficiency. This test was one of hundreds of air toxics tests performed during this test program for oil and gas production facilities from 1990 to 1992. The majority of the volatile air toxics analyses were performed at in-house laboratory. Project staff developed thorough familiarity with the applications and limitations of GC/MS, GC/PID, GC/FID, GC/ECD and GC/FPD. Tedlar bags, canisters, sorbent tubes and impingers were used during sampling, along with isokinetic tests methods for multiple metals and PAHs.

Air Toxics Testing of Glycol Reboiler – Gas Processing Plant. Project manager for test program to determine emissions of BTXE from glycol reboiler vent at gas processing facility handling 12 MM/cfd of produced gas. Developed innovative test methods to accurately quantify BTXE emissions in reboiler vent gas.

Air Toxics Emissions Inventory Plan. Lead engineer for the development of generic air toxics emission estimating techniques (EETs) for oil and gas production equipment. This project was performed for the Western States Petroleum Association in response to the requirements of the California Air Toxics "Hot Spots" Act. EETs were developed for all point and fugitive oil and gas production sources of air toxics, and the specific air toxics associated with each source were identified. A pooled source emission test methodology was also developed to moderate the cost of source testing required by the Act.

Fugitive NMHC Emissions from TEOR Production Field. Project manager for the quantification of fugitive Nonmethane hydrocarbon (NMHC) emissions from a thermally enhanced oil recovery (TEOR) oil production field in Kern County, CA. This program included direct measurement of NMHC concentrations in storage tank vapor headspace and the modification of available NMHC emission factors for NMHC-emitting devices in TEOR produced gas service, such as wellheads, vapor trunklines, heat exchangers, and compressors. Modification of the existing NMHC emission factors was necessary due to the high concentration of CO_2 and water vapor in TEOR produced gases.

Fugitive Air Emissions Testing of Oil and Gas Production Fields. Project manager for test plan/test program to determine VOC and air toxics emissions from oil storage tanks, wastewater storage tanks and produced gas lines. Test results were utilized to develop comprehensive air toxics emissions inventories for oil and gas production companies participating in the test program.

Oil and Gas Production Field – Air Emissions Inventory and Air Modeling. Project manager for oil and gas production field risk assessment. Project included review and revision of the existing air toxics emission inventory, air dispersion modeling, and calculation of the acute health risk, chronic non-carcinogenic risk and carcinogenic risk of facility operations. Results indicated that fugitive H_2S emissions from facility operations posed a potential health risk at the facility fenceline.

TITLE V PERMIT APPLICATION/MONITORING PLAN EXPERIENCE

Title V Permit Application – San Diego County Industrial Facility. Project engineer tasked with preparing streamlined Title V operating permit for U.S. Navy facilities in San Diego. Principal emission units included chrome plating, lead furnaces, IC engines, solvent usage, aerospace coating and marine coating operations. For each device category in use at the facility, federal MACT requirements were integrated with District requirements in user friendly tables that summarized permit conditions and compliance status.

Title V Permit Application Device Templates - Oil and Gas Production Industry. Project manager and lead engineer to prepare Title V permit application "templates" for the Western States Petroleum Association (WSPA). The template approach was chosen by WSPA to minimize the administrative burden associated with listing permit conditions for a large number of similar devices located at the same oil and gas production facility. Templates are being developed for device types common to oil and gas production operations. Device types include: boilers, steam generators, process heaters, gas turbines, IC engines, fixed-roof storage tanks, fugitive components, flares, and cooling towers. These templates will serve as the core of Title V permit applications prepared for oil and gas production operations in California.

Title V Permit Application - Aluminum Rolling Mill. Project manager and lead engineer for Title V permit application prepared for largest aluminum rolling mill in the western U.S. Responsible for the overall direction of the permit application project, development of a monitoring plan for significant emission units, and development of a hazardous air pollutant (HAP) emissions inventory. The project involved extensive onsite data gathering, frequent interaction with the plant's technical and operating staff, and coordination with legal counsel and subcontractors. The permit application was completed on time and in budget.

Title V Model Permit - Oil and Gas Production Industry. Project manager and lead engineer for the comparative analysis of regional and federal requirements affecting oil and gas production industry sources located in the San Joaquin Valley. Sources included gas turbines, IC engines, steam generators, storage tanks, and process fugitives. From this analysis, a model applicable requirements table was developed for a sample device type (storage tanks) that covered the entire population of storage tanks operated by the industry. The U.S. EPA has tentatively approved this model permit approach, and work is ongoing to develop comprehensive applicable requirements tables for each major category of sources operated by the oil and gas industry in the San Joaquin Valley.

Title V Enhanced Monitoring Evaluation of Oil and Gas Production Sources. Lead engineer to identify differences in proposed EPA Title V enhanced monitoring protocols and the current monitoring requirements for oil and gas production sources in the San Joaquin Valley. The device types evaluated included: steam generators, stationary ICEs, gas turbines, fugitives, fixed roof storage tanks, and thermally enhanced oil recovery (TEOR) well vents. Principal areas of difference included: more stringent Title V O&M requirements for parameter monitors (such as temperature, fuel flow, and O_2), and more extensive Title V recordkeeping requirements.

RACT/BARCT/BACT EVALUATIONS

BACT Evaluation of Wool Fiberglass Insulation Production Line. Project manager and lead engineer for BACT evaluation of a wool fiberglass insulation production facility. The BACT evaluation was performed as a component of a PSD permit application. The BACT evaluation included a detailed analysis of the available control options for forming, curing and cooling sections of the production line. Binder formulations, wet electrostatic precipitators, wet scrubbers, and thermal oxidizers were evaluated as potential PM_{10} and VOC

control options. Low NO_x burner options and combustion control modifications were examined as potential NO_x control techniques for the curing oven burners. Recommendations included use of a proprietary binder formulation to achieve PM_{10} and VOC BACT, and use of low-NO_x burners in the curing ovens to achieve NO_x BACT. The PSD application is currently undergoing review by EPA Region 9.

RACT/BARCT Reverse Jet Scrubber/Fiberbed Mist Eliminator Retrofit Evaluation. Project manager and lead engineer on project to address the inability of existing wet electrostatic precipitators (ESPs) and atomized mist scrubbers to adequately remove low concentration submicron particulate from high volume recovery boiler exhaust gas at the Alaska Pulp Corporation mill in Sitka, AK. The project involved thorough on-site inspections of existing control equipment, detailed review of maintenance and performance records, and a detailed evaluation of potential replacement technologies. These technologies included a wide variety of scrubbing technologies where manufacturers claimed high removal efficiencies on submicron particulate in high humidity exhaust gas. Packed tower scrubbers, venturi scrubbers, reverse jet scrubbers, fiberbed mist eliminators and wet ESPs were evaluated. Final recommendations included replacement of atomized mist scrubber with reverse jet scrubber and upgrading of the existing wet ESPs. The paper describing this project was published in the May 1992 TAPPI Journal.

Aluminum Smelter RACT Evaluation - Prebake. Project manager and technical lead for CO and PM_{10} RACT evaluation for prebake facility. Retrofit control options for CO emissions from the anode bake furnace, potline dry scrubbers and the potroom roof vents were evaluated. PM_{10} emissions from the coke kiln, potline dry scrubbers, potroom roof vents, and miscellaneous potroom fugitive sources were addressed. Four CO control technologies were identified as technologically feasible for potline CO emissions: potline current efficiency improvement through the addition of underhung busswork and automated puncher/feeders, catalytic incineration, recuperative incineration and regenerative incineration. Current efficiency improvement was identified as probable CO RACT if onsite test program demonstrated the effectiveness of this approach. Five PM_{10} control technologies were identified as technologically feasible: increased potline hooding efficiency through redesign of shields, the addition of a dense-phase conveying system, increased potline air evacuation rate, wet scrubbing of roof vent emissions, and fabric filter control of roof vent emissions. The cost of these potential PM_{10} RACT controls exceeded regulatory guidelines for cost effectiveness, though testing of modified shield configurations and dense-phase conveying is being conducted under a separate regulatory compliance order.

RACT/BACT Testing/Evaluation of PM_{10} Mist Eliminators on Five-Stand Cold Mill. Project manager and lead engineer for fiberbed mist eliminator and mesh pad mist eliminator comparative pilot test program on mixed phase aerosol (PM_{10})/gaseous hydrocarbon emissions from aluminum high speed cold rolling mill. Utilized modified EPA Method 5 sampling train with portion of sample gas diverted (after particulate filter) to Ratfisch 55 VOC analyzer. This was done to permit simultaneous quantification of aerosol and gaseous hydrocarbon emissions in the exhaust gas. The mesh pad mist eliminator demonstrated good control of PM_{10} emissions, though test results indicated that the majority of captured PM_{10} evaporated in the mesh pad and was emitted as VOC.

Aluminum Remelt Furnace/Rolling Mill RACT Evaluations. Lead engineer for comprehensive CO and PM_{10} RACT evaluation for the largest aluminum sheet and plate rolling mill in western U.S. Significant sources of CO emissions from the facility included the remelt furnaces and the coater line. The potential CO RACT options for the remelt furnaces included: enhanced maintenance practices, preheating combustion air, installation of fully automated combustion controls, and energy efficiency modifications. The coater line was equipped with an afterburner for VOC and CO destruction prior to the initiation of the RACT study. It was determined that the afterburner meets or exceeds RACT requirements for the coater line. Significant sources of PM_{10} emissions included the remelt furnaces and the 80-inch hot rolling mill. Chlorine fluxing in the melting and holding furnaces was identified as the principal source of PM_{10} emissions from the remelt furnaces. The facility is in the process of minimizing/eliminating fluxing in the melting furnaces, and exhaust gases generated in holding furnaces during fluxing will be ducted to a baghouse for PM_{10} control. These modifications are

being performed under a separate compliance order, and were determined to exceed RACT requirements. A water-based emulsion coolant and inertial separators are currently in use on the 80-inch hot mill for PM_{10} control. Current practices were determined to meet/exceed PM_{10} RACT for the hot mill. Tray tower absorption/recovery systems were also evaluated to control PM_{10} emissions from the hot mill, though it was determined that the technical/cost feasibility of using this approach on an emulsion-based coolant had not yet been adequately demonstrated.

BARCT Low NO_x Burner Conversion – Industrial Boilers. Lead engineer for evaluation of low NO_x burner options for natural gas-fired industrial boilers. Also evaluated methanol and propane as stand-by fuels to replace existing diesel stand-by fuel system. Evaluated replacement of steam boilers with gas turbine co-generation system.

BACT Packed Tower Scrubber/Mist Eliminator Performance Evaluations. Project manager and lead engineer for Navy-wide plating shop air pollution control technology evaluation and emissions testing program. Mist eliminators and packed tower scrubbers controlling metal plating processes, which included hard chrome, nickel, copper, cadmium and precious metals plating, were extensively tested at three Navy plating shops. Chemical cleaning and stripping tanks, including hydrochloric acid, sulfuric acid, chromic acid and caustic, were also tested. The final product of this program was a military design specification for plating and chemical cleaning shop air pollution control systems. The hydrochloric acid mist sampling procedure developed during this program received a protected patent.

BACT Packed Tower Scrubber/UV Oxidation System Pilot Test Program. Technical advisor for pilot test program of packed tower scrubber/ultraviolet (UV) light VOC oxidation system controlling VOC emissions from microchip manufacturing facility in Los Angeles. The testing was sponsored in part by the SCAQMD's Innovative Technology Demonstration Program, to demonstrate this innovative control technology as BACT for microchip manufacturing operations. The target compounds were acetone, methylethylketone (MEK) and 1,1,1-trichloroethane, and compound concentrations ranged from 10-100 ppmv. The single stage packed tower scrubber consistently achieved greater than 90% removal efficiency on the target compounds. The residence time required in the UV oxidation system for effective oxidation of the target compounds proved significantly longer than the residence time predicted by the manufacturer.

BACT Pilot Testing of Venturi Scrubber on Gas/Aerosol VOC Emission Source. Technical advisor for project to evaluate venturi scrubber as BACT for mixed phase aerosol/gaseous hydrocarbon emissions from deep fat fryer. Venturi scrubber demonstrated high removal efficiency on aerosol, low efficiency on VOC emissions. A number of VOC tests indicated negative removal efficiency. This anomaly was traced to a high hydrocarbon concentration in the scrubber water. The pilot unit had been shipped directly to the jobsite from another test location by the manufacturer without any cleaning or inspection of the pilot unit.

Pulp Mill Recovery Boiler BACT Evaluation. Lead engineer for BACT analysis for control of SO_2, NO_x, CO, TNMHC, TRS and particulate emissions from the proposed addition of a new recovery furnace at a kraft pulp mill in Washington. A "top down" approach was used to evaluate potential control technologies for each of the pollutants considered in the evaluation.

Air Pollution Control Equipment Design Specification Development. Lead engineer for the development of detailed Navy design specifications for wet scrubbers and mist eliminators. Design specifications were based on field performance evaluations conducted at the Long Beach Naval Shipyard, Norfolk Naval Shipyard, and Jacksonville Naval Air Station. This work was performed for the U.S. Navy to provide generic design specifications to assist naval facility engineering divisions with air pollution control equipment selection. Also served as project engineer for the development of Navy design specifications for ESPs and fabric filters.

CONTINUOUS EMISSION MONITOR (CEM) PROJECT EXPERIENCE

Process Heater CO and NO_x CEM Relative Accuracy Testing. Project manager and lead engineer for process heater CO and NO_x analyzer relative accuracy test program at petrochemical manufacturing facility.

Objective of test program was to demonstrate that performance of onsite CO and NO_x CEMs was in compliance with U.S. EPA "Boiler and Industrial Furnace" hazardous waste co-firing regulations. A TECO Model 48 CO analyzer and a TECO Model 10 NO_x analyzer were utilized during the test program to provide ± 1 ppm measurement accuracy, and all test data was recorded by an automated data acquisition system. One of the two process heater CEM systems tested failed the initial test due to leaks in the gas conditioning system. Troubleshooting was performed using O_2 analyzers, and the leaking component was identified and replaced. This CEM system met all CEM relative accuracy requirements during the subsequent retest.

Performance Audit of NO_x and SO_2 CEMs at Coal-Fired Power Plant. Lead engineer on system audit and challenge gas performance audit of NO_x and SO_2 CEMs at a coal-fired power plant in southern Nevada. Dynamic and instrument calibration checks were performed on the CEMs. A detailed visual inspection of the CEM system, from the gas sampling probes at the stack to the CEM sample gas outlet tubing in the CEM trailer, was also conducted. The CEMs passed the dynamic and instrument calibration requirements specified in EPA's Performance Specification Test - 2 (NO_x and SO_2) alternative relative accuracy requirements.

LATIN AMERICA ENVIRONMENTAL PROJECT EXPERIENCE

Preliminary Design of Ambient Air Quality Monitoring Network – Lima, Peru. Project leader for project to prepare specifications for a fourteen station ambient air quality monitoring network for the municipality of Lima, Peru. Network includes four complete gaseous pollutant, particulate, and meteorological parameter monitoring stations, as well as eight PM_{10} and TSP monitoring stations.

Evaluation of Proposed Ambient Air Quality Network Modernization Project – Venezuela. Analyzed a plan to modernize and expand the ambient air monitoring network in Venezuela. Project was performed for the U.S. Trade and Development Agency. Direct interaction with policy makers at the Ministerio del Ambiente y de los Recursos Naturales Renovables (MARNR) in Caracas was a major component of this project.

Evaluation of U.S.-Mexico Border Region Copper Smelter Compliance with Treaty Obligations – Mexico. Project manager and lead engineer to evaluate compliance of U.S. and Mexican border region copper smelters with the SO_2 monitoring, recordkeeping and reporting requirements in Annex IV [Copper Smelters] of the La Paz Environmental Treaty. Identified potential problems with current ambient and stack monitoring practices that could result in underestimating the impact of SO_2 emissions from some of these copper smelters. Identified additional source types, including hazardous waste incinerators and power plants, that should be considered for inclusion in the La Paz Treaty process.

Development of Air Emission Limits for ICE Cogeneration Plant - Panamá. Lead engineer assisting U.S. cogeneration plant developer to permit an ICE cogeneration plant at a hotel/casino complex in Panama. Recommended the use of modified draft World Bank NO_x and PM limits for ICE power plants. The modification consisted of adding a thermal efficiency factor adjustment to the draft World Bank NO_x and PM limits. These proposed ICE emission limits are currently being reviewed by Panamanian environmental authorities.

Mercury Emissions Inventory for Stationary Sources in Northern Mexico. Project manager and lead engineer to estimate mercury emissions from stationary sources in Northern Mexico. Major potential sources of mercury emissions include solid- and liquid-fueled power plants, cement kilns co-firing hazardous waste, and non-ferrous metal smelters. Emission estimates were provided for approximately eighty of these sources located in Northern Mexico. Coordinated efforts of two Mexican subcontractors, located in Mexico City and Hermosillo, to obtain process throughput data for each source included in the inventory.

Translation of U.S. EPA Scrap Tire Combustion Emissions Estimation Document – Mexico. Evaluated the Translated a U.S. EPA scrap tire combustion emissions estimation document from English to Spanish for use by Latin American environmental professionals.

Environmental Audit of Aluminum Production Facilities – Venezuela. Evaluated the capabilities of existing air, wastewater and solid/hazardous waste control systems used by the aluminum industry in eastern Venezuela. This industry will be privatized in the near future. Estimated the cost to bring these control systems into compliance with air, wastewater and solid/hazardous waste standards recently promulgated in Venezuela. Also served as technical translator for team of U.S. environmental engineers involved in the due diligence assessment.

Assessment of Environmental Improvement Projects – Chile and Peru. Evaluated potential air, water, soil remediation and waste recycling projects in Lima, Peru and Santiago, Chile for feasibility study funding by the U.S. Trade and Development Agency. Project required onsite interaction with in-country decisionmakers (in Spanish). Projects recommended for feasibility study funding included: 1) an air quality technical support project for the Santiago, Chile region, and 2) soil remediation/metals recovery projects at two copper mine/smelter sites in Peru.

Air Pollution Control Training Course – Mexico. Conducted two-day Spanish language air quality training course for environmental managers of assembly plants in Mexicali, Mexico. Spanish-language course manual prepared by Powers Engineering. Practical laboratory included training in use of combustion gas analyzer, flame ionization detector (FID), photoionization detector (PID), and occupational sampling.

Stationary Source Emissions Inventory – Mexico. Developed a comprehensive air emissions inventory for stationary sources in Nogales, Sonora. This project requires frequent interaction with Mexican state and federal environmental authorities. The principal Powers Engineering subcontractor on this project is a Mexican firm located in Hermosillo, Sonora.

VOC Measurement Program – Mexico. Performed a comprehensive volatile organic compound (VOC) measurements program at a health products fabrication plant in Mexicali, Mexico. An FID and PID were used to quantify VOCs from five processes at the facility. Occupational exposures were also measured. Worker exposure levels were above allowable levels at several points in the main assembly area.

Renewable Energy Resource Assessment Proposal – Panama. Translated and managed winning bid to evaluate wind energy potential in Panama. Direct interaction with the director of development at the national utility monopoly (IRHE) was a key component of this project.

Comprehensive Air Emissions Testing at Assembly Plant – Mexico. Project manager and field supervisor of emissions testing for particulates, NO_x, SO_2 and CO at turbocharger/air cooler assembly plant in Mexicali, Mexico. Source specific emission rates were developed for each point source at the facility during the test program. Translated test report into Spanish for review by the Mexican federal environmental agency (SEMARNAP).

Air Pollution Control Equipment Retrofit Evaluation – Mexico. Project manager and lead engineer for comprehensive evaluation of air pollution control equipment and industrial ventilation systems in use at assembly plant consisting of four major facilities. Equipment evaluated included fabric filters controlling blast booth emissions, electrostatic precipitator controlling welding fumes, and industrial ventilation systems controlling welding fumes, chemical cleaning tank emissions, and hot combustion gas emissions. Recommendations included modifications to fabric filter cleaning cycle, preventative maintenance program for the electrostatic precipitator, and redesign of the industrial ventilation system exhaust hoods to improve capture efficiency.

Comprehensive Air Emissions Testing at Assembly Plant – Mexico. Project manager and field supervisor of emissions testing for particulates, NO_x, SO_2 and CO at automotive components assembly plant in Acuña, Mexico. Source-specific emission rates were developed for each point source at the facility during the test program. Translated test report into Spanish.

Fluent in Spanish. Studied at the Universidad de Michoacán in Morelia, Mexico, 1993, and at the Colegio de España in Salamanca, Spain, 1987-88. Have lectured (in Spanish) on air monitoring and control equipment at the Instituto Tecnológico de Tijuana. Maintain contact with Comisión Federal de Electricidad engineers responsible for operation of wind and geothermal power plants in Mexico, and am comfortable operating in the Mexican business environment.

EXPERT TESTIMONY

- On behalf of Attorney General of Iowa, In re Application of Interstate Power and Light Company for a Generating Facility Siting Certificate, Docket No. GCU-07-01, Iowa Utilities Board, November 9, 2007. Nature of testimony - IGCC with CO_2 control as alternative to pulverized coal-fired boiler.

- On behalf of individuals, the National Parks Conservation Association and Group Against Smog and Pollution, In the Matter of Greene Energy Resource Recovery Project, Plan Approval PA-30-00150A, Pennsylvania Department of Environmental Protection, June 2006. Nature of testimony – best available NO_x control for CFB boiler.

- On behalf of the Consumer Advocate Division of the Public Service Commission of West Virginia, Appalachian Power Company, Application for a Certificate of Public Convenience and Necessity to construct a 600 MW Integrated Gasification Combined Cycle Generating Station in Mason County, Public Service Commission of West Virginia, Case No. 06-0033-E-CN, November 19, 2007. Nature of testimony – challenges of converting IGCC designed without CO_2 capture for later retrofit to CO_2 capture.

- On behalf of Sierra Club, Sierra Club vs. Environment and Public Protection Cabinet and East Kentucky Power Cooperative, Inc., File No. DAQ-27974-037, October 30, 2006. Nature of testimony – best available NO_x control for CFB boiler.

- On behalf of Californians for Renewable Energy, In the Matter of Southern California Edison Company (U 338-E) for Approval of Results of Summer 2007 Track of its New Generation Request for Offers and for Cost Recovery, Application 06-11-007, Public Utilities Commission of California, November 30, 2006. Nature of testimony – cost to ratepayers of peaking gas turbines.

- On behalf of Utility Consumers' Action Network (UCAN), In the Matter of the Application of San Diego Gas & Electric Company (U 902-E) for a Certification of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project, Application 06-08-010, Public Utilities Commission of California, May 2008. Nature of testimony – advantages of distributed generation alternative to new transmission line.

- On behalf of Environmental Health Coalition, In the Matter of: the Application for Certification for the Chula Vista Energy Upgrade Project, Docket No. 07-AFC-4, California Energy Resources Conservation and Development Commission, September 17, 2008. Nature of testimony – cost viability of distributed photovoltaics alternative to peaking gas turbine.

- On behalf of Sierra Club, Sierra Club v. Tennessee Valley Authority, Case No. CV-02-J-2279-NW (N.D. Ala. 2008). Nature of testimony – opacity issues and particulate controls for existing coal-fired boiler.

- In the PSD Air Quality Permit Application of Hyperion Energy Center South Dakota Department of Environment and Natural Resources, Board of Minerals and Environment, June 25, 2009. Nature of testimony – air emissions from proposed petroleum refinery and best available control technology.

- On behalf of Sierra Club and the National Audubon Society, In The Matter Of Southwestern Electric Power Company (SWEPCO) – Turk Power Plant, Docket No. 08-006-P, Arkansas Pollution Control and Ecology Commission. March 6, 2009. Nature of testimony – best available SO_2 and PM controls for proposed coal-fired boiler.

- On Behalf of Protestant Annie Mae Shelton, In the Matter of Applications of Aspen Power, LLC for TCEQ Air Quality Permit No. 81706, Prevention of Significant Deterioration Air Quality Permit PSD-TX-1089, and HAP 12, SOAH Docket No. 582-09-0636, TCEQ Docket No. 2008-1145-AIR, Before the Texas State Office of Administrative Hearings, March 3, 2009. Nature of testimony – best available NO_x, PM, and CO/VOC controls for biomass boiler.

- On Behalf of Sierra Club and No Coal Coalition, in the Matter of Applications of White Stallion Energy Center, LLC for State Air Quality Permit 86088; Prevention of Significant Deterioration Air Quality Permit Psd-Tx-1160 and for Hazardous Air Pollutant Major Source [FCAA § 112 (G)] Permit Hap-28 and Plant-wide Applicability Limit Pal-48, Texas State Office of Administrative Hearings, November 2, 2009. Nature of testimony – best available NO_x, PM, SO_2, and CO/VOC controls for CFB boilers.

- On behalf of Montana Environmental Information Center and Citizens for Clean Energy, In the Matter of: Southern Montana Electric Generation & Transmission Cooperative – Highwood Generating Station Air Quality Permit No. 3423-00, Montana Board of Environmental Review, Case No. BER 2007-07-AQ, October 2, 2007. Nature of testimony – IGCC with CO_2 control as alternative to coal-fired CFB boiler.

- On behalf of NRDC, Natural Resources Defense Council, Inc., v. Chris Korleski, Erac No. 996266, Erac No. 996267, State of Ohio Environmental Review Appeals Commission, May 11, 2010. Nature of testimony – best available air emission control levels for proposed coal-to-liquids plant.

- On Behalf of Save The Dunes Council, Inc., et al., In The Matter of Objection to the Issuance Of Significant Source Modification Permit No. 089-25484-00453 to BP Products North America Inc. Whiting Business Unit, Cause No. 08-A-J-4115. Nature of testimony – estimation of air emissions from proposed petroleum refinery expansion.

- On behalf of North Carolina Waste Awareness Reduction Network Inc., North Carolina Waste Awareness Reduction Network Inc. v. N.C. Department of Environment and Natural Resources, Division of Air Quality, 08-Ehr-0771, 0835 & 0836, 09-Ehr-3102, 3174 & 3176, North Carolina Office of Administrative Hearings, March 1, 2010. Nature of testimony – best available SO_2 and PM emission controls for proposed pulverized coal-fired boiler.

PUBLICATIONS

Bill Powers, "*San Diego Smart Energy 2020 – The 21st Century Alternative*," San Diego, October 2007.

Bill Powers, "*Energy, the Environment, and the California – Baja California Border Region*," Electricity Journal, Vol. 18, Issue 6, July 2005, pp. 77-84.

W.E. Powers, *"Peak and Annual Average Energy Efficiency Penalty of Optimized Air-Cooled Condenser on 515 MW Fossil Fuel-Fired Utility Boiler,"* presented at California Energy Commission/Electric Power Research Institute Advanced Cooling Technologies Symposium, Sacramento, California, June 2005.

W.E. Powers, R. Wydrum, P. Morris, *"Design and Performance of Optimized Air-Cooled Condenser at Crockett Cogeneration Plant,"* presented at EPA Symposium on Technologies for Protecting Aquatic Organisms from Cooling Water Intake Structures, Washington, DC, May 2003.

P. Pai, D. Niemi, W.E. Powers, *"A North American Anthropogenic Inventory of Mercury Emissions,"* presented at Air & Waste Management Association Annual Conference in Salt Lake City, UT, June 2000.

P.J. Blau and W.E. Powers, *"Control of Hazardous Air Emissions from Secondary Aluminum Casting Furnace Operations Through a Combination of: Upstream Pollution Prevention Measures, Process Modifications and End-of-Pipe Controls,"* presented at 1997 AWMA/EPA Emerging Solutions to VOC & Air Toxics Control Conference, San Diego, CA, February 1997.

W.E. Powers, et. al., *"Hazardous Air Pollutant Emission Inventory for Stationary Sources in Nogales, Sonora, Mexico ,"* presented at 1995 AWMA/EPA Emissions Inventory Specialty Conference, RTP, NC, October 1995.

W.E. Powers, *"Develop of a Parametric Emissions Monitoring System to Predict NO_x Emissions from Industrial Gas Turbines,"* presented at 1995 AWMA Golden West Chapter Air Pollution Control Specialty Conference, Ventura, California, March 1995.

W. E. Powers, et. al., *"Retrofit Control Options for Particulate Emissions from Magnesium Sulfite Recovery Boilers,"* presented at 1992 TAPPI Envr. Conference, April 1992. Published in *TAPPI Journal*, July 1992.

S. S. Parmar, M. Short, W. E. Powers, *"Determination of Total Gaseous Hydrocarbon Emissions from an Aluminum Rolling Mill Using Methods 25, 25A, and an Oxidation Technique,"* presented at U.S. EPA Measurement of Toxic and Related Air Pollutants Conference, May 1992.

N. Meeks, W. E. Powers, *"Air Toxics Emissions from Gas-Fired Internal Combustion Engines,"* presented at AIChE Summer Meeting, August 1990.

W. E. Powers, *"Air Pollution Control of Plating Shop Processes,"* presented at 7th AES/EPA Conference on Pollution Control in the Electroplating Industry, January 1986. Published in *Plating and Surface Finishing* magazine, July 1986.

H. M. Davenport, W. E. Powers, *"Affect of Low Cost Modifications on the Performance of an Undersized Electrostatic Precipitator,"* presented at 79th Air Pollution Control Association Conference, June 1986.

AWARDS

Engineer of the Year, 1991 – ENSR Consulting and Engineering, Camarillo
Engineer of the Year, 1986 – Naval Energy and Environmental Support Activity, Port Hueneme
Productivity Excellence Award, 1985 – U. S. Department of Defense

PATENTS

Sedimentation Chamber for Sizing Acid Mist, Navy Case Number 70094

EXHIBIT 2

CFE

COMISION FEDERAL DE ELECTRICIDAD

Generation and Transmission Expansion Plan
Baja California System

2003-2007

Florencio Aboytes PhD

March 2003

Overview

I. Baja California Bulk Electric System

II. Load Forecast 2003–2007

III. Total Installed Capacity (2002)

IV. Existing Transmission Grid (2002)

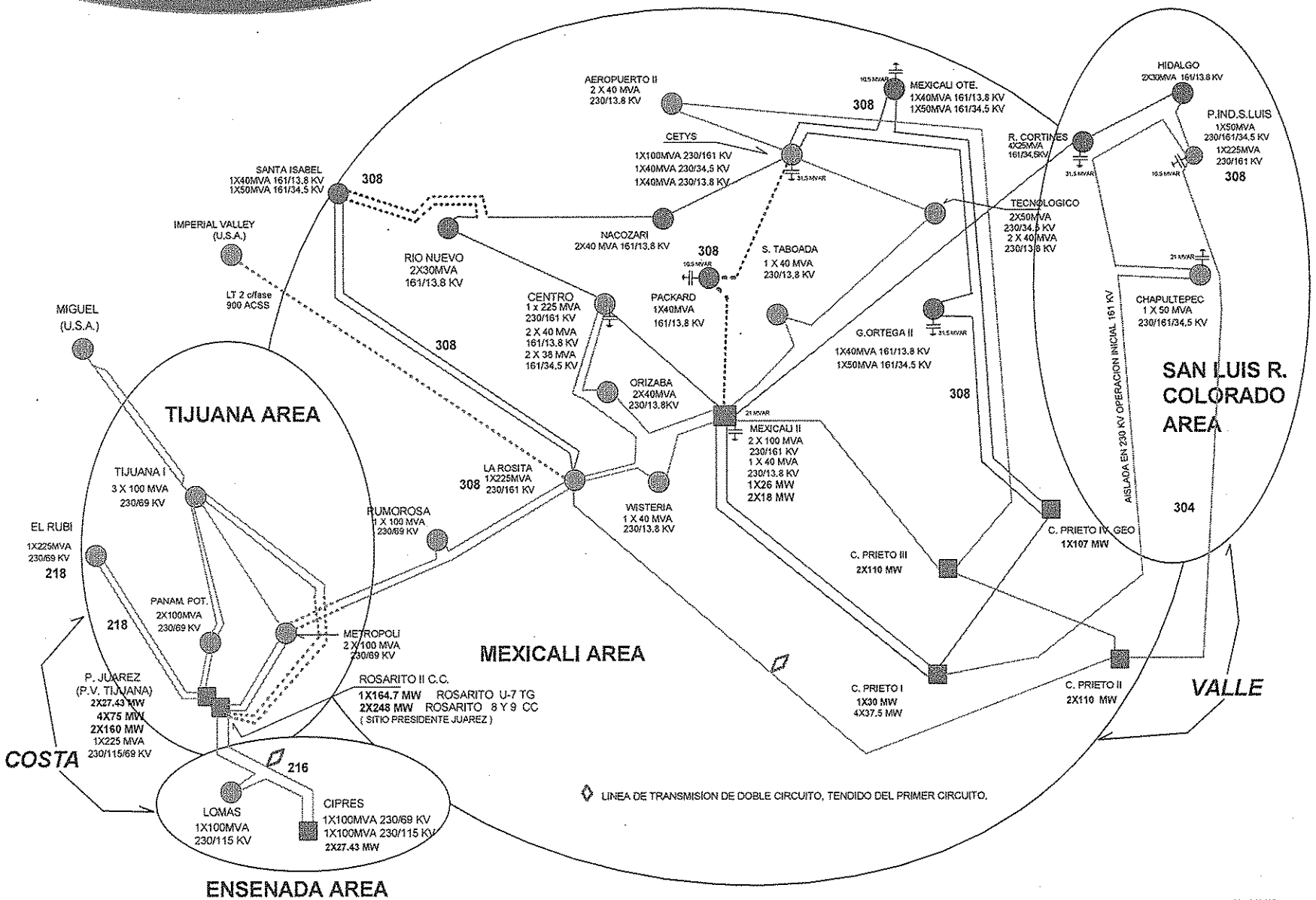
V. Transactions with WECC 1995-2002

VI. WECC Path 45

VII. Planned Generating Capacity Additions 2003-2007

VII. US/Mexico Border Joint System Impact Study 2003-2006

Baja California Bulk Electric System



Load Forecast 2002-2007

Areas	Load Growth 1997-2002	Peak Load MW		Expected Load Growth 2002-2007
		2002	2007	
Tijuana	8.52%	530	793	8.3%
Ensenada	5.71%	141	189	6.11%
Mexicali	6.77%	843	1,190	7.14%
San Luis R.C.	4.10%	155	211	6.36%
Tecate	6.68%	30	43	7.38%
Total	**6.94%**	**1,699**	**2,426**	**7.38%**

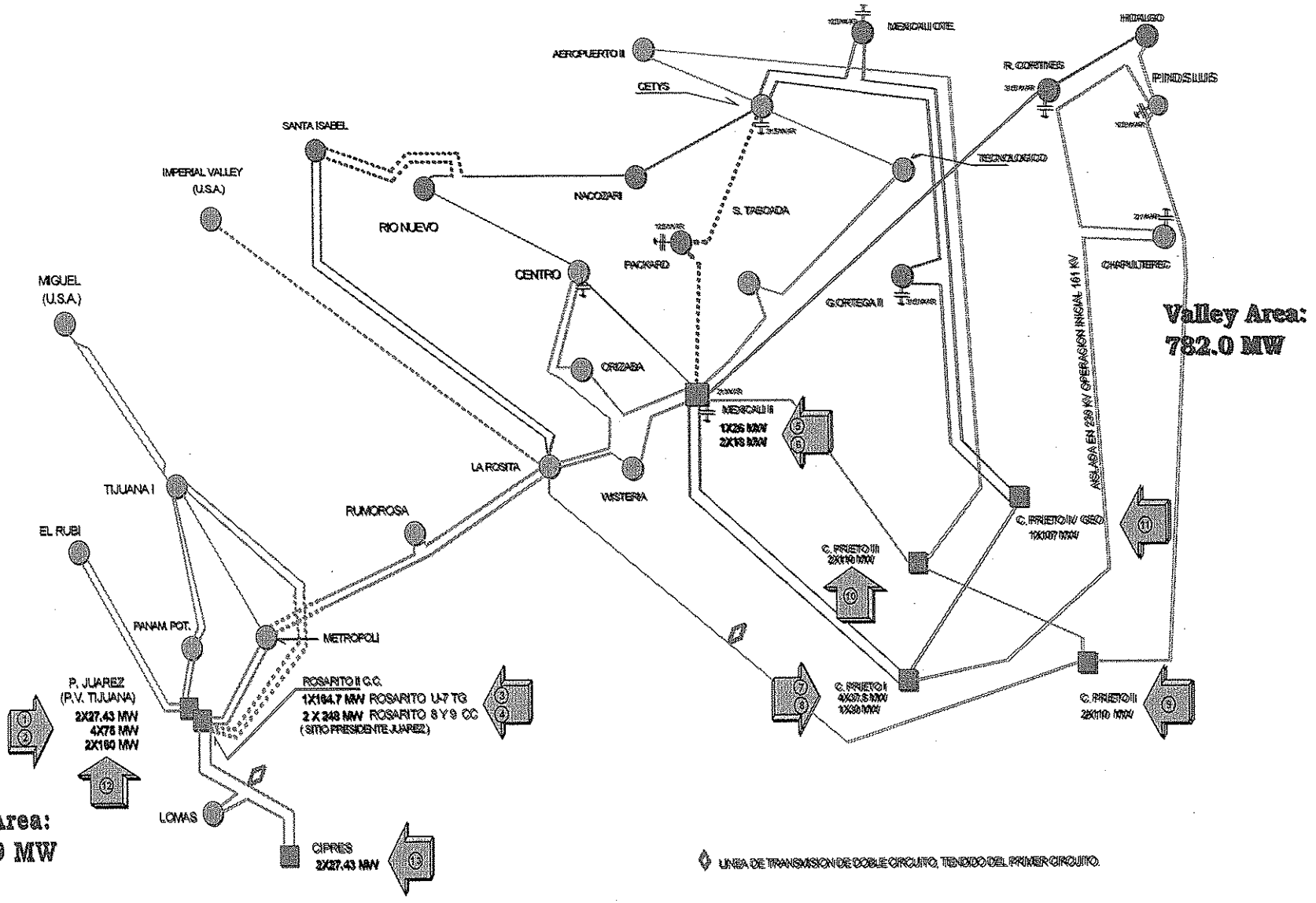
Total Installed Capacity

Baja California System

2002

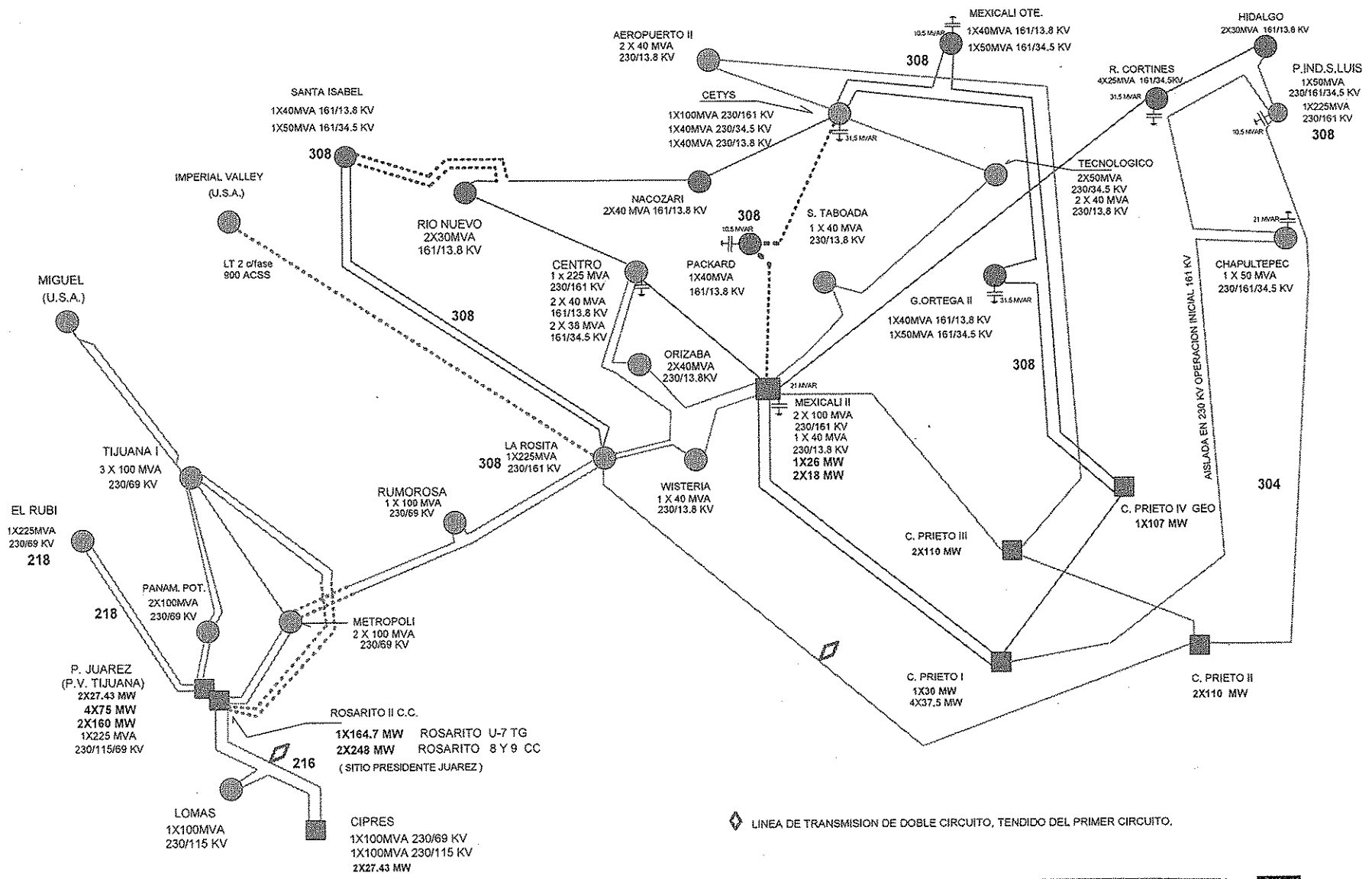
POWER STATION	UNITS	TOTAL CAPACITY (MW)
1.- PRESIDENTE JUAREZ	4 X 75	300
2.- PRESIDENTE JUAREZ	2 X 160	320
3.- PRESIDENTE JUAREZ	1 X 150	150
4.- PRESIDENTE JUAREZ	2 X 248	496
5.- MEXICALI II	1X 26	26
6.- MEXICALI II	2 X 18	36
7.- CERRO PRIETO I	4 X 37.5	150
8.- CERRO PRIETO I	1 X 30	30
9.- CERRO PRIETO II	2 X 110	220
10.- CERRO PRIETO III	2 X 110	220
11.- CERRO PRIETO IV	4 X 25	100
12.- TIJUANA	2 X 30	60
13.- CIPRES	2 X 27.4	55
		2,163

Generation Sites



Existing Transmission Grid

(2002)



Import/Export Transactions

IMPORTS

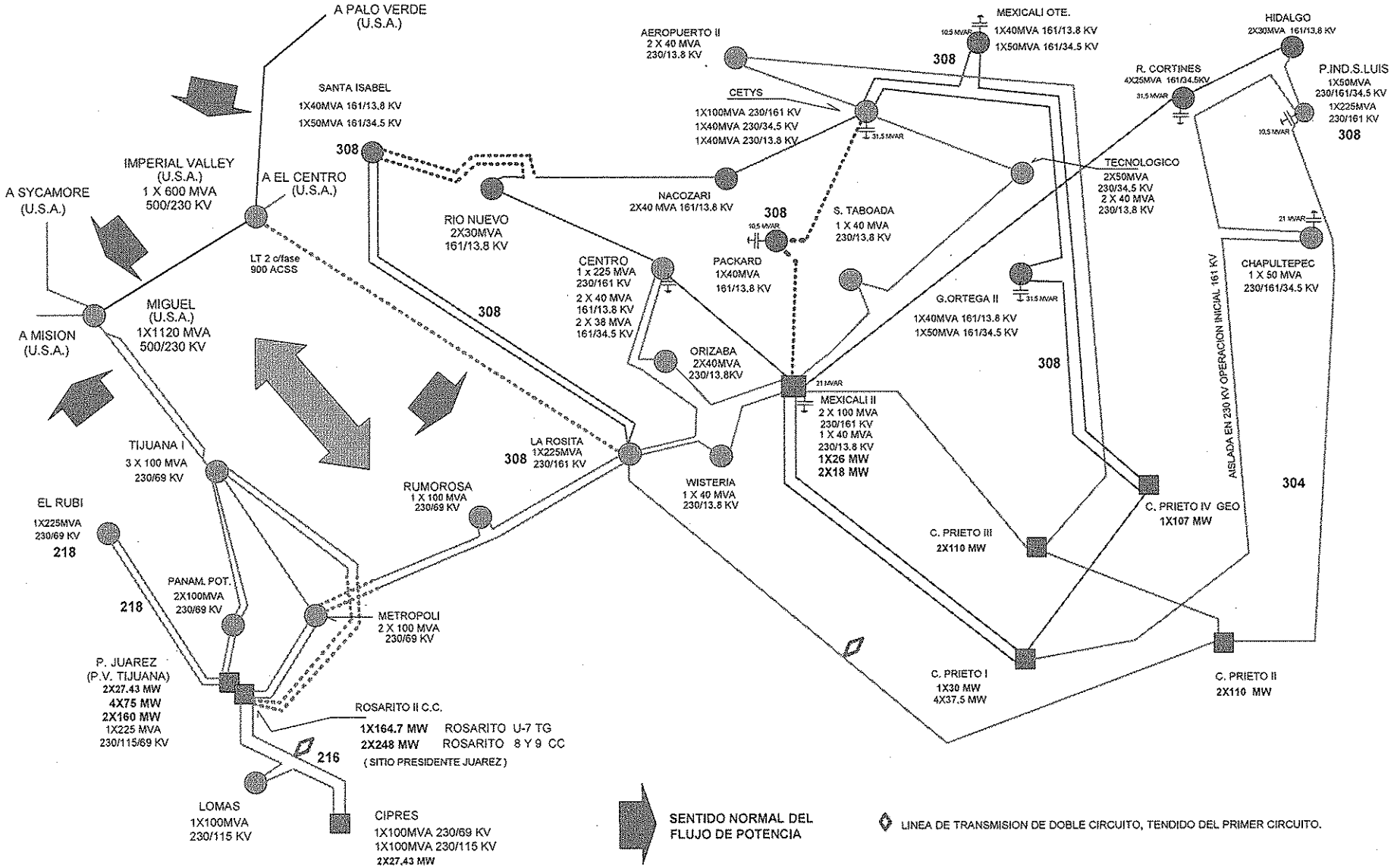
YEAR	SELLER	CAPACITY (MW)	ENERGY (GWh)
1995	SDG&E,SCE,IID	180	229
1996	SDG&E,SCE	270	355
1997	SDG&E,IID,POWEREX,APS	290	406
1998	SDG&E,ENRON,APS,ENOVA,POWEREX	320	480
1999	IID,ENRON,WILLIAMS,CALPX,ISO	408	647
2000	IID,ENRON,PNM,CALPX	390	930
2001	CDWR,CORAL,APS,IID,ISO	120	97
2002	POWEREX ,CDWR,CORAL,ISO	400	316

EXPORTS

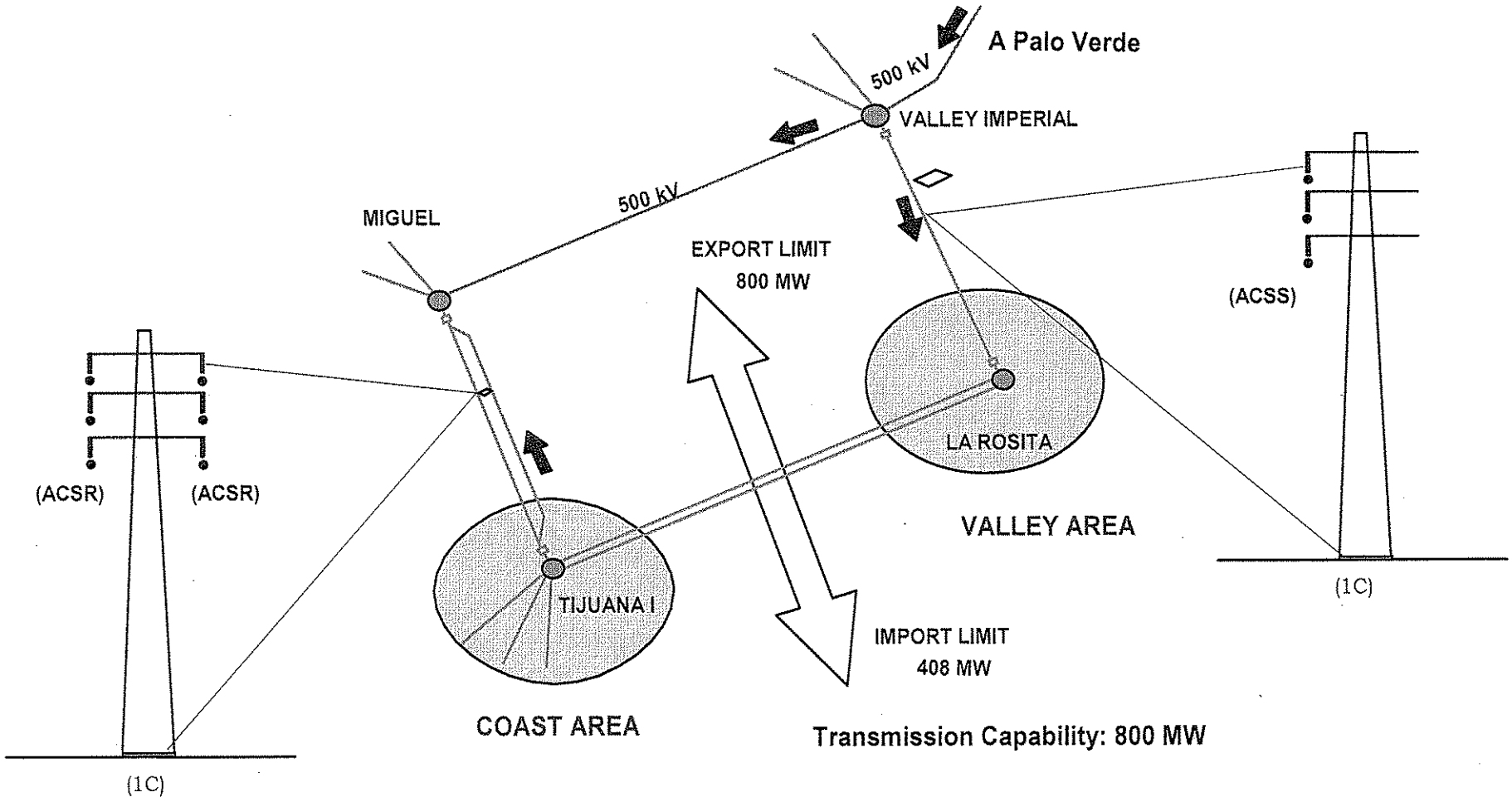
YEAR	BUYER	CAPACITY (MW)	ENERGY (GWh)
1995	SDG&E, SCE	290	1,919
1996	SDG&E, SCE	110	1,258
1997	SDG&E	272	17
1998	ENRON	180	45
1999	ENRON,CALPX	170	31
2000	CALPX	320	75
2001	ISO,CDWR,CORAL	408	127
2002	ISO, CORAL	305	165

Import/Export Transactions

1995–2002

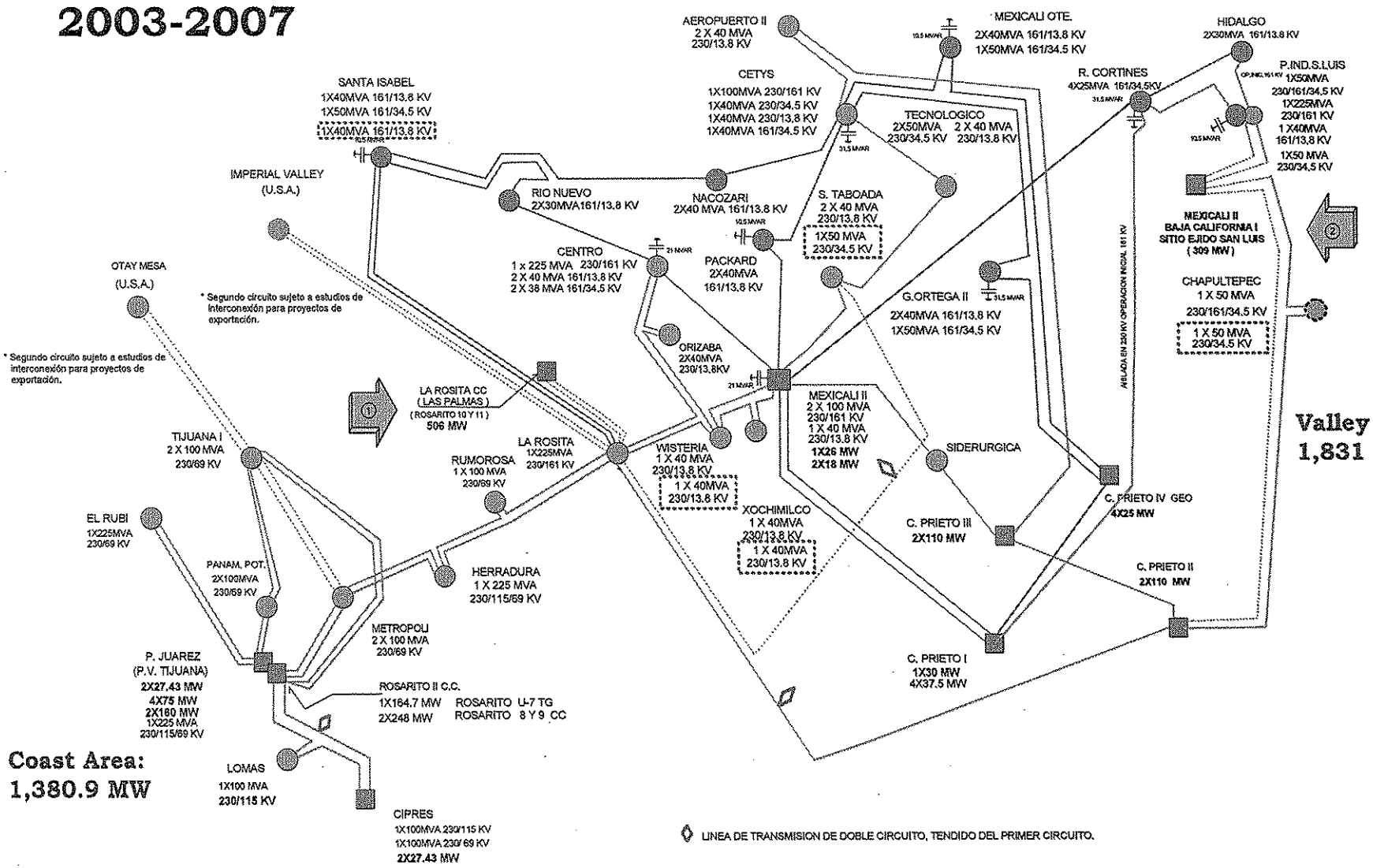


WECC Path 45 Capability



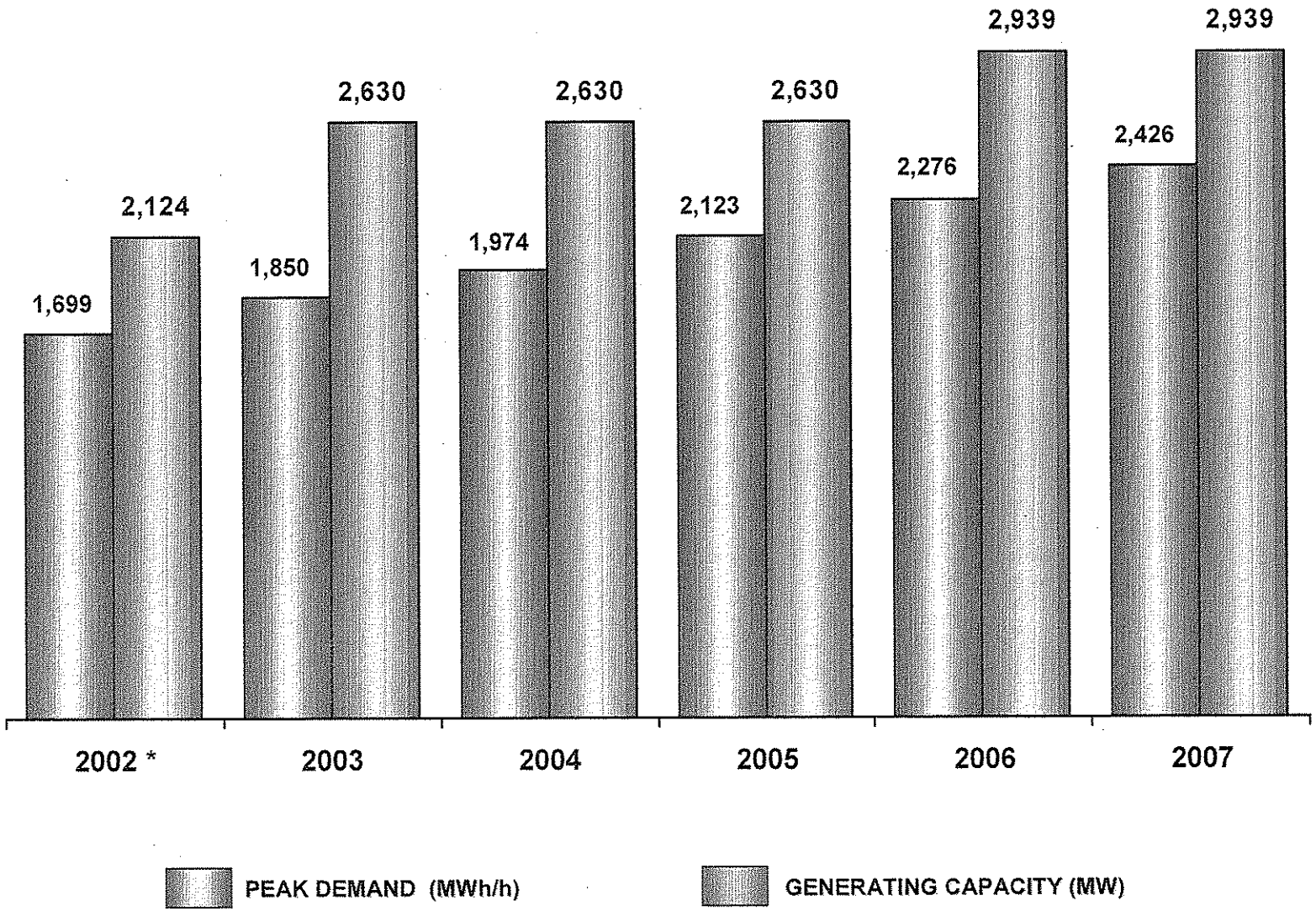
Generation and Transmission Expansion

2003-2007



Generating Capacity and Peak Demand

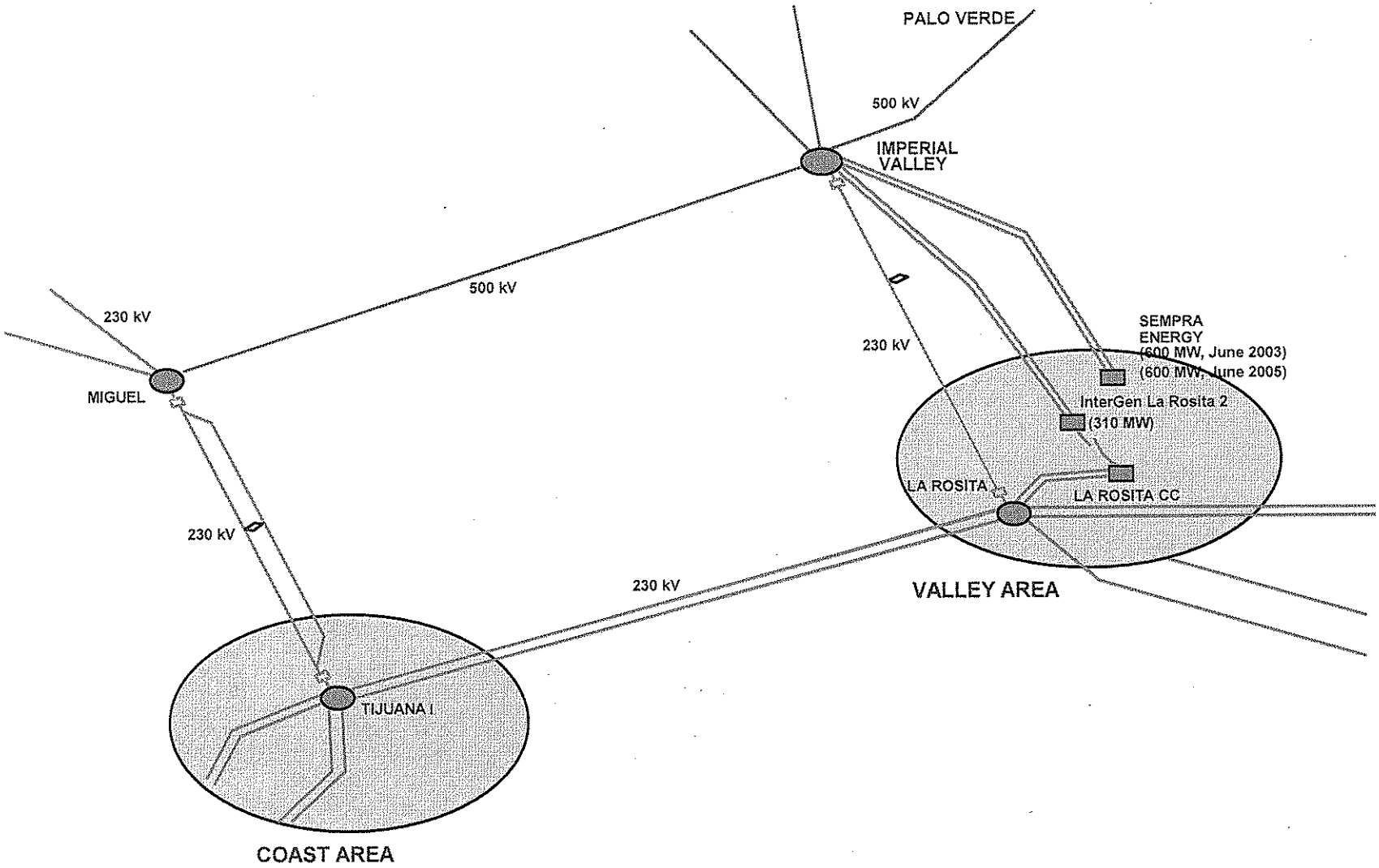
Baja California System



Generating Capacity Additions 2003-2007

Year	Power Station	Capacity (MW)	Site
2003	Rosarito 10 y 11	506	Las Palmas
2004			
2005			
2006	Mexicali II	309	Ejido San Luis

2003-2007


PALO VERDE
500 kV
IMPERIAL VALLEY
500 kV
230 kV
230 kV
MIGUEL
SEMPRA ENERGY
(600 MW, June 2003)
(600 MW, June 2005)
InterGen La Rosita 2
(310 MW)
LA ROSITA
LA ROSITA CC
230 kV
230 kV
VALLEY AREA
TIJUANA I
COAST AREA

CFE

COMISION FEDERAL DE ELECTRICIDAD

Generation and Transmission Expansion Plan
Baja California System

2003-2007

Florencio Aboytes PhD

March 2003

EXHIBIT 3

Bill Powers

From: Don Wood [dwood8@cox.net]
Sent: Wednesday, June 18, 2008 12:05 PM
To: dwood8@cox.net
Subject: The Wind Blows in Mexico

California Energy Markets

Mexico Could Be Wind Hotspot If Wires, Border Issues Are Solved

6/17/08 - FREE TRIAL

Like the Tehachapi region in California, the border area of Mexico's Baja Norte is blessed with abundant wind, but to be successful, developers need to clear transmission hurdles, meet both Mexican and California regulatory requirements and export their electricity at an attractive price.

Moreover, the wind potential of the region needs to be studied in detail, according to a report released June 6 by consulting firms Kema Inc. and Bates White.

"Once the wind resource potential of the Northern Baja region is determined, it could be considered as another renewable-energy-rich region," stated the report, prepared for the California Energy Commission.

A previous report, from California's Renewable Energy Transmission Initiative, rated the Baja Norte region with a wind potential of 1,800 MW, compared to approximately 36,000 MW in British Columbia, 21,000 MW in California, 9,000 MW in Washington and 7,000 MW in Oregon. But according to the Kema-Bates White report, a "more thorough" assessment carried out by a private developer indicates the Baja region could have wind potential up to 10,000 MW with "several thousand" megawatts along the Juarez mountain range.

The report rated the wind potential of the La Rumorosa region in Baja alone as "good to superb," with potential capacity up to 1,800 MW. It also noted the 5,000 MW of applications for Baja projects sitting in the California Independent System Operator interconnection queue.

There is pressure in Mexico "to keep some of their renewable potential for Mexican consumption," said Bates White consultant Nicolas Puga, and some developers might need to "dedicate some of their output to the Mexican market." However, Mexican customers would not need a large chunk of the wind potential, he said.

Mexico has a renewables standard of 8 percent by 2012. Alejandro Peraza,

director general of electricity for Mexico's power regulator, Comisión Reguladora de Energía, told California Energy Markets Thursday that ideal projects for Mexico would "use Baja wind resources on both sides of the border."

"Baja's wind resources are big enough to supply power to U.S. and Mexican consumers," he wrote in an e-mail. But "it is also clear that our transmission capabilities should be upgraded if substantial wind power is to be consumed in Mexico."

Developers have already staked territory in the Mexican wind game, according to the report: Sempra Generation is developing a 250 MW wind project in La Rumorosa-the company's first wind facility-and has signed a power-purchase agreement with Southern California Edison. To bring the wind to load centers, the company applied for a U.S. "presidential permit" to build a 500 kV wire from its Mexico project into California, connecting to the Southwest Powerlink.

Mexico's Fuerza Eólica SA holds the only two permits from CRE for wind power in Baja and claims to have land rights for up to 750 MW of capacity. One 10 MW permit is to supply municipal lighting customers in Mexico; the other 300 MW project is designed for export.

EnXco, the U.S. affiliate of France's EDF Energies Nouvelles, has been studying wind potential in the area. "Evidence" indicates that enXco has rights to about 15,000 acres of land west of La Rumorosa, the Kema-Bates White report stated.

Peraza said that on the whole, developers "seem to be willing to dedicate some capacity to consumers in Mexico."

Sempra Generation CEO and President Mike Allman told CEM Friday that the first phase of the La Rumorosa project would be for export only, but that ultimately the company could develop the site out to 1,000 MW. "I suppose there's some potential in future phases" to supply power in Mexico, he said.

Neither exporting electricity to California from Baja nor exporting some and keeping some for Mexico's use is without precedent. Sempra's Termoeléctrica de Mexicali, a 625 MW natural gas-fired plant, has been moving electrons across the border since 2003. InterGen's 1,065 MW La Rosita natural gas plant also exports and has 500 MW under contract with Mexico's national monopoly utility, Comisión Federal de Electricidad.

The report stressed that cost hurdles exist on both sides of the border. Mexican customers most interested in wind power are municipalities, but they change every two years. Project developers can also sell to CFE, but they would get a price of only 85 to 90 percent of the utility's short-run marginal cost of electricity-"clearly this is not an attractive option," the Kema report stated.

In addition, Mexican renewables are ineligible for U.S. tax credits, which for wind equate to about 3 cents/kWh in levelized value. And in bids received by San Diego Gas & Electric, La Rumorosa developers have quoted

capacity factors of 30 percent compared to the 35 to 40 percent touted by U.S. wind companies.

"There are pluses and minuses," Allman said. "One of the minuses is we don't get the PTC." On the positive end, he noted the wind resources in the region-which extend five miles north of the border and 40 miles south-are "one of the three best areas in California" to develop wind. Mexico also has an accelerated depreciation schedule, which the Kema report noted allows 100 percent depreciation in the first fiscal year of equipment operation. There is also a 30 percent fiscal credit for research and exploration, according to a 2008 report from Milbank, Tweed, Hadley & McCloy LLP.

"We can be as competitive" as California wind, Allman said, adding that La Rumorosa is situated just a few miles from an interconnection with the Cal-ISO system.

The Kema-Bates White report also mentioned it is possible for developers of projects sited in Mexico to earn credits under the Kyoto Protocol's clean-development mechanism. The CDM would offer companies "an additional source of cash without being forced to sell their output in Mexico," the report stated, so long as developers showed their project would displace fossil-fuel generation.

The Milbank report hypothesized wind companies in Mexico could "sell some of the credits expected to be earned" to finance projects.

"Renewable projects in Mexico . . . could benefit from deriving additional income from unbundled RECs, carbon credits or even CDM carbon credits," Puga said.

Developers of wind turbines in Mexico have several transmission options. Mexico's CFE does not invest in wires upgrades designed solely for export, though the Kema-Bates White report indicated the government might justify the investment if the system benefited from a network upgrade.

"Baja is electrically isolated from the rest of the country," Peraza said, adding that the country has plans to build a tie there in 2011.

For exports alone, developers could move power along Path 45, which CFE and Coral Energy use for short-term exports to California. The report estimated that Path 45 has 800 MW in unused capacity, but developers would have to execute long-term wheeling contracts through CFE's system. Wheeling "may result in increasing the overall cost of any renewable resources" and may "not be economical."

Another option is to build a new line, as proposed by Sempra. Project developers would shoulder the cost of the wire until it crossed the border, at which point they could roll expenses into rates.

The question of how to move the cross-border power to load centers, however, would still exist. Sempra's Allman said that the Cal-ISO has said the Southwest Powerlink can accommodate only 80 MW of capacity. Beyond that, the Sunrise Powerlink or some other transmission solution would be required to

move La Rumorosa wind to load centers. The Kema report also mentioned that the Cal-ISO sees Sunrise or GreenPath North as necessities to exploit the potential of Baja Norte wind.

The report also noted that electricity exported to meet the California RPS would have to meet state regulations, in addition to meeting Mexican laws. Environmental groups have protested the La Rumorosa contract, alleging Sempra failed to show appropriate environmental mitigation.

Larson, however, noted that Sempra's TDM plant was "built to meet California air quality standards in terms of equipment."

"You could pick up that plant and operate it on the other side of the border," he said.

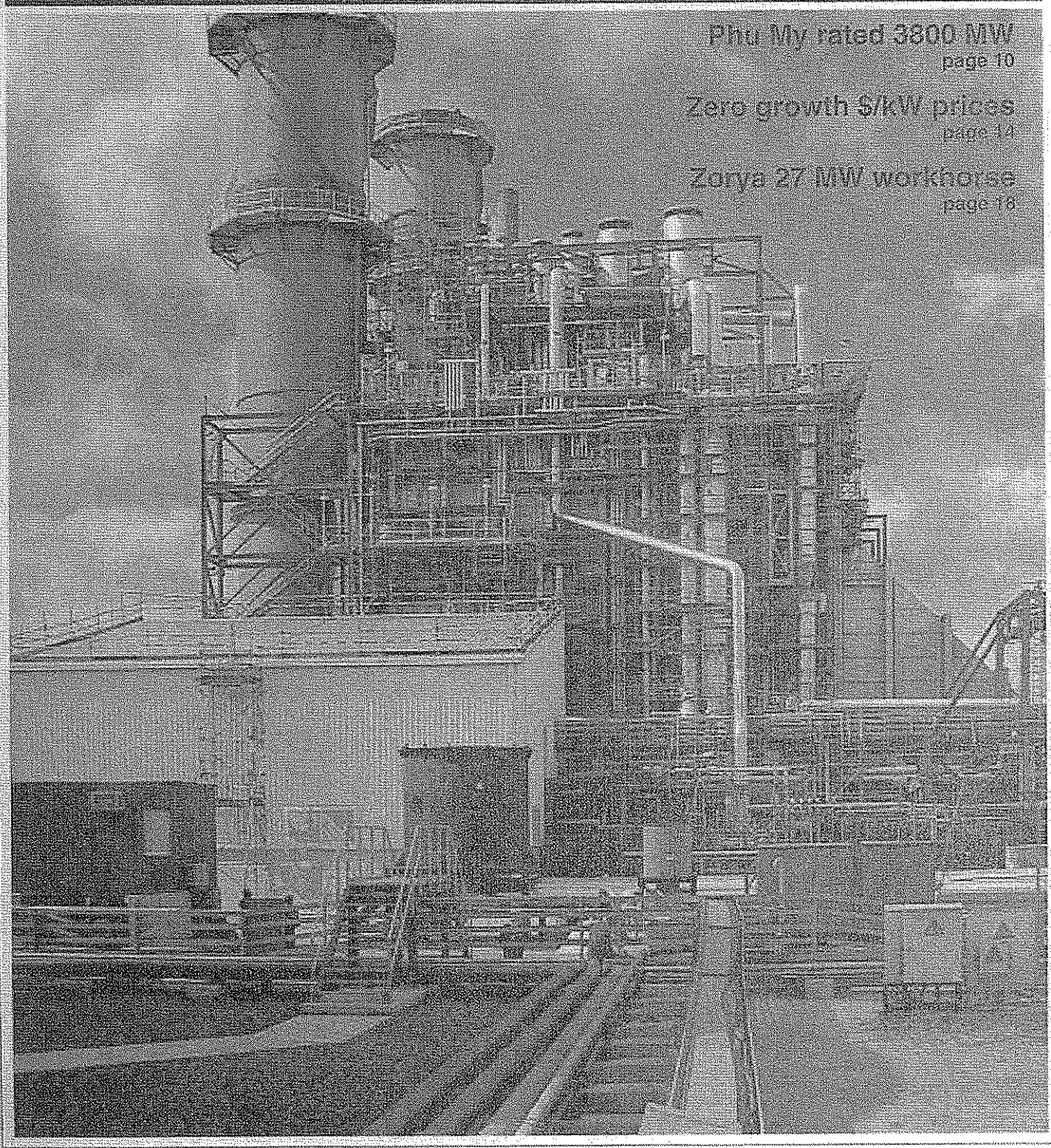
Overall, the Kema-Bates White report called on the California Energy Commission to study Baja wind potential and discuss in forums with Mexico the transmission options. The CEC should also work to promote border transmission, including Sunrise and GreenPath North, and Mexico should explore "the possibility of adopting standards identical to the California standards for export projects."

The CEC could undertake a formal collaboration with Mexico's Secretaría de Energía to address energy supply and transmission [MOU 600-07-003].

EXHIBIT 4

Gas Turbine World

Where Technology Turns Into Power and Profit



Phu My rated 3800 MW
page 10

Zero growth $/kW prices
page 14

Zorya 27 MW workhorse
page 18

April – May 2004

Vol. 34 No. 2

provide front-end environmental, permitting and grid connection services.

To date, PB reports, the Barcelona office has provided engineering support services for the existing 800 MW combined cycle plants at San Roque near Cadiz and Besos outside Barcelona.

Projects are part of Spanish electric utility Endesa's alliance with GasNatural (Repsol) to develop large, natural gas fired power stations.

San Roque and Besos are nearly identical. Both are single-shaft KA26-1 combined cycle plants, supplied by Alstom, ISO rated 393 MW each on natural gas fuel.

PB is also working on new projects including the 400 MW Riba Roja d'Ebre and Arrubal power stations.

GE Energy

Qatar expanding LNG production

Qatar Petroleum and ExxonMobil awarded GE Energy a US$200 million contract for the supply of three turbo compressor strings.

To be installed for main refrigerant service in the Qatargas II liquefied natural gas expansion project in Ras Laffan Industrial City.

Qatar II, the world's largest LNG project, will also include the world's largest trains for liquefied gas production.

Each Qatargas II liquefaction train will be rated for an annual capacity of 7.8 million tons.

The project will use the new AP-XO liquefaction process developed by Air Products and Chemicals.

Qatar Petroleum owns 70 percent of the project and ExxonMobil 30 percent.

General Electric

Gas turbines replace diesel power stations

Al Kamil Power Company started operation at its site-rated 285-MW simple cycle power station in the Sharqiya region of Oman.

Plant was purchased to replace installed diesel engine generating capacity in the region. Natural gas is the primary fuel with distillate oil as back-up.

Simple cycle station is powered by three GE MS9001E gas turbines equipped with dry low NOx combustors.

Machines are normally rated 123.4 MW each, derated by high site ambient temperatures (32°C) to 95 MW.

Generated power is sold to Oman's Ministry of Electricity and Water under a fifteen-year power purchase agreement.

Al Kamil Power is a subsidiary of International Power in the UK.

MS9001E

Compression by Fr9E drivers

GE will provide three MS9001E gas turbine driven compression strings with low emissions capability.

GE says this project will be the first application of Fr 9E machines in LNG refrigeration service.

Huge single-shaft machines are rated 169,100 horsepower (126 MW) each.

Company scope of supply includes full-load string testing in addition to gas turbine and compressor spare parts.

Large electric motor/generators with variable frequency drives will be used for start-up helper power on each string. They will also serve for electric power generation.

GE says it will manufacture the gas turbines in Belfort, France. To be tested and packaged at GE Oil & Gas facility in Massa, Italy for shipment to Ras Laffan.

Centrifugal compressors will be built and assembled at GE's Florence and Massa workshops.

Timetable calls for shipment of units to start in November 2005. First LNG train is scheduled for operation in the winter of 2007.

UAE Project

Plans for 1000-MW water and power plant

International 'expression of interest' documents for participation in a planned 1000-MW power generation and water plant in Qidfa, Al Fujairah are under evaluation. Plant to be operational by 2008 at the latest.

This is an independent power and water project in the United Arab Emirates. EOI evaluation and negotiations are to be completed in time for agreements to be signed in the third quarter 2004.

Union Water & Electricity Company (UWEC), which is evaluating the EOIs, has invited international power developers to take an equity stake in this and in future power generation and water desalination projects in the UAE.

Sempra Energy

Mexicali plant spurs surge of capacity

New 600-MW merchant facility in Mexicali Baja, Mexico commissioned by Sempra Energy of San Diego is one of several new plants being built or planned along the U.S.-Mexican border by U.S. and overseas companies.

The location allows utilities to meet the growing power needs of Mexico while also being near U.S. markets.

Other plants are stationed in Mexico and sell power primarily into the U.S. grid, with gas being supplied from indigenous U.S. supplies.

Strong economic advantages for the Mexican programs include availability of low cost labor and avoiding some of the stringent environmental rules for new U.S. facilities.

Another overriding factor is that under Mexican regulations, permitting for a new plant takes only 6-8 months compared with much longer periods—usually twice that—to gain approvals for U.S. projects.

Cost for installing Sempra's Termoelectrica de Mexicali (TMD) facility is reported to be around US$350 million.

Power island consists of two GE Frame 7FA gas turbines, two HRSGs, and a 310-MW Alstom steam turbine equipped with a 380 MVA hydrogen-cooled generator installed in combined cycle.

FutureGen

DOE focus on coal hydrogen program

US Dept. of Energy FutureGen program is centered on advancing IGCC technology to develop, build and operate on coal-based feedstock to generate emissions-free electric power and co-produce hydrogen.

R&D scope includes design and construction of a 275-MW demonstration plant that will also serve as a large scale engineering laboratory for testing new clean power, carbon capture, and coal-to-hydrogen technologies.

Also will include design development and testing of advanced sequestration technologies to capture CO_2 from syngas, possibly using novel membranes now under development.

Candidate reservoirs for sequestration include depleted oil and gas reservoirs, non-profitable coal seams, deep saline aquifers, and basalt formations "all common in the U.S."

Pratt & Whitney Marine

"ST" gas turbines for Norwegian patrol boats

Pratt & Whitney Marine ST18 and ST40 gas turbines have been selected to power the Royal Norwegian Navy "Skjold class" surface effect fast patrol boats.

Navy plans on an initial build of six boats, each powered by two ST18 gas turbine engines and two ST40s, combined in pairs to provide cruise and boost propulsion.

Engine buy is worth $40 million to Pratt over the next four years.

Skjold surface effect boats to be built between 2004 and 2007. Will combine very high speed capability with treated exhaust to suppress infrared detection.

Navy gas turbine engines are design rated for 100°F hot day operation on low sulfur distillate or diesel oil, with 4-inch inlet and 6-inch exhaust losses.

At those conditions, the ST18 marine engine is rated at 1869 shaft-hp and the ST40 is rated at 3999 shaft-hp.

EXHIBIT 5

Hour Ending	HE01	HE02	HE03	HE04	HE05	HE06	HE07	HE08	HE09	HE10	HE11
IOU											
PGAE											
Actual System Load	9096	8852	8908	8839	9422	9947	11624	11904	12097	12413	12773
Hour Ahead Forecast	9607	9441	9385	9684	10048	10385	11651	12103	12177	12581	12910
Day Ahead Forecast	9739	9680	9642	9733	10186	11021	12111	12528	12537	12542	12787
2Day Ahead Forecast	9278	9167	9338	9398	9854	10588	11649	12051	12308	12598	12828
SCE											
Actual System Load	9802	9600	9495	9550	10016	10503	11391	11851	12557	13133	13550
Hour Ahead Forecast	9986	9791	9588	9726	10042	10656	11382	11591	12097	12176	13177
Day Ahead Forecast	9645	9373	9208	9262	9667	10285	11034	11435	12066	12674	13172
2Day Ahead Forecast	9706	9414	9279	9329	9739	10273	11028	11539	12163	12756	13222
SDGE											
Actual System Load	1711	1641	1598	1602	1720	1956	2220	2328	2473	2740	2783
Hour Ahead Forecast	1777	1732	1634	1641	1729	1985	2236	2364	2593	2758	2874
Day Ahead Forecast	1773	1702	1669	1677	1775	2033	2296	2434	2601	2780	2930
2Day Ahead Forecast	1786	1717	1687	1698	1800	2064	2329	2467	2618	2769	2893

HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
Megawatts												
12697	12883	12901	12886	12913	12865	12833	13822	13553	13010	12131	11095	10166
12897	12896	12920	12922	12832	12857	12953	13854	13641	12968	12161	11151	10431
12854	12931	13021	12975	12923	12870	13007	13852	13620	13036	12225	11260	10260
12861	12898	12932	12859	12786	12734	12939	13829	13649	13170	12312	11198	10027
13773	13943	14150	14201	14124	13871	13726	14555	14286	13660	12862	12012	10984
13386	14000	13968	14234	13997	13673	13658	14271	14087	13839	13124	11653	11225
13528	13822	14024	14108	14031	13819	13772	14246	14161	13694	12943	11813	10486
13563	13796	13964	14107	13990	13758	13751	14371	14538	14194	12247	10950	10080
2789	2826	2897	2861	2804	2766	2782	2972	2881	2735	2509	2238	2019
2948	3059	3104	3044	2967	2874	2768	3013	2934	2729	2437	2079	1879
3029	3094	3148	3148	3094	3008	3034	3213	3085	2874	2564	2241	1950
2963	3013	3046	3026	2964	2881	2913	3139	3028	2825	2527	2215	1943

HE25		
	IOU	
		PGAE
	Actual System Load	
	Hour Ahead Forecast	
	Day Ahead Forecast	
	2Day Ahead Forecast	
		SCE
	Actual System Load	
	Hour Ahead Forecast	
	Day Ahead Forecast	
	2Day Ahead Forecast	
		SDGE
	Actual System Load	
	Hour Ahead Forecast	
	Day Ahead Forecast	
	2Day Ahead Forecast	

EXHIBIT 6

California Public Utilities Commission

505 Van Ness Ave., San Francisco

FOR IMMEDIATE RELEASE
Media Contact: Terrie Prosper, 415.703.1366, news@cpuc.ca.gov

PRESS RELEASE
Docket #: A.08-03-015

CPUC APPROVES EDISON SOLAR ROOF PROGRAM

SAN FRANCISCO, June 18, 2009 - The California Public Utilities Commission (CPUC), in its ongoing commitment to innovative programs and policies to advance the delivery of renewable energy, today approved a solar photovoltaic program for Southern California Edison.

The program will result in the deployment of 500 megawatts (MW) of solar photovoltaic (PV) on existing commercial rooftops in Edison's service territory. Edison will own, install, operate, and maintain 250 MW of solar PV projects, which will primarily consist of one to two MW rooftop systems. The remaining 250 MW will be installed, owned, and operated by independent, non-utility solar providers selected through a competitive process.

Prior to today's decision, utility solar programs in the one to two MW range had limited participation in the California Solar Initiative or Renewables Portfolio Standard (RPS) program. Edison's program creates a new avenue for developing such smaller sized solar projects.

"This program represents a valuable complement to the existing renewable procurement efforts we have underway, given the significant permitting challenges large scale renewables face, both in terms of transmission and the generating facilities themselves," said CPUC President Michael R. Peevey. "It represents an important hedging strategy by allowing for the deployment of distributed resources that, while somewhat more expensive than the large scale renewable projects that are the primary focus of the RPS program, offer a much higher level of certainty in terms of when they will come online."

Added Commissioner John A. Bohn, author of the decision, "This decision is a major step forward in diversifying the mix of renewable resources in California and spurring the development of a new

market niche for large scale rooftop solar applications. Unlike other generation resources, these projects can get built quickly and without the need for expensive new transmission lines. And since they are built on existing structures, these projects are extremely benign from an environmental standpoint, with neither land use, water, or air emission impacts. By authorizing both utility-owned and private development of these projects we hope to get the best from both types of ownership structures, promoting competition as well as fostering the rapid development of this nascent market."

"This decision is good for California because it makes good use of all that sun and warehouse roofs in Southern California to produce clean energy right where we need it, both by Edison and independent generators," commented Commissioner Rachelle Chong. "I commend Edison for its foresight in bringing a focus on commercial solar PV projects that are 1-2 megawatts in size."

Commissioner Timothy Alan Simon said, "I support this decision because it strikes a balance between promoting utility-owned generation and competitive procurement for independent energy producers, as well as distributed generation and central station solar systems. Finally, it will bring much needed economic stimulus to the Inland Empire."

Because this is the first significant foray by a utility into ownership of renewable generation, the CPUC will carefully monitor the program's progress, examine ways in which the program can be improved, and fine tune the program when and where appropriate.

The energy generated from the project will be used to serve Edison's retail customers and the output from these facilities will be counted towards Edison's RPS goals. The output and capacity of the projects will not count towards the California Solar Initiative program goals.

The RPS program is one of the most ambitious renewable energy standards in the country. It requires investor-owned utilities to procure 20 percent of their electricity sales from renewable sources by 2010. Governor Schwarzenegger subsequently established an RPS target of 33 percent by 2020 for all retail sellers of electricity. The California Solar Initiative has a goal to install 3,000 MW of new customer solar projects by 2016, moving the state toward a cleaner energy future and helping lower the cost of solar systems for consumers.

###

EXHIBIT 7

Bill Powers

From: Don Wood [dwood8@cox.net]
Sent: Sunday, November 18, 2007 8:04 PM
To: dwood8@cox.net
Subject: Nov. 17 letter to SDUT on need for more local distributed generation

SAN DIEGO UNION TRIBUNE -- LETTERS

Generation of power outside SDG&E grid

11/17/07

Regarding "Power Links in Peril?" (A1, Nov. 13):

As interim vice chancellor for resource management and planning at the University of California San Diego, I would like to comment that the story made clear the importance of distributed generation and development of power separate from the SDG&E grid. Also clear is the need to work pro-actively and cooperatively with our neighbors.

During the wildfires, UC San Diego proved the importance of distributed generation in helping the region avoid rolling blackouts. In support of the San Diego community, the campus was able to reduce its imported power to zero and export up to 4.5 megawatts of power to support the SDG&E grid during the day. This 4.5 megawatts of electricity is enough to power 4,000 homes. When SDG&E was struggling with power challenges, the UCSD-distributed generation system was providing critical support for the region.

The benefits of distributed generation often go unnoticed until times of crisis. But efforts from UCSD and other sources prove the efficacy of this technology and its importance in San Diego's overall energy planning strategy. This technology should be properly incentivized to assure our regional energy "cul-de-sac" can meet the extremes we will undoubtedly face in this era of global climate change.

GARY C. MATTHEWS
San Diego

EXHIBIT 8

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Application of San Diego Gas & Electric Company (U 902-E) for a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project	Application 06-08-010 (Filed August 4, 2006)

PHASE II REPLY BRIEF OF POWERS ENGINEERING ON BEHALF OF BILL POWERS, P.E.

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Dated: June 13, 2008

SUMMARY

SDG&E's Phase II opening brief is a methodical exercise in mischaracterizing the record to support its pre-determined position that non-wire options are not an alternative to the Sunrise Powerlink. The figurative elephant in the room is the March 27, 2008 SCE commercial PV application and testimony.[1] SDG&E does not mention the SCE commercial PV program once in its opening brief. There is a good reason for this. The technical viability and cost-effectiveness of the proposed SCE PV program contradict virtually every point made by SDG&E in its opening brief in opposition to the large-scale use of PV in San Diego County as a major element of the two non-wire alternatives to the Sunrise Powerlink identified in the DEIR.

A second elephant in the room is the high cost and pre-commercial status of dish Stirling technology, and the imminent failure of SDG&E's dish Stirling contract. Without the dish Stirling project, there is no renewable energy justification for the Sunrise Powerlink.

This reply brief is organized in "statement and response" format. A specific statement from the SDG&E Phase II opening brief is provided followed by the Powers Engineering response. Powers Engineering provides responses to thirty-four statements in this reply brief.

[1] Ex. SD-115, Ex. SD-116.

1. **Mr. Powers wrote his Smart Energy Report on behalf of the "No Sunrise Team," not as an impartial analysis of how best to meet San Diego's energy needs. Moreover, Mr. Powers has never designed or constructed a PV system other than the 2 kW system on his home, he is not an electrical engineer. (p. 238)**

The DEIR prepared by the Commission lists two non-wire alternatives as superior to the Sunrise Powerlink. Using SDG&E's logic, the Commission is also a member of the "No Sunrise Team." Mr. Powers clarified the significance of this term at TR at 3918 ln 8-16:

> "THE WITNESS: So the No Sunrise Team are people who are working against Sunrise? The point I want to make there is that the San Diego Smart Energy Report is based on the California Energy Action Plan and the loading order. The fact that the Energy Action Plan and the loading order are -- are consistent with a No Transmission Alternative in San Diego should in no way take away from the validity of that approach."

SDG&E mischaracterizes Mr. Powers experience with power systems by focusing exclusively on PV systems. Mr. Powers has extensive experience in power system design, as described at TR at 3914 ln 4-11:

> "My statement is that I have experience designing a large number of power systems. I was on the design team for three 50 megawatt peaking turbines in San Diego, the 3.5 megawatt CHP Project at Children's Hospital in San Diego, and am the coauthor of two Electric Power Research Institute documents on emission-control systems and cooling systems for gas-turbine power plants."

2. **"Because Mr. Powers is proposing 920 MW of PV, *id.* at 7, the "renewable energy park" proposal apparently envisions up to 92 "parks" (if each "park" was 10 MW) to 920 "parks" (if each "park" was 1 MW)." (p. 240)**

SDG&E misunderstands the renewable energy park alternative. Mr. Powers does not suggest transmitting 920 MW generated in renewable energy parks on the rural 69 kV grid. The proposal is to substitute the 290 MW solar trough plant in Borrego Springs described in the DEIR with 290 MW of renewable energy parks at or near rural SDG&E substations.[2] SDG&E acknowledges that the existing rural 69 kV can move up to 324 MW without upgrades.[3] Therefore the existing rural 69 kV grid has the capability move 290 MW of power from renewable energy parks without upgrades.

---

[2] Ex Powers-1, p. 6.
[3] SDG&E Phase II rebuttal testimony, p. 5-21.

3. **Mr. Powers, however, admitted that he could not identify any "renewable energy parks" under development in San Diego County. (p. 241)**

SDG&E mischaracterizes Mr. Powers' position. Mr. Powers stated that SDG&E was almost certainly receiving bids to install a large amount of renewable energy park capacity (TR at 3916 ln 9-28):

> "Next question: So when you said in your testimony that renewable-energy parks were a concept, you meant just exactly that, that they are a hypothetical concept but they are not currently under development?
>
> Powers: The point I would like to make there is that SDG&E currently has a renewables solicitation open. They are to receive renewable proposals I think on April 28th of this year. I am -- it is highly likely that they will receive numerous proposals for the energy park-type system, a number of megawatts at substations, and that they will also receive proposals to put in a tremendous amount of PV into San Diego.
>
> The -- PG&E already has done two – contracted for two solar renewable parks at two substations. So my point here is that the fact that I do not have an explicit list does not mean that within a couple of weeks SDG&E may have a whole suite of specific proposals for exactly that."

4. **Third, Mr. Powers fails to show that such PV systems are cost-effective. (p. 241)**

Commercial PV is more cost-effective than dish Stirling, SDG&E's renewable energy justification for the Sunrise Powerlink. The CEC identifies an installed capital cost of approximately $6,000/kW for dish Stirling.[4] The gross installed cost of 900 MW of dish Stirling would be $5.4 billion.[5] In contrast, the gross installed cost of flat-plate PV stated in the SCE PV application to the Commission is less than $4,000/kW.[6] The gross cost of 900 MW of PV using the SCE cost would be less than $3.6 billion.

The economics overwhelmingly favor developing the estimated 4,600 MW of commercial building and commercial parking area PV potential in San Diego County before paying for a 500 kV transmission line to access higher cost dish Stirling solar power in Imperial County.[7]

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[4] RT at 3921 ln 3
[5] RT at 3921 ln 4
[6] Ex. SD-115. Average installed cost of PV is $3.5/watt DC (p. 13). DC to AC conversion factor is 0.9 (p. 1). Estimated AC output is $3.5/watt ÷ 0.9 = $3.85/watt ($3,850/kW).
[7] Ex. Powers-1, Attachment B, p. 48.

by the CEC) seeks to achieve 400 MW of solar electric capacity statewide. In the DEIR, Aspen estimates that the CEC will allocate 15% of the funding and goal to SDG&E's service territory, and thus, if achieved, would add 60 MW to SDG&E's target." Population growth in SDG&E service territory averaged 0.2 percent in the 2004-2006 timeframe.[21] Extrapolating from the 2004-2006 population growth trend, and assuming load growth is proportional to population growth, load could be expected to grow by 2 to 3 percent by 2020. Even if none of this load growth is equipped with PV, it will have little overall impact on Mr. Powers comparison due to the small amount of load growth.

14. Mr. Powers testified: "Non-renewable distributed generation (DG) should substitute for the 620 MW combined-cycle plant in the In-Area All-Source alternative, as explained in detail in [the Smart Energy Report]." Mr. Powers, however, admitted that: "I cannot identify any specific CHP plants," and he is not aware of any CHP plants under development. (p. 246)

SDG&E mischaracterizes Mr. Powers' position. Mr. Powers states (TR at 3917 at ln 19-26):

> "My response to that is that the combined-heat-and-power projects are being proposed on a continuous basis in the San Diego area. The -- I want to clarify that the fact that I did not put together a specific list of 80 or 100 CHP projects for -- as a substitute for a combined-cycle project somehow implies that there isn't a continuous stream of such proposals."

SDG&E cites in its Phase II rebuttal testimony (p. 5-38) an EPRI marketing study of additional CHP potential in SDG&E service territory of nearly 400 MW. EPRI found that "*A little over half would reject a project with a payback of 2 years.*" Two years is a very aggressive payback period. The CEC metric for cost-effective is a simple payback in ten years. A ten-year payback would greatly expand the cost-effective CHP potential in SDG&E service territory relative to the nearly 400 MW of additional CHP potential already identified in the EPRI CHP marketing study.[22]

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[21] Ex. Powers-1, Attachment B, p. D2.
[22] Powers Phase II opening brief, p. 24.

Exhibit 3 is considered Comment D33-30.

EXHIBIT 3

Hearing Research 268 (2010) 12–21

Contents lists available at ScienceDirect

Hearing Research

journal homepage: www.elsevier.com/locate/heares

Review Article

Responses of the ear to low frequency sounds, infrasound and wind turbines

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ARTICLE INFO

Article history:
Received 29 April 2010
Received in revised form
7 June 2010
Accepted 9 June 2010
Available online 16 June 2010

ABSTRACT

Infrasonic sounds are generated internally in the body (by respiration, heartbeat, coughing, etc) and by external sources, such as air conditioning systems, inside vehicles, some industrial processes and, now becoming increasingly prevalent, wind turbines. It is widely assumed that infrasound presented at an amplitude below what is audible has no influence on the ear. In this review, we consider possible ways that low frequency sounds, at levels that may or may not be heard, could influence the function of the ear. The inner ear has elaborate mechanisms to attenuate low frequency sound components before they are transmitted to the brain. The auditory portion of the ear, the cochlea, has two types of sensory cells, inner hair cells (IHC) and outer hair cells (OHC), of which the IHC are coupled to the afferent fibers that transmit "hearing" to the brain. The sensory stereocilia ("hairs") on the IHC are "fluid coupled" to mechanical stimuli, so their responses depend on stimulus velocity and their sensitivity decreases as sound frequency is lowered. In contrast, the OHC are directly coupled to mechanical stimuli, so their input remains greater than for IHC at low frequencies. At very low frequencies the OHC are stimulated by sounds at levels below those that are heard. Although the hair cells in other sensory structures such as the saccule may be tuned to infrasonic frequencies, auditory stimulus coupling to these structures is inefficient so that they are unlikely to be influenced by airborne infrasound. Structures that are involved in endolymph volume regulation are also known to be influenced by infrasound, but their sensitivity is also thought to be low. There are, however, abnormal states in which the ear becomes hypersensitive to infrasound. In most cases, the inner ear's responses to infrasound can be considered normal, but they could be associated with unfamiliar sensations or subtle changes in physiology. This raises the possibility that exposure to the infrasound component of wind turbine noise could influence the physiology of the ear.

1. Introduction

The increasing use of wind turbines as a "green" form of energy generation is an impressive technological achievement. Over time, there have been rapid increases in the size of the towers, blades, and generator capacity of wind turbines, as well as a dramatic increase in their numbers. Associated with the deployment of wind turbines, however, has been a rather unexpected development. Some people are very upset by the noise that some wind turbines produce. Wind turbine noise becomes annoying at substantially lower levels than other forms of transportation noise, with the exception of railroad shunting yards (Pedersen and Waye, 2004; Pedersen and Persson Waye, 2007; Pedersen et al., 2009). Some people with wind turbines located close to their homes have reported a variety of clinical symptoms that in rare cases are severe enough to force them to move away. These symptoms include sleep disturbance, headaches, difficulty concentrating, irritability and fatigue, but also include a number of otologic symptoms including dizziness or vertigo, tinnitus and the sensation of aural pain or pressure (Harry, 2007; Pierpont, 2009). The symptom group has been colloquially termed "wind turbine syndrome" and speculated to result from the low frequency sounds that wind turbines generate (Pierpont, 2009). Similar symptoms resulting from low frequency sound emissions from non-wind turbine sources have also been reported (Feldmann and Pitten, 2004).

On the other hand, engineers associated with the wind industry maintain that infrasound from wind turbines is of no consequence if it is below the audible threshold. The British Wind Energy Association (2010), states that sound from wind turbines are in the 30–50 dBA range, a level they correctly describe as difficult to discern above the rustling of trees [i.e. leaves].

This begs the question of why there is such an enormous discrepancy between subjective reactions to wind turbines and the measured sound levels. Many people live without problems near

Abbreviations: CA, cochlear aqueduct; CM, cochlear microphonic; CSF, cerebrospinal fluid; cVEMP, cervical vestibular evoked myogenic potential; EP, endocochlear potential; IHC, inner hair cell(s); oVEMP, ocular vestibular evoked myogenic potential; OHC, outer hair cell(s); RW, round window; ST, scala tympani; SV, scala vestibuli.

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doi:10.1016/j.heares.2010.06.007

noisy intersections, airports and factories where sound levels are higher. The answer may lie in the high infrasound component of the sound generated by wind turbines. A detailed review of the effects of low frequency noise on the body was provided by Leventhall (2009). Although it is widely believed that infrasound from wind turbines cannot affect the ear, this view fails to recognize the complex physiology that underlies the ear's response to low frequency sounds. This review considers the factors that influence how different components of the ear respond to low frequency stimulation and specifically whether different sensory cell types of the inner ear could be stimulated by infrasound at the levels typically experienced in the vicinity of wind turbines.

2. The physics of infrasound

Sounds represent fluctuating pressure changes superimposed on the normal ambient pressure, and can be defined by their spectral frequency components. Sounds with frequencies ranging from 20 Hz to 20 kHz represent those typically heard by humans and are designated as falling within the audible range. Sounds with frequencies below the audible range are termed infrasound. The boundary between the two is arbitrary and there is no physical distinction between infrasound and sounds in the audible range other than their frequency. Indeed, infrasound becomes perceptible if presented at high enough level.

The level of a sound is normally defined in terms of the magnitude of the pressure changes it represents, which can be measured and which does not depend on the frequency of the sound. In contrast, for sounds of constant pressure, the displacement of the medium is inversely proportional to frequency, with displacements increasing as frequency is reduced. This phenomenon can be observed as the difference in vibration amplitude between a subwoofer generating a low frequency tone and a tweeter generating a high frequency tone at the same pressure level. The speaker cone of the subwoofer is visibly displaced while the displacement of the tweeter cone is imperceptible. As a result of this phenomenon, vibration amplitudes to infrasound are larger than those to sounds in the auditory range at the same level, with displacements at 1 Hz being 1000 times those at 1 kHz when presented at the same pressure level. This corresponds to an increase in displacement at a rate of 6 dB/octave as frequency is lowered.

3. Overview of the anatomy of the ear

The auditory part of the inner ear, the cochlea, consists of a series of fluid-filled tubes, spiraling around the auditory nerve. A section through the middle of a human cochlea is shown in Fig. 1A. The anatomy of each turn is characterized by three fluid-filled spaces (Fig. 1B): scala tympani (ST) and scala vestibuli (SV) containing perilymph (yellow), separated by the endolymphatic space (ELS)(blue). The two perilymphatic compartments are connected together at the apex of the cochlea through an opening called the helicotrema. Perilymph is similar in ionic composition to most other extracellular fluids (high Na^+, low K^+) while endolymph has a unique composition for an extracellular fluid in the body, being

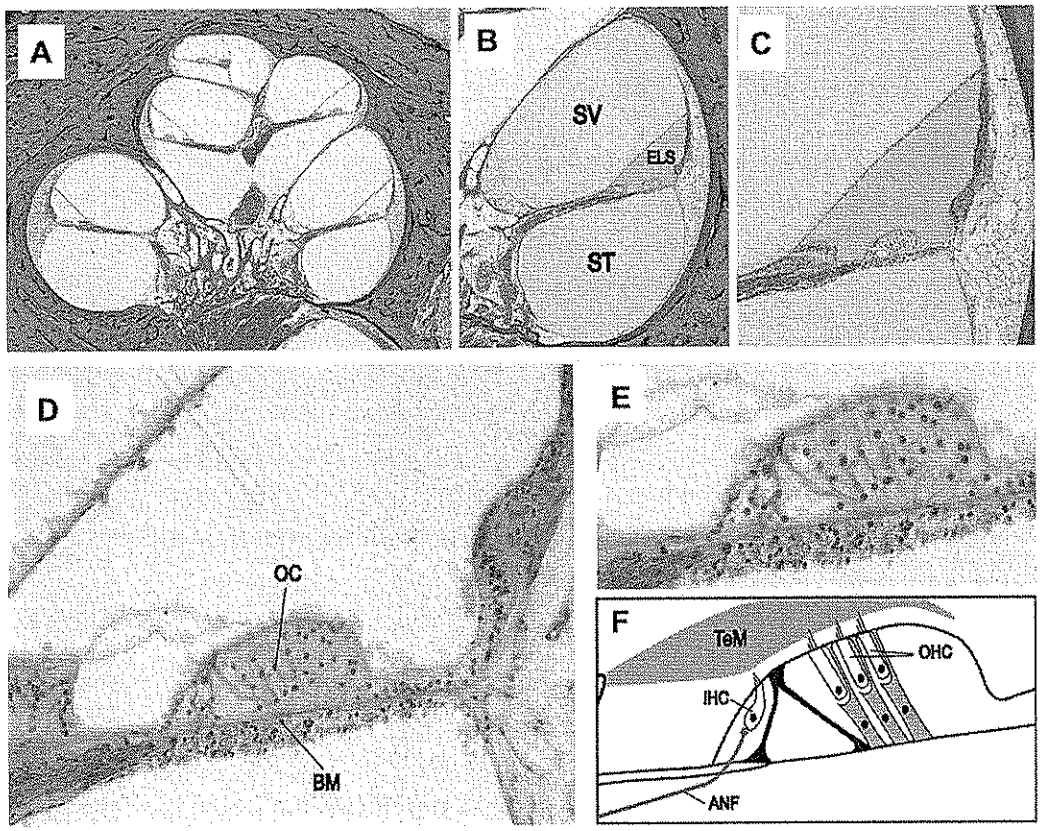

Fig. 1. Panels A–E Cross-section through the human cochlea shown with progressively increasing magnification. Panels B and C The fluid spaces containing perilymph have been colored yellow and endolymph blue. Panel D The sensory structure of the cochlea, the organ of Corti, is colored green. Panel F Schematic showing the anatomy of the main components of the organ of Corti. Abbreviations are: SV: scala vestibuli; ST: scala tympani; ELS: endolymphatic space; OC: organ of Corti; BM: basilar membrane; TeM: tectorial membrane; IHC: inner hair cell; OHC: outer hair cell; ANF: afferent nerve fiber. Original histological images courtesy of Saumil Merchant, MD, Otopathology Laboratory, Massachusetts Eye and Ear Infirmary and Harvard Medical School, Boston.

high in K^+ and low in both Na^+ and Ca^{2+}. It is also electrically polarized by about + 80 mV with respect to perilymph, which is called the endocochlear potential (EP). The main sensory organ of the cochlea (Fig. 1C–E, and shown colored green in Fig. 1D) lies on the basilar membrane between the ELS and the perilymph of ST and is called the organ of Corti. The organ of Corti, seen here in cross section, contains one row of inner hair cells (IHC) and three rows of outer hair cells (OHC) along the spiral length of the cochlea. As shown schematically in Fig. 1F, the sensory hairs (stereocilia) of the OHC have a gradation in length, with the tallest stereocilia embedded in the gelatinous tectorial membrane (TeM) which overlies the organ of Corti in the endolymphatic space (Kimura, 1975). This arrangement allows sound-evoked displacements of the organ of Corti to be converted to a lateral displacement of OHC stereocilia. In contrast, the stereocilia of the IHC do not contact the tectorial membrane, but remain within the fluid of the subtectorial space (Kimura, 1975; Lim, 1986). Because of this difference in how the hair cell stereocilia interact with the TeM, the two types of hair cell respond differently to mechanical stimuli. At low frequencies, the IHC respond according to the velocity of basilar membrane displacement, while OHC respond to the displacement itself (Russell and Sellick, 1983; Dallos, 1984).

The two types of hair cells also contact different types of afferent nerve fibers, sending information to the brain (Spoendlin, 1972; Santi and Tsuprun, 2001). Each IHC is innervated by multiple Type I afferent fibers, with each fiber innervating only a single IHC. The Type I afferents represent the vast majority (95%) of the fibers transmitting information to the brain and as a result it is generally believed that mammals hear with their IHC (Dallos, 2008). In contrast, the OHC contact Type II afferent fibers, which are unmyelinated and make synaptic contacts with a number of OHC. Type II afferents fibers are believed to be unresponsive to sounds and may signal the static position of the organ of Corti (Brown, 1994; Robertson et al., 1999). The OHC also receive substantial efferent innervation (from the brain) while the IHC receive no direct efferent innervation (Spoendlin, 1972).

4. Mechanics of low frequency stimulation

Infrasound entering the ear through the ossicular chain is likely to have a greater effect on the structures of the inner ear than is sound generated internally. The basic principles underlying stimulation of the inner ear by low frequency sounds are illustrated in Fig. 2. Panel A shows the compartments of a simplified, uncoiled cochlea bounded by solid walls with two parallel fluid spaces representing SV and ST respectively that are separated by a distensible membrane representing the basilar membrane and organ of Corti. It is generally agreed that the differential pressure between SV and ST across the basilar membrane is the important factor driving the motion of the basilar membrane (Von Békésy, 1960; Dancer and Franke, 1980; Nakajima et al., 2008; Merchant and Rosowski, 2008). In example A, all the boundaries of the inner ear are solid and noncompliant with the exception of the stapes. In this non-physiologic situation, the stapes applies pressures to SV (indicated by the red arrows) but as the fluid can be considered incompressible, pressures are instantaneously distributed throughout both fluid spaces and pressure gradients across the basilar membrane will be small. In panel B, the round window (RW) and the cochlear aqueduct (CA) have been added to the base of ST. For frequencies below 300 Hz the RW provides compliance between perilymph and the middle ear (Nakajima et al., 2008) and the CA provides fluid communication between perilymph and the cerebrospinal fluid (CSF). Under this condition, pressures applied by the stapes induce small volume flows between the stapes and

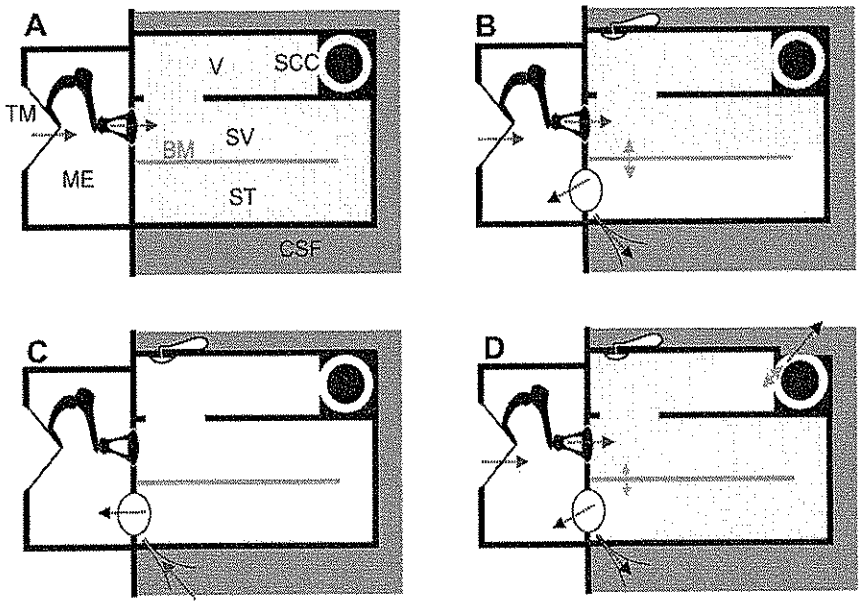

Fig. 2. Schematic representation of the uncoiled inner ear for four different mechanical conditions with low frequency stimulation. Red arrows indicate applied pressure and blue arrows indicate loss to compliant structures. A: indicates a hypothetical condition where the fluid space is rigidly bounded with no "windows" providing compliance. Sound pressure applied by the stapes causes uniform pressures (indicated by color shading) throughout the fluid space, so pressure difference across the basilar membrane and therefore stimulation is minimal. B: The normal situation with compliances provided by the round window and cochlear aqueduct at the base of scala tympani. Pressure differentials cause movement of fluid towards the compliant regions, including a pressure differential across the basilar membrane causing stimulation. C: Situation where low frequency enters scala tympani through the cochlear aqueduct. The main compliant structure is located nearby so pressure gradients across the basilar membrane are small, limiting the amount of stimulation. Infrasound entering through the cochlear aqueduct (such as from respiration and body movements) therefore does not provide the same degree of stimulation as that entering via the stapes. D: Situation with compromised otic capsule, such as superior canal dehiscence. As pressure gradients occur both along the cochlea and through the vestibule and semi-circular canal, the sensory structures in the semi-circular canal will be stimulated. Abbreviations: BM: basilar membrane; CA: cochlear aqueduct; CSF: cerebrospinal fluid; ES: endolymphatic duct and sac; ME: middle ear; RW: round window; SCC: semi-circular canal; ST: scala tympani, SV: scala vestibuli, TM: tympanic membrane; V: vestibule. The endolymphatic duct and sac is not an open pathway but is closed by the tissues of the sac, so it is not considered a significant compliance.

the site(s) of compliance (blue arrows) which requires a pressure gradient to exist along the system, as indicated by the shading. The pressure differential across the basilar membrane will displace it, causing stimulation of the IHC and OHC. This is the situation for external sounds entering the normal cochlea via the ossicular chain. In panel C the situation is compared for sounds originating in the CSF and entering the system through the CA. In this case, the compliant RW is situated close to the location of aqueduct entry, so the major fluid flows and pressure gradients occur locally between these structures. As the stapes and other boundaries in scala vestibuli and the vestibule are relatively noncompliant, pressure gradients across the basilar membrane will be lower than with an equivalent pressure applied by the stapes. For infrasonic frequencies, it was shown that responses to 1 Hz pressure oscillation applied to the fluid in the basal turn of ST were substantially increased when the wall of SV was perforated thereby providing greater compliance in that scala (Salt and DeMott, 1999).

The final condition in Fig. 2D shows the consequences of a "third window" on the SV/vestibule side of the cochlear partition. This causes an increased "air-bone gap" (i.e. an increase in sensitivity to bone conducted vibration and a decreased sensitivity to air conducted sounds, primarily at low frequencies; Merchant and Rosowski, 2008). It may also produce an abnormal sound-induced stimulation of other receptors in the inner ear, such as the hair cells in the ampulla of the semi-circular canal. This is the basis of the Tullio phenomenon, in which externally or internally generated sounds, such as voice, induce dizziness.

Receptors in other organs of the inner ear, specifically both the saccule and the utricle also respond to airborne sounds delivered by the stapes, as discussed in more detail below. The mechanism of hair cell stimulation of these organs is less certain, but is believed to be related to pressure gradients through the sensory epithelium (Sohmer, 2006).

5. Physiologic responses of the ear to low frequency stimuli

5.1. Cochlear hair cells

When airborne sounds enter the ear, to be transduced into an electrical signal by the cochlear hair cells, they are subjected to a number of mechanical and physiologic transformations, some of which vary systematically with frequency. The main processes involved were established in many studies and were summarized by Cheatham and Dallos (2001). A summary of the components is shown in Fig. 3. There are three major processes influencing the sensitivity of the ear to low frequencies. The first arises from the transmission characteristics of sounds through the ossicular structures of the middle ear, which have been shown to attenuate signals at a rate of 6 dB/octave for frequencies below 1000 Hz (Dallos, 1973). As the vibration amplitude in air increases at 6 dB/octave as frequency is lowered, this attenuation characteristic of middle ear transmission results in the displacement of middle ear structures remaining almost constant across frequency for sounds of constant pressure level. A second process attenuating low frequency sounds is the fluid shunting between ST and SV through the helicotrema. The helicotrema has been shown to attenuate frequencies below 100 Hz by 6 dB/octave (Dallos, 1970). The third filter arises from the demonstrated dependence of the IHC on stimulus velocity, rather than displacement (Dallos, 1984). This results in an attenuation of 6 dB/octave for frequencies below approximately 470 Hz for the IHC, and causes a 90° phase difference between IHC and OHC responses (Dallos, 1984). The combined results of these processes are compared with the measured sensitivity of human hearing (ISO226, 2003) in Fig. 3B. The three processes combine to produce the steep decline of sensitivity (up to

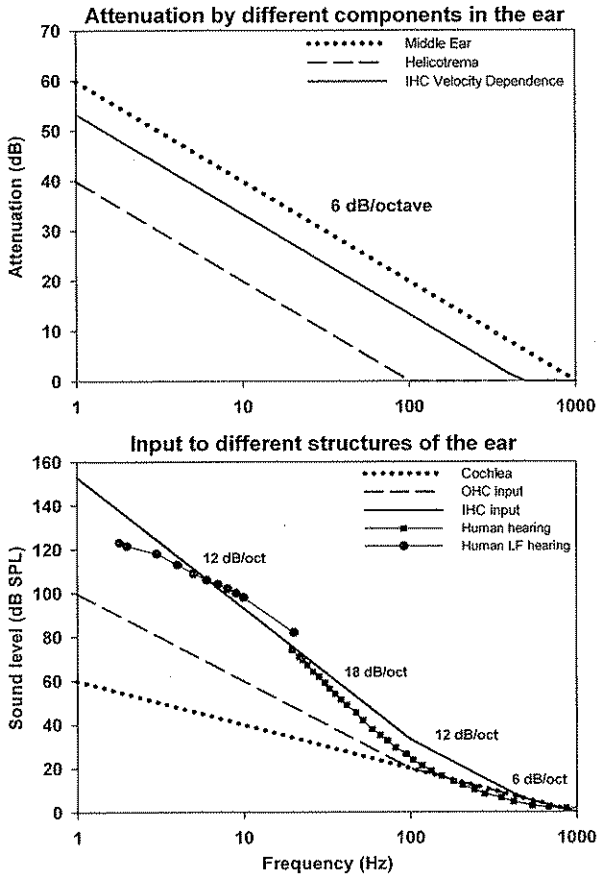

Fig. 3. Upper panel: Estimated properties of high-pass filter functions associated with cochlear signal processing (based on Cheatham and Dallos, 2001). The curves show the low frequency attenuation provided by the middle ear (6 dB/octave below 1000 Hz), by the helicotrema (6 dB/octave below 100 Hz) and by the fluid coupling of the inner hair cells (IHC) resulting in the IHC dependence on stimulus velocity (6 dB/Octave below 470 Hz). Lower panel: Combination of the three processes above into threshold curves demonstrating: input to the cochlea (dotted) as a result of middle ear attenuation; input to the outer hair cells (OHC) as a result of additional filtering by the helicotrema; and input to the IHC as a result of their velocity dependence. Shown for comparison is the sensitivity of human hearing in the audible range (ISO226, 2003) and the sensitivity of humans to infrasounds (Møller and Pederson, 2004). The summed filter functions account for the steep (18 dB/octave) decrease in sensitivity below 100 Hz.

18 dB/octave) in human hearing for frequencies between 100 and 20 Hz. This steep cutoff means that to hear a stimulus at 5 Hz it must be presented at 105 dB higher level than one at 500 Hz. This reflects the fact that the predominant, type I afferent fibers are stimulated by the IHC and that mammals hear with their IHC (Dallos, 2008). However, an important consequence of this underlying mechanism is that the OHC and IHC differ markedly in their responses to low frequency stimuli. As the OHC respond to displacement, rather than velocity, they are not subject to the 6 dB/octave attenuation seen by IHC, so at low frequencies they are stimulated by lower sound levels than the IHC. In theory, the difference between IHC and OHC responses will increase as frequency decreases (becoming over 50 dB at 1 Hz), but in practice, there is interaction between the two types of hair cells which limits the difference as discussed below.

The measured response phase of OHC, IHC and auditory nerve fibers is consistent with the above processes. The cochlear microphonics (CM) recorded in the organ of Corti with low frequency stimuli are in phase with the intracellular potentials of the OHC. This supports the view that the low frequency CM is dominated by

OHC-generated potentials, which follow the displacement of the basilar membrane (Dallos et al., 1972). In contrast, intracellular responses from the IHC lead the organ of Corti CM response by an amount which approaches 90° as frequency is reduced to 100 Hz (Dallos, 1984) corresponding to maximal basilar membrane velocity towards SV (Nuttall et al., 1981). As frequency is lowered, the intracellular potentials of IHC and afferent fiber responses show phase changes consistent with the IHC no longer responding to the increasingly attenuated velocity stimulus, but instead responding to the extracellular potentials generated by the OHC (Sellick et al., 1982; Cheatham and Dallos, 1997). A similar change of phase as frequency is lowered was reported in human psychophysical measurements (Zwicker, 1977) with masking patterns differing by approximately 90° for frequencies above and below 40 Hz. This transition from a response originating from mechanical stimulation of the IHC, to one originating from electrical stimulation of the IHC by large extracellular responses from the OHC may account for the transition of low frequency sensitivity in humans from 18 dB/octave above 20 Hz to 12 dB/octave below 10 Hz (Møller and Pederson, 2004) (Fig. 3B). Near 10 Hz the IHC transition to become primarily stimulated by the more sensitive OHC responses. It can be inferred that if extracellular voltages generated by the OHC are large enough to electrically stimulate the IHC at a specific frequency and level, then the lowest level that the OHC respond to at that frequency must be substantially lower. Based on this understanding of how the sensitivity of the ear arises, one conclusion is that at low frequencies the OHC are responding to infrasound at levels well below those that are heard. On the basis of the calculated input to OHC in Fig. 3B, it is possible that for frequencies around 5 Hz, the OHC could be stimulated at levels up to 40 dB *below* those that stimulate the IHC. Although the OHC at 1 kHz are approximately 12 dB less sensitive than IHC (Dallos, 1984), this difference declines as frequency is lowered and differences in hair cell sensitivity at very low frequencies (below 200 Hz) have not been measured.

Much of the work understanding how the ear responds to low frequency sounds is based on measurements performed in animals. Although low frequency hearing sensitivity depends on many factors including the mechanical properties of the middle ear, low frequency hearing sensitivity has been shown to be correlated with cochlear length for many species with non-specialized cochleas, including humans and guinea pigs (West, 1985; Echteler et al., 1994). The thresholds of guinea pig hearing have been measured with stimulus frequencies as low as 50 Hz, as shown in Fig. 4A. The average sensitivity at 125 Hz for five groups in four studies (Heffner et al., 1971; Miller and Murray, 1966; Walloch and Taylor-Spikes, 1976; Prosen et al., 1978; Fay, 1988) was 37.9 dB SPL, which is 17.6 dB less sensitive than the human at the same frequency and is consistent with the shorter cochlea of guinea pigs. In the absence of data to the contrary, it is therefore reasonable to assume that if low frequency responses are present in the guinea pig at a specific level, then they will be present in the human at a similar or lower stimulus level.

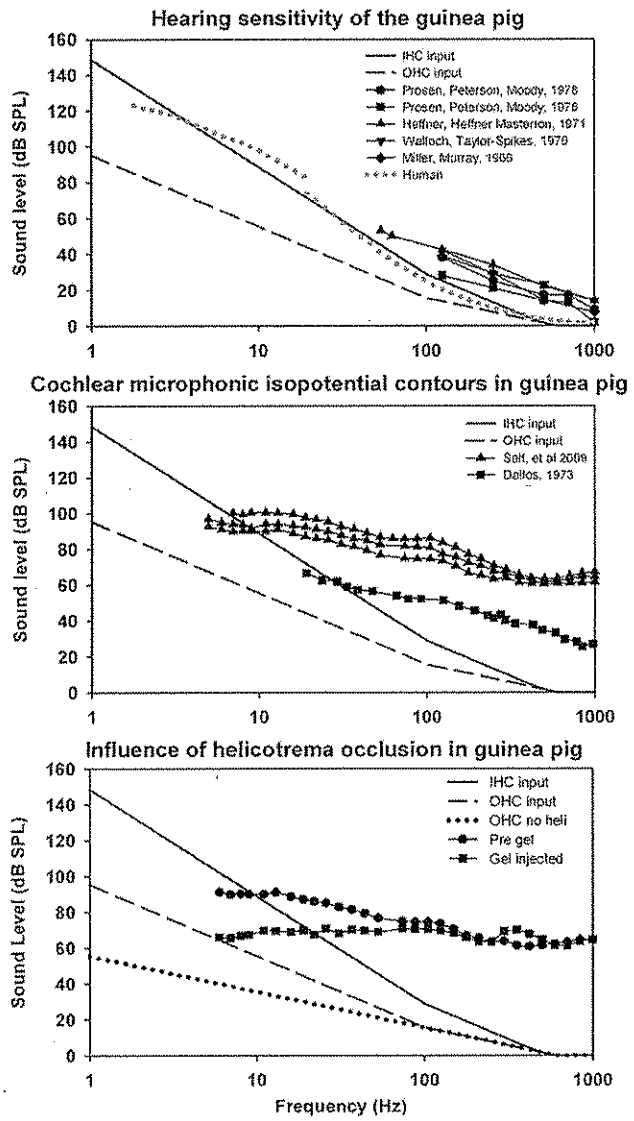

Fig. 4. Upper panel: Similar filter functions as Fig. 3, with parameters appropriate for the guinea pig, and compared with measures of guinea pig hearing. At 125 Hz the guinea pig is approximately 18 dB less sensitive than the human (shown dotted for comparison). Middle panel: Cochlear microphonic isopotential contours in the guinea pig show no steep cutoff below 100 Hz, consistent with input to the OHC being maintained at lower levels than the IHC for low frequencies. Lower panel: Influence of helicotrema occlusion in the guinea pig, produced by injecting 2 μL of hyaluronate gel into the cochlear apex, on the CM isopotential function. Also shown for comparison is the estimated input sensitivity for the OHC with the attenuation by the helicotrema excluded. CM sensitivity curves both have lower slopes than their predicted functions, but the change caused by helicotrema occlusion is comparable.

5.2. Cochlear microphonic measurements

Cochlear microphonics (CM) to low frequency tones originate primarily from the OHC (Dallos et al., 1972; Dallos and Cheatham, 1976). The sensitivity of CM as frequency is varied is typically shown by CM isopotential contours, made by tracking a specified CM amplitude as frequency is varied. Fig. 4B shows low frequency CM sensitivity with two different criteria (Dallos, 1973: 3 μV; Salt et al., 2009: 500 μV). The decrease in CM sensitivity as frequency is lowered notably follows a far lower slope than that of human hearing over the comparable frequency range. In the data from Salt et al. (2009), the stimulus level differences between 5 Hz and 500 Hz average only 34 dB (5.2 dB/octave), compared to the 105 dB difference (15.8 dB/octave) for human hearing over the same range. Although these are suprathreshold, extracellular responses, based on an arbitrary amplitude criterion, these findings are consistent with the OHC having a lower rate of cutoff with frequency than the IHC, and therefore responding to lower level stimuli at very low frequencies.

The measured change in CM sensitivity with frequency may include other components, such as a contribution from transducer adaptation at the level of the OHC stereocilia (Kros, 1996). Kennedy et al. (2003) have suggested that adaptation of the mechano-electrical transducer channels is common to all hair cells and contributes to driving active motion of the hair cell bundle. Based

on their measurements in cells isolated from the apical turns of neonatal rats, they estimated that the adaptation caused high-pass filtering with a low frequency cutoff frequency of 2/3 of the best frequency for the cochlear location. This type of adaptation, however, does not appear to provide additional attenuation at very low frequencies, as inferred from CM sensitivity curves measured down to 5 Hz. On the contrary, the CM sensitivity curve appears to flatten below 10 Hz, a phenomenon which is currently under investigation in our laboratory.

Fig. 4C shows the influence of plugging the helicotrema with gel on CM sensitivity with frequency, recorded from the basal turn of a guinea pig with a 500 μV criterion (Salt et al., 2009). These relative sensitivity changes, combined with a 90° phase shift in responses, replicate those of Franke and Dancer (1982) and demonstrate the contribution to attenuation provided by the helicotrema for frequencies below approximately 100 Hz. This contrasts with a prior suggestion that the helicotrema of the guinea pig was less effective than that of other species (Dallos, 1970). While the above CM measurements were made with the bulla open, measurements made in both the bulla open/closed conditions with closed sound-field stimulation suggest there is no pronounced frequency dependence of the difference between these conditions below 300 Hz although there may be a level difference of 5–15 dB (Dallos, 1973; Wilson and Johnstone, 1975).

5.3. Low frequency biasing, operating point, and distortion generation

As a result of the saturating, nonlinear transducer characteristic of cochlear hair cells (Russell and Sellick, 1983; Kros, 1996), the fidelity of cochlear transduction depends highly on the so-called operating point of the cochlear transducer, which can be derived by Boltzmann analysis of the CM waveform (Patuzzi and Moleirinho, 1998; Patuzzi and O'Beirne, 1999). The operating point can be regarded as the resting position of the organ of Corti or its position during zero crossings of an applied stimulus (which may not be identical, as stimulation can itself influence operating point). Small displacements of operating point have a dramatic influence on even-order distortions generated by the cochlea ($2f$, f_2-f_1) while having little influence on odd-order distortions ($3f$, $2f_1-f_2$) until displacements are large (Frank and Kössl, 1996; Sirjani et al., 2004). Low frequency sounds (so-called bias tones) have been shown to modulate distortion generated by the ear by their displacement of the operating point of the organ of Corti (Brown et al., 2009). In normal guinea pigs, 4.8 Hz bias tones at levels of 85 dB SPL have been shown to modulate measures of operating point derived from an analysis of CM waveforms (Brown et al., 2009; Salt et al., 2009). This is a level that is substantially below the expected hearing threshold of the guinea pig at 4.8 Hz. In animals where the helicotremea was occluded by injection of gel into the perilymphatic space at the cochlear apex, even lower bias levels (down to 60 dB SPL) modulate operating point measures (Salt et al., 2009). These findings are again consistent with the OHC being the origin of the signals measured and the OHC being more responsive to low frequency sounds than the IHC. A similar hypersensitivity to 4.8 Hz bias tones was also found in animals with surgically-induced endolymphatic hydrops (Salt et al., 2009). This was thought to be related to the occlusion of the helicotrema by the displaced membranous structures bounding the hydropic endolymphatic space in the apical turn. In some cases of severe hydrops, Reissner's membrane was seen to herniate into ST. As endolymphatic hydrops is present both in patients with Meniere's disease and in a significant number of asymptomatic patients (Merchant et al., 2005), the possibility exists that some individuals may be more sensitive to infrasound due the presence of endolymphatic hydrops.

In the human ear, most studies have focused on the $2f_1-f_2$ distortion product, as even-order distortions are difficult to record in humans. The $2f_1-f_2$ component has been demonstrated to be less sensitive to operating point change (Sirjani et al., 2004; Brown et al., 2009). Using different criteria of bias-induced distortion modulation, the dependence on bias frequency was systematically studied in humans for frequencies down to 25 Hz, 6 Hz and 15 Hz respectively (Bian and Scherrer, 2007; Hensel et al., 2007; Marquardt et al., 2007). In each of these studies, the bias levels required were above those that are heard by humans, but in all of them the change of sensitivity with frequency followed a substantially lower slope than the hearing sensitivity change as shown in Fig. 5. Again this may reflect the OHC origins of acoustic emissions, possibly combined with the processes responsible for the flattening of equal loudness contours for higher level stimuli, since the acoustic emissions methods are using probe stimuli considerably above threshold. Although in some regions, slopes of 9–12 dB/octave were found, all showed slopes of 6 dB/octave around the 20 Hz region where human hearing falls most steeply at 18 dB/octave. It should also be emphasized that each of these studies selected a robust modulation criterion and was not specifically directed at establishing a threshold for the modulation response at each frequency. Indeed, in the data of Bian and Scherrer (2007) (their Fig. 3), significant modulation can be seen at levels down to 80 dB SPL at some of the test frequencies. In one of the studies (Marquardt et al., 2007) equivalent measurements were performed in guinea pigs. Although somewhat lower slopes were observed in guinea pigs it is remarkable that stimulus levels required for modulation of distortion were within 5–10 dB of each other for guinea pigs and humans across most of the frequency range. In this case the guinea pig required lower levels than the human. Although the threshold of sensitivity cannot be established from these studies, it is worth noting that for distortion product measurements in the audible range, "thresholds" typically require stimulus levels in the 35–45 dB SPL range (Lonsbury-Martin et al., 1990). In the Marquardt study, the bias tone level required at 500 Hz is over 60 dB above hearing threshold at that frequency.

5.4. Feedback mechanisms stabilizing operating point

The OHC not only transduce mechanical stimuli to electrical responses, but also respond mechanically to electrical stimulation

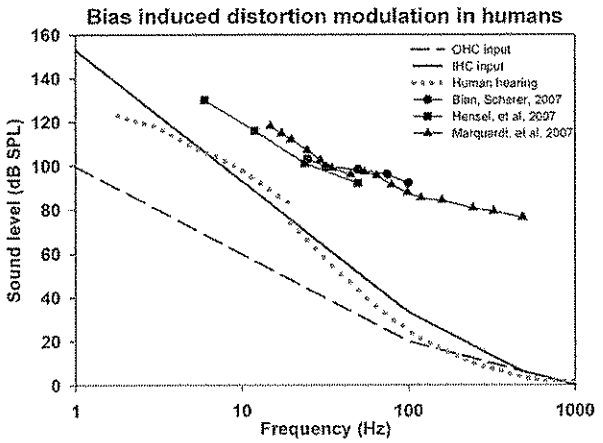

Fig. 5. Frequency dependence of low frequency bias-induced modulation of the $2f_1-f_2$ distortion product measured in the external ear canal of humans in three studies, compared with estimated input functions and human hearing sensitivity. Below 100 Hz the sensitivity to bias falls off at a much lower slope than human hearing, consistent with the response originating from OHC with a lower cutoff slope.

(reviewed by Dallos, 2008) in a manner that provides mechanical amplification. This "active tuning" primarily enhances responses to high stimulus frequencies and is thought to provide little or no active gain with stimuli below approximately 1 kHz (Sellick et al., 2006). For low frequency stimulation, however, basilar membrane modulation by the low frequency tone does have a major influence on the mechanics at the best frequency of high frequency tones i.e. on the active tuning process (Patuzzi et al., 1984). It has been suggested that slow mechanical movements of the OHC may play a part in stabilizing the operating point of the transducer (LePage, 1987, 1989) so the OHC may participate in an active cancellation of low frequency sounds. In models of the cochlear transducer, it was proposed that negative feedback occurred at low frequencies (in which the OHC opposed movements of the basilar membrane), which becomes a positive feedback at the best frequency for the region (Mountain et al., 1983). Chan and Hudspeth (2005) have also suggested OHC motility may be exploited to maintain the operating point of a fast amplifier in the hair cell bundle. However, this possibility has recently been questioned by Dallos (Ashmore et al., 2010) for a number of reasons, one of which is the somatic motor protein, prestin, has an extremely fast response capability. So the interrelationships between hair cell motility and transduction, and between OHC and IHC remain an intense focus of current research. For low frequencies, it has been shown that an out-of phase motion exists between the IHC reticular lamina and the overlying TM so that electromechanical action of the OHC may stimulate the IHC directly, without involvement of the basilar membrane (Nowotny and Gummer, 2006). The possible roles of the OHC and efferent systems are made more complex by recent findings of reciprocal synapses between OHC and their efferent terminals, seen as afferent and efferent synapses on the same fiber (Thiers et al., 2008). One explanation for this system is that the synapses may locally (without involvement of the central nervous system) coordinate the responses of the OHC population so that optimum operating point is maintained for high frequency transduction.

There is some evidence for active regulation of operating point based on the biasing of acoustic emission amplitudes by low frequency tones in which a "hysteresis" was observed (Bian et al., 2004). The hysteresis was thought to result from active motor elements, either in the stereocilia or the lateral wall of the OHC, shifting the transducer function in the direction of the bias. A similar hysteresis was also reported by Lukashkin and Russell (2005) who proposed that a feedback loop was present during the bias that keeps the operating point at its most sensitive region, shifting it in opposite directions during compression and rarefaction phase of the bias tone thereby partially counteracting its effects.

If there are systems in the cochlea to control operating point as an integral component of the amplification process, they would undoubtedly be stimulated in the presence of external infrasound.

5.5. Vestibular function

The otolith organs, comprising of the saccule and utricle, respond to linear accelerations of the head (Uzun-Coruhlu et al., 2007) and the semi-circular canals respond to angular acceleration. These receptors contribute to the maintenance of balance and equilibrium. In contrast to the hair cells of the cochlea, the hair cells of the vestibular organs are tuned to very low frequencies, typically below 30 Hz (Grossman et al., 1988). Frequency tuning in vestibular hair cells results from the electrochemical properties of the cell membranes (Manley, 2000; Art and Fettiplace, 1987) and may also involve active mechanical amplification of their stereociliary input (Hudspeth, 2008; Rabbitt et al., 2010). Although vestibular hair cells are maximally sensitive to low frequencies they typically do not respond to airborne infrasound. Rather, they normally respond to mechanical inputs resulting from head movements and positional changes with their output controlling muscle reflexes to maintain posture and eye position. At the level of the hair cell stereocilia, although vibrations originating from head movements and low frequency sound would be indistinguishable, the difference in sensitivity lies in the coupling between the source stimulus and the hair cell bundle. Head movements are efficiently coupled to the hair cell bundle, while acoustic stimuli are inefficiently coupled due to middle ear characteristics and the limited pressure gradients induced within the structure with sound stimuli (Sohmer, 2006).

In a similar manner to cochlear hair cells, which respond passively (i.e. without active amplification) to stimuli outside their best frequency range, vestibular hair cells respond passively to stimuli outside their best frequency range. The otolith organs have been shown to respond to higher, acoustic frequencies delivered in the form of airborne sounds or vibration. This has been demonstrated in afferent nerve fiber recordings from vestibular nerves (Young et al., 1977; McCue and Guinan, 1994; Curthoys et al., 2006) and has recently gained popularity as a clinical test of otolith function in the form of vestibular evoked myogenic potential (VEMP) testing (Todd et al., 2003; Zhou and Cox, 2004; Curthoys, 2010).These responses arise because higher frequency stimuli are more effectively coupled to the otolithic hair cells. But as sound or vibration frequency is reduced, its ability to stimulate the vestibular organs diminishes (Murofushi et al., 1999; Hullar et al., 2005; Todd et al., 2008). So for very low frequencies, even though the hair cell sensitivity is increasing as active tuning is invoked, mechanical input is being attenuated. While there have been many studies of vestibular responses to physiologic stimuli (i.e. head accelerations, rotations, etc) comprising of infrasonic frequency components, we are unaware of any studies that have directly investigated vestibular responses to airborne infrasound of similar frequency composition. As people do not become unsteady and the visual field does not blur when exposed to high-level infrasound, it can be concluded that sensitivity is extremely low.

In some pathologic conditions, coupling of external infrasound may be greater. It is known that "third window" defects, such as superior canal dehiscence increase the sensitivity of labyrinthine receptors to sounds (Wit et al., 1985; Watson et al., 2000; Carey et al., 2004), and are exhibited as the Tullio phenomenon (see earlier section). To our knowledge, the sensitivity of such patients to controlled levels of infrasound has never been evaluated. In this respect, it needs to be considered that vestibular responses to stimulation could occur at levels below those that are perceptible to the patient (Todd et al., 2008).

5.6. Inner ear fluids changes

Some aspects of cochlear fluids homeostasis have been shown to be sensitive to low frequency pressure fluctuations in the ear. The endolymphatic sinus is a small structure between the saccule and the endolymphatic duct which has been implicated as playing a pivotal role in endolymph volume regulation (Salt, 2005). The sinus has been shown to act as a valve, limiting the volume of endolymph driven into the endolymphatic sac by pressure differences across the endolymphatic duct (Salt and Rask-Andersen, 2004). The entrance of saccular endolymph into the endolymphatic sac can be detected either by measuring the K^+ concentration in the sac (as saccular endolymph has substantially higher K^+ concentration) or by measuring hydrostatic pressure. The application of a sustained pressure to the vestibule did not cause K^+ elevation or pressure increase in the sac, confirming that under this condition, flow was prevented by the membrane of the sinus acting as a valve. In contrast, the application of 5 cycles at 0.3 Hz to the

external ear canal, caused a K^+ increase in the sac, confirming that oscillation of pressure applied to the sinus allowed pulses of endolymph to be driven from the sinus into the endolymphatic sac. The pressure changes driving these pulses was large, comparable to those produced by contractions of the tensor tympani muscle, as occurs during swallowing. Tensor tympani contractions produce displacements of the stapes towards the vestibule for a duration of approximately 0.5 s (~2 Hz), which induce large EP changes and longitudinal movements of endolymph within the cochlea (Salt and DeMott, 1999). The lowest sound level that drives endolymph movements is currently unknown.

A therapeutic device (the Meniett: www.meniett.com; Odkvist et al., 2000) that delivers infrasound to the inner ear is widely used to treat Meniere's disease in humans (a disease characterized by endolymphatic hydrops). The infrasonic stimulus (6 Hz or 9 Hz) is delivered by the device in conjunction with sustained positive pressure in the external canal. An important aspect of this therapy, however, is that a tympanostomy tube is placed in the tympanic membrane before the device is used. The tympanostomy tube provides an open perforation of the tympanic membrane which shunts pressure across the structure, so that ossicular movements (and cochlear stimulation) are minimized, and the pressures are applied directly to the round window membrane. Nevertheless, the therapeutic value of this device is based on infrasound stimulation influencing endolymph volume regulation in the ear.

As presented above, endolymphatic hydrops, by occluding the perilymph communication pathway through the helicotrema, makes the ear more sensitive to infrasound (Salt et al., 2009). It has also been shown that non-damaging low frequency sounds in the acoustic range may themselves cause a transient endolymphatic hydrops (Flock and Flock, 2000; Salt, 2004). The mechanism underlying this volume change has not been established and it has never been tested whether stimuli in the infrasound range cause endolymphatic hydrops.

Although infrasound at high levels apparently does not cause direct mechanical damage to the ear (Westin, 1975; Jauchem and Cook, 2007) in animal studies it has been found to exacerbate functional and hair cell losses resulting from high level exposures of sounds in the audible range (Harding et al., 2007). This was explained as possibly resulting from increased mixture of endolymph and perilymph around noise induced lesion sites in the presence of infrasound.

6. Wind turbine noise

Demonstrating an accurate frequency spectrum of the sound generated by wind turbines creates a number of technical problems. One major factor that makes understanding the effects of wind turbine noise on the ear more difficult is the widespread use of A-weighting to document sound levels. A-weighting shapes the measured spectrum according to the sensitivity of human hearing, corresponding to the IHC responses. As we know the sensitivity for many other elements of inner ear related to the OHC do not decline at the steep slope seen for human hearing, then A-weighting considerably underestimates the likely influence of wind turbine noise on the ear. In this respect, it is notable that in none of the physiological studies in the extensive literature reporting cochlear function at low frequencies were the sound stimuli A-weighted. This is because scientists in these fields realize that shaping sound levels according to what the brain perceives is not relevant to understanding peripheral processes in the ear. A-weighting is also performed for technical reasons, because measuring unweighted spectra of wind turbine noise is technically challenging and suitable instrumentation is not widely available. Most common approaches to document noise levels (conventional sound level meters, video cameras, devices using moving coil microphones, etc) are typically insensitive to the infrasound component. Using appropriate instrumentation, Van den Berg showed that wind turbine noise was dominated by infrasound components, with energy increasing between 1000 Hz and 1 Hz (the lowest frequency that was measured) at a rate of approximately 5.5 dB/octave, reaching levels of approximately 90 dB SPL near 1 Hz Sugimoto et al. (2008) reported a dominant spectral peak at 2 Hz with levels monitored over time reaching up to 100 dB SPL. Jung and Cheung (2008) reported a major peak near 1 Hz at a level of approximately 97 dB SPL. In most studies of wind turbine noise, this high level, low frequency noise is dismissed on the basis that the sound is not perceptible. This fails to take into account the fact that the OHC are stimulated at levels that are not heard.

7. Conclusions

The fact that some inner ear components (such as the OHC) may respond to infrasound at the frequencies and levels generated by wind turbines does not necessarily mean that they will be perceived or disturb function in any way. On the contrary though, if infrasound is affecting cells and structures at levels that cannot be heard this leads to the possibility that wind turbine noise could be influencing function or causing unfamiliar sensations. Long-term stimulation of position-stabilizing or fluid homeostasis systems could result in changes that disturb the individual in some way that remains to be established. We realize that some individuals (such as fighter pilots) can be exposed to far higher levels of infrasound without undue adverse effects. In this review, we have confined our discussion to the possible direct influence of infrasound on the body mediated by receptors or homeostatic processes in the inner ear. This does not exclude the possibility that other receptor systems, elsewhere in the body could contribute to the symptoms of some individuals.

The main points of our analysis can be summarized as follows:

1) Hearing perception, mediated by the inner hair cells of the cochlea, is remarkably insensitive to infrasound.
2) Other sensory cells or structures in the inner ear, such as the outer hair cells, are more sensitive to infrasound than the inner hair cells and can be stimulated by low frequency sounds at levels below those that are heard. The concept that an infrasonic sound that cannot be heard can have no influence on inner ear physiology is incorrect.
3) Under some clinical conditions, such as Meniere's disease, superior canal dehiscence, or even asymptomatic cases of endolymphatic hydrops, individuals may be hypersensitive to infrasound.
4) A-weighting wind turbine sounds underestimates the likely influence of the sound on the ear. A greater effort should be made to document the infrasound component of wind turbine sounds under different conditions.
5) Based on our understanding of how low frequency sound is processed in the ear, and on reports indicating that wind turbine noise causes greater annoyance than other sounds of similar level and affects the quality of life in sensitive individuals, there is an urgent need for more research directly addressing the physiologic consequences of long-term, low level infrasound exposures on humans.

Acknowledgments

This work was supported by research grant RO1 DC01368 (2005–2010) and KO8 DC 006869 (2004–2010) from the National Institute on Deafness and Other Communication Disorders, National Institutes of Health.

References

Art, J.J., Fettiplace, R., 1987. Variation of membrane properties in hair cells isolated from the turtle cochlea. J. Physiol. 385, 207–242.

Ashmore, J., Avan, P., Brownell, W.E., Dallos, P., Dierkes, K., Fettiplace, R., Grosh, K., Hackney, C.M., Hudspeth, A.J., Jülicher, F., Lindner, B., Martin, P., Meaud, J., Petit, C., Sacchi, J.R., Canlon, B., 2010. The remarkable cochlear amplifier. Hear. Res. 266, 1–17.

Bian, L., Linhardt, E.E., Chertoff, M.E., 2004. Cochlear hysteresis: observation with low-frequency modulated distortion product otoacoustic emissions. J. Acoust. Soc. Am. 115, 2159–2172.

Bian, L., Scherrer, N.M., 2007. Low-frequency modulation of distortion product otoacoustic emissions in humans. J. Acoust. Soc. Am. 122, 1681–1692.

British Wind Energy Association, 2010. http://www.bwea.com/ref/noise.html.

Brown, M.C., 1994. Antidromic responses of single units from the spiral ganglion. J. Neurophysiol. 71, 1835–1847.

Brown, D.J., Hartsock, J.J., Gill, R.M., Fitzgerald, H.E., Salt, A.N., 2009. Estimating the operating point of the cochlear transducer using low-frequency biased distortion products. J. Acoust. Soc. Am. 125, 2129–2145.

Carey, J.P., Hirvonen, T.P., Hullar, T.E., Minor, L.B., 2004. Acoustic responses of vestibular afferents in a model of superior canal dehiscence. Otol. Neurotol. 25, 345–352.

Chan, D.K., Hudspeth, A.J., 2005. Ca2+ current-driven nonlinear amplification by the mammalian cochlea in vitro. Nat. Neurosci. 8, 149–155.

Cheatham, M.A., Dallos, P., 1997. Low-frequency modulation of inner hair cell and organ of corti responses in the guinea pig cochlea. Hear. Res. 108, 191–212.

Cheatham, M.A., Dallos, P., 2001. Inner hair cell response patterns: implications for low-frequency hearing. J. Acoust. Soc. Am. 110, 2034–2044.

Curthoys, I.S., Kim, J., McPhedran, S.K., Camp, A.J., 2006. Bone conducted vibration selectively activates irregular primary otolithic vestibular neurons in the guinea pig. Exp. Brain Res. 175, 256–267.

Curthoys, I.S., 2010. A critical review of the neurophysiological evidence underlying clinical vestibular testing using sound, vibration and galvanic stimuli. Clin. Neurophysiol. 121, 132–144.

Dallos, P., 1970. Low-frequency auditory characteristics: species dependence. J. Acoust. Soc. Am. 48, 489–499.

Dallos, P., Billone, M.C., Durrant, J.D., Wang, C., Raynor, S., 1972. Cochlear inner and outer hair cells: functional differences. Science 177, 356–358.

Dallos, P., 1973. The Auditory Periphery. Academic Press, NY, pp. 83–126.

Dallos, P., Cheatham, M.A., 1976. Production of cochlear potentials by inner and outer hair cells. J. Acoust. Soc. Am. 60, 510–512.

Dallos, P., 1984. Some electrical circuit properties of the organ of Corti. II. Analysis including reactive elements. Hear. Res. 14, 281–291.

Dallos, P., 2008. Cochlear amplification, outer hair cells and prestin. Curr. Opin. Neurobiol. 18, 370–376 (Review).

Dancer, A., Franke, R., 1980. Intracochlear sound pressure measurements in guinea pigs. Hear. Res. 2, 191–205.

Echteler, S.M., Fay, R.R., Popper, A.N., 1994. The influence of cochlear shape on low-frequency hearing. In: Mammals, Fay RR, Popper, A.N. (Eds.), Comparative Hearing. Springer, New York, pp. 134–171.

Fay, R.R., 1988. Hearing in vertebrates. In: A Psychophysics Databook. Hill-Fay Associates, pp. p375–378.

Feldmann, J., Pitten, F.A., 2004. Effects of low frequency noise on man—a case study. Noise Health 7, 23–28.

Flock, A., Flock, B., 2000. Hydrops in the cochlea can be induced by sound as well as by static pressure. Hear. Res. 150, 175–188.

Franke, R., Dancer, A., 1982. Cochlear mechanisms at low frequencies in the guinea pig. Arch. Otorhinolaryngol. 234, 213–218.

Frank, G., Kössl, M., 1996. The acoustic two-tone distortions $2f_1-f_2$ and f_2-f_1 and their possible relation to changes in the operating point of the cochlear amplifier. Hear. Res. 98, 104–115.

Grossman, G.E., Leigh, R.J., Abel, L.A., Lanska, D.J., Thurston, S.E., 1988. Frequency and velocity of rotational head perturbations during locomotion. Exp. Brain Res. 70, 470–476.

Harding, G.W., Bohne, B.A., Lee, S.C., Salt, A.N., 2007. Effect of infrasound on cochlear damage from exposure to a 4 kHz octave band of noise. Hear. Res. 225, 128–138.

Harry, A., 2007. Wind turbines, noise and health. www.windturbinenoisehealth humanrights.com/wtnoise_health_2007_a_barry.pdf.

Heffner, R., Heffner, H., Masterton, B., 1971. Behavioral measurements of absolute and frequency-difference thresholds in guinea pig. J. Acoust. Soc. Am. 49, 1888–1895.

Hensel, J., Scholz, G., Hurttig, U., Mrowinski, D., Janssen, T., 2007. Impact of infrasound on the human cochlea. Hear. Res. 233, 67–76.

Hudspeth, A.J., 2008. Making an effort to listen: mechanical amplification in the ear. Neuron 59, 530–545.

Hullar, T.E., Della Santina, C.C., Hirvonen, T., Lasker, D.M., Carey, J.P., Minor, L.B., 2005. Responses of irregularly discharging chinchilla semicircular canal vestibular-nerve afferents during high-frequency head rotations. J. Neurophysiol. 93, 2777–2786.

ISO226, 2003. Normal Equal Loudness Level Contours. International Standards Organization, Genéve.

Jauchem, J.R., Cook, M.C., 2007. High-intensity acoustics for military nonlethal applications: a lack of useful systems. Mil Med. 172, 182–189.

Jung, S.S., Cheung, W., 2008. Experimental identification of acoustic emission characteristics of large wind turbines with emphasis on infrasound and low-frequency noise. J. Korean Phys. Soc. 53, 1897–1905.

Kennedy, H.J., Evans, M.G., Crawford, A.C., Fettiplace, R., 2003. Fast adaptation of mechanoelectrical transducer channels in mammalian cochlear hair cells. Nat. Neurosci. 6, 832–836.

Kimura, R.S., 1975. The ultrastructure of the organ of Corti. Int. Rev. Cytol. 42, 173–222.

Kros, C.J., 1996. Physiology of mammalian cochlear hair cells. In: Dallos, P., Popper, A.N., Fay, R.R. (Eds.), The Cochlea. Springer Press, New York, pp. 318–385.

LePage, E.L., 1987. Frequency-dependent self-induced bias of the basilar membrane and its potential for controlling sensitivity and tuning in the mammalian cochlea. J. Acoust. Soc. Am. 82, 139–154.

LePage, E.L., 1989. Functional role of the olivo-cochlear bundle: a motor unit control system in the mammalian cochlea. Hear. Res. 38, 177–198.

Leventhall, H.G., 2009. Low frequency noise. What we know, what we do not know and what we would like to know. J. Low Freq. Noise Vib. Active Contr. 28, 79–104.

Lim, D.J., 1986. Functional structure of the organ of Corti: a review. Hear. Res. 22, 117–146.

Lonsbury-Martin, B.L., Harris, F.P., Stagner, B.B., Hawkins, M.D., Martin, G.K., 1990. Distortion product emissions in humans. I. Basic properties in normally hearing subjects. Ann. Otol. Rhinol. Laryngol. Suppl. 147, 3–14.

Lukashkin, A.N., Russell, I.J., 2005. Dependence of the DPOAE amplitude pattern on acoustical biasing of the cochlear partition. Hear. Res. 203, 45–53.

Manley, G.A., 2000. Cochlear mechanisms from a phylogenetic viewpoint. Proc. Natl. Acad. Sci. U.S.A. 97, 11736–11743.

Marquardt, T., Hensel, J., Mrowinski, D., Scholz, G., 2007. Low-frequency characteristics of human and guinea pig cochleae. J. Acoust. Soc. Am. 121, 3628–3638.

McCue, M.P., Guinan Jr., J.J., 1994. Acoustically responsive fibers in the vestibular nerve of the cat. J. Neurosci. 14, 6058–6600.

Merchant, S.N., Adams, J.C., Nadol Jr., J.B., 2005. Pathophysiology of Meniere's syndrome: are symptoms caused by endolymphatic hydrops? Otol. Neurotol. 26, 74–81.

Merchant, S.N., Rosowski, J.J., 2008. Conductive hearing loss caused by third-window lesions of the inner ear. Otol. Neurotol. 29, 282–289.

Miller, J.D., Murray, F.S., 1966. Guinea pig's immobility response to sound: threshold and habituation. J. Comp. Physiol. Psychol. 61, 227–233.

Møller, H., Pederson, C.S., 2004. Hearing at low and infrasonic frequencies. Noise Health 6, 37–57.

Mountain, D.C., Hubbard, A.E., McMullen, T.A., 1983. Electromechanical processes in the Cochlea. In: de Boer, E., Viergever, M.A. (Eds.), Mechanics of Hearing. Delft University Press, Delft, The Netherlands, pp. 119–126.

Murofushi, T., Matsuzaki, M., Wu, C.H., 1999. Short tone burst-evoked myogenic potentials on the sternocleidomastoid muscle: are these potentials also of vestibular origin? Arch. Otolaryngol. Head Neck Surg. 125, 660–664.

Nakajima, H.H., Dong, W., Olson, S., Merchant, S.N., Ravicz, M.E., Rosowski, J.J., 2008. Differential intracochlear sound pressure measurements in normal human temporal bones. J. Assoc. Res. Otolaryngol. 10, 23–36.

Nowotny, M., Gummer, A.W., 2006. Nanomechanics of the subtectorial space caused by electromechanics of cochlear outer hair cells. Proc. Natl. Acad. Sci. U.S.A. 103, 2120–2125.

Nuttall, A.L., Brown, M.C., Masta, R.I., Lawrence, M., 1981. Inner hair cell responses to the velocity of basilar membrane motion in the guinea pig. Brain Res. 211, 171–174.

Odkvist, L.M., Arlinger, S., Billermark, E., Densert, B., Lindholm, S., Wallqvist, J., 2000. Effects of middle ear pressure changes on clinical symptoms in patients with Ménière's disease—a clinical multicentre placebo-controlled study. Acta Otolaryngol. Suppl. 543, 99–101.

Patuzzi, R., Sellick, P.M., Johnstone, B.M., 1984. The modulation of the sensitivity of the mammalian cochlea by low frequency tones. III. Basilar membrane motion. Hear. Res. 13, 19–27.

Patuzzi, R., Moleirinho, A., 1998. Automatic monitoring of mechano-electrical transduction in the guinea pig cochlea. Hear. Res. 125 (1–2), 1–16.

Patuzzi, R.B., O'Beirne, G.A., 1999. Boltzmann analysis of CM waveforms using virtual instrument software. Hear. Res. 133, 155–159.

Pedersen, E., van den Berg, F., Bakker, R., Bouma, J., 2009. Response to noise from modern wind farms in The Netherlands. J. Acoust. Soc. Am. 126, 634–643.

Pedersen, E., Waye, K.P., 2004. Perception and annoyance due to wind turbine noise—a dose-response relationship. J. Acoust. Soc. Am. 116, 3460–3470.

Pedersen, A., Persson Waye, K., 2007. Wind turbine noise, annoyance and self-reported health and well-being in different living environments. Occup. Environ. Med. 64, 480–486.

Pierpont, N., 2009. Wind turbine syndrome. K-selected books. http://www.kselected.com/?page_id=6560.

Prosen, C.A., Petersen, M.R., Moody, D.B., Stebbins, W.C., 1978. Auditory thresholds and kanamycin-induced hearing loss in the guinea pig assessed by a positive reinforcement procedure. J. Acoust. Soc. Am. 63, 559–566.

Rabbitt, R.D., Boyle, R., Highstein, S.M., 2010. Mechanical amplification by hair cells in the semicircular canals. Proc. Natl. Acad. Sci. U.S.A. 107, 3864–3869.

Robertson, D., Sellick, P.M., Patuzzi, R., 1999. The continuing search for outer hair cell afferents in the guinea pig spiral ganglion. Hear. Res. 136, 151–158.

Russell, I.J., Sellick, P.M., 1983. Low-frequency characteristics of intracellularly recorded receptor potentials in guinea-pig cochlear hair cells. J. Physiol. 338, 179–206.

Salt, A.N., DeMott, J.E., 1999. Longitudinal endolymph movements and endocochlear potential changes induced by stimulation at infrasonic frequencies. J. Acoust. Soc. Am. 106, 847–856.

Salt, A.N., Rask-Andersen, H., 2004. Responses of the endolymphatic sac to perilymphatic injections and withdrawals: evidence for the presence of a one-way valve. Hear. Res. 191, 90–100.

Salt, A.N., 2005. Low frequency pressure changes may participate in endolymph volume regulation. In: Lim, D.J. (Ed.), Meniere's Disease and Inner Ear Homeostasis Disorders. House Ear Institute Press, Los Angeles, pp. 27–29.
Salt, A.N., 2004. Acute endolymphatic hydrops generated by exposure of the ear to non-traumatic low frequency tone. J. Assoc. Res. Otolaryngol. 5, 203–214.
Salt, A.N., Brown, D.J., Hartsock, J.J., Plontke, S.K., 2009. Displacements of the organ of Corti by gel injections into the cochlear apex. Hear. Res. 250, 63–75.
Santi, P.A., Tsuprun, V.L., 2001. Cochlear microanatomy and ultrastructure. In: Jahn, A.F., Santos-Sacchi, J. (Eds.), Physiology of the Ear, second ed., pp. 257–283. Singular.
Sellick, P.M., Patuzzi, R., Johnstone, B.M., 1982. Modulation of responses of spiral ganglion cells in the guinea pig cochlea by low frequency sound. Hear. Res. 7, 199–221.
Sellick, P.M., Robertson, D., Patuzzi, R., 2006. The effect of BAPTA and 4AP in scala media on transduction and cochlear gain. Hear. Res. 211, 7–15.
Sirjani, D.B., Salt, A.N., Gill, R.M., Hale, S.A., 2004. The influence of transducer operating point on distortion generation in the cochlea. J. Acoust. Soc. Am. 115, 1219–1229.
Sohmer, H., 2006. Sound induced fluid pressures directly activate vestibular hair cells: implications for activation of the cochlea. Clin. Neurophysiol. 117, 933–934.
Spoendlin, H., 1972. Innervation densities of the Cochlea. Acta Otolaryngol. 73, 235–248.
Sugimoto T, Koyama K, Kurihara Y, Watanabe K. Measurement of infrasound generated by wind turbine generator. In: Proc. SICE Conf. 2008, pp. 5–8.
Thiers, F.A., Nadol Jr., J.B., Liberman, M.C., 2008. Reciprocal synapses between outer hair cells and their afferent terminals: evidence for a local neural network in the mammalian cochlea. J. Assoc. Res. Otolaryngol. 9, 477–489.
Todd, N.P., Rosengren, S.M., Colebatch, J.G., 2003. A short latency vestibular evoked potential (VsEP) produced by bone-conducted acoustic stimulation. J. Acoust. Soc. Am. 114, 3264–3272.
Todd, N.P., Rosengren, S.M., Colebatch, J.G., 2008. Tuning and sensitivity of the human vestibular system to low-frequency vibration. Neurosci. Lett. 444, 36–41.
Uzun-Coruhlu, H., Curthoys, I.S., Jones, A.S., 2007. Attachment of the utricular and saccular maculae to the temporal bone. Hear. Res. 233, 77–85.
Van den Berg, G.P. The sound of high winds: the effect of atmospheric stability on wind turbine sound and microphone noise. PhD Dissertation, University of Groningen, Netherlands. http://dissertations.ub.rug.nl/faculties/science/2006/g.p.van.den.berg/
Von Békésy, G., 1960. Experiments in Hearing. McGraw-Hill, New York.
Walloch, R.A., Taylor-Spikes, M., 1976. Auditory thresholds in the guinea pig: a preliminary report of a behavioral technique employing a food reward. Laryngoscope 86, 1699–1705.
Watson, S.R., Halmagyi, G.M., Colebatch, J.G., 2000. Vestibular hypersensitivity to sound (Tullio phenomenon): structural and functional assessment. Neurology 54, 722–728.
West, C.D., 1985. The relationship of the spiral turns of the cochlea and the length of the basilar membrane to the range of audible frequencies in ground dwelling mammals. J. Acoust. Soc. Am. 77, 1091–1101.
Westin, J.B., 1975. Infrasound: a short review of effects on man. Aviat Space Environ. Med. 46, 1135–1143.
Wilson, J.P., Johnstone, J.R., 1975. Basilar membrane and middle-ear vibration in guinea pig measured by capacitive probe. J. Acoust. Soc. Am. 57, 705–723.
Wit, H.P., Scheurink, A.J., Bleeker, J.D., 1985. Hearing thresholds of normal and fenestrated deaf pigeons. A behavioural study on hearing with the vestibular organ. Acta Otolaryngol. 100, 36–41.
Young, E.D., Fernández, C., Goldberg, J.M., 1977. Responses of squirrel monkey vestibular neurons to audio-frequency sound and head vibration. Acta Otolaryngol. 84, 352–360.
Zhou, G., Cox, L.C., 2004. Vestibular evoked myogenic potentials: history and overview. Am. J. Audiol. 13, 135–143.
Zwicker, E., 1977. Masking-period patterns produced by very-low-frequency maskers and their possible relation to basilar-membrane displacement. J. Acoust. Soc. Am. 61, 1031–1040.

Exhibit 4 is considered Comment D33-31.

EXHIBIT 4

CALL FOR NOMINATIONS: 2011 BOARD OF DIRECTORS - SEE PAGE 39

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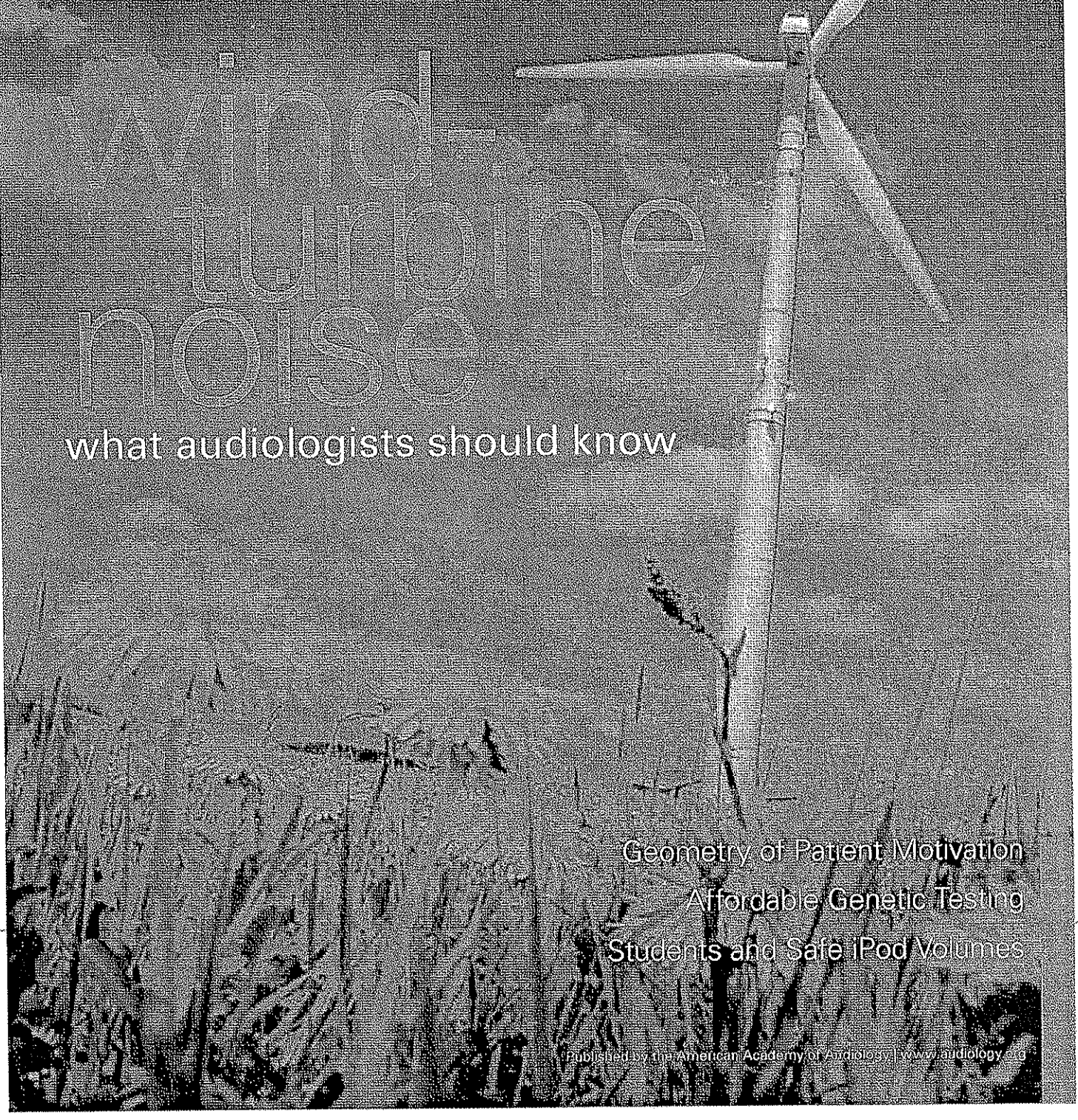
hearing loss

what audiologists should know



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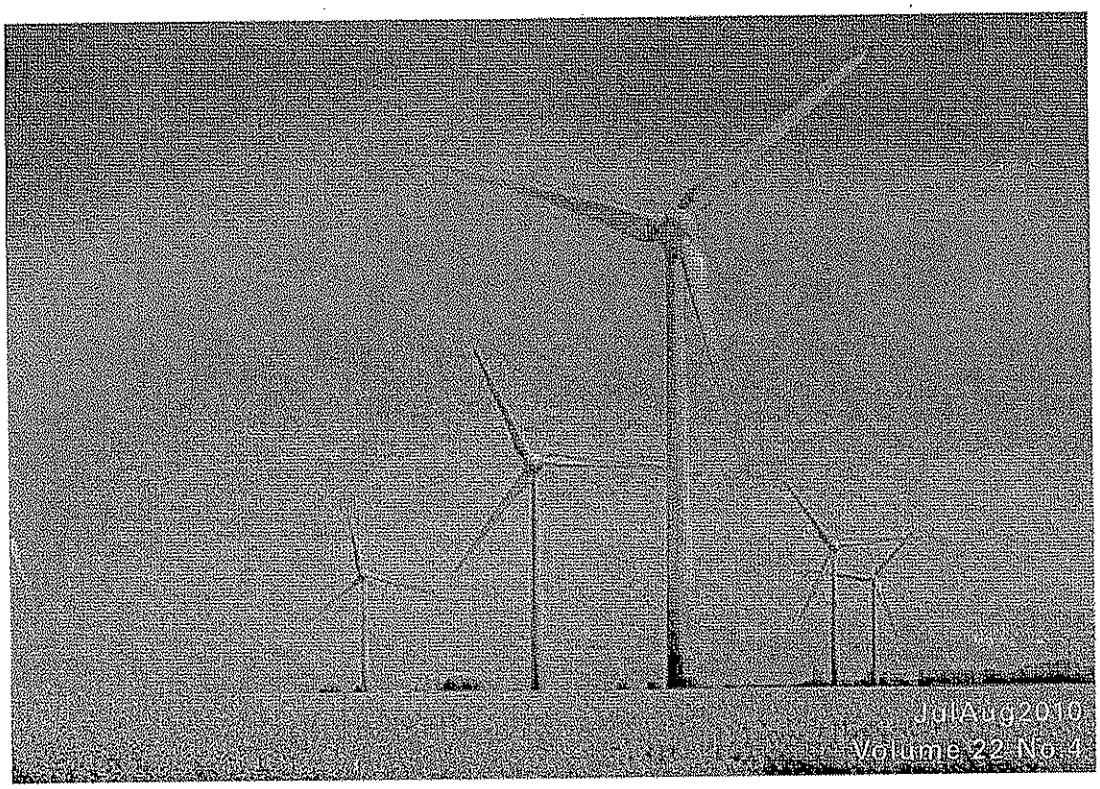
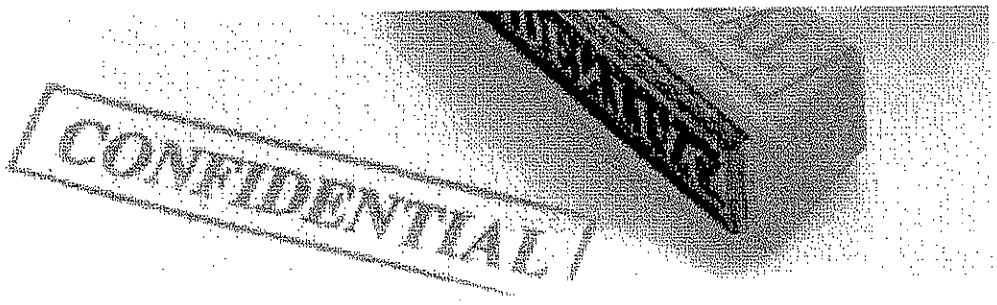


Jul/Aug 2010
Volume 22 No 4

CONTENTS

DEPARTMENTS



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Audiology Today (ISSN 1535-2609) is published bi-monthly by the American Academy of Audiology, 11730 Plaza America Drive, Suite 300, Reston, VA 20190; Phone: 703-790-8466. Periodicals postage paid at Herndon, VA, and additional mailing offices.

Postmaster: Please send postal address changes to *Audiology Today*, c/o Membership Department, American Academy of Audiology, 11730 Plaza America Drive, Suite 300, Reston, VA 20190.

Members and Subscribers: Please send address changes to membership@audiology.org.

The annual print subscription price is $112 for US institutions ($134 outside the US) and $54 for US individuals ($102 outside the US). Single copies are $15 for US individuals ($20 outside the US) and $20 for US institutions ($25 outside the US). For subscription inquiries, telephone 703-790-8466 or 800-AAA-2336. Claims for undelivered copies must be made within four (4) months of publication.

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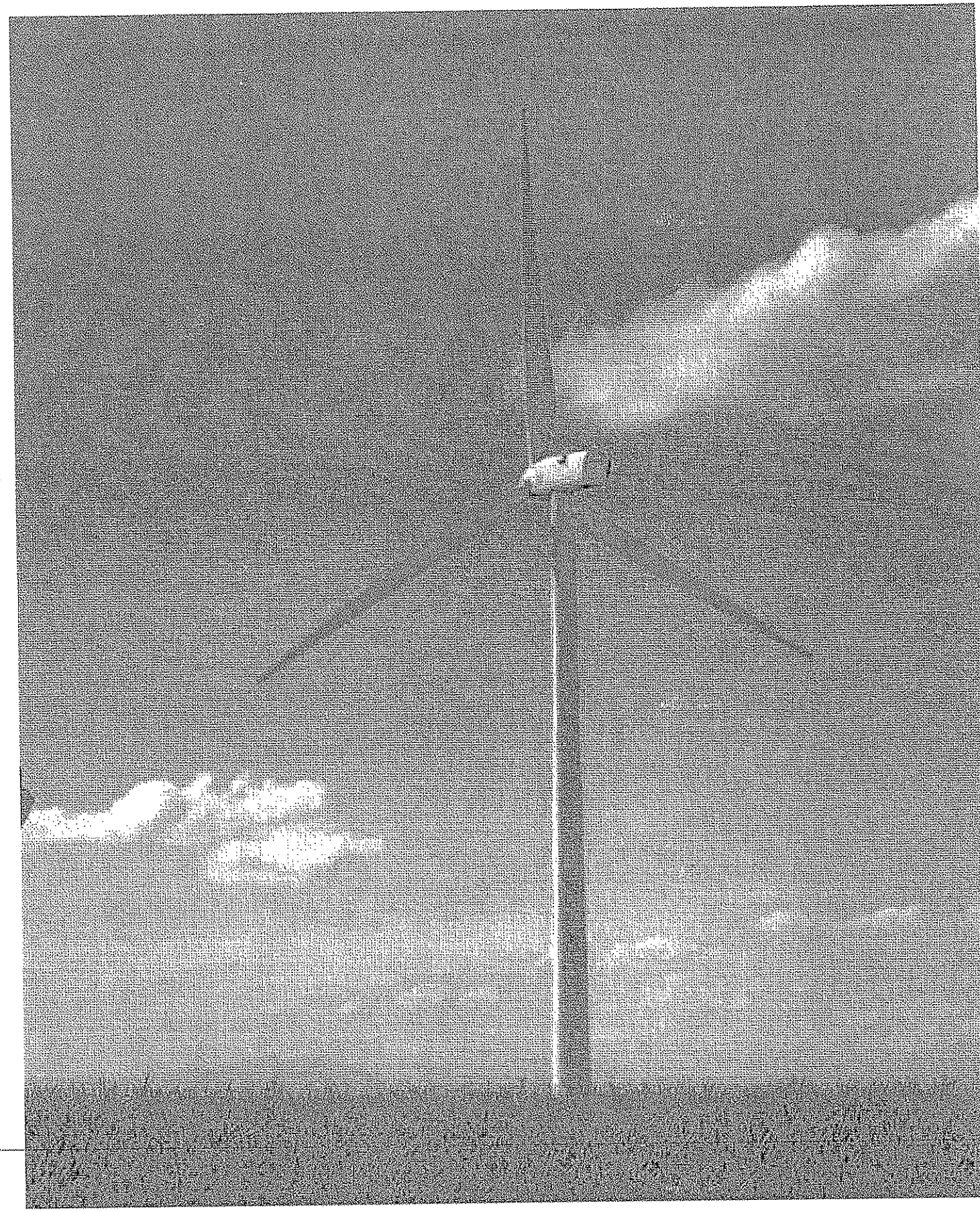
Wind-Turbine NOISE

What Audiologists Should Know

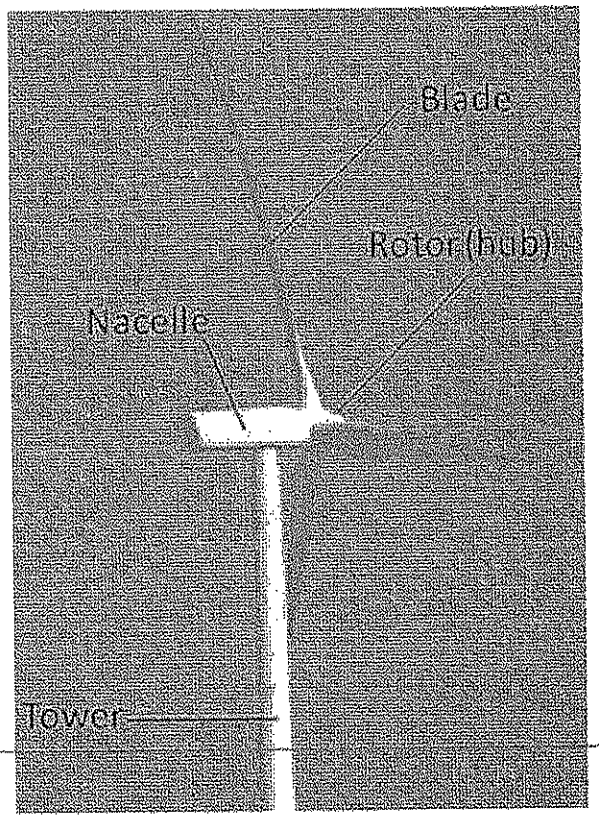
BY JERRY PUNCH, RICHARD JAMES, AND DAN PABST

Noise from modern wind turbines is not known to cause hearing loss, but the low-frequency noise and vibration emitted by wind turbines may have adverse health effects on humans and may become an important community noise concern.



Most of us would agree that the modern wind turbine is a desirable alternative for producing electrical energy. One of the most highly touted ways to meet a federal mandate that 20 percent of all energy must come from renewable sources by 2020 is to install large numbers of utility-scale wind turbines. Evidence has been mounting over the past decade, however, that these utility-scale wind turbines produce significant levels of low-frequency noise and vibration that can be highly disturbing to nearby residents.

None of these unwanted emissions, whether audible or inaudible, are believed to cause hearing loss, but they are widely known to cause sleep disturbances. Inaudible components can induce resonant vibration in solids, liquids, and gases—including the ground, houses, and other building structures, spaces within those structures, and bodily tissues and cavities—that is potentially harmful to humans. The most extreme of these low-frequency (infrasonic) emissions, at frequencies under about 16 Hz, can easily penetrate homes. Some residents perceive the energy as sound, others experience it as vibration, and others are not aware of it at all. Research is beginning to show that, in addition to sleep disturbances, these emissions may have other deleterious consequences on health. It is for these reasons that wind turbines are becoming an important community health issue, especially when hosted in quiet rural communities that have no prior experience with industrial noise or urban hum.



Major components of a modern wind turbine.

The people most susceptible to disturbances caused by wind turbines may be a small percentage of the total exposed population, but for them the introduction of wind turbines in their communities is not something to which they can easily become acclimated. Instead, they become annoyed, uncomfortable, distressed, or ill. This problem is increasing as newer utility-scale wind turbines capable of generating 1.5-5 MWatts of electricity or more replace the older turbines used over the past 30 years, which produced less than 1 MWatt of power. These large wind turbines can have hub heights that span the length of a football field and blade lengths that span half that distance. The increased size of these multi-MWatt turbines, especially the blades, has been associated with complaints of adverse health effects (AHEs) that cannot be explained by auditory responses alone.

For this article, we reviewed the English-language, peer-reviewed literature from around the world on the topic of wind-turbine noise and vibration and their effects on humans. In addition, we used popular search engines to locate relevant online trade journals, books, reference sources, government regulations, and acoustic and vibration standards. We also consulted professional engineers and psychoacousticians regarding their unpublished ideas and research.

Sources of Wind-Turbine Noise and Vibration

Physically, a modern wind turbine consists of a tower; a rotor (or hub); a set of rotating blades—usually three, located upwind to the tower; and a nacelle, which is an enclosure containing a gearbox, a generator, and

computerized controls that monitor and regulate operations (FIGURE 1). Wind speed can be much greater at hub level than at ground level, so taller wind towers are used to take advantage of these higher wind speeds. Calculators are available for predicting wind speed at hub height, based on wind speeds at 10 meter weather towers, which can easily be measured directly.

Mechanical equipment inside the nacelle generates some noise, but at quieter levels than older turbines. This mechanical sound is usually considered of secondary importance in discussions of annoyance from today's turbines. The main cause of annoyance is an aerodynamic source created by interaction of the turning blades with the wind. With optimal wind conditions, this aerodynamic noise is steady and commonly described as an airplane overhead that never leaves.

When wind conditions are not optimal, such as during turbulence caused by a storm, the steady sounds are augmented by fluctuating aerodynamic sounds. Under steady wind conditions, this interaction generates a broadband whooshing sound that repeats itself about once a second and is clearly audible. Many people who live near the wind turbine find this condition to be very disturbing.

The whooshing sound comes from variations of air turbulence from hub to blade tip and the inability of the turbine to keep the blades adjusted at an optimal angle as wind direction varies. The audible portion of the whoosh is around 300 Hz, which can easily penetrate walls of homes and other buildings. In addition, the rotating blades create energy at frequencies as low as 1–2 Hz (the blade-passage frequency), with overtones of up to about 20 Hz. Although some of this low-frequency energy is audible to some people with sensitive hearing, the energy is mostly vibratory to people who react negatively to it.

Adverse Health Effects of Wind-Turbine Noise

Hubbard and Shepherd (1990), in a technical paper written for the National Aeronautics and Space Administration (NASA), were the first to report in depth on the noise and vibration from wind turbines. Most of the relevant research since that time has been conducted by European investigators, as commercial-grade (utility-scale) wind turbines have existed in Europe for many decades. Unfortunately, the research and development done by wind-turbine manufacturers is proprietary and typically has not been shared with the public, but reports of the distressing effects on people living near utility-scale wind turbines in various parts of the world are becoming more common.

Studies carried out in Denmark, The Netherlands, and Germany (Wolsink and Sprengers, 1993; Wolsink et al, 1993), a Danish study (Pedersen and Nielsen, 1994), and two Swedish studies (Pedersen and Persson Waye, 2004, 2007) collectively indicate that wind turbines differ from other sources of community noise in several respects. These investigators confirm the findings of earlier research that amplitude-modulated sound is more easily perceived and more annoying than constant-level sounds (Bradley, 1994; Bengtsson et al, 2004) and that sounds that are unpredictable and uncontrollable are more annoying than other sounds (Geen and McCown, 1984; Hatfield et al, 2002).

Annoyance from wind-turbine noise has been difficult to characterize by the use of such psychoacoustic parameters as sharpness, loudness, roughness, or modulation (Persson Waye and Öhrström, 2002). The extremely low-frequency nature of wind-turbine noise, in combination with the fluctuating blade sounds, also means that the noise is not easily masked by other environmental sounds.

Pedersen et al (2009), in a survey conducted in The Netherlands on 725 respondents, found that noise from

wind turbines is more annoying than transportation or industrial noises at comparable levels, measured in dBA. They noted that annoyance from turbine sounds at 35 dBA corresponds to the annoyance reported for other common community-noise sources at 45 dBA. Higher visibility of the turbines was associated with higher levels of annoyance, and annoyance was greater when attitudes toward the visual impact of the turbines on the landscape were negative. However, the height of wind turbines means that they are also most clearly visible to the people closest to them and those who also receive the highest sound levels. Thus, proximity of the receiver to wind turbines makes it difficult to determine whether annoyance to the noise is independent of annoyance to the visual impact. Pedersen et al (2009) also found that annoyance was substantially lower in people who benefitted economically from having wind turbines located on their property.

Among audiologists and acousticians, it has been understood for many decades that sufficiently intense and prolonged exposure to environmental noise can cause hearing impairment, annoyance, or both. In essence, the view has been *what* you can hear can hurt you. In the case of wind turbines, it seems that *what* you can't hear can also hurt you. Again, there is no evidence that noise generated by wind turbines, even the largest utility-scale turbines, causes hearing loss. But there is increasingly clear evidence that audible and low-frequency acoustic energy from these turbines is sufficiently intense to cause extreme annoyance and inability to sleep, or disturbed sleep, in individuals living near them.

Jung and colleagues (2008), in a Korean study, concluded that low-frequency noise in the frequency range above 30 Hz can lead to psychological complaints and that infrasound in the frequency range of 5–8 Hz can cause complaints due to rattling doors and windows in homes.

The energy generated by large wind turbines can be especially disturbing to the vestibular systems of some people, as well as cause other troubling sensations of the head, chest, or other parts of the body. Dr. Nina Pierpont (2009), in her definitive natural experiment on the subject, refers to these effects as Wind-Turbine Syndrome (WTS). TABLE 1 lists the symptoms that, in various combinations, characterize WTS. Although hearing impairment is not one of the symptoms of WTS, audiologists whose patients report these symptoms should ask them if they live near a wind turbine.

It is well known that sleep deprivation has serious consequences, and we know that noncontinuous sounds and nighttime sounds are less tolerable than continuous and daytime sounds. Somewhat related effects, such as cardiac arrhythmias, stress, hypertension, and headaches have also been attributed to noise or vibration from wind turbines, and some researchers are referring to these effects as Vibroacoustic Disease, or VAD (Castelo Branco, 1999; Castelo Branco and Alves-Pereira, 2004). VAD is described as occurring in persons who are exposed to high-level (>90 dB SPL) infra- and low-frequency noise (ILFN), under 500 Hz, for periods of 10 years or more. It is believed to be a systemic pathology characterized by direct tissue damage to a variety of bodily organs and may involve abnormal proliferation of extracellular matrices.

Alves-Pereira and Castelo Branco (2007) reported on a family who lived near wind turbines and showed signs of VAD. The sound levels in the home were less than 60 dB SPL in each 1/3-octave band below 100 Hz. We have measured unweighted sound levels ranging from 60 to 70 dB Leq (averaged over 1 minute) in these low-frequency bands in Ontario homes of people reporting AHEs from wind turbines. A spectral analysis of sounds emitted at a Michigan site revealed that unweighted peak levels at frequencies under 5 Hz exceeded 90 dB SPL (Wade Bray, pers. comm., 2009).

Table 1. Core Symptoms of Wind-Turbine Syndrome

1	Sleep disturbance
2	Headache
3	Visceral Vibratory Vestibular Disturbance (VVVD)
4	Dizziness, vertigo, unsteadiness
5	Tinnitus
6	Ear pressure or pain
7	External auditory-canal sensation
8	Memory and concentration deficits
9	Irritability, anger
10	Fatigue, loss of motivation

Source: Pierpont, 2009

Similar observations have been made in studies of people who live near busy highways and airports, which also expose people to low-frequency sounds, both outdoors and in their homes. Evidence is insufficient to substantiate that typical exposures to wind-turbine noise, even in residents who live nearby, can lead to VAD, but early indications are that there are some more-vulnerable people who may be susceptible. Because ILFN is not yet recognized as a disease agent, it is not covered by legislation, permissible exposure levels have not yet been established, and dose-response relationships are unknown (Alves-Pereira, 2007).

As distinguished from VAD, Pierpont's (2009) use of the term Wind-Turbine Syndrome appears to emphasize a constellation of symptoms due to stimulation, or overstimulation, of the vestibular organs of balance due to ILFN from wind turbines (see TABLE 1). One of the most distinctive symptoms she lists in the constellation of symptoms comprising WTS is Visceral Vibratory Vestibular Disturbance (VVVD), which she defines as "a sensation of internal quivering, vibration, or pulsation accompanied by agitation, anxiety, alarm, irritability, rapid heartbeat, nausea, and sleep disturbance" (p. 270).

Drawing on the recent work of Balaban and colleagues (i.e., Balaban and Yates, 2004), Pierpont describes the close association between the vestibular system and its neural connections to brain nuclei involved with balance processing, autonomic and somatic sensory inflow and outflow, the fear and anxiety associated with vertigo or a sudden feeling of postural instability, and aversive learning. These neurological relationships give credence to Pierpont's linkage of the symptoms of VVVD to the vestibular system.

Todd et al (2008) demonstrated that the resonant frequency of the human vestibular system is 100 Hz, concluding that the mechano-receptive hair cells of the vestibular structures of the inner ear are remarkably sensitive to low-frequency vibration and that this sensitivity to vibration exceeds that of the cochlea. Not only is 100 Hz the frequency of the peak response of the vestibular system to vibration, but it is also a frequency at which a substantial amount of acoustic energy is produced by wind turbines. Symptoms of both VAD and VVVD can presumably occur in the presence of ILFN as a result of disruptions of normal paths or structures that mediate the fine coordination between living tissue deformation and activation of signal transducers; these disruptions can lead to aberrant mechano-electrical coupling that can, in turn, lead to conditions such as heart arrhythmias (Ingber, 2008). Ultimately, further research will be needed to sort out the commonalities and differences among the symptoms variously described in the literature as VAD, VVVD, and WTS.

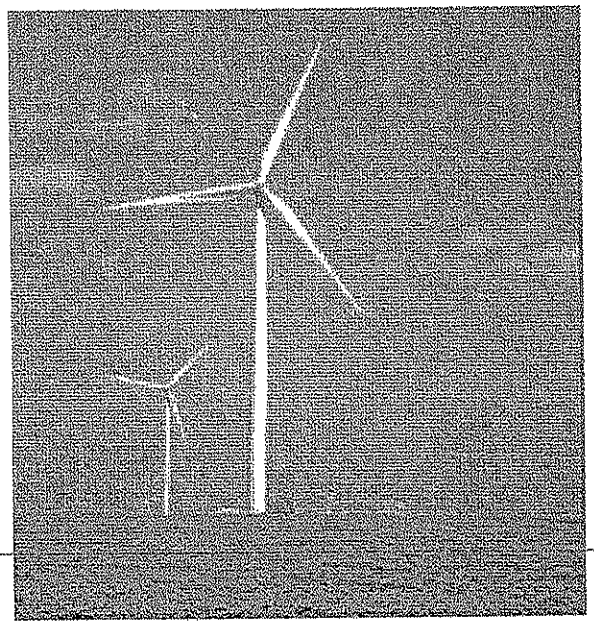
Dr. Geoff Leventhall, a British scientist, and his colleagues (Waye et al, 1997; Leventhall, 2003, 2004) have documented the detrimental effects of low-frequency noise exposure. They consider it to be a special environmental noise, particularly to sensitive people in their homes. Waye et al (1997) found that exposure to dynamically modulated low-frequency ventilation noise (20–200 Hz)—as opposed to midfrequency noise exposure—was more bothersome, less pleasant, impacted work performance more negatively, and led to lower social orientation.

Leventhall (2003), in reviewing the literature on the effects of exposure to low-frequency noise, found no evidence of hearing loss but substantial evidence of vibration of bodily structures (chest vibration), annoyance (especially in homes), perceptions of unpleasantness (pressure on the eardrum, unpleasant perception within the chest area, and a general feeling of vibration), sleep disturbance (reduced wakefulness), stress, reduced performance on demanding

verbal tasks, and negative biological effects that included quantitative measurements of EEG activity, blood pressure, respiration, hormone production, and heart rate.

Regarding work performance, reviewed studies indicated that dynamically modulated low-frequency noise, even when inaudible to most individuals, is more difficult to ignore than mid- or high-frequency noise and that its imperviousness to habituation leads to reduced available information-processing resources. Leventhall hypothesized that low-frequency noise, therefore, may impair work performance. More recently, as a consultant on behalf of the British Wind Energy Association (BWEA), the American Wind Energy Association (AWEA), and the Canadian Wind Energy Association (CANWEA), Leventhall (2006) changed his position, stating that although wind turbines do produce significant levels of low-frequency sound, they do not pose a threat to humans—in effect reverting to the notion that *what* you can't hear can't hurt you.

According to the World Health Organization guidelines (WHO, 2007), observable effects of nighttime, outdoor wind-turbine noise do not occur at levels of 30 dBA or lower. Many rural communities have ambient, nighttime sound levels that do not exceed 25 dBA. As outdoor sound levels increase, the risk of AHEs also increases, with the most vulnerable being the first to show its effects. Vulnerable populations include elderly persons; children, especially those younger than age six; and people with pre-existing medical conditions, especially if sleep is affected. For outdoor sound levels of 40 dBA or higher, the WHO states that there is sufficient evidence to link prolonged exposure to AHEs. While the WHO identifies long-term, nighttime audible sounds over 40 dBA outside one's home as a cause of AHEs, the wind industry commonly promotes 50 dBA as a safe limit for nearby homes and properties. Recently, a limit of 45 dBA has been proposed for new wind projects in Canada (Keith et al, 2008).



Utility-scale wind turbines located in Huron County, Michigan.

Much of the answer as to why the wind industry denies that noise is a serious problem with its wind turbines is because holding the noise to 30 dBA at night has serious economic consequences. The following quotation by Upton Sinclair seems relevant here: "It is difficult to get a man to understand something when his salary depends upon his not understanding it" (Sinclair, 1935, reprinted 1994, p. 109).

In recent years, the wind industry has denied the validity of any noise complaints by people who live near its utility-scale wind turbines. Residents who are leasing their properties for the siting of turbines are generally so pleased to receive the lease payments that they seldom complain. In fact, they normally are required to sign a leasing agreement, or gag clause, stating they will not speak or write anything unfavorable about the turbines. Consequently, complaints, and sometimes lawsuits, tend to be initiated by individuals who live near property on which wind turbines are sited, and not by those who are leasing their own property. This situation pits neighbor against neighbor, which leads to antagonistic divisions within communities.

Measurement of Wind-Turbine Noise

It is important to point out that the continued use of the A-weighting scale in sound-level meters is the basis for misunderstandings that have led to acrimony between advocates and opponents of locating wind turbines in residential areas. The dBA scale grew out of the desire to incorporate a function into the measurement of sound pressure levels of environmental and industrial noise that is the inverse of the minimum audibility curve (Fletcher and Munson, 1933) at the 40-phon level. It is typically used, though, to specify the levels of noises that are more intense, where the audibility curve becomes considerably flattened, obviating the need for A-weighting. It is mandated in various national and international standards for measurements that are compared to damage-risk criteria for hearing loss and other health effects. The A-weighted scale in sound-level meters drastically reduces

sound-level readings in the lower frequencies, beginning at 1000 Hz, and reduces sounds at 20 Hz by 50 dB.

For wind-turbine noise, the A-weighting scale is especially ill-suited because of its devaluation of the effects of low-frequency noise. This is why it is important to make C-weighted measurements, as well as A-weighted measurements, when considering the impact of sound from wind turbines. Theoretically, linear-scale measurements would seem superior to C-scale measurements in wind-turbine applications, but linear-scale measurements lack standardization due to failure on the part of manufacturers of sound-level meters to agree on such factors as low-frequency cutoff and response tolerance limits. The Z-scale, or zero-frequency weighting, was introduced in 2003 by the International Electro-technical Commission (IEC) in its Standard 61672 to replace the flat, or linear, weighting used by manufacturers in the past.

State of Michigan Siting Guidelines

Michigan's siting guidelines (State of Michigan, 2008) will be used as an example of guidelines that deal only in a limited way with sound. These guidelines refer to earlier, now outdated, WHO and Environmental Protection Agency (EPA) guidelines to support a noise criterion that SPLs cannot exceed 55 dBA at the adjacent property line. This level is allowed to be exceeded during severe weather or power outages, and when the ambient sound level is greater than 55 dBA, the turbine noise can exceed that higher background sound level by 5 dB. These levels are about 30 dB above the nighttime levels of most rural communities. When utility-scale turbines were installed in Huron County, Michigan, in May 2008, the WHO's 2007 guidelines that call for nighttime, outside levels not to exceed 30 dBA were already in place. Based on measurements made by the authors, these turbines produce 40–45 dBA sound levels at the perimeter of a 1,000 ft radius under typical weather conditions, and the additive effects of multiple turbines produce higher levels. Many of the turbines have been located close enough to homes to produce very noticeable noise and vibration.

Kamperman and James (2009) have offered recommendations for change in the State of Michigan guidelines (2008) for wind turbines. Some of the more pertinent details of the Michigan siting guidelines are shown in the left-hand column of TABLE 2. The state of Michigan permits sound levels that do not exceed 55 dBA or L90 + 5 dBA, whichever is greater, measured at the property line closest to the wind-energy system. These guidelines make no provisions to limit low-frequency sounds from wind-turbine operations.

In consideration of the current WHO guidelines (2007), measurements made by the authors in Huron County, Michigan, indicate that the current Michigan guidelines do not appear adequate to protect the public from the nuisances and known health risks of wind-turbine noise. In fact, these guidelines appear to be especially lenient

Table 2. Current and Proposed Wind-Turbine Siting Guidelines

Current Michigan Guidelines*	Alternative Proposed Guidelines**
Sound level cannot exceed 55 dBA or L90 + 5 dBA, whichever is greater.	Operating LAeq is not to exceed the background LA90 + 5 dBA, where LA90 is measured during a preconstruction noise study at the quietest time of night. Similar dBC limits should also be applied.
Limits apply to sound levels measured at homes (as stated in Huron County Ordinance).	Limits apply to sound levels measured at property lines, except that turbine sounds cannot exceed 35 dBA at any home.
No provisions are made for limiting low-frequency sounds from wind-turbine operations.	LCeq-LA90 cannot exceed 20 dB at receiving property, e.g., LCeq (from turbines) minus (LA90 [background] + 5) ≤ 20 dB, and is not to exceed 55 LCeq from wind turbines (60 LCeq for properties within one mile of major heavily trafficked roads).

*Source: State of Michigan, 2008

**Source: Kamperman and James, 2009

in terms of tolerable sound levels. Sound levels that approach 20 dBA higher than natural ambient levels are considered unacceptable in most countries; Michigan permits 30 dBA increases.

In considering the health and well-being of people living near wind-turbine projects, the changes recommended by Kamperman and James (2009) would abandon the 55 dBA limit in favor of the commonly accepted criteria of L90 + 5 dBA, for both A- and C-scale readings, where L90 is the preconstruction ambient level. These recommendations also include a prohibition against any wind-turbine-related sound levels exceeding 35 dBA on receiving properties that include homes or other structures in which people sleep. Additional protections against low-frequency sound are given in the right-hand column of TABLE 2. These recommended provisions would protect residents by limiting the difference between C-weighted Leq during turbine operation and the quietest A-weighted pre-operation background sound levels, plus 5 dB, to no more than 20 dB at the property line. This level should not exceed 55 dB Leq on the C scale, or 60 dB Leq for properties within one mile of major heavily trafficked roads, which sets a higher tolerance for communities that tend to experience slightly noisier conditions.

Implementation of the recommendations of Kamperman and James would result in siting wind turbines differently than what is currently planned for future wind-turbine projects in Michigan. This change would result in sound levels at nearby properties that are much less noticeable, and much less likely to cause sleep deprivation, annoyance, and related health risks. These sound-level measurements should be made by independent acoustical engineers or knowledgeable audiologists who follow ANSI guidelines (1993, 1994) to ensure fair and accurate readings, and not by representatives of the wind industry.

People living within a mile of one or more wind turbines, and especially those living within a half mile, have frequent sleep disturbance leading to sleep deprivation, and sleep disturbances are common in people who live up to about 1.25 miles away. This is the setback distance at which a group of turbines would need to be in order not to be a nighttime noise disturbance (Kamperman and James, 2009). It is also the setback distance used in several other countries that have substantial experience with wind turbines, and is the distance at which Pierpont (2009) found very few people reporting AHEs.

A study conducted by van den Berg (2003) in The Netherlands demonstrated that daytime levels cannot be used to predict nighttime levels and that residents within 1900 mile (1.18 mile) of a wind-turbine project expressed annoyance from the noise. Pierpont (2009) recommends baseline minimum setbacks of 2 kilometers (1.24 mile) from residences and other buildings such as hospitals, schools, and nursing homes, and longer setbacks in mountainous terrain and when necessary to meet the noise criteria developed by Kamperman and James (2009).

In a panel review report, the American Wind Energy Association (AWEA) and Canadian Wind Energy Association (CANWEA) have objected to setbacks that exceed 1 mile (Colby et al, 2009). A coalition of independent medical and acoustical experts, the Society for Wind Vigilance (2010), has provided a recent rebuttal to that report. The society has described the panel review as a typical product of industry-funded white papers, being neither authoritative nor convincing. The society accepts as a medical fact that sleep disturbance, physiological stress, and psychological distress can result from exposure to wind-turbine noise.

Wind turbines have different effects on different people. Some of these effects are somewhat predictable based on financial compensation, legal restrictions on free speech included in the lease contracts with hosting landowners, and distance of the residence from wind projects, but they are sometimes totally unpredictable. Planning for wind projects needs to be directed not only toward benefitting society at large but also toward protecting the individuals living near them. We believe that the state of Michigan, and other states that have adopted similar siting guidelines for wind turbines, are not acting in the best interest of all their citizens and need to revise their siting guidelines to protect the public from possible health risks and loss of property values, as well as reduce complaints about noise annoyance.

Wind-utility developers proposing new projects to a potential host community are often asked if their projects will cause the same negative community responses that are heard from people living in the footprint of operating projects. They often respond that they will use a different

People living near wind turbines may experience sleep disturbance.

type of wind turbine or that reports of complaints refer to older-style turbines that they do not use. In our opinion, these statements should usually be viewed as diversionary.

Finally, it is important to note that there is little difference in noise generated across makes and models of modern utility-scale, upwind wind turbines once their power outputs are normalized. Kamperman (pers. comm., 2009), after analyzing data from a project funded by the Danish Energy Authority (Søndergaard and Madsen, 2008), has indicated that when the A-weighted sound levels are converted to unweighted levels, the low-frequency energy from industrial wind turbines increases inversely with frequency at a rate of approximately 3 dB per octave to below 10 Hz (the lowest reported frequency). Kamperman has concluded that the amount of noise generated at low frequencies increases by 3–5 dB for every MW of electrical power generated. Because turbines are getting larger, this means that future noise problems are likely to get worse if siting guidelines are not changed.

Conclusion

Our purpose in this article has been to provide audiologists with a better understanding of the types of noise generated by wind turbines, some basic considerations underlying sound-level measurements of wind-turbine noise, and the adverse health effects on people who live near these turbines. In future years, we expect that audiologists will be called upon to make noise measurements in communities that have acquired wind turbines, or are considering them. Some of us, along with members of the medical profession, will be asked to provide legal testimony regarding our opinions on the effects of such noise on people. Many of us will likely see clinical patients who are experiencing some of the adverse health effects described in this article.

As a professional community, audiologists should become involved not only in making these measurements to corroborate the complaints of residents living near wind-turbine projects but also in developing and shaping siting guidelines that minimize the potentially adverse health effects of the noise and vibration they generate. In these ways, we can promote public health interests without opposing the use of wind turbines as a desirable and viable alternative energy source.

Jerry Punch, PhD, Richard James, BME, and Dan Pabst, BS, are with the Department of Communicative Sciences and Disorders, Michigan State University, East Lansing, MI.

Portions of this work were presented at the Annual Convention of the American Speech-Language-Hearing Association (ASHA), November 2009, New Orleans, LA.

Acknowledgments. We wish to thank the many families and residents of Huron County, Michigan, with whom we spent many hours discussing a variety of issues related to their concerns about the noise and vibration from nearby wind turbines. Their involvement, and especially their compelling stories, provided information and encouragement that led us to the belief that this work should be shared with members of the audiology profession.

References

Alves-Pereira M, Castelo Branco NAA. (2007) In-home wind-turbine noise is conducive to Vibroacoustic Disease. Paper presented at Second International Meeting on Wind-Turbine Noise, Lyon, France.

American National Standards Institute (ANSI) (1993) *ANSI Standard S12.9, Part 3—1993 (R 2008).* Quantities and procedures for description and measurement of environmental sound, Part 3, Short-term measurements with an observer present. New York: American National Standards Institute.

American National Standards Institute (ANSI) (1994) *ANSI Standard S12.18—1994 (R 2009).* Outdoor measurement of sound pressure level. New York: American National Standards Institute.

Balaban CD, Yates BJ. (2004) The vestibuloautonomic interactions: a teleologic perspective. In: Highstein SM, Fay RR, Popper AN, eds. *The Vestibular System.* New York: Springer-Verlag, 286–342.

Bengtsson J, Persson Waye K, Kjellberg A. (2004) Sound characteristics in low frequency noise and their relevance for the perception of pleasantness. *Acta Acust* 90:171–180.

Bradley JS. (1994) Annoyance caused by constant-amplitude and amplitude-modulated sound containing rumble. *Noise Control Eng J* 42:203–208.

Castelo Branco NAA. (1999) The clinical stages of vibroacoustic disease. *Aviation, Space, Env Med* 70(3):32–39.

Castelo Branco NAA, Alves-Pereira M. (2004) Vibroacoustic disease. *Noise Health* 6(23):3–20.

Colby WD, Dobie R, Leventhall G, Lipscomb DM, McCunney RJ, Seilo MT. (December 2009) "Wind-Turbine Sound and Health Effects: An Expert Panel Review." Prepared for the American Wind Energy Association and Canadian Wind Energy Association.

Fletcher H, Munson WA. (1933) Loudness, its definition, measurement and calculation. *J Acoust Soc Am* 5:82–108.

Geen RG, McCown EJ. (1984) Effects of noise and attack on aggression and physiological arousal. *Motivat Emot* 8:231–241.

Hatfield J, Job RF, Hede AJ, Carter NL, Peploe P, Taylor R, et al (2002). Human response to environmental noise: the role of perceived control. *J Behav Med* 9:341–359.

Hubbard HH, Shepherd KP. (1990) Wind Turbine Acoustics, NASA Technical Paper 3057 DOE/NASA/20320–77, National Aeronautics and Space Administration.

Ingber DE. (2008) Tensegrity-based mechanosensing from macro to micro. *Prog Biophys Molec Biol* 97:163–179.

Kamperman G, James R. (2009) Guidelines for selecting wind-turbine sites. *J Sound Vib* 43(7):8–11.

Keith SE, Michaud DS, Bly SHP. (2008) A proposal for evaluating the potential health effects of wind-turbine noise for projects under the Canadian Environmental Assessment Act. *J Low Freq Noise, Vib and Active Control* 27:253–265.

Jung SS, Cheung W, Cheong C, Shin S. (2008) Experimental identification of acoustic emission characteristics of large wind turbines with emphasis on infrasound and low-frequency noise. *J Korean Phy Soc* 53:1897–1905.

Leventhall G. (2003) A Review of Published Research on Low Frequency Noise and its Effects. Defra Report. London: Department for Environment, Food and Rural Affairs.

Leventhall G. (2004) Low frequency noise and annoyance. *Noise Health* 6(23):59–72.

Leventhall G. (2006) Infrasound from wind turbines—fact, fiction or deception. *Canad Acoust* 34(2):29–36.

Pedersen E, Persson Waye K. (2004) Perception and annoyance due to wind turbine noise: a dose–response relationship. *J Acoust Soc Am* 116:3460–3470.

Pedersen E, Persson Waye K. (2007) Wind turbine noise, annoyance and self-reported health and wellbeing in different living environments. *Occup Env Med* 64:480–486.

Pedersen E, van den Berg F, Bakker R, Bouma J. (2009) Response to noise from modern wind farms in The Netherlands. *J Acoust Soc Am* 126:634–643.

Pedersen TH, Nielsen KS. (1994) Genvirkning af støj fra vindmøller (Annoyance by noise from wind turbines). Report No. 150, DELTA Acoustic and Vibration, Lydtekniske Institute, Copenhagen.

Persson Waye K, Öhrström E. (2002) Psycho-acoustic characters of relevance for annoyance of wind turbine noise. *J Sound Vib* 250(1):65–73.

Pierpont, N. (2009) Wind-Turbine Syndrome: a report on a natural experiment. Santa Fe, NM: K-Selected Books.

Sinclair U. (1935) I, candidate for governor: and how I got licked. New York: Farrar and Rinehart. (Reprinted, Berkeley, CA: University of California Press, 1994.)

Søndergaard B, Madsen KD. (2008) Low frequency noise from large wind turbines: summaries and conclusions on measurements and methods. EFP-06 Project, DELTA Danish Electronics, Light and Acoustics.

State of Michigan. (2008) Sample zoning for wind energy systems. http://www.michigan.gov/documents/dleg/WindEnergySampleZoning_236105_7.pdf (accessed December 2, 2009).

The Society for Wind Vigilance. (2010) An Analysis of the American/Canadian Wind Energy Association Sponsored "Wind-Turbine Sound and Health Effects: An Expert Panel Review, December 2009." http://windconcernsontario.wordpress.com/2010/01/10/media-release-the-society-for-wind-vigilance/ (accessed January 12, 2010).

Todd NPM, Rosengren SM, Colebatch JG. (2008) Tuning and sensitivity of the human vestibular system to low-frequency vibration. *Neurosci Lett* 444:36–41.

van den Berg GP. (2003) Effects of the wind profile at night on wind-turbine sound. *J Sound Vib* 277(4–5):955–970.

Waye KP, Rylander R, Benton S, Leventhall G. (1997) Effects on performance and work quality due to low frequency ventilation noise. *J Sound Vib* 205(4):467–474.

Wolsink M, Sprengers M. (1993) Wind turbine noise: a new environmental threat? Proceedings of the Sixth International Congress on the Biological Effects of Noise, ICBEN, Nice, France, 2, 235–238.

Wolsink M, Sprengers M, Keuper A, Pedersen TH, Westra CA. (1993) Annoyance from wind turbine noise on sixteen sites in three countries. Proceedings of the European Community Wind Energy Conference, Lübeck, Travemünde, 273–276.

World Health Organization (WHO) (2007) *Night Noise Guidelines* (NNGL) for Europe: Final Implementation Report. World Health Organization, Regional Office for Europe, Bonn Office.

Exhibit 5 is considered Comment D33-32.

EXHIBIT 5

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Application of SAN DIEGO GAS & ELECTRIC COMPANY (U902 E) for a Permit to Construct Electrical Facilities with Voltages between 50 kV and 200 kV and New Substations with High Side Voltages Exceeding 50 kV: The East County Substation Project	)	Application 09-08-003 (Filed August 10, 2009)

DECLARATION OF DAVID COLLING IN SUPPORT OF BACKCOUNTRY AGAINST DUMPS' COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT FOR THE EAST COUNTY SUBSTATION, TULE WIND AND ENERGIA SIERRA JUAREZ GEN-TIE PROJECTS

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Attorneys for Party and Protestant
Backcountry Against Dumps

March 3, 2011

I, David Colling, declare as follows:

Qualifications

1. I am an electrical pollution assessor for Bio-Ag Consultants and Distributors, Inc. ("Bio-Ag"). After a long career as a dairy farmer in the Ripley area of Ontario, Canada, I began working for Bio-Ag as a sales representative in 1991. I subsequently received two years of training in electrical engineering at Ryerson Polytechnical Institute, and obtained specialized training in electrical pollution from recognized electrical pollution experts Dave Stetzer and Dr. Andrew Michrowski. I have worked as an electrical pollution assessor for Bio-Ag since 2005. In that time, I have performed electrical pollution testing on over 300 homes, offices and farms, which includes the measuring of ground current. I have tested for electrical pollution in residences adjacent to the Ripley, Underwood, Melancthon/Amaranth and Kingsbridge wind farms in Ontario. I have also tested for electrical pollution in a residence adjacent to the Amaranth Substation, which receives and transmits electricity produced by the Melanchton/Amaranth Wind Farm.

My Testing Shows that Wind Turbines Can Produce Harmful Electrical Pollution

2. Dirty electricity refers to electromagnetic energy that flows along a conductor and deviates from a pure 60-Hz sine wave. These deviations occur in the KHz and MHz range, the intermediate frequency portion of the nonionizing part of the electromagnetic spectrum.

3. Dirty electricity is produced by both electricity-consuming equipment, such as computers and televisions, and electricity-generating equipment. Wind turbines are one of the latter sources of dirty electricity. To enable variable speed operation of

wind turbines, the alternating current they generate is first converted to direct current and then converted back into alternating current with the correct voltage and frequency. These conversions create higher frequency electrical currents that "ride" the 60-Hz sine wave and radiate from the collector lines that transmit the wind-generated electricity to substations. If not adequately filtered, the dirty electricity can be propagated through the substations and onto transmission and distribution lines.

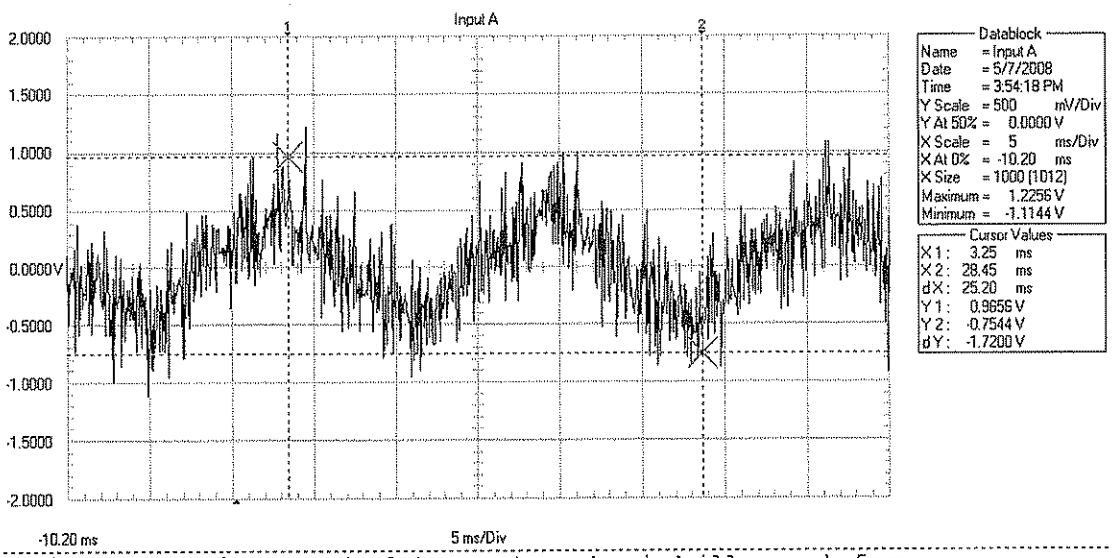
4. The dirty electrical currents reach and impact people and the environment in two ways. The currents are propagated from the electrical transmission facilities through both the atmosphere and the ground. Ground current is typically propagated through grounding rods extending from neutral conductor wires.

5. At the behest of residents experiencing health problems after wind farms began operating nearby, I have tested for dirty electricity emanating from the Ripley, Underwood, Melancthon/Amaranth and Kingsbridge wind farms in Ontario. Not only did my tests confirm that all four of these wind farms were emitting dirty electricity, they confirmed that the dirty electrical currents were – and in some cases still are – propagated in the form of ground currents to numerous nearby residences. As an example, the Ripley Wind Farm and its electrical pollution are discussed in more detail below. Electrical pollution measurements for the Underwood Wind Farm are reproduced in Exhibit 1, along with measurements from additional Ripley Wind Farm sites.

6. The Ripley Wind Farm is located in Ripley, Ontario, off the southeastern shores of Lake Huron. The farm consists of 38 Enercon E82 2 MW turbines, with a total maximum production of 76 MW. The waveforms shown below were measured at one of the many nearby residences I tested for electrical pollution, Residence 1. Residence 1 is

located 900-plus meters from 10 wind turbines. Measurements were taken between the primary ground wire at the transformer pole and a remote rod, and in the residence's home between the kitchen sink and an ECG electrode on the floor, as indicated in the caption for the figures. As figure 1 shows, the wind turbines were creating significant electrical pollution. The frequency profile of the primary neutral to earth voltage ("PNEV") shown in figure 1 is littered with higher frequency distortions of the 60-Hz sine wave.

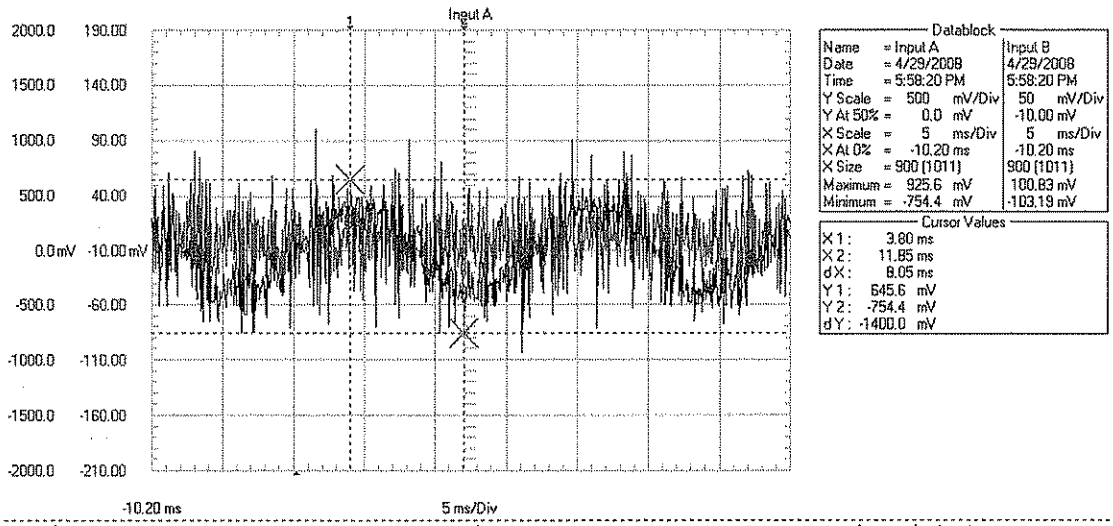
Figure 1.



Residence 1, Primary neutral to remote rod, windmills on, before collection lines buried.

7. Figure 2, on the following page, shows that the dirty electrical current produced by the Ripley wind turbines was propagated as a ground current that reached Residence 1, as measured by sink-to-floor readings in the kitchen with the power to the home turned off. A frequency comparison of the PNEV and sink-to-floor readings confirmed that the source of the ground current was the Ripley Wind Farm.

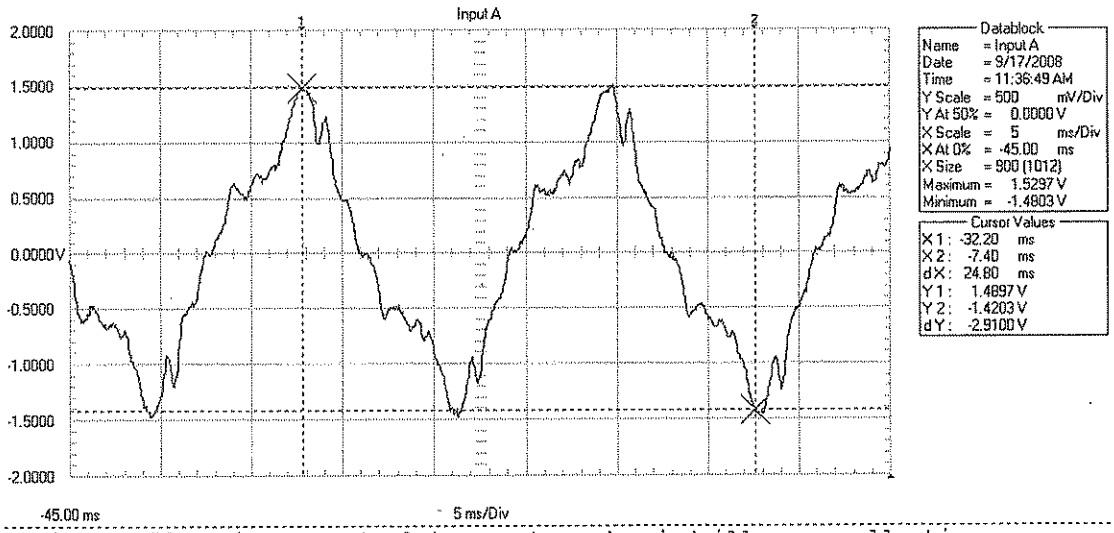
Figure 2.



Residence #1, Input A(blue wave) is PNEV. Input B(red wave) is sink to floor. The power was shut off to the house. Windmills running.

8. A few months after I took the measurements shown in figures 1 and 2, the Ripley Wind Farm developers – Suncor Energy and Acciona Energy – buried the collector lines leading from the wind turbines to the substation. The undergrounding substantially reduced the PNEV frequency distortions, though it did not eliminate them. This change is shown in figure 3, on the following page.

Figure 3.



Residence #3, Primary Neutral to remote rod, windmills on, collection line now buried.

9. The electrical pollution testing I did at other locations on the Ripley Wind Farm and nearby residences yielded similar results, as exemplified by the measurements for Residence 3 shown in Exhibit 1. The testing I did at the Underwood, Melancthon/Amaranth and Kingsbridge wind farms also yielded comparable results, with the wind turbines producing significant PNEV frequency distortions. Examples of the measurements I took at the Underwood Wind Farm is also included in Exhibit 1.

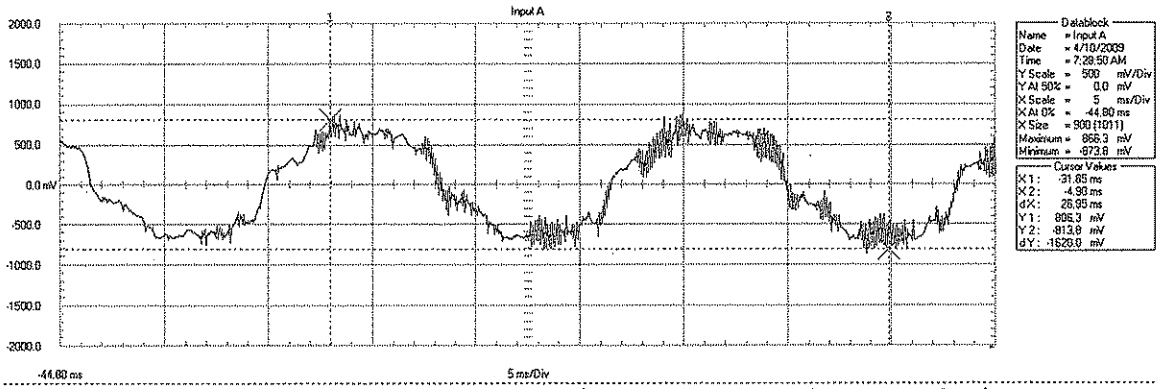
My Testing Shows that Electrical Substations Can Propagate Harmful Electrical Pollution

10. As discussed, if not adequately filtered, dirty electricity can be propagated through electrical substations and onto transmission and distribution lines. I observed and measured this precise phenomenon at a residence approximately 300 meters from the Amaranth Substation. This substation is connected to the same distribution lines that power the residence as the substation requires power for the wind turbine control network. The power from the wind turbines comes into the substation on a separate set

electrical lines called collection lines that are of higher voltage than the distribution lines. The substation requires power from the distribution lines as the only power coming in on the collection lines is from wind turbines. Therefore when the wind turbines are off power is needed from the distribution lines to keep control systems on. Measurements were taken at the ground wire on a distribution pole at the road entrance to the substation. The measurements were taken in the same manner as described above for the Ripley Wind Farm measurements. As figure 4 on the following page shows, the substation was creating significant electrical pollution that propagated along the distribution lines leading to the residence. The frequency profile of the primary neutral to earth voltage ("PNEV") measured at the entrance to the Amaranth substation shown in figure 4 is littered with higher frequency distortions of the 60-Hz sine wave.

11. Figures 5 and 6 show that the dirty electrical current flowing through the Amaranth Substation was propagated as a ground current that reached the residence, as measured by sink-to-floor readings in the kitchen with the power to the home turned off and no body contact (shown as the red waveforms in both figures; the blue waveform in figure 6 is the PNEV frequency profile). The PNEV was measured at the residence transformer pole. A frequency comparison of the PNEV and sink-to-floor readings confirmed that the source of the ground current was the Amaranth Substation.

Figure 4.



Amaranth Substation, PNEV at the service entrance pole ground wire

Figure 5.

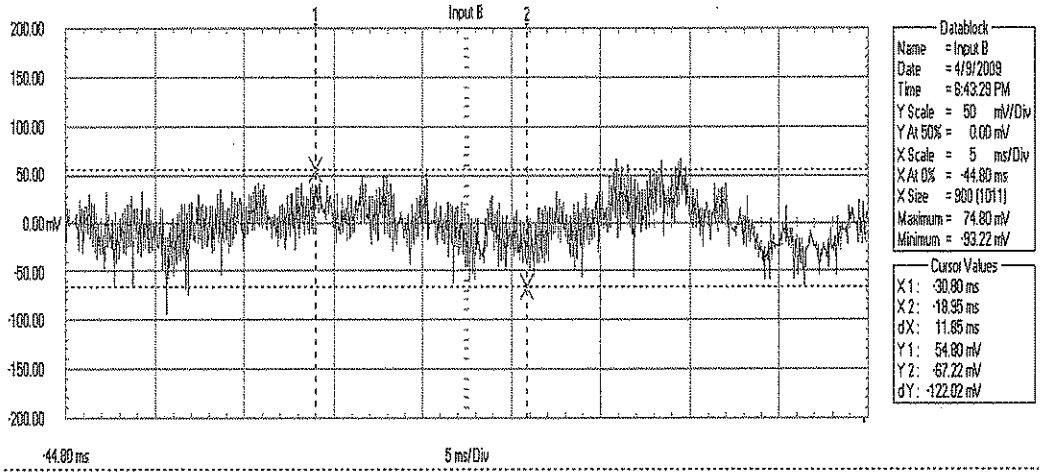
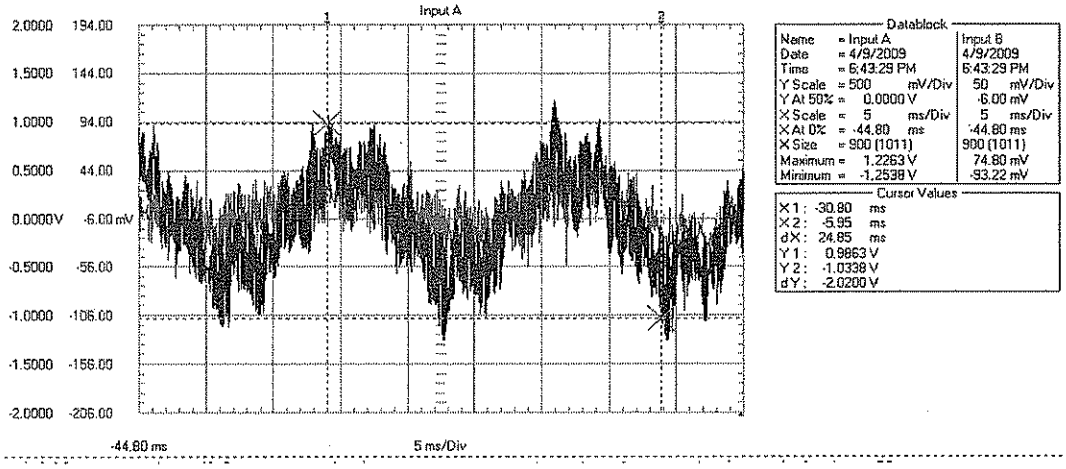


Figure 6.



Conclusions

12. Wind turbines can produce significant electrical pollution in the form of dirty electricity. Additionally, if not adequately filtered, dirty electricity can be propagated through the substations and onto transmission and distribution lines. I have tested for dirty electricity emanating from the Ripley, Underwood, Melancthon/Amaranth and Kingsbridge wind farms, as well as the Amaranth Substation, all in southern Ontario. Not only did my tests confirm that all four wind farms and the substation were emitting dirty electricity, they confirmed that the dirty electrical currents were – and in some cases still are – propagated in the form of ground currents to numerous nearby residences.

I declare, under penalty of perjury, that the foregoing is true and correct based on my personal knowledge and best professional judgment, and that this declaration was executed on March 3, 2011 in Ripley, Ontario, Canada.

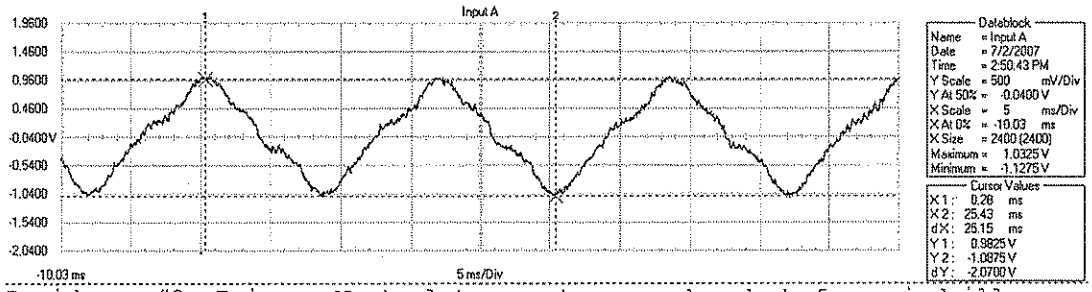
DAVID COLLING

EXHIBIT 1

Ripley Wind Farm, Electrical Pollution Testing Near Residence 3

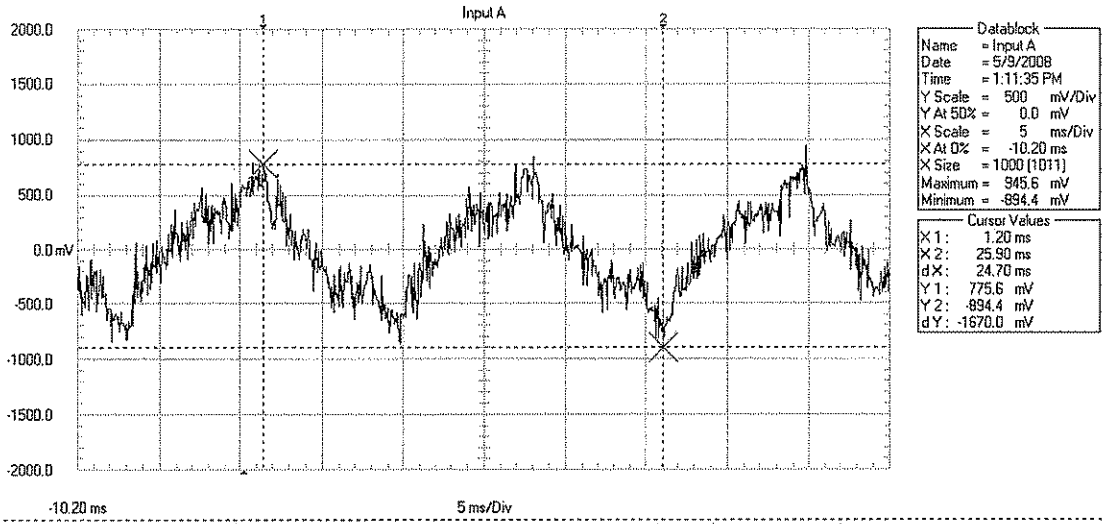
I took the measurements shown below in figures 1 through 3 in the same manner as described for the Ripley Wind Farm measurements discussed in the main body of my declaration.

Figure 1.



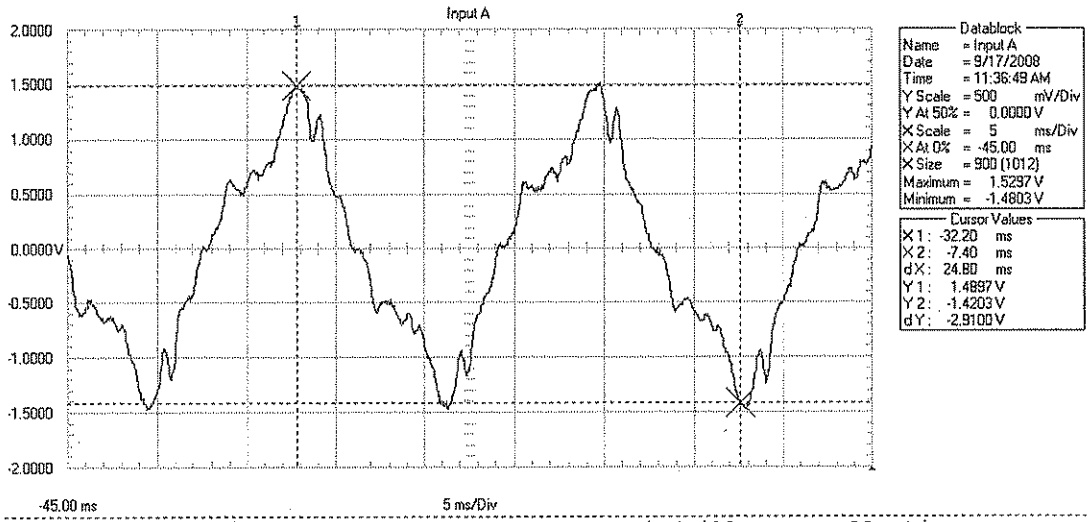
Residence #3, Primary Neutral to remote ground rod, before windmills were installed and running.

Figure 2.



Residence #3, Primary Neutral to remote rod, windmills running before the collection line was buried.

Figure 3.

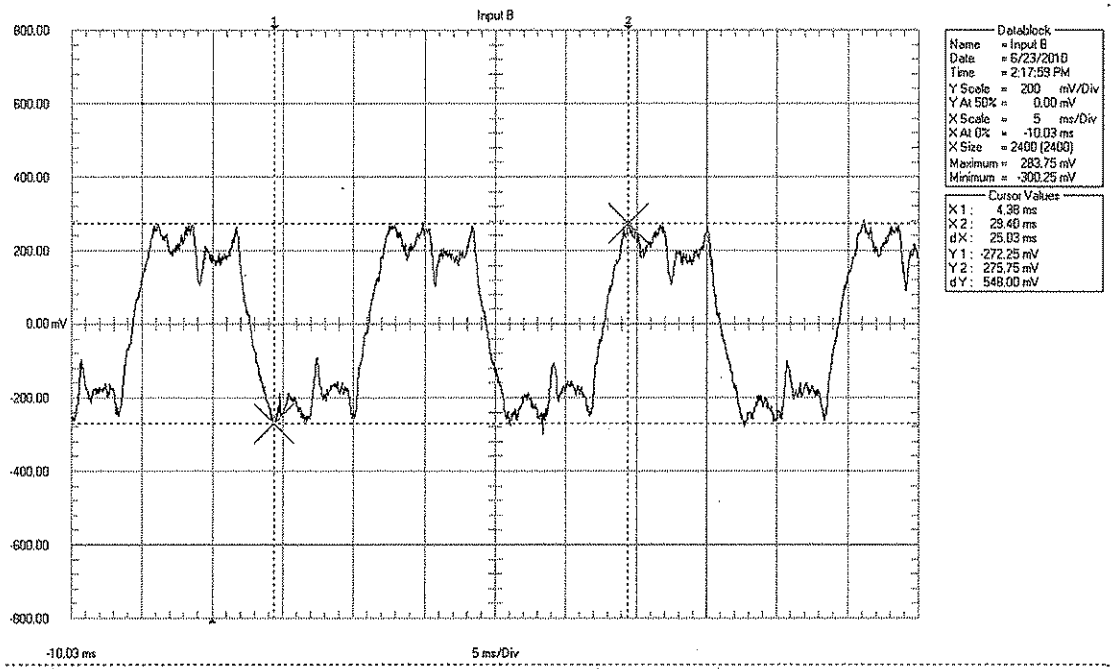


Residence #3, Primary Neutral to remote rod, windmills on, collection line now buried.

Underwood Wind Farm

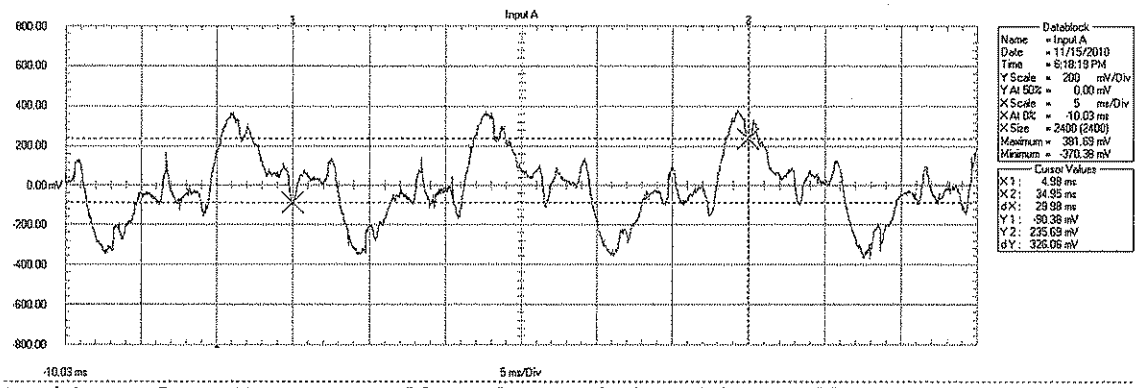
The Underwood Wind Farm, developed and operated by Enbridge, Inc., is located just north of Kincardine, Ontario. It consists of 110 Vestas V82 1.65 MW wind turbines, with a maximum generation capacity of 181.5 MW. I took the measurements shown below in figures 4 through 6 in the same manner as described for the Ripley Wind Farm measurements.

Figure 4.



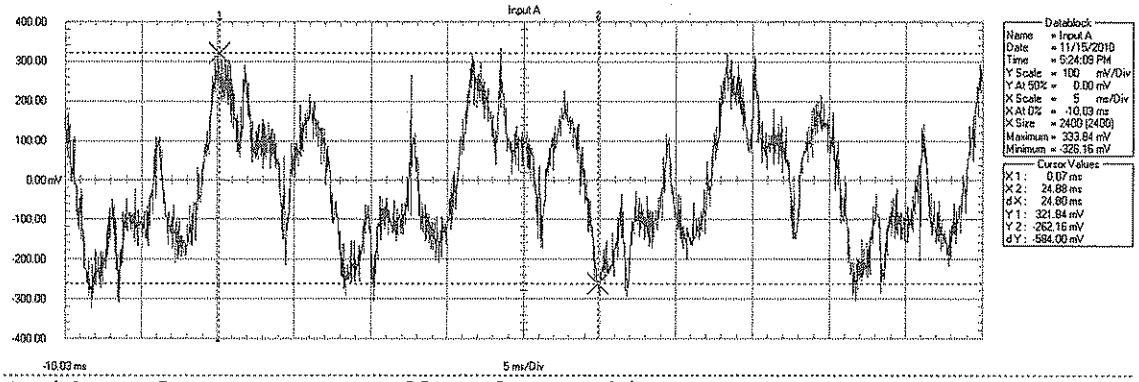
Residence 5, PNEV power off to house. Wind Turbines on.

Figure 5.



Residence 5, PNEV, power off to farm, wind turbines off.

Figure 6.



Residence 5, PNEV, power off to farm,turbines on.

Exhibit 6 is considered Comment D33-33.

EXHIBIT 6

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Application of San Diego Gas & Electric Company (U 902-E) for a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project	Application 06-08-010 (Filed August 4, 2006)

PHASE II DIRECT TESTIMONY OF TRAVIS LONGCORE ON BEHALF OF THE CENTER FOR BIOLOGICAL DIVERSITY AND THE SIERRA CLUB

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Dated: March 12, 2008

TESTIMONY OF TRAVIS LONGCORE, PH.D.

My name is Travis Longcore. I have been retained to provide written and oral testimony on the biological impacts of the proposed Sunrise Powerlink Transmission Project with special emphasis on avian collision and electrocution and other impacts to birds. I am currently Research Assistant Professor of Geography at the University of Southern California Center for Sustainable Cities where I am Director of Urban Ecological Research. I am also Science Director of The Urban Wildlands Group, a Los Angeles-based conservation nonprofit. I have taught for seven years at UCLA for the Department of Geography, Institute of the Environment, and Department of Ecology and Evolutionary Biology. Courses taught include Environmental Impact Assessment, Bioresource Management, Ecology, and Field Ecology.

For the past ten years I have consulted on land use issues, providing expert opinion on the compliance of proposed projects with various laws, including the California Environmental Quality Act, National Environmental Policy Act, California Coastal Act, Endangered Species Act, and Migratory Bird Treaty Act. In this capacity I have reviewed dozens of environmental reports and evaluated the quality of their biological resources analysis. I have expertise in the scientific literature describing avian collisions with structures, particularly with lighted communication towers, but also with wind turbines and other structures. Further information about my background can be found in the attached curriculum vitae.

This testimony is based on the Draft Environmental Impact Report/Environmental Impact Statement and Proposed Land Use Plan Amendment ("DEIR/EIS"), peer-reviewed scientific articles that are cited herein, assumptions predicated on these sources, and expert opinion supported by these facts and assumptions.

Collision Impacts

The DEIR/EIS does not provide adequate data to describe and mitigate the impacts resulting from avian collisions with the proposed power transmission lines. Guidance for identifying and mitigating impacts from collisions is available (APLIC 1994) and the DEIR/EIS claims that the project will follow these guidelines in designing and siting towers. "The applicant shall install the transmission lines utilizing Avian Power Line Interaction Committee standards for collision-

reducing techniques as outlined in 'Mitigating Bird Collisions with Power Lines: The State of the Art in 1994'" (p. D.2-147). APLIC is a well-respected utility-supported organization that is run by the Edison Electric Institute, which is the research arm of the utilities. The authors of the APLIC guidelines include a U.S. Fish and Wildlife Service biologist, a respected ornithologist from Clemson University, and a retired electrical engineer from a utility company (APLIC 1994). They received input from a broad range of electric utility companies and the resulting guidelines are widely accepted by the industry. A comparison of these guidelines and the DEIR/EIS reveals, however, that these techniques have not been utilized in the siting and design of towers for this project.

It deserves mention that avian collisions with power lines can be reduced through tower design and siting decisions, but collisions cannot be eliminated (Alonso et al. 1994; Brown and Drewien 1995; Janss and Ferrer 1998). Even a single tower can kill many birds in a single night under adverse conditions, as was shown by a 100-foot unlighted communication tower on a ridge in West Virgina that killed 75 birds in a single night (Wylie 1977). This type of blind collision can occur during the day as well (Emerson 1904; Bevanger 1998; Janss 2000). Even after following all possible mitigation measures currently available, avian collisions will continue to occur with power lines. For this reason, site planning is critically important to minimize impacts of new routes. As summarized by Janss (2000), "Because mitigation measures only reduce collision mortality, but do not solve it, adequate route planning of power lines is especially important."

APLIC (1994) provides the following guidance on route planning:

- Keep lines distant from areas where birds are taking off or landing (e.g., wetlands).
- Keep lines below the height of vegetation (in forests).
- Avoid topographic features that concentrate migratory birds (e.g., mountain passes, river valleys).
- Orient lines parallel to primary flight patterns.
- Minimize the horizontal distribution of lines by placing them all at the same height rather than stacked at different heights. This is especially important because the majority of collisions occur with the overhead ground wire, which is typically smaller than other wires and virtually invisible to birds in flight.

Obviously a certain amount of field reconnaissance is necessary to gather the information needed to follow these guidelines. APLIC (1994) provides an entire chapter describing methods to observe birds in power line corridors and to evaluate the presence of birds for potential new corridors. They conclude:

> "All items that could affect the success of the project must be considered and evaluated before the line is built. In general, the purpose of preconstruction studies is to obtain information on bird flight altitudes, directions of flight, intensity of movement, species composition, and temporal variations in flight activity in and about the corridor. Day-time and night-time observations should be made by individuals who can identify birds correctly and gather quantitative data in a systematic fashion" (APLIC 1994).

The DEIR/EIS, despite claiming to follow the APLIC guidelines as part of mitigation measure B-10a, does not show any evidence that project applicants have done so in planning the route and designing the towers.

Some effort is made in the DEIR/EIS to identify migratory pathways for birds. These pathways are shown on several figures (D.2-1, D.2-2, D.2-3). The source given for these pathways is two email communications between a staff member at the San Diego Natural History Museum and consultants for the proposed project (p. D.2-540). The applicant has an obligation under the APLIC guidelines to collect data regarding the distribution, behavior, species composition, and collision susceptibility of the birds that will encounter all portions of the proposed project. Unfortunately, the DEIR/EIS incorrectly claims that it is not possible to know how many birds or what species might be impacted by the proposed projects (D.2-146 and repeated several times thereafter). To the contrary, the APLIC guidelines identify many techniques to evaluate the bird use of areas in route planning. These include: daytime and nighttime visual observation using tools to measure distance and altitude of birds (clinometers and theodolites), closed circuit television recordings, night vision tools such as image intensifiers, forward looking infra-red devices, and radar. In fact, radar techniques were developed to detect birds specifically to evaluate the risk of new transmission lines in 1978 (Korschgen et al. 1984). These tools can be used to develop a reasonable assessment of the quantity and general species composition of birds that might be at risk of collision. Examples of such efforts are available in the published literature. Williams et

al. (2001) used radar, visual observations, and a ceilometer to describe birds migrating through a mountain pass. Mabee and colleagues have described bird numbers and altitude of flight using radar at proposed wind power sites (Mabee and Cooper 2004; Mabee et al. 2006). Others have used nocturnal flight calls to identify passing migrants (Farnsworth et al. 2004; Farnsworth and Russell 2007).

It is common for energy projects that may impact migratory birds to include detailed studies of bird migration using a combination of visual observation and radar investigation as part of the environmental review process. The APLIC guidelines cite three such examples (James 1980; McKernan et al. 1982; Gauthreaux 1991). A cursory Internet search reveals many other examples of pre-construction monitoring of birds for potential impacts, including reference to a study of "bird migration in relationship to a proposed powerline and proposed mitigation" by the Golden Valley Electric Association in Alaska, and numerous studies of risk to birds from wind power projects (Mabee and Cooper 2004; Mabee et al. 2006). There are consulting firms that specialize in such studies, offering services such as "monitor rates of nocturnal and diurnal bird migration/movements" and "identify migration and movement corridors for birds" (www.abrinc.com). For projects with potential impacts from avian collision, fieldwork using radar and other techniques is common (Korschgen et al. 1984; Cooper et al. 1991; Harmata et al. 1999; Deng and Frederick 2001; Gauthreaux and Belser 2003; Mabee and Cooper 2004; Mabee et al. 2006).

Although the DEIR/EIS should rely on data gathered in the field at proposed transmission line sites to assess the collision risk of potential structures, it is remarkable that the DEIR/EIS contains no data from San Diego Gas & Electric regarding collisions (or electrocutions) of birds at existing high voltage transmission lines. Given the environmentally oriented operating procedures described in the DEIR/EIS, it would seem that SDG&E personnel would have collected data regarding collision events (incidental observations made by maintenance staff) or electrocution events resulting in power outages. Other utilities collect such data, especially on electrocutions, because they result in service interruptions (APLIC 1994, 2006). Although such data are rarely collected by systematic surveys, they would at least give an indication of the patterns of species vulnerability to collision and electrocution in the project area at existing transmission lines.

Absent data from original studies or incidental observations from SDG&E at existing lines, potential mortality and vulnerable species must be discerned from the scientific literature. Although most migrants travel at altitudes greater than the tops of the proposed towers (Able 1970; Bellrose 1971), a certain proportion of migrants is found nearer the ground, especially during inclement weather or daytime migration (APLIC 1994). Mabee and Cooper (2004) found that at two locations in Oregon, 12–14% of spring migrants were flying below 100 m (328 feet). For a fall migration in West Virginia, 12.7% of birds flew below 100 m (Mabee et al. 2006). These studies show that at given times birds are migrating at an altitude where they could collide with powerlines (e.g., below 100 m).

Ornithologists have identified characteristics that make certain bird species especially vulnerable to collisions (Bevanger 1994; Savereno et al. 1996; Bevanger 1998; Janss 2000). Rails, coots, and cranes (Gruiformes) are most frequently recorded birds killed at powerlines (Bevanger 1998). Other groups at risk include waterbirds and diving birds such as ducks (Anseriformes) and loons (Gaviformes), which also have high "wing loading," which means that their wings are small relative to their weight (Bevanger 1998). These species are unable to maneuver to avoid powerlines, especially in low visibility conditions. Many shorebirds (Scolopacidae) are collision victims, partially because they encounter many lines in their long migratory routes (Bevanger 1998). Aerial predators, such as swifts, many raptors, and even gulls, are at risk because they spend so much time in flight that they have an increased probability of colliding with wires than other species that fly less (Bevanger 1998; Janss 2000).

Collision mortality is of particular concern for species that are in decline (Bevanger 1998; Janss 2000). Usually such species are identified as "sensitive" or are formally listed as threatened or endangered species. For those bird species identified as sensitive in the DEIR/EIS, many fall into groups that are susceptible to collision with power lines. These include the raptors (Cooper's hawk, golden eagle, long-eared owl, ferruginous hawk, Swainson's hawk, northern harrier, white-tailed kite, prairie falcon, bald eagle), common loon, greater sandhill crane, least bittern, and long-billed curlew. Also at risk are all smaller migratory species, which are killed in collisions but are much more difficult to locate under wires than larger species.

The DEIR/EIS fails to recognize the hazard posed to resident and migratory birds of the Salton

Sea and the agricultural fields to the south of it. The proposed northern route would pass along and through the western edge of the agricultural zone and within two miles of the Salton Sea itself. The agricultural fields are even more important than the Salton Sea itself to many wading birds (cattle egret, white-faced ibis, sandhill crane) and shorebirds (mountain plover, whimbrel, long-billed curlew) (Shuford et al. 2002), yet the DEIR/EIS does not recognize the increased risk of mortality posed by a new transmission line through this essential habitat. Furthermore, the DEIR/EIS does not identify the risk of constructing a power line across San Felipe Creek, less than 1.5 miles from wetland habitats on the southwestern edge of the Salton Sea. This area is identified as supporting particular concentrations of colonial waterbirds (Shuford et al. 2002). Because of the proximity to wetland habitats associated with the Salton Sea and the rather extensive marsh and stream habitats along San Felipe Creek and San Sebastian Marsh, birds can be expected to move between the Salton Sea and the San Sebastian Marsh. These will include members of the very groups of birds that are at high risk of collision with power lines. Indeed, the earliest records of power line mortalities are derived from exactly this situation, where power lines are located between and adjacent to wetland habitats (Emerson 1904).

The DEIR/EIS should consider impacts to sensitive bird species at the Salton Sea from collision with the Imperial Valley Link (Table 1). These species have morphological characteristics that predispose them to collisions with power lines (Bevanger 1998; Janss 2000) and the DEIR/EIS fails to identify many of them as being impacted by the proposed power line.

Table 1. Sensitive species associated with Salton Sea and agricultural lands (Shuford et al. 2002) that are vulnerable to collision with power lines (Emerson 1904; McNeil et al. 1985; Bevanger 1998; Janss 2000). Status is indicated as California Bird Species of Special Concern (BSSC), federal Birds of Conservation Concern (BCC), and listing status under state and federal endangered species acts.

Species	Status
brown pelican	Federally endangered
American white pelican	California BSSC, Federal BCC
American bittern	Federal BCC
least bittern	California BSSC, Federal BCC

greater sandhill crane	California threatened, Fully Protected Species
lesser sandhill crane	California BSSC
white-faced ibis	Federal BCC
wood stork	California BSSC
fulvous whistling-duck	California BSSC
black rail	California Threatened, Federal BCC
Yuma clapper rail	Federal Endangered
greater sandhill crane	State Threatened, Fully Protected Species
long-billed curlew	Federal BCC

Collision with power lines is the principal cause of death for sandhill cranes (California Department of Fish and Game 1994), which are threatened and fully protected species in California. Collisions occur during migration and when power lines are found in feeding areas (Krapu et al. 1984; Windingstad 1988). The construction of major power lines within known feeding areas south of the Salton Sea would constitute a significant impact to sandhill cranes, which the DEIR/EIS overlooks entirely.

Part of the risk to waterfowl from power lines is that waterfowl rarely fly under power lines but rather attempt to gain altitude and fly over them (Morkill and Anderson 1991). This makes them vulnerable, especially when they see transmission lines and gain altitude, only to collide with the nearly invisible ground wire above the energized lines (Morkill and Anderson 1991). Marking ground wires is consequently a common mitigation technique (APLIC 1994; Brown and Drewien 1995; Janss and Ferrer 1998).

The proposed aboveground transmission line routes would be a permanent hazard to resident and migratory birds. Far greater field data must be conducted to describe this risk, but it is probably significant in most of the undeveloped regions of the project area. The proposed project design, as far as it is revealed in the DEIR/EIS, does not minimize those impacts, nor does it follow the APLIC recommendations to do so.

1. *Keep lines distant from areas where birds take off or land.* The Imperial Valley Link

cuts through habitat highly utilized by wintering birds (agricultural lands) and between wetland habitats. The Anza-Borrego Link, Central Link, and Inland Valley Link traverse habitats where dense populations of birds live and through which many species migrate. No mitigation for the Imperial Valley Link is even proposed.

2. *Keep lines below the height of vegetation.* This minimization measure is not available for the proposed project because the vegetation types through which the lines would pass are not forested.

3. *Avoid topographic features that concentrate migratory birds.* Although the proposed routes do not follow ridgelines, they do follow valley floors, which can also concentrate migrants. Furthermore, no data were collected to describe the movement of birds across the various project areas so no conclusions can be reached whether migratory pathways have been avoided.

4. *Orient lines parallel to primary flight patterns.* No studies were conducted to determine these flight patterns, but the extent of the project guarantees that this recommendation cannot be followed throughout.

5. *Minimize horizontal distribution of lines.* The proposed project fails to follow this recommendation. The 500 kV tower design includes two ground wires at the top of the tower with the main circuits hanging below. In areas with the 69/92 kV underbuild the towers include three heights of wires spread over 60–70 feet (Figure B-19). All of the steel pole towers show circuits at several heights (B-16 to B-18) rather than at the same height. None of these designs are consistent with the APLIC (1994) recommendations because they spread the wires over a vertical area of 60–80 feet. If all cables were to be at one level, one change in altitude would allow birds to avoid them (Janss 2000). The current designs therefore do not minimize collision risk to birds.

Mitigation Measure B-10a further suggests the use of diversion devices for a portion of the project in the Imperial Valley and Anza-Borrego links. Diversion devices can reduce mortality of birds by 50% and sometimes 75% (Morkill and Anderson 1991; Alonso et al. 1994; Brown and Drewien 1995; Janss and Ferrer 1998). Such a reduction is an improvement, but certainly does

not represent reduction of the significant impact to a less than significant level given the miles of lines to be installed and the vulnerable species known to live and migrate near these lines. Appropriate studies of these transmission corridors following the APLIC (1994) guidelines would allow for an adequate description of additional risk to birds from collisions with the proposed lines but these studies have not been conducted. Sufficient data are not presented in the DEIR/EIS to support the claim that impacts to birds from collision with the proposed transmission lines would be mitigated to a less than significant level and indeed, collisions could result in take of federal and state protected species.

Electrocution Impacts

Electrocution by power lines is a significant source of mortality for some bird species to the extent that population density and distribution is altered (Sergio et al. 2004). The DEIR/EIS describes a project that will consist of large transmission lines, while most mortality from electrocution derives from smaller distribution lines where the separation between wires is smaller (Lehman 2001; APLIC 2006). The proposed project also involves relocation of a 69 kV distribution line along the Central Link of the project (p. D.2-144). Although the DEIR/EIS argues that the electrocution risk will be the same as before, this relocation makes the relocated distribution line part of the project and therefore impacts must be identified, minimized, and mitigated. The project also does not fully account for the collision risk posed by the 69 or 92 kV underbuilds along several project links. The depictions of such structures (Figure B-19) do not provide measurements of the distances between the energized conductors and between the innermost conductor and the steel structure. The renderings are apparently not to scale, but it seems possible that the underbuild lines might be close enough to allow for electrocution of birds.

The DEIR/EIS does not discuss the potential of "streamers" to cause flashovers on power lines. "Streamers" are long streams of bird excrement that can span energized conductors and other line structures. A flashover is a fault that originates on the energized conductor and travels through the streamer to the structure (APLIC 2006). These may cause power outages and occasionally bird mortalities (APLIC 2006). The DEIR/EIS should discuss this potential problem relative to the tower designs proposed for the project.

Transmission Towers as Perches

The construction of transmission towers across areas that have few natural perches can dramatically alter the distribution of raptors and ravens (Knight and Kawashima 1993; Knight et al. 1993). For example, a study of raptor habitat use and density following construction of a 230 kV transmission line with 75-foot towers across open prairie in Colorado showed a significant increase in raptor density within 1,300 feet (0.4 km) of the towers (Stahlecker 1978), essentially changing the distribution of raptors across the landscape. Although towers were 1.5% of the available perches, they accounted for 81% of raptor perch sites (Stahlecker 1978). Such artificial concentration of predaceous species by power lines has been confirmed in other studies (Knight and Kawashima 1993) can have adverse impacts on prey species (Lammers and Collopy 2007).

The DEIR/EIS acknowledges that transmission towers would provide additional nest sites for red-tailed hawks but asserts that the number of red-tailed hawks would be controlled by prey availability (p. D.2-148). This argument does not, however, account for the altered distribution of raptors within the landscape that results from transmission tower construction (Stahlecker 1978). This impact is in fact significant because of the concentration of predator activity in certain areas and its effects on sensitive species. The DEIR/EIS offers no mitigation for this impact.

The mitigation proposed for increased density of ravens associated with transmission towers is to develop a raven control plan for Anza-Borrego State Park and in habitat for desert tortoise and flat-tailed horned lizard (MM B-11a, b). Ongoing lethal control of ravens, as implied by the text of the mitigation measure, is far less desirable than avoiding such impacts. Undergrounding lines along existing roads would avoid this impact entirely.

Noise

The analysis in the DEIR/EIS of the impacts of increased noise from construction and operations on sensitive bird species relies on the faulty assumption that they are not affected by noise levels less than 60 dB(A). The DEIR/EIS applies this standard to least Bell's vireo, southwestern willow flycatcher, California gnatcatcher, and other species. Least Bell's vireo was located along the proposed route in the Anza Borrego Link (Yaqui Well) and Central Link (assumed present at MP 101), while southwestern willow flycatcher is assumed present along the Central Link (MP

101). These species were located or assumed present along several of the alternative routes as well.

The 60 dB(A) threshold for impacts on avian species was established in 1991 by a study conducted for the San Diego Association of Governments in which "it was theoretically estimated that noise levels in excess of 60 dB(A) Leq in [Least Bell's] vireo habitat would mask the bird's song, subsequently reducing the reproductive success of this species during their breeding season...." (County of San Diego 2000). This study, on which the U.S. Fish and Wildlife Service apparently based its acceptance of the 60 dB(A) threshold as well, to our knowledge has never been published or peer reviewed. The DEIR/EIS refers to Bowles and Wisdom (2005) as a source for the standard but this published abstract of a conference paper questions, and does not support, the use of the 60 dB(A) standard.

Since 1991, scientific understanding of the effects of noise on birds has improved greatly, with studies published that present heuristic and mathematical models that quantify the pattern of impacts caused by noise (Hill 1990; Reijnen and Foppen 1994; Reijnen et al. 1996; Reijnen et al. 1997; Forman et al. 2002; Peris and Pescador 2004; Slabbekoorn and Ripmeester 2008). Rather than relying on undocumented research nearly two decades old, it is incumbent upon the applicant to incorporate the best and most up-to-date scientific evidence of the impacts of noise on breeding birds in the environmental analysis of the proposed project.

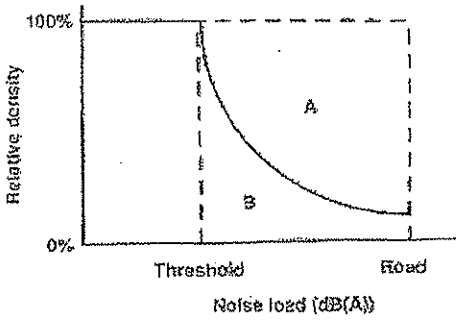


Figure 1. Threshold model for relative breeding density of birds plotted against traffic noise, where T is the threshold value and R the value at the roadside [or other noise source]. The decrease factor of the density = area of A/(area of A + B). Caption and figure reproduced from Reijnen et al. (1995).

In the late 1990s, a group of Dutch ecologists investigated the effects of traffic noise on breeding bird density. Of 45 bird species investigated in woodlands in The Netherlands, 33 showed significantly depressed breeding density near roads. All species in the small passerine families Sylviidae, Fringillidae, and Emberizidae were affected by noise (Reijnen et al. 1997). This research also showed that noise effects followed a threshold model (Reijnen et al. 1995). This means that up to a certain noise level, no decrease in density is observed. When noise increases beyond that threshold level, bird density decreases dramatically in the area between the location at which that threshold is met and the road (Figure 1). The decreased density over the area with noise greater than the threshold level ranges from 30% to 100% and is known as the "decrease factor" (Reijnen and Foppen 1995; Reijnen et al. 1995). These two variables, the threshold and the decrease factor, describe the impact of road noise on breeding birds. Empirical measurement of the threshold value in woodlands shows that for all bird species combined the threshold value is 42–52 dB(A), with individual species exhibiting thresholds as low as 36 dB(A) and as high as 58 dB(A) (Reijnen and Foppen 1995; Reijnen et al. 1995). Furthermore, years with overall low population densities showed lower threshold levels. This information can be used to evaluate the impacts of noise from the proposed project from construction, maintenance, and operation (corona noise).

The least Bell's vireo and southwestern willow flycatcher are small songbirds that rely on hearing songs to attract mates and defend territories. Habitat for both species would be impacted by noise from the proposed project (Figs. Ap8C-06, Ap8C-10). The studies of road noise from Europe include similar small songbirds that use acoustical communication. The threshold levels for two European warbler species (*Phylloscopus sibilatrix* and *Phylloscopus trochilus*) are 26 dB(A) and 39 dB(A), with decrease factors of 0.61 and 0.38, meaning breeding density was diminished to ~40–60% of undisturbed levels (Reijnen et al. 1995). From the published literature, therefore, a reasonable threshold based on similar species for least Bell's vireo and southwestern willow flycatcher would be 40 dB(A) or below. Data from California support this conclusion. In 1999, Haas recorded sound levels (one hour A-weighted Leq) at 87 locations in the vicinity of the southwestern willow flycatcher colony along the San Luis Rey River in the vicinity of the Lake Henshaw Dam. The study site harbors the most robust and stable southwestern willow flycatcher colony in California. Sampling locations were established along the river; 100 meters

(the approximate average length of a southwestern willow flycatcher territory within the colony) separated each location. The territories were nearly identical in all habitat characteristics except sound level. Of these territories, 44 were occupied by either a pair of flycatchers (n = 42) with a nest, a solitary male (n = 1), or a solitary female (n = 1). Using sound as the independent variable, and occupancy as the response variable, I completed a logistic regression on these data. The results were highly significant ($p < 0.0001$, $r^2 = 0.49$), indicating with certainty that territory occupancy is reduced by sound levels in the 50–60 dB(A) range.

A conclusion that noise impacts on sensitive bird species such as southwestern willow flycatcher and least Bell's vireo start below 50 dB(A) is robust. Thresholds for other bird species have been determined to be in the 40–50 dB(A) range (Reijnen et al. 1997). The 60 dB(A) threshold currently used by the DEIR/EIS will be ineffective at eliminating noise impacts, and in fact noise at the 50–60 dB(A) level could deter breeding activity altogether for some species. According to the DEIR/EIS, corona noise from the 500 kV transmission line would increase ambient noise levels within the project right of way to 52 dB(A) along a number of project links under certain weather conditions (Table D.8-13). Noise from construction and maintenance activities would also increase noise levels for sensitive bird species. These impacts should be evaluated with a lower threshold that is based on the published scientific literature rather than the unsubstantiated 60 dB(A) threshold.

Helicopter Disturbance

The DEIR/EIS discloses that 111 towers will be built using helicopters to deliver materials (p. B-84) and furthermore describes complete inspection of the system using helicopters on at least an annual basis (p. D.2-149). Yet the DEIR/EIS only describes helicopter disturbance within the context of impacts to Peninsula bighorn sheep (p. D.2-114). The DEIR/EIS gives no limits to the frequency of helicopter flyovers for the lines (p. D.8-18). Many other wildlife groups are affected by helicopter disturbance than bighorn sheep (Efroymson and Suter 2001), and the DEIR/EIS does not contain a complete discussion of the impacts of helicopter disturbance on these groups. Efroymson and Suter (2001) summarized the literature on the effects of military overflights on wildlife and found thresholds for impacts to wildlife from rotary-wing aircraft for raptors, waterfowl, and ungulates. For example, flights within 15 km can disturb waterfowl,

which only sometimes become habituated to such disturbance (Efroymson and Suter 2001). Raptors can similarly be disturbed and while some species can become habituated (such as red-tailed hawks, which are known for habituating to human activity) other species may abandon an area that has been disturbed by helicopter overflights (Andersen et al. 1989). The DEIR/EIS uses a mitigation approach for golden eagles that limits disturbance from helicopters (and other noise sources) to the period outside of breeding season when within 4,000 feet of a nest site (Mitigation Measure B-7h). This measure is not sufficient to protect golden eagles from adverse impacts. Scientific literature on this subject is clear, "The presence of humans detected by a raptor in its nesting or hunting habitat can be a significant habitat-altering disturbance even if the human is far from an active nest" (Richardson and Miller 1997). Regardless of distance, a straightline view of disturbance affects raptors, and an effective approach to mitigate impacts of disturbance for golden eagles involved calculation of viewsheds using a three-dimensional GIS tool and development of buffers based on this (Camp et al. 1997; Richardson and Miller 1997). The DEIR/EIS assumes that impacts to golden eagles can be avoided by a 4,000-foot buffer from nest sites, but this approach will not avoid disturbance to hunting habitat or line-of-sight impacts from nest sites, regardless of distance. Helicopters will be a chronic intrusion into areas that currently have no such artificial disturbance.

Electromagnetic Fields

The DEIR/EIS contains an electromagnetic field (EMF) management plan, but places undeveloped land as the lowest priority for implementation of low-cost measures to reduce EMFs (Appendix 7, p. 6). This approach ignores the adverse impacts of EMFs on wildlife that have been documented in the scientific literature.

Birds are closely associated with powerlines through perching, nesting on supporting structures, and exposure to EMFs in habitats below and adjacent to lines (Fernie and Reynolds 2005). An experimental study exposed America kestrel (a raptor found along the project route) to electromagnetic fields equivalent to being under a 735 kV transmission line (Fernie et al. 2000). The pairs exposed to EMFs had higher fertility but poorer hatching success (Fernie et al. 2000). Behavior was affected as well, with pairs exposed to EMFs maintaining higher activity levels.

Such activity is not desirable during nesting when reductions in activity levels are associated with egg-laying and protection of eggs (Fernie and Reynolds 2005).

A German study showed increased egg size in one species nesting under a 100 kV power line, decreased egg size in another species, and no difference in two other species (reported in Fernie and Reynolds 2005). A review of studies of embryonic development found that most studies (88%) found adverse effects resulting from exposure to EMFs similar to that experienced by nesting under power lines (Fernie and Reynolds 2005). Exposure to EMFs also has been shown to inhibit production of the hormone melatonin, which helps to regulate seasonal behaviors such as nesting, molt, and migration (Fernie et al. 1999). Even though relatively few studies of the effects of EMFs on birds have been completed, "much of the research has found that EMF exposure has generally affected birds, and most of the effects have been adverse" (Fernie and Reynolds 2005). The DEIR/EIS errs in failing to consider the impacts of EMFs on birds and other wildlife and consequently fails to identify significant adverse impacts to bird habitat across the aboveground portions of the proposed transmission line.

Fragmentation Impacts

The proposed project will have impacts to native ecosystems that extend well beyond the footprint of the transmission towers and associated road infrastructure. These impacts are not adequately described in the DEIR/EIS. One such mechanism is through "bottom-up" effects whereby invertebrate communities are disrupted, which then affects other wildlife. Disturbance of natural scrub and chaparral communities will promote the invasion of alien insect species, such as the Argentine ant (*Linepithema humile*). The deleterious effect of Argentine ants on native arthropods is well documented; many studies report a decrease in arthropod diversity as Argentine ant abundance increases (Erickson 1971; Cole 1983; Human and Gordon 1996, 1997; Holway 1998a; Kennedy 1998). The proposed project will promote invasion of Argentine ants by providing two conditions that increase invasion: a water source (Holway 1998b; Human et al. 1998; Holway and Suarez 2006) and increased disturbance (Human et al. 1998). These are provided in the form of watering for dust suppression (D.2-165), washing of insulators on towers (B-98), and by construction and maintenance activities. Argentine ants invade far beyond dis-

turbed areas and water sources and into surrounding undisturbed habitats, with increased abundance documented to a distance of up to 650 feet (Suarez et al. 1998).

The proposed project will also involve destruction of habitat as part of the fuels management program (p. D.15-64). Community level analysis indicates that arthropod species composition will change and overall diversity will decrease when native habitats are subjected to fuel modification. Disturbed coastal sage scrub sites have fewer arthropod predator species such as scorpions and trap-door spiders, and are dominated by exotic arthropods such as Argentine ants, European earwigs (*Forficula auricularia*), pillbugs and sowbugs (*Armadillidium vulgare* and *Porcellio* sp.), and the sowbug killer (*Dysdera crocata*) (Longcore 2003). These changes in arthropod species diversity will have resonating impacts on vertebrates that use arthropods as prey species. Suarez et al. show that coast horned lizards prefer native ants (*Pogonomyrmex* and *Messor* spp.) as their food source and suffer when these species are eliminated by invading Argentine ants (Suarez et al. 1998).

Disturbance associated with road building and vegetation clearance promotes the invasion of plant species already associated with residential development. Alien plant species found in southern California wildlands are largely associated with disturbed areas, including cleared areas (Rundel 2000). This relationship between invasive exotics and disturbance is found throughout California and in other Mediterranean regions (Kotanen 1997; Rundel 1998). The understories of areas subject to fuel modification are rapidly dominated by invasive exotic grasses and forbs. As described by Keeley, "Prefire fuel manipulations such as fuel breaks produce conditions that favor weedy aliens and thus act to increase the alien presence, increase the movement of aliens into wildlands, and increase seed sources capable of invading after fire" (Keeley 2002). Incidentally, this increases fire frequency as well (Minnich and Dezzani 1998).

As discussed extensively in the literature (Mooney et al. 1986; Minnich and Dezzani 1998; Rundel 1998), invasive plant species can profoundly affect ecosystem structure and function by modifying fire regimes, nutrient cycling, and erosion patterns. The roads, towers, and associated fuel modification will affect an area far greater than the footprint of these activities themselves by promoting the invasion of exotic plants and animals into wildlands.

Inadequacy of Analytical Approach

The presentation of significant impacts categorized by impact class and associated mitigation measures without the necessary studies is a hallmark of the DEIR/EIS. In numerous instances the DEIR/EIS makes conclusions about the severity of impacts based on incomplete information and defers the surveys necessary to gather this information until after project approval. An environmental disclosure document fails if it simply acknowledges vague significant impacts but does not actually provide information about the scope and nature of those impacts. This information is critical because it is needed for the public and decisionmakers to determine if mitigation measures can offset the impacts, whether impacts can be avoided, and whether it is tolerable to approve the project even though the significant impacts remain. The non-specific approach characterized by the entire DEIR/EIS denies the public and decisionmakers knowledge of the actual extent of the impacts on biological resources. For example, the DEIR/EIS acknowledges that the development of a project in Mexico near La Rumorosa would create a significant impact from the collision of birds with turbines (p. D.2-263) but provides no further detail on the scope of this impact or the species that are likely to be involved, save for a general species list (p. D.2-248). It might have been possible, based on site surveys and comparison with other wind projects, to predict that the project would kill around 815 birds per year (using the equation in the caption of Figure 1 of Barclay et al. 2007 as a rough approximation, assuming 125 440-foot tall turbines). This number could include golden eagles and other sensitive species. Collision mortality would be a significant impact that cannot be mitigated, which is the same conclusion reached in the DEIR/EIS, but such descriptions of magnitude would allow decisionmakers to weigh whether the overall benefit of the proposed project would be greater than the significant impacts it would have.

Another example illustrates the need for more specificity in the impact analysis. The DEIR/EIS provides no estimate of the number of birds that might collide with the transmission wires or what species they might be. Absent the field surveys necessary to describe such risks, the scientific literature provides some guidance. Janss and Ferrer (1998) found 43 birds in 20 surveys conducted over two years with some spans marked with diverters during the second year on 4.5 km of 380 kV line on lattice towers through scrubland, grassland, and agricultural lands in Spain, equaling 1.7 birds per mile per year. Approximately 30% of these birds were common cranes

Of the several routes running south down Route 79 from the Lake Henshaw area, the Santa Ysabel SR79 Underground option is superior because it avoids the fragmentation and habitat loss associated with the aboveground route and its access roads.

Farther along in the Coastal Link, the Los Peñasquitos Canyon Preserve and Mercy Road Alternative is an underground route that is worse than the proposed project because it disturbs existing preserve areas. This raises an additional question for the evaluation of project impacts. The DEIR/EIS reports on the compliance of various routes with federal, state, and local land use plans. It is not evident, however, whether the project would involve construction and impacts in areas that were set aside as mitigation in previous CEQA or NEPA documents. Many of the developments in San Diego County were approved based on assumptions about the protection of habitats set aside within and adjacent to the developments in addition to off-site mitigation sites.

The southern transmission route is superior to the northern route because it follows an existing transmission line through much of the inland reaches, then follows Interstate 8 through the mountains. By staying close to existing development and disturbance sources this route is somewhat less damaging than the northern route. The DEIR/EIS, however, identifies Modified Route D as part of its "environmentally superior" southern route. From a biological perspective, Route D is worse than the Interstate 8 alignment because it is longer, destroys more native vegetation, and would disturb an additional golden eagle nest site and additional least Bell's vireo habitat. The only reason the DEIR/EIS identifies Modified Route D as superior is because of reduced visual impacts, but this choice comes at the expense of biological resources.

Wind Development

The DEIR/EIS contains a description of impacts and mitigation measures for the development of a wind power generation project to be located at an undetermined site in northern Mexico near La Rumorosa. The DEIR/EIS does not describe the exact route for the transmission line either in Mexico or the United States or the location of the wind turbines. This portion of the DEIR/EIS fails to meet common standards for provision of a complete and consistent project description. It furthermore fails to show adherence to the State of California's guidelines for design and siting of wind facilities to reduce impacts to birds and bats (California Energy Commission 2007).

These guidelines identify the need to collect one or more years of field data on bird and bat populations for projects located in areas that may impact special status species (California Energy Commission 2007, p. 9). The DEIR/EIS simply cannot support any conclusions about the proposed project element without conducting the necessary field studies.

The description of the impacts of wind development contains the assertion that taller towers would decrease raptor mortality at the La Rumorosa site (D.2-262). However, recent research has shown that turbine height is weakly and positively correlated with bird mortality, and taller turbines kill exponentially more bats than shorter turbines (Barclay et al. 2007). Bat mortality at wind projects is a grave conservation concern (Kunz et al. 2007; Arnett et al. 2008) and recent research should be incorporated into the DEIR/EIS to identify and avoid these impacts.

Conclusion

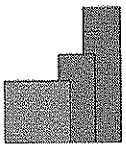
The absence of detail about the magnitude and species-specific context of impacts is a pervasive problem with the DEIR/EIS. The logical and factual basis upon which evaluation of mitigation and minimization measures rests is absent in many instances. Useful comparative information from other similar projects that might help quantify impacts is missing. In sum, the DEIR/EIS is insufficient because it fails to identify significant impacts that will result from the project, it fails to provide adequate descriptions of the identified significant impacts and their mitigation measures, and it lacks the analytical connective reasoning to place impacts to biological resources in context.

I declare under penalty of perjury this testimony is, to the best of my knowledge, true and correct.

/s/ Dr. Travis Longcore

Exhibit 7 is considered Comment D33-34.

EXHIBIT 7



McCann Appraisal, LLC

March 4, 2011

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Re: Proposed "**Project**" in joint PUC/BLM Draft EIS / EIR
ECO / Boulevard Substation, Tule Wind and Energia Sierra Juarez (ESJ)
Gen-tie line to US/Mexico border.
&
Cumulative Projects include Campo Wind, Manzanita Wind and Jordan Wind
(Enel Jewel Valley Project)

Dear Messrs.' Thomsen and Fisher:

On behalf of Backcountry Against Dumps, The Protect Our Communities Foundation, East County Community Action and Donna Tisdale, I am submitting this real estate impact evaluation for your consideration and use in addressing the captioned wind energy projects. The scope of work and my professional opinions have been developed independently.

The Project is comprised of several wind turbine projects and related HVTL and substation infrastructure. Compliance of the proposed facilities with the County of San Diego Zoning Ordinance requirements for Major Use Permit(s) (MUP) has been evaluated from a real estate valuation and land use perspective, and I have also evaluated the combined projects pursuant to the issue of economic impacts, in consideration of EIR/EIS requirements.

My professional opinions are effective as of the current date, and my evaluation and this Consulting Report have been prepared and submitted pursuant to applicable licensing laws that mandate compliance with the Uniform Standards of Professional Appraisal Practice (USPAP), and my opinions are certified accordingly.

Professional Opinions

Briefly stated, based upon my review of the proposed Project facilities, the Project does not comply with the County of San Diego Zoning Ordinance requirements for a MUP, as it is not compatible with adjacent and nearby residential uses and will have a harmful effect on the desirable character of the neighborhood. The Project will cause substantial diminution and injury to property values in the area, averaging approximately 25% as far as 2 to 3 miles, and with approximately 5% value loss from the nearest turbines out to as far as 5 miles. The basis for my professional opinions are described and summarized herein.

Further, the HVTL infrastructure and substation facilities will cause varying levels of value impairment, separate and apart from the impact of industrial scale (400-500 foot) turbines.

Also, in my opinion, the EIR/EIS is deficient with regard to addressing property value impacts, and identifies no measures to mitigate against value losses in the surrounding area, particularly for residential property. In the event that the Project is approved, it should be conditioned upon implementation of a Property Value Guarantee (PVG). From a property value perspective, and to mirror the criteria of the EIR/EIS, implementation of a PVG that leaves property owners economically "whole" would Change a Class I impact to a Class II. A Class III level of mitigation is not possible, as marketing times will still be impaired for properties with the most visible impairment of vistas and/or an increase in noise levels (audible and low frequency) beyond the level of "noticeable" to "nuisance", or equivalent terms.

Finally, the reasonably foreseeable projects cited in the caption of this consulting report and described herein will cause a disproportionate and cumulative adverse impact on Boulevard, surrounding rural residential property, and the general Project area. The combined effect will be to surround and "blight" these residential uses and residents, and significantly expand the area of value impairment from the ECO / Boulevard Substation, Tule Wind and Energia Sierra Juarez (ESJ) Gen-tie line Project.

My specialized and unique experience with utility scale wind energy developments, as well as 30 years of real estate, land use evaluation and appraisal background has enabled and qualified me to evaluate whether the proposed Project meets the criteria described in the San Diego County Zoning Ordinance, the overall issue of economic impact, from a real estate and land use perspective, and the methodology that is appropriate for measuring property value damages from disamenities or environmental impairment.

My research continues, and I reserve the right to supplement my opinions at a later date, as may be warranted if the Project proceeds, testimony at hearing and/or in litigation becomes necessary. Other records considered in developing my opinions are retained in my work file for future reference.

Project Summary
Following review of Project documents and review of issues with the Boulevard Planning Group, the Project is summarized as follows:

Proposed Project in joint PUC/BLM Draft EIS / EIR includes ECO / Boulevard Substation, Tule Wind and Energia Sierra Juarez (ESJ) Gen-tie line to US/Mexico border. Full DEIR/EIS:
http://www.cpuc.ca.gov/environment/info/dudek/ecosub/ECO_Draft_EIR.htm

Project Description:
http://www.cpuc.ca.gov/environment/info/dudek/ecosub/Draft_EIR/B_ProjectDescription.pdf

Project Overview map at page 5 of link above.
Additional proposed projects whose impacts are analyzed at a qualitative program level include the Campo, Manzanita, and Jordan Wind projects. The entire impacted area is totally groundwater dependent.

The ECO Substation Project, as proposed by San Diego Gas &Electric , will be located east of the rural low income community of Jacumba CA 91934. It includes the following major components:

- Construction of a 500/230/138-kilovolt (kV) substation in Eastern San Diego County
- Construction of the Southwest Powerlink (SWPL) loop-in, a short loop-in of the existing SWPL transmission line to the proposed ECO Substation
- Construction of a138 kV transmission line, approximately 13.3 miles in length, running between the proposed ECO Substation and the rebuilt Boulevard Substation
- Rebuild of the existing Boulevard Substation.

Linked source of information above:
http://www.cpuc.ca.gov/environment/info/dudek/ecosub/Draft_EIR/00-NoticeofAvailability.pdf

Additional ECO Substation details:

- 58 acres with 25 acres of additional cut and fill
- 15 X 30 120,000 gallon water tank
- 2 retention basins, 1.2 and 1.9 acres
- Microwave communication tower and backup generator
- Tallest structure 135'
- Approximately 1,500' from nearest property line
- A new custom off-the-grid home is less than 3,600 feet just north side of I-8, at base of Table Mountain, with a gorgeous view over the proposed 80 plus acre substation site and on into Baja where the ESJ turbines will be.
- Document / maps do not disclose proximity of multiple vacant private properties within 1 mile.

- 13.3 miles of new 138 kV transmission line to connect with new Boulevard Substation.
- 14 homes reportedly located within 500 feet of new 138 kV line (DEIR/EIS D.85 Noise)

" The ECO Substation will be designed so that it will ultimately be expanded to include the following components:

- Five 500 kV bays
- Nine 239 kV bays
- Nine 138 kV bays
- Four 500/230 transformer banks
- Three 230/128 kV transformer banks
- One or more 500 kV series capacitors
- Two 230 kV , 63 MVAR shunt capacitors
- Four 12 kV. 180 MVAR shunt reactor banks
- One 230 kV static VAR compensator

The maximum amount of oil required for the transformers at the ECO Substation will be approximately 569,800 gallons. There does not appear to be any indication of where all these new transmission lines will run through the neighboring rural communities.

SDG&E's application states they planned to purchased approximately 6 parcels 500 acres of private undeveloped land in the In-Ko-Pah area. Source: http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/SDG&E%20ECO%20Application_A0908003.pdf

The ECO Substation site appears to have been purchased. Large no trespassing signs have been erected in the area. Eminent domain was reportedly used to obtain several parcels.

Boulevard Substation:

- New 2-acre substation will be built on residential property immediately east of the existing substation.
- Currently designated 1 DU 4/8/20 acres and zoned S 92 Multiple Use. Pending General Plan Update will be rezoned as Semi-rural SR -10 1 DU/20, 20 acres.)
- Existing home and structures will be removed. Mature Oaks may be removed.
- 2 single family homes are located within 500-600 feet (DEIR/EIS D.85 Noise)
- Nearby homes are located south, west, north, and east of new site. (see current views at -14AFigure D.34 existing setting :http://www.cpuc.ca.gov/environment/info/dudek/ecosub/Draft_EIR/D-3_VisualResources.pdf

- About 50 homes are within about 1,500' of proposed substation and new 138 kV line as shown in Figure D.4-5c. More are out of site in the Calexico Lodge area across Old 80 to the Northwest.
- At least one known sensitive receptor, ill with cancer and suppressed immune system, lives less than 2,000 feet southwest of proposed substation. Their home is also about 750 feet from the SDG&E easement that is a potential route for two or more new 138 kV lines that will serve Campo and Manzanita Wind projects.
- Two steel poles 85' tall will be installed southwest of new substation
- Boulevard Expansion will allow for up to four generation tie-lines
- New 138 kV lines will come in from Jewel Valley to the south from ECO Substation
- New 138 kV lines will come in from the north from Tule Wind
- 2 New 138 kV lines will come in from the west along an unidentified SDG&E Easement (likely along the line that comes into the existing substation from the west) from unidentified new substation locations that will serve SDG&E's and Invenergy's proposed Campo and SDG&E's Manzanita Wind projects
- New 138 kV line will come in from the Jewel Valley area (south) , from the Ribbonwood Road area (northwest), and potentially from the McCain Valley Road / Old Hwy Road area (northeast)

http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/SDG&E%20ECO%20Application_A0908003.pdf

Iberdrola Renewables 200 MW Tule Wind Project (Pacific Wind)

The proposed Tule Wind Project, consisting of up to 134 wind turbines in the 1.5 to 3.0–megawatt (MW) range generating up to 200 MW of electricity, would be located in the McCain Valley in southeastern San Diego County, California. In addition to wind turbines and associated generator step-up transformers, the Tule Wind MW Project would include the following components:

- Proposed for approximately 15,000 acres of public land, some private ranch land, tribal land and State Land Commissions Land near Boulevard.
- Closet homes and the Lark Canyon and Cottonwood Campgrounds are 900 feet or more from turbines, transmission lines and ancillary facilities (DEIR/EIS D.86 Noise)
- The residence of an elderly couple, Robert and Kathryn McCallister (APN 61103002 & 61107002 McCallister Robert & Kathryn Trust), will be about 2,000 feet east of turbines, and less than 1,000 feet west of both the proposed 500 kV Sunrise Powerlink and Tule Wind 138 kV line.
- A 34.5 kV overhead and underground collector cable system linking the wind turbines to the collector substation
- A 5-acre collector substation and a 5-acre operations and maintenance (O&M) facility
- Two meteorological towers and one sonic detecting and ranging (SODAR) unit
- A 138 kV overhead transmission line running south from the collector SG&E Boulevard Substation

- 36 miles of newly constructed access roads and temporarily widened and improved existing access roads.
- Turbines in J string on tribal land will be 100 feet from Sawtooth Wilderness Area
- 11 Turbines on private inholdings in R string, East of McCain Valley Road would be surrounded BLM In-Ko-Pah Area of Critical Environmental Concern
- Turbines will be located within McCain Valley National Cooperative Land and Wildlife Management Area and inside the Lark Canyon Off-Highway Vehicle Park.
- BLM lands were down-zoned from Visual Resource Management Class II to Class IV, in the 2008 Eastern San Diego Resource Management Plan revision, specifically to accommodate the Tule Wind project. That downzone is the subject of unresolved federal litigation.

For public safety, permanent fences would be erected around the collector substation, meteorological towers, O&M facility, and the equipment storage area

ESJ Gen-Tie Project (Sempra Generation)

- Approximate 10 acres of impacts
- Proposed by Energia Sierra Juarez U.S. Transmission, LLC, the ESJ Gen-Tie Project
- Capacity to import up to 1,250 MW of wind / energy generated in northern Baja
- Will connect to existing SWPL Transmission Line through ECO Substation, east of Jacumba
- Constructed on three to five 150-foot lattice towers or 170-foot steel monopoles, extending south from the point of interconnection for about 0.5 mile to the U.S.-Mexico border.
- The DEIR/EIS addresses the gen-tie line including any potential impacts to the U.S. associated with wind turbines constructed in Mexico.
- This project also requires a Presidential Permit (PP-334) from the United States Department of Energy and a Major Use Permit from the County of San Diego.
- The County of San Diego will use the EIR/EIS to issue the Major Use Permit for its compliance with CEQA

Cumulative Projects include Campo Wind, Manzanita Wind and Jordan Wind that is now the Enel Jewel Valley Project with 158 MW of wind and 10 MW of solar.

Campo Wind Project

- SDG&E and Invenergy propose to construct and operate approximately 106 turbines capable of generating 160 MW of electricity on Campo tribal lands. (west of Tisdale ranch)
- Turbines (approximately 450 feet tall from ground to tip of the fully extended turbine blade) would be located on available ridgelines on the reservation.
- In addition to the 160 MW of generating capacity proposed for this project, the Campo Tribe has requested that an additional 140 MW of generation be

analyzed in the Bureau of Indian Affairs' NEPA review of the project for future development purposes.

- The proposed Invenergy and SDG&E Campo Wind Project would connect with the Boulevard Substation Rebuild component of the ECO Substation Project.

Manzanita Wind Project

- SDG&E proposal for 57.5 MW, which could include up to 25 wind turbines depending on the turbine size selected.
- Turbines to be located on the same ridgeline as the existing Kumeyaay Wind facility.
- Turbines are proposed to be approximately 414 feet tall from ground to tip of the turbine blade fully extended.
- Project would connect with the Boulevard Substation Rebuild component of the ECO Substation Project.
- It is expected that the Campo and Manzanita wind energy projects would develop a switchyard for both facilities on non-tribal lands and a new 138 kV transmission line would be constructed along the existing ROW of the 69 kV transmission corridor that currently connects to the existing Boulevard Substation.
- The new 138 kV transmission line would interconnect with the proposed Boulevard Substation Rebuild component of the ECO Substation Project.

Jordan Wind Project (now Enel Jewel Valley Project)

- Enel Green Power Jewel Valley Project changed the proposed 40 2.3 MW turbines (total generating capacity of 92 MW) into 158 MW wind and 10 MW solar tracking units on over 7,000 acres of ranch land.
- The towers of the proposed wind turbines would be approximately 260 feet tall (height from ground to tip of fully extended blade would be approximately 430 feet).
- Enel's preferred point of interconnection is the Boulevard Substation Rebuild component of the ECO Substation Project.

Proximity of turbines to residence: See Figure D. 4-9 at page D-43 in DEIR/EIS

- When you use the scale on the Figure D.4-9 map, you can see that most of Boulevard will be impacted within a 1 to 3 mile radius.

EIR Comments

The Draft EIR Executive Summary clearly **recognizes a Class I, Substantial adverse effect on scenic vistas**. These scenic impacts are also listed in the EIR as adverse and unavoidable. Permanent noise levels are also listed, and are shown as Class II noise levels that can be mitigated by placement configuration. However, after researching the subject of noise from wind turbines, reviewing substantial literature on the subject, being an eyewitness to extensive live testimony from residents and experts regarding the distances that low frequency noise and other noise is broadcast, and given the close proximity of numerous residences and even the entire town of Boulevard, for example, it is highly doubtful that configuration of turbines on ridges will be successful in mitigating noise impacts for neighbors of the project. Further, existing resident reports of disturbing noise from the first area wind project casts much doubt on such conclusions of the EIR.

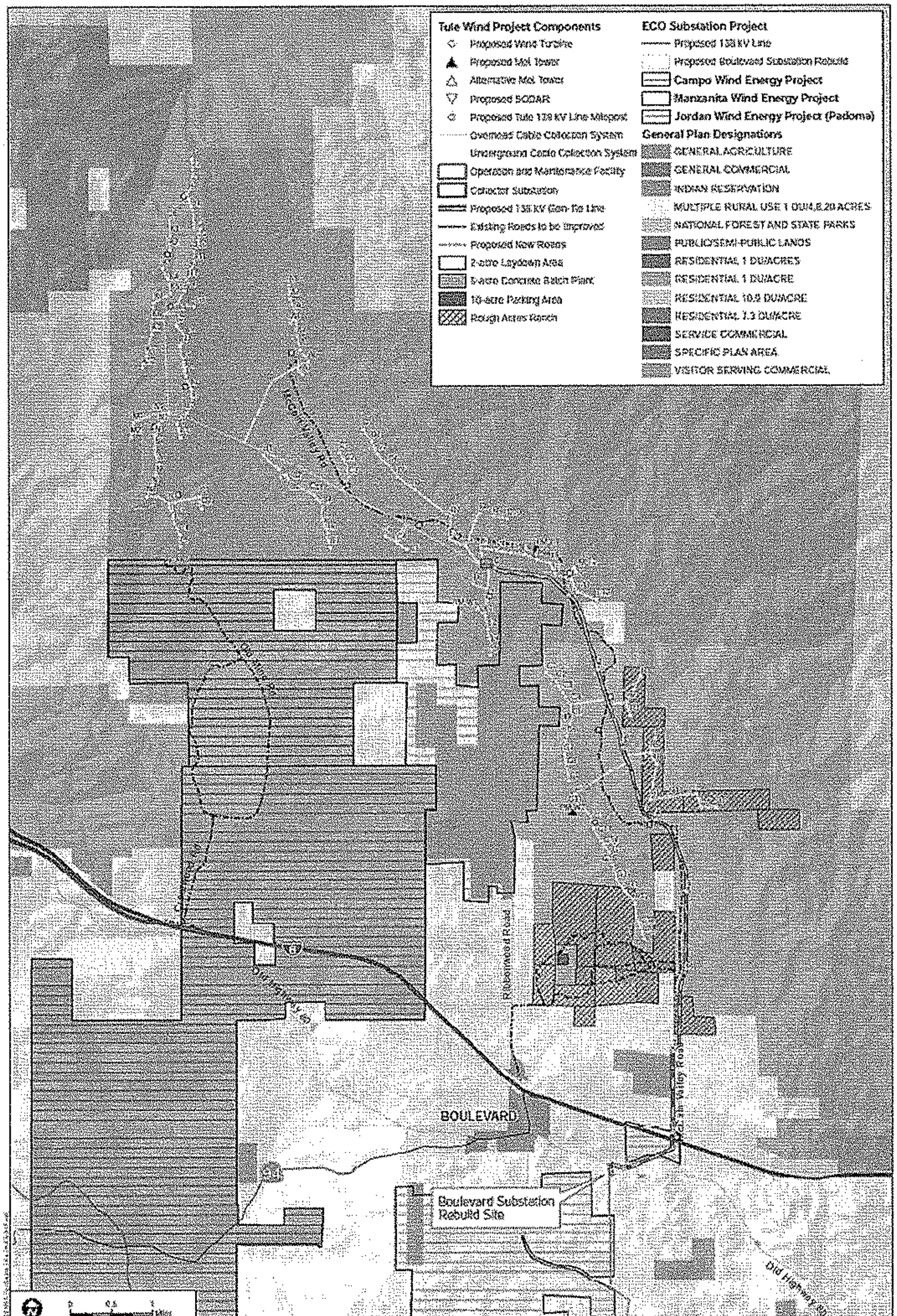
During a site visit and area tour (January 18-20, 2011) I personally inspected the Project area and numerous locations with scenic (premium & above average) vistas of future turbine, substation and HVTL infrastructure sites. At the time of this visit, I also was invited to speak at a community meeting, and had the opportunity to talk with neighbors of an existing wind energy project about their experiences. I am aware that noise levels have been disturbing to some residents, resulting in sleep disturbances as far as 3 miles from the nearest turbine. This often results in impaired use and enjoyment, and for some, results in a decision to sell and move from their homes.

In my judgment, there will be significant degradation and impairment of the scenic amenities, in varying degrees, throughout the entire Project area. Aesthetic and noise impacts are often comingled and variable from day to evening and property to property, but as the following discussion will illustrate, impacts can and do extend for miles, in many instances.

In fact, the EIR addresses social and economic conditions, and based upon a literature review, the EIR Table D.16-7 concludes there will be a decrease of property values, but classifies the impacts as "not adverse".

This is the primary focus of the McCann Property Value Impact Analysis, as residential owners and the "market" reactions regarding property values are an objective measure of the desirable characteristics of any community and an empirical method to measure economic impact, even though limited to property values.

However, while each of the Project components is considered separately, they are also considered cumulatively, inclusive of the reasonably likely future projects mentioned previously. The following EIR/EIS Exhibit, Figure D.4-9 reveals the close proximity of the various wind energy projects, individually, and how ultimately Boulevard would essentially be surrounded by an expansive, industrial overlay character. The impact on the character of a given area can be measured in terms of property value, as well as nuisances, aesthetic impairment and vistas from within and nearby the project area.



DUDEK

SOURCE: HDR 2010

FIGURE D.4-9

Tule Wind Project Existing General Plan Land Use Designations

East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects - EIR/EIS

Property Value Impacts

The contrast of such man made towers with natural views and the highly valued amenity derived from views is analyzed herein, with focus on ratings of the view from, or "Vista" of residential properties.

It is important to understand that high quality or natural views are an asset to real estate market values and, in particular, residential property and land. Other types of "value" can be identified and described in non-real estate terminology, but my focus as an appraiser is on the market value of property.

Similarly, detraction from such premium views can and does have a measurable adverse effect on residential property values. This is well studied in the real estate appraisal profession, and in fact by proponents of wind energy funded by the USDOE such as:

- ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY The Impact of Wind Power Projects on Residential Property Values in the United States: Ben Hoen, Ryan Wiser, et al, Environmental Energy Technologies Division December 2009. (LBNL)

The 2009 LBNL report is the main study relied on in the DEIR/DEIS to attempt to support the conclusion that the Tule wind turbines will have insignificant property value impacts. The LBNL study is the "literature review" in Pacific Wind Development's Environmental Document that the DEIR/DEIS discusses on page D.

This USDOE funded study is often cited by wind energy developers to claim there is no value impact from such projects, even though the study acknowledges that nearby properties may experience losses and further recommends that more study in the immediate project areas is needed. This study is useful to understanding the minimum level of probable impact from the Project at distances out to 5 miles, but is insufficient to gauge impacts at closer setbacks. Further, despite public funding, the study authors have repeatedly declined to make available the raw underlying sale data records used in the regression analysis, thereby eliminating any testing of their conclusions using accepted, tried and tested regression models for mass appraisal purposes.

VISTA IMPAIRMENT

In the LBNL study, the authors attempt to analyze the impact of wind projects on residential property values. They also separately address the statistically measured impact on residential values from scenic vistas, or views based on ***regression analysis of over 4,700 sale transactions,*** for this component of the study.

As graphically depicted within the LBNL report (pg xiii) on Figure ES-2, the following observations are prima facie evidence that impairment of scenic views results in a measurable loss of property values, as follows:

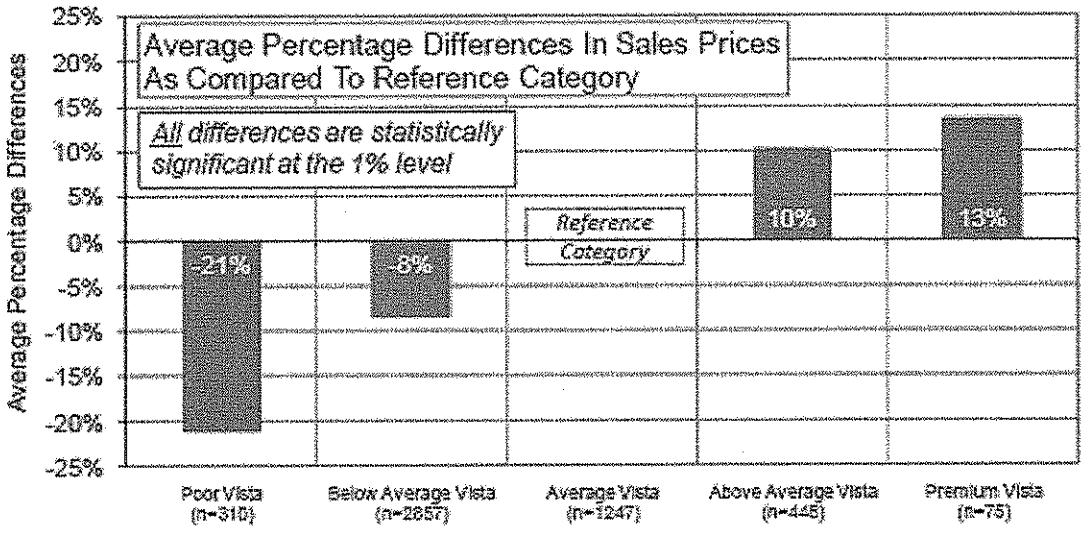
- A premium Vista adds 13% above the value of an average vista.
- A poor vista results in values 21% below the base-line average vista.
- An above average vista adds 10% to the value of an average vista.
- A below average vista reflects values 8% lower than an average vista.

To illustrate examples of the LBNL findings as it applies to the impairment of vistas for residential property, it is first acknowledged that the vista of any given residential property is going to be rated differently before introduction of the Project which will later have a view of the Project turbines and infrastructure, albeit at varied distances.

My personal inspection and review of photographic evidence of existing vistas in the project area indicates strong similarity with premium and above average vistas, as defined and characterized in the LBNL report. On balance, the LBNL report provides examples of premium, above average, average, below average and poor vistas.

In my opinion, below average and poor vista ratings are consistent with the impairment of vistas that will be caused by the Project itself. In scale, the below average "after" vista rating is reasonably applicable to distances of approximately 3 to 5 miles, while the poor vista rating will result from setbacks of less than 3 miles. At less than 1 to 1.5 mile setbacks, the poor vista is considered severe, and is often exacerbated by noise nuisances, etc. ***(see McCann Exhibit A)***

Figure ES-2: Base Model Results: Scenic Vista



Source: December 2009 LBNL report

Thus, in project area residential locations with a premium vista, the Project downgrading the amenity to a poor or below average vista will result in a **value loss of 21% to 34%.** Similarly, residential property possessing a current average vista, if downgraded to poor or below average vista from the Project will suffer **between 8% and 21% value diminution.**

At 400 to 500 feet in height, the view of the Project will be present at considerable distances that extend beyond the nearest residential property, particularly if blinking lights are required at night for aviation safety purposes.

In addition to the findings of the LBNL research report, I have also considered several peer reviewed studies published in The Appraisal Journal, that relate to value losses and impairment caused by other industrial "towers", such as cell towers, high voltage transmission lines, as well as the higher values that are derived from premium views from property.

Each of these studies generally confirms the findings summarized by the data reflected in LBNL Figure ES-2, and are maintained in the appraiser's work file for future reference.

NUISANCE IMPAIRMENT

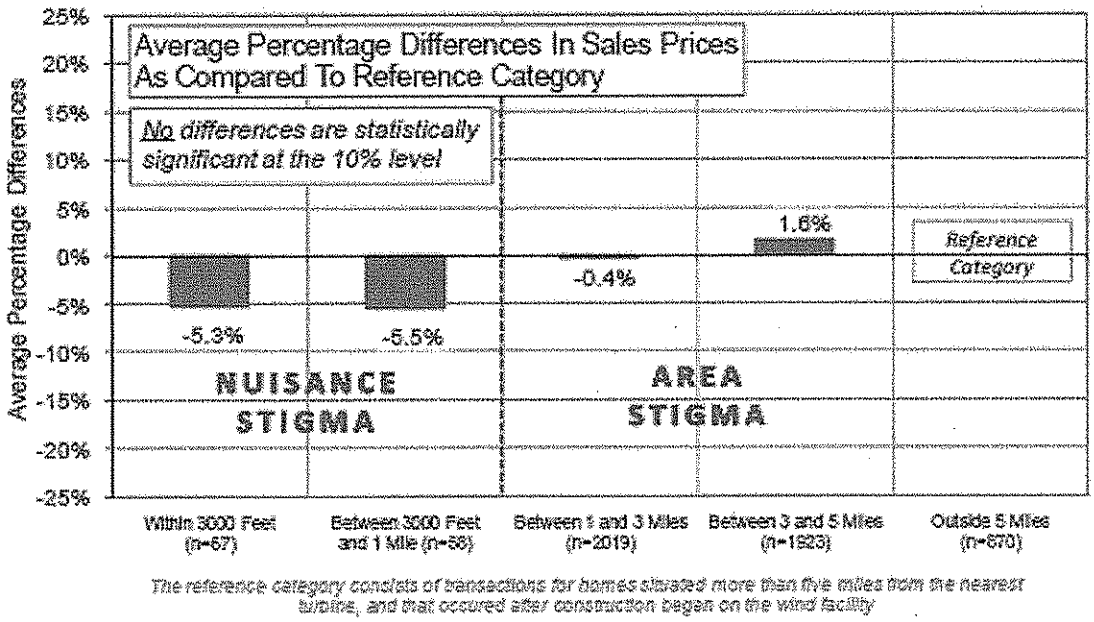
For many residents, the introduction of the Project will constitute a nuisance, based on the noise, the unprecedented height and the impairment of aesthetics related thereto, the blinking aviation light in the night sky, if required by the FAA, etc. The LBNL study attempts to separately isolate the impact of nuisance on value, as depicted in the following Figure ES-1 from the LBNL study.

This figure separates the nuisance by distance from residential property, and clearly reveals that properties in the 3,000 feet and less, and 3,000 feet to 1-mile range **suffer value loss of 5.3% to 5.5%,** respectively.

While the author discounts the statistical significance of the LBNL findings, this dismissal of relevance must be understood in the context of the largely irrelevant data from greater distances having provided the baseline property characteristics in a disproportionately sized data pool or sample, and which "waters down" the statistical indications. The LBNL report must also be understood as a study commissioned with the intent of furthering the government policy of expanding wind energy development in the United States.

Nevertheless, even exclusion of certain impacted property data did not eliminate the downward indication of value resulting from proximity to a nuisance.

Figure ES-1: Base Model Results: Area and Nuisance Stigma

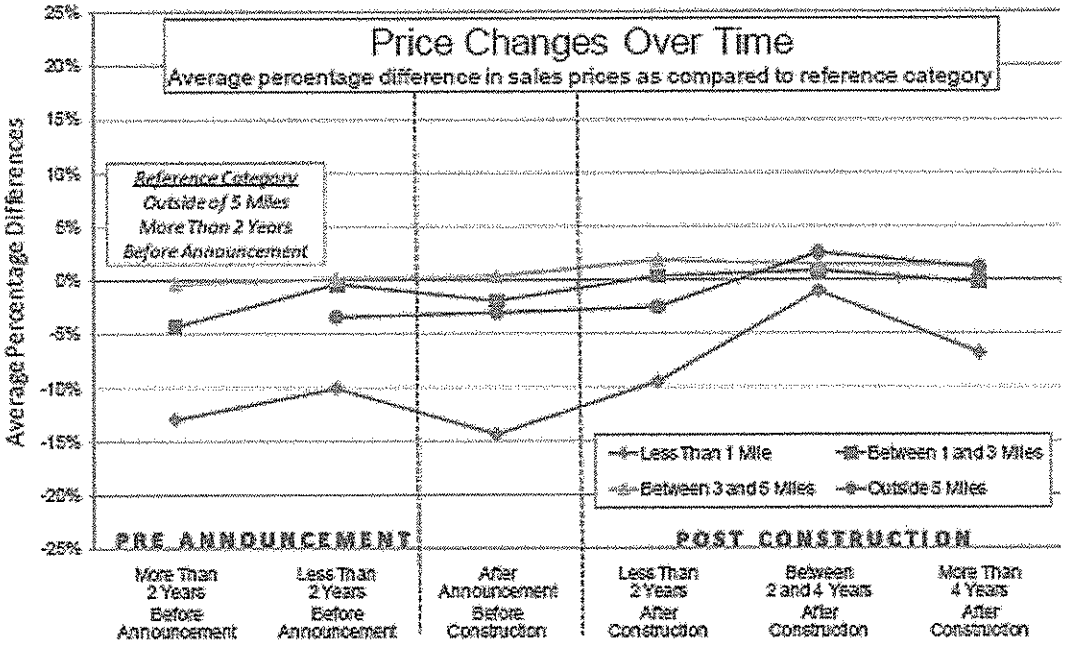


Source: December 2009 LBNL report

Pre-Construction "Constructive Notice"

Further, the following LBNL study Figure ES-4 depicts value changes over time, at varied distance from wind turbines. The applicability of this focus of the LBNL study to the subject Project can be understood in the post-announcement but pre-construction phase of turbine projects, at which point the Project has not been erected and impacts are evidenced by market reaction to "constructive notice" served on surrounding neighbors and property owners. Properties within 1-mile of such projects reflect the largest decline in value, and **confirm that wind turbines have measurable negative impact on property values within 1-mile**. I also note the reference category of home sales beyond 5 miles increased over time, whereas homes within 5 miles of the studied projects typically did not increase in value, showing downward pressure from the market at even a distance of 5 miles.

Figure ES - 4: Temporal Aspects Model Results: Area and Nuisance Stigma



The reference category consists of transactions of homes situated more than five miles from where the nearest turbine would eventually be located and that occurred more than two years before announcement of the facility

The EIR/EIS fails to reconcile the differences between the Project turbines and neighbors' homes with the distances cited in the LBNL study. No effort to mitigate through increasing setbacks is cited, and no Property Value Guarantee is mentioned as another measure to mitigate value impacts. In short, the EIR/EIS stopped short of truly addressing the issue, in the process of "filling out the form".

The LBNL study is not the only pro-wind study that refutes the claims of developers regarding property value loss, due to their utility scale wind energy projects. A recent study focuses more on the pre-construction or "constructive notice" phase of development, as characterized by MET facilities.

A separate academic study conducted by Jennifer L. Hinman, J.L. , Illinois State University, WIND FARM PROXIMITY AND PROPERTY VALUES: A POOLED HEDONIC REGRESSION ANALYSIS OF PROPERTY VALUES IN CENTRAL ILLINOIS

The background of this study author is a Master's Thesis, prepared by the author in partial fulfillment of degree requirements. ISU is heavily funded by wind energy developers, the American Wind Energy Association, the USDOE and other grant programs that are decidedly "pro-wind", and which seek to refute the actual experience of many neighbors to such projects.

In fact, ISU newsletters disclose that "corporate partners" that include wind energy development companies have access to the renewable energy programs, include advising on research direction and the right to review any applied research developed by ISU.

An excerpt of the Hinman report is presented as follows:

This study uses 3,851 residential property transactions from January 1, 2001 through December 1, 2009 from McLean and Ford Counties, Illinois. This is the first wind farm proximity and property value study to adopt pooled hedonic regression analysis with difference-in-differences estimators. This methodology significantly improves upon many of the previous methodologies found in the wind farm proximity and property value literature. ***The estimation results provide evidence that a "location effect" exists such that before the wind farm was even approved, properties located near the eventual wind farm area were devalued in comparison to other areas****. Additionally, the results show that property value impacts vary based on the different stages of wind farm development. These stages of wind farm development roughly correspond to the different levels of risk as perceived by local residents and potential homebuyers. Some of the estimation results support the existence of "wind farm anticipation stigma theory," meaning that* ***property values may have diminished in "anticipation" of the wind farm*** *after the wind farm project was approved by the McLean County Board. Wind farm anticipation stigma is likely due to the impact associated with a fear of the unknown, a general uncertainty surrounding a proposed wind farm project regarding the aesthetic impacts on the landscape, the actual noise impacts from the wind turbines, and just how disruptive the wind farm will be.*

Property Value Guarantee (PVG)
Property values have been shown to decline based on pre-construction anticipation of wind projects. As such, there is ample evidence to either deny such related projects within 1 to 3 miles of homes for actual turbines.

Despite all the industry claims to the contrary, significant value impacts have in fact occurred, and have even resulted in the abandonment of homes, as well as nuisances, health problems, etc.

Even the principal author of the LBNL study, Ben Hoen, now recommends implementation of Property Value Guarantees (PVG's) in the context of wind energy project mitigation of impacts. Thus, the EIR/EIS is not current with the available updated conclusions and information, as determined by the author of the study they cited to make limited mention for inadequately classifying the issue of property value impacts.

(Per page 32 of linked webinar)
http://www.windpoweringamerica.gov/newengland/pdfs/2010/webinar_neweep_property_values_hoen.pdf

Property Value Risks Will Persist Unless They Are Measured, Mitigated and Managed

Manage

Manage risks in the short term for homeowners through tenable/workable measures

- Offer some combination of neighbor agreements/incentives and/or property value guarantees (e.g., Dekalb County, IL) to nearby homeowners as are economically tenable and legally workable
- Conduct follow up studies (e.g., surveys, appraisals)
- Realize that cumulative impacts may exist
- Realize that real or perceived risks may increase/decrease as more/better information become available

Nuisance can be manifest by close proximity of the Project to homes out to 2 or 3 miles. Distance beyond 3 miles includes visual impacts but at that range, turbines typically have more of an impact on marketing. When noise issues are known to occur, typical development practices leave homeowners wishing to sell with the ethical dilemma of making full disclosure of known nuisances to potential buyers, or facing possible legal repercussions and financial liability for failing to make such a disclosure. Pre-construction failure to notify buyers of pending projects has resulted in litigated judgments in favor of buyers who did not get full disclosure from the seller.

The prospective turbine developments will have a negative impact or "nuisance" under circumstances of each receptor location when that the project or use has a dominant presence, impairs aesthetics, negatively changes the character of a property setting or perception thereof (single or multiple properties), causes the need for financial and/or time expenditures by neighbors that they would not otherwise have, or in any number of potential ways has a demonstrable adverse impact on the use, enjoyment, marketability or value of the neighboring use, then it could create a man-made detriment to neighboring property and result in a negative impact for any homes that "got in the way". This is exactly why adequate setbacks are important. To mitigate against adverse impacts on neighboring property.

Thus an impaired view from a property possessing a "premium" vista, based upon LBNL data analyzed and claimed to be statistically significant, indicates that a 13% premium could become a 21% reduction, or a net property value reduction of 34%.

This range of value loss for the nearest residential properties is fairly classified as a nuisance, and is quantified as significant with empirical data rather than subjective "fears" or speculation.

I have also reviewed the photo simulations contained in the EIR/EIS and, in my professional opinion, the "after" photos depict an impairment of views consistent with the ratings for poor and below average vistas, depending on the distance of, and view from homes in the area.

Mendota Hills – McCann Study

I have undertaken independent research and study of property value impacts, which includes numerous individual case studies of homes that either could not be sold due to close proximity of wind turbines, or that sold for substantial discounts. Individual discounts typically range from 20% to 40%, with some examples of 60% to 80% resales from developers, when they have bought out homeowners experiencing a high level of noise nuisances and/or health impacts.

The following table depicts property value impacts s within 2 miles of the first Illinois wind energy project, in contrast to home sale prices over 2 miles from the turbines. It is noted that the study sales all occurred between early 2003 and early 2005, during one of the strongest markets in modern history. Thus, there is NO value loss due to market conditions that have evolved since, and this study is extremely useful for eliminating market decline impacts that were not caused by development of the industrial scale turbines.

This rural residential location is relatively homogenous, in that there is a range of home size and styles in both the near and far distances, having a comparable market appeal prior to the construction and operation of the Mendota Hills project. It is also prima facie evidence that property values within 2 miles have been lower than further homes by 25%, or $25.89 per square foot lower.

Mendota Hills Wind Energy Project

Sale #	Address	Sale Date	Price	Grantor	Grantee	Style	Size SF	$/SF
1	629 W. Chestnut	Oct 2003	$37,000	Estes	Lipe	1.5	1,161	$31.87
2	323 W. Chestnut	Oct 2004	$40,000	Reed	Hovious	1.5	1,425	$28.07
3	1019 Steward Rd.	May 2003	$40,000	Houle-Ward	Reyns	2	1,408	$28.41
4	91143 Paw Paw	Mar 2005	$187,000	Zaylik	Pachero	2	1,571	$119.03
5	1224 IL Rte. 251	Jun 2003	$138,000	Gittleson	Kowalski	2	1,272	$108.49
6	339 Chestnut St.	Jan 2003	$72,000	White	Flynn	2	1,684	$42.76
7	630 W. Chestnut	Sep 2003	$126,000	Eddy	Morath, Sr.	1.5	1,728	$72.92
8	427 Chestnut St.	Oct 2003	$87,606	Hesik	Rourke, Jr.	1.5	1,380	$63.04
9	138 Cherry St.	Sep 2004	$80,000	Hammond	Alexander	1.5	1,326	$60.33
10	536 W. Cherry	Oct 2004	$63,500	Johnson	Fitzpatrick	1.5	999	$63.56
11	885 Compton Rd.	Oct 2004	$68,900	Boysen	Gellings	1	480	$143.54
12	518 W. Cherry St.	Apr 2003	$87,500	Allen	Beckman	1	927	$94.39
13	222 Maple St.	Dec 2004	$150,000	Clark	Cummings	1	1,852	$80.99
14	444 W. Main St.	Mar 2005	$109,900	Miller	Michaels	1	1,402	$78.39
15	2874 Beemerville	Jul 2003	$367,000	Finkboner	DGNB TRT	1	2,201	$166.74
							Average sale price	$78.84
16	1310 Melugins Grove	Apr 2004	$179,000	Lyons	Overton	2	1,952	$91.70
17	2612 Shady Oaks Rd.	Apr 2003	$131,000	Smith	Paplech	1.5	1,208	$108.44
18	3448 Cyclone Rd.	Mar 2003	$105,900	Munyon	Pippenger	2	1,456	$72.73
19	2524 Johnson St.	Aug 2004	$61,800	Copeland	Lampson	1.5	948	$65.19
20	741 Third St.	Feb 2004	$63,500	Eckhardt	Rosales	1.5	868	$73.16
21	613 Church Rd.	May 2003	$115,000	Merkel	Parpart	1.5	1,458	$78.88
22	3435 Willow Creek	Jun 2003	$116,000	Swiatek	Brydun	2	884	$133.48
23	3021 Cottage Hill	Mar 2005	$182,000	Russ	Curtis	1.5	1,239	$146.89
24	3385 Willow Creek	Mar 2003	$180,000	McCoy	Carver	2	2,840	$63.38
25	745 Second St.	Dec 2004	$59,000	Wilson	Calderon	1.5	1,161	$50.82
26	761 4th St.	Mar 2003	$68,000	Stewart	Elsinger	1	724	$93.92
27	2774 Welland Rd.	Apr 2003	$93,000	Batha	Crumpton	1.5	1,104	$84.24
28	558 Earlville Rd.	Jan 2003	$145,000	Hodge	Ikeler	2	1,280	$113.28
29	2505 Wood St.	Aug 2004	$105,000	Janiak	Bullock	2	1,812	$57.95
30	385 Earlville Rd.	Aug 2004	$280,000	Rago	Diehl	2	2,142	$130.72
31	3095 Cyclone Rd.	Dec 2004	$169,900	Summerhill	Rainbolt	2	2,048	$82.96
32	742 Second St.	Jan 2003	$103,000	Delhotal	Stewart	2	1,876	$54.90
33	395 Angling Rd.	Mar 2005	$119,000	BMV Prop.	Herendeen	1	680	$175.00
34	2515 Wood St.	Apr 2004	$80,800	Jones	Sarver	1	912	$87.72
35	1218 Locust Rd.	Jan 2005	$169,000	Wachowski	Gembeck	1	1,040	$162.50
36	901 Melugens Grove	Aug 2003	$228,000	Kidd	Rajan	1	2,000	$114.00
37	1490 German Rd.	Aug 2004	$85,000	Firlit	Challand	2	2,144	$39.65
38	603 Ogee Rd.	Apr 2004	$285,000	Anderson	Miller	1	1,920	$148.44
39	546 Carnahan Rd.	Jan 2005	$110,000	Coley	Sarabia	1	1,296	$84.88
40	1353 County Line	Nov 2003	$185,000	Vallejo	Bozzeth	1.5	1,338	$138.27
41	2512 Johnson St.	Feb 2005	$123,000	Montavon	Sutton	2	2,232	$55.11
42	2509 Herman Rd.	Apr 2004	$142,900	Bresson	Arjes	1	1,404	$101.78
43	955 Woodlawn	Jul 2003	$265,000	Swan	LaRosa	1.5	1,918	$138.16
44	1279 Locust Rd.	Mar 2003	$270,000	Witte	olin	1	2,156	$125.23
45	648 Ogee	Nov 2003	$225,000	Fickenscher	Rojas	1	1,768	$127.26
46	1339 Woodlawn Rd.	Sep 2003	$230,000	Howell	Barnhill	1	1,701	$135.21
47	1349 Woodlawn Rd.	May 2003	$207,500	Howell	Wiskari	1	1,809	$114.70
48	711 O'Gee Rd.	Aug 2004	$185,000	Groevengoed	Carabal	1	1,352	$136.83
49	1295 Locust Rd.	May 2004	$300,000	Hagan	Lowe	1	2,672	$112.28
50	860 Paw Paw Rd.	May 2004	$185,000	Wiskur	Pogreba	1	1,148	$161.15
51	3011 Honeysuckle	Mar 2005	$355,000	Abbott	Brandt	2	3,655	$97.13
52	489 Earlville Rd.	Nov 2004	$165,000	Schlafke	Fromhertz	2	1,400	$127.86
53	2512 Shaw Rd.	Jun 2004	$153,500	Hlavin	Kapinski	2	1,638	$93.71
							Average sale price	$104.72

Sales 17 - 53 located > 2 miles from turbines	$104.72	sq ft
Sales 1 - 16 located within 2 miles of turbines	$78.84	sq ft
Difference in sale price per square foot	$25.89	sq ft
Average Value diminution within 2 miles of turbines	25%	

Conclusion

The LBNL study cited in the EIR/EIS actually demonstrates that there are measurable and significant value losses for residential property, after the introduction of wind turbine energy projects into the neighboring communities. The author of the report has updated his conclusions to include recommendation of PVG's, as well as recognition of cumulative impacts.

A separate academic study (Hinman thesis) used similar regression methodology as LBNL, and found that values decline even pre-construction, which appears to be a market reaction in anticipation of the studied wind project.

The Mendota Hills study is based simply on a near-far comparison of average value per square foot for residences within and outside a 2 mile setback from turbines. Other independent and industry studies have also consistently found that actual sales reflect lower values for homes, under different distance scenarios, as well as Project sizes, locations and even different countries.

The common denominator is that turbines are being constructed too close too people to avoid tangible and intangible adverse impacts and impairment of character of the areas developed with wind projects, the use, enjoyment and value of neighboring homes, and the stability of real estate value within distanes out to 5 miles. However, the majority of data reveals the most onerous impacts of 25% to 40% value decline within 2-3 miles, which is still far greater than the deminimus setbacks proposed for turbines from residents in the Project.

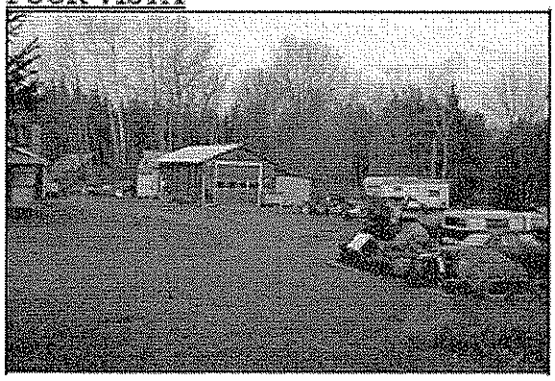
I also note that HVTL are well studied in the appraisal profession, and 10% lower values is the approximate value loss within close proximity to suburban locations. With expansive, premium vistas at the subject Project locations, the impact distances are not only expected to be greater, but also cumulatice. The same is true for the more localized impact of substation development, as far as cumulative impacts. Thus, under the worse case scenario, any residence located immedialetly adjacent to a substation, where HVTL towers and lines connect, that is also within 2-3 miles of turbines, is likely to be so impaired as to be unmarketable at any price.

The EIR/EIS inadequately addresses any of these impacts, and should be considered as irrelevant to support any findings on real estate values and economic impact. Similarly, the Project fails to meet the criteria for a MUP from the San Diego Zoning Ordinance, and EIR/EIS documentation provides no basis to demonstrate compliance with such zoning requirements.

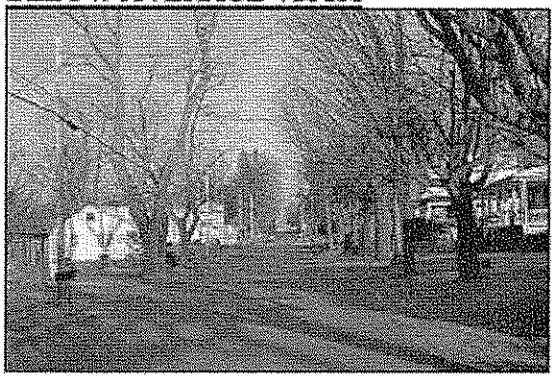
McCann Exhibit A

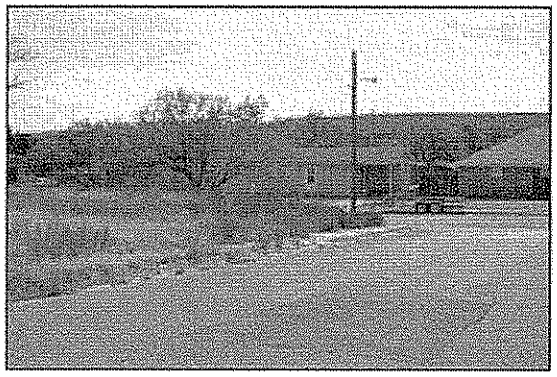
Appendix D: Vista Ratings with Photos

POOR VISTA

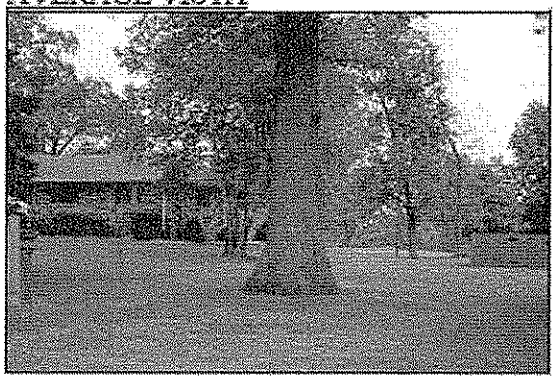


BELOW AVERAGE VISTA

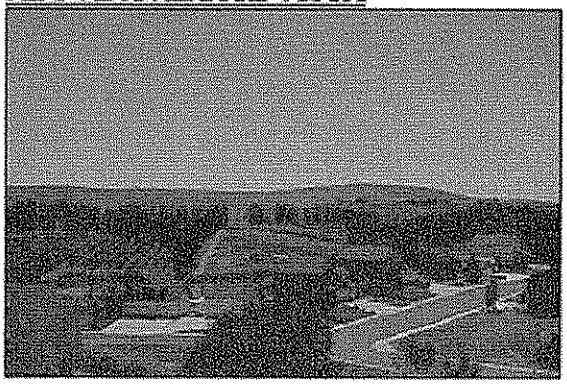


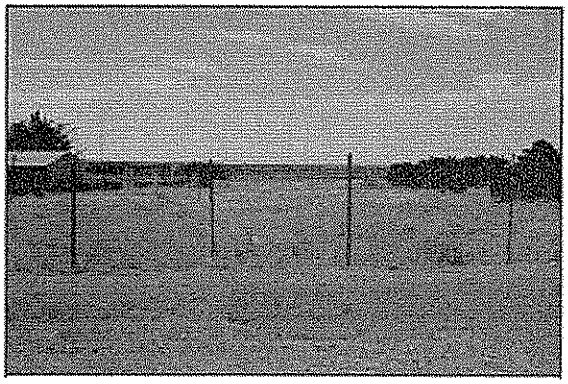


AVERAGE VISTA

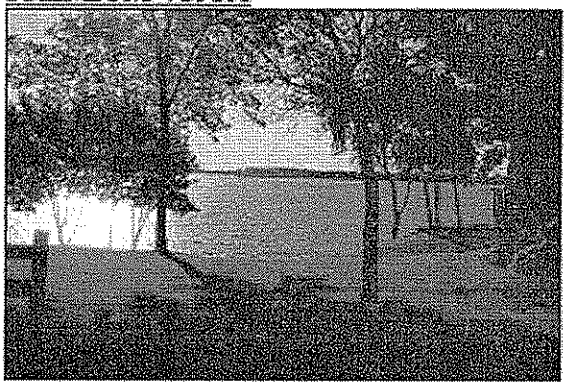


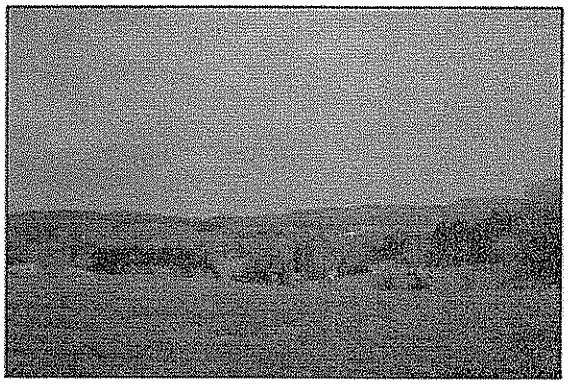
ABOVE AVERAGE VISTA





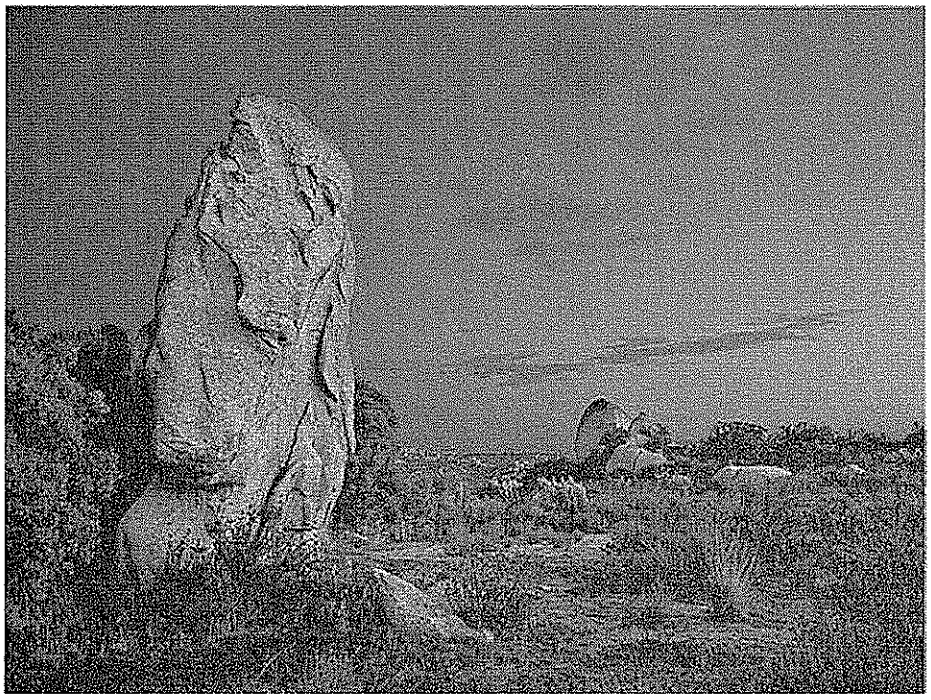
PREMIUM VISTA

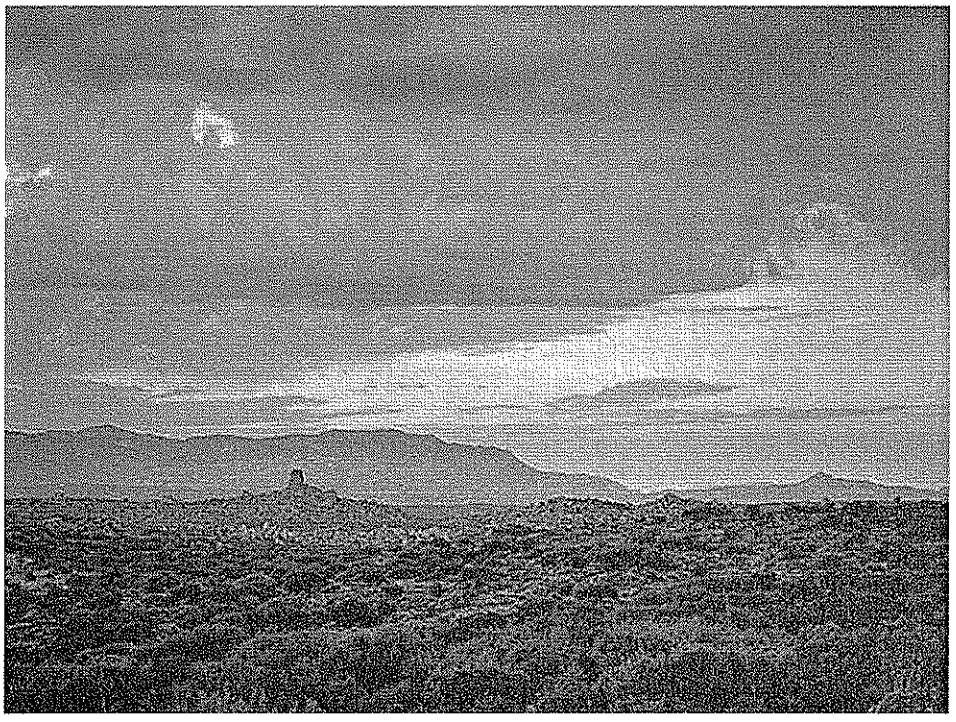


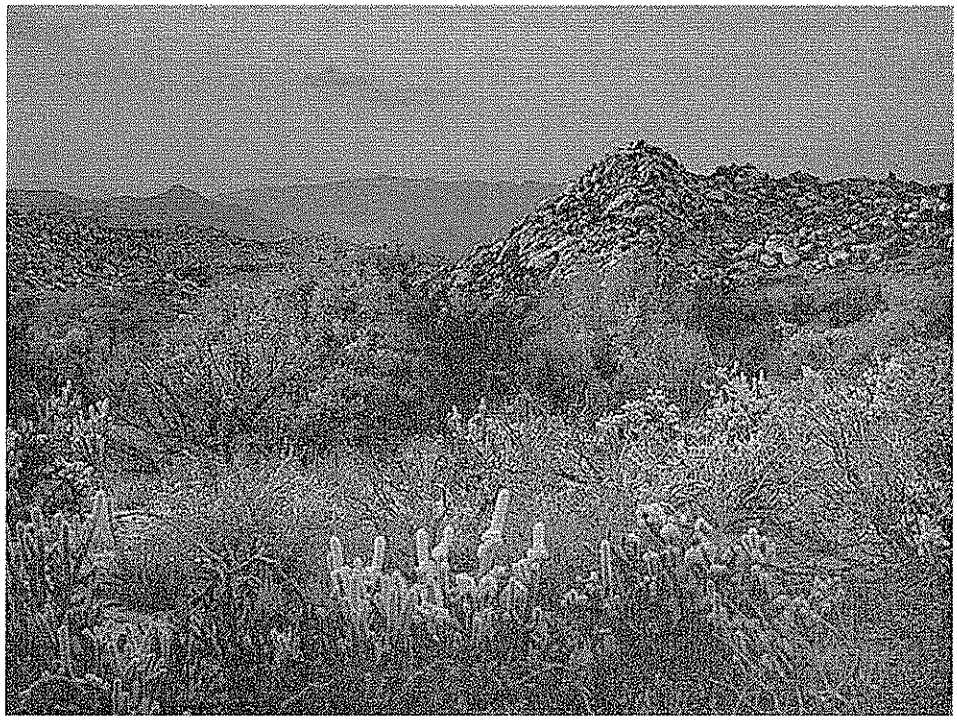


Source: LBNL Appendix D, report page 120 & 121

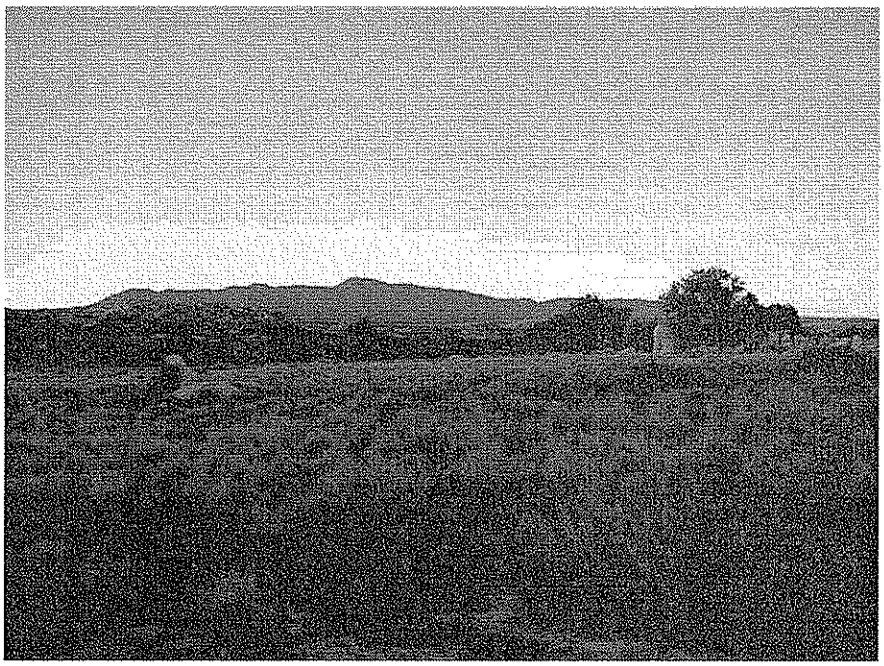
Examples of Premium Vistas – Subject Area







2810 Ribbonwood Rd, Boulevard, CA



Premium Vista

Proposed northern portion of Enel Jewel Valley Project

CERTIFICATION

The undersigned, representing McCANN APPRAISAL, LLC, do hereby certify to the best of our knowledge and belief that:

FIRST: The statements of fact contained in this appraisal report are true and correct.

SECOND: The reported analyses, opinions and conclusions are limited only by the reported assumptions and limiting conditions and represents the personal, impartial and unbiased professional analyses, opinions, and conclusions of the undersigned.

THIRD: We have no present or prospective interest in the property that is the subject of this report and no personal interest with respect to any of the parties involved.

FOURTH: We have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment.

FIFTH: Our engagement in this assignment was not contingent upon developing or reporting predetermined results.

SIXTH: Our compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.

SEVENTH: Our analysis, opinions, and conclusions were developed, and this report has been prepared in conformity with the Uniform Standards of Professional Appraisal Practice.

EIGHTH: For preliminary valuation purposes only an exterior inspection was made by McCann Appraisal, LLC of the property that is the subject of this report:

NINTH: No one other than the undersigned provided significant real property appraisal assistance to the person signing this certification.

TENTH: McCann Appraisal, LLC has been previously engaged to consult regarding appraisal issues in the subject market area.

IN WITNESS WHEREOF, THE UNDERSIGNED has caused these statements to be signed and attested to.

Michael S. McCann, CRA
State Certified General Real Estate Appraiser
License No.553.001252 (Expires 9/30/2011)

PROFESSIONAL BIOGRAPHY
MICHAEL S. MCCANN, CRA

Michael S. McCann has been exclusively engaged in the real estate appraisal profession since 1980, and is the owner of McCann Appraisal, LLC.

EXPERIENCE

His appraisal experience has included market value appraisals of various types of commercial, office, residential, retail, industrial and vacant property, along with a wide variety of unique or special purpose real estate, such as limestone quarries, hotels, contaminated properties, etc. He has gained a wide variety of experience in real estate zoning evaluations and property value impact studies, including analysis of utility scale wind turbine generating facilities, gas-fired electric generating plants, shopping centers, industrial facilities, limestone quarries, sanitary landfills and transfer station waste disposal facilities. He has been retained as an independent consultant to municipalities, government agencies, corporations, attorneys, developers lending institutions and private owners, and has spoken at seminars for the Appraisal Institute, the Illinois State Bar Association and Lorman Education Services on topics including the vacation of public right of ways (1986), and Property Taxation in the New Millennium (2000), Zoning and Land Use in Illinois (2005, 2006).

In addition to evaluation of eminent domain real estate acquisitions for a wide variety of property owners & condemning authorities, Mr. McCann has served as a Condemnation Commissioner (2000-2002) appointed by the United States District Court - Northern District, for the purpose of determining just compensation to property owners, under a federal condemnation matter for a natural gas pipeline project in Will County, Illinois.

EXPERT TESTIMONY

Assignments include appraisals, studies and consultation regarding real estate located in 21 states. He has qualified and testified as an expert witness in Federal Court, and for condemnation, property tax appeal and zoning matters in the Counties of Cook, Will, Boone, Lake, Madison, St. Clair, Iroquois, Fulton, McHenry, Ogle & Kendall Circuit Courts, as well as the Chicago and Cook County Zoning Boards of Appeal, the Property Tax Appeal Board (PTAB) and tax court & Commissions of Illinois, Wisconsin, and Ohio, Circuit Courts in New Jersey and Indiana, as well as zoning, planning, and land use and County Boards in Texas, Missouri, Idaho, Michigan, New Mexico and various metropolitan Chicago area locales. He has also been certified as an expert on the Uniform Standards of Professional Appraisal Practice (USPAP) by the Cook County, Illinois Circuit Court. Mr. McCann has substantial experience in large-scale condemnation and acquisition projects and project coordination at the request of various governmental agencies and departments. These include appraisals for land acquisition projects such as the Chicago White Sox Stadium project, the Southwest Transit

(Orange Line) CTA rail extension to Chicago's Midway Airport, the United Center Stadium for the Chicago Bulls and Blackhawks, the minor league baseball league, Silver Cross Field stadium in Joliet, Illinois, as well as many other urban renewal, acquisition and neighborhood revitalization projects.

REAL ESTATE EDUCATION

Specialized appraisal education includes successful completion of Real Estate Appraisal Principles, Appraisal Procedures, Residential Valuation, Capitalization Theory and Techniques Part A, Standards of Professional Practice Parts A, B and C, Case Studies in Real Estate Valuation, Highest and Best Use and Market Analysis, Advanced Income Capitalization, Subdivision Analysis and Special Purpose Properties, Eminent Domain and Condemnation, and Valuation of Detrimental Conditions in Real Estate offered by the Appraisal Institute. In addition, he has completed the Society of Real Estate Appraisers' Marketability and Market Analysis course, the Executive Enterprises - Environmental Regulation course, and a variety of continuing education real estate seminars.

DESIGNATIONS & PROFESSIONAL AFFILIATIONS

Mr. McCann is a State Certified Associate Member of the Appraisal Institute, and the National Association of Review Appraisers & Mortgage Underwriters designated him as a Certified Review Appraiser (CRA). He was elected in 2003 as a member of Lambda Alpha International, an honorary land economics society, and he served several years as a member of the Appraiser's Council of the Chicago Board of Realtors.

LICENSES

State Certified General Real Estate Appraiser in the State of Illinois (License No. 533.001252) and is current with all continuing education requirements.

Comment Letter D34

Steve Taffolla

From:	Wald, Johanna <jwald@nrdc.org>
Sent:	Friday, March 04, 2011 5:45 PM
To:	ECOSUB; catulewind@blm.gov
Cc:	jeff.aardahl@defenders.org; Barb Boyle; Joan Taylor; Garry George; Ileene Anderson; Lisa Belenky; Helen O'Shea; Kim Delfino; Lon
Subject:	comments on Tule Wind DEIR/DEIS
Attachments:	Attachment 3 - Peninsular_bighorn_FCH.pdf; Attachment 1 - Desert Siting Criteria Memo June 29.pdf; Attachment 2 - CDREWG Recommendations_12-22-10.pdf; 3.4.11 Tule Wind DEIR DEIS comments.pdf

To: Iain Fisher, CPUC and Greg Thomsen, BLM

Attached please find the comments of multiple environmental membership organizations on the Joint Draft Environmental Impact Report/Draft Environmental Impact Statement East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects. These comments consist of one letter plus three attachments.

D34-1

If you have any questions about these documents please do not hesitate to contact me.

I would appreciate it very much if you would confirm receipt of these documents.

Thank you in advance for your consideration of our views. Johanna Wald

Johanna H. Wald
Senior Attorney
NRDC
111 Sutter Street
San Francisco, CA 94104
phone: 415.875.6100
fax: 415.875.6161

DEFENDERS OF WILDLIFE
NATURAL RESOURCES DEFENSE COUNCIL
SIERRA CLUB
CENTER FOR BIOLOGICAL DIVERSITY
AUDUBON CALIFORNIA
SAN DIEGO AUDUBON SOCIETY

March 4, 2011

Iain Fisher, CPUC
Greg Thomsen, BLM
c/o Dudek
605 Third Street,
Encinitas, California 92024

Via email: ecosub@dudek.com; catulewind@blm.gov

Re: **Joint Draft Environmental Impact Report/Draft Environmental Impact Statement**
East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects

Dear Sirs:

This letter constitutes the comments on the above-captioned proposed project and draft environmental impact report/environmental impact statement (hereinafter referred to as the DEIR/DEIS) by the above named environmental organizations—all membership organizations with long histories of advocacy on behalf of the lands and resources administered by the Bureau of Land Management (BLM).

Defenders of Wildlife (Defenders) has 950,000 members and supporters nationally, 145,000 of whom reside in California. Defenders is dedicated to protecting all wild animals and plants in their natural communities. To this end, we employ science, public education and participation, media, legislative advocacy, litigation, and proactive on-the-ground solutions in order to impede the accelerating rate of extinction of species, associated loss of biological diversity, and habitat alteration and destruction.

The **Natural Resources Defense Council** (NRDC) has over 1.2 million members and online activists nationwide, more than 250,000 of whom live in California. NRDC uses law, science, and the support of its members and activists to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things. NRDC has worked to protect wildlands and natural values on public lands and to promote pursuit of all cost-effective energy efficiency measures and sustainable energy development for many years.

The **Sierra Club** is a national nonprofit organization of approximately 1.3 million members and supporters (approximately 250,000 of whom live in California) dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. The Sierra Club's concerns encompass protecting our public lands, wildlife, air and water while at the same time rapidly increasing our use of renewable energy to reduce global warming.

The **Center for Biological Diversity** is a non-profit environmental organization dedicated to the protection of native species and their habitats in the Western Hemisphere through science, policy, and environmental law. The Center has over 320,000 members and on-line activists throughout California and the western United States, including members and staff that visit and enjoy the McCain Valley and adjacent environs where the project is proposed.

D34-1
Cont.

Audubon California is the state office of National Audubon Society with 150,000 members and supporters in California. Audubon's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity. For more than a century, Audubon has built a legacy of conservation success by mobilizing the strength of its network of members, Chapters, Audubon Centers, state offices and dedicated professional staff to connect people with nature and the power to protect it.

The mission of the **San Diego Audubon Society (SDAS)** is to foster the protection and appreciation of birds, other wildlife, and their habitats, through education and study, and to advocate for a cleaner, healthier environment. Originally founded in 1948, SDAS has been bringing people and nature together in the San Diego region for over 60 years. SDAS has approximately 2,500 members and over three hundred volunteers.

D34-1 Cont.

Our organizations recognize the need to develop the nation's renewable energy resources and to do so rapidly in order to respond effectively to the challenge of climate change. Unique natural resources here in California are already being affected by climate change, including, for example, the pikas of the High Sierra Nevada and the Joshua trees in the Mojave Desert. We also recognize that renewable energy development can help create jobs in communities that are eager for them, because of the nation's continuing economic situation. For these and other related reasons, our organizations are working with regulators and project proponents to move renewable energy projects forward. That said, renewable development is not appropriate everywhere on the public lands and must be balanced against the equally urgent need to protect important environmental, scenic, cultural, and biological resources. California is fortunate indeed that we have sufficient renewable energy resources, including wind, throughout the State[1] to allow for development in an environmentally and fiscally responsible manner.

Our organizations have been intensively involved in the BLM's work to develop comprehensive renewable energy programs for the public lands as well as its efforts to "fast track" the permitting of individual renewable energy projects in California so that they may be eligible for grant funding under the American Recovery and Reinvestment Act of 2009 (ARRA). Thus far, the experience with fast-track project has been decidedly mixed. Although six public lands solar projects received agency approval by the end of 2010, many remain controversial, and all six projects permitted have been challenged in federal court. We believe that the issues being raised in these lawsuits—National Environmental Policy Act (NEPA) document adequacy, biological impacts, impacts to cultural resources, and associated consultation obligations—could and should have been addressed by more up-front collaboration with affected stakeholders and by paying more attention to repeated concerns regarding project siting. As we have often stated, our collective goal should not simply be the issuance of permits—what matters most is building projects on appropriate sites and delivering "clean" electrons to consumers in support of our broader goals of reducing our reliance on dirty energy and addressing the climate change challenge.

D34-2

In our view, the best way to develop the renewable resources in California is through comprehensive, pro-active planning by both the federal government and the state to identify the most appropriate areas for such development on both public and private land -- *i.e.*, development zones -- and to guide development to those zones. Our organizations have made repeated efforts to address project siting issues in a proactive way. In a letter dated June 29, 2009 to Interior Secretary Salazar and California's Governor Schwarzenegger and signed by 11 organizations, including most of the signers of this comment letter, we outlined an approach to identify appropriate development zones for renewable energy projects, and identified places where proposed development would likely cause a high level of controversy (*see* Attachment #1).

[1] California's Renewable Energy Transition Initiative found, for example, that the state potentially could access 500 GW of renewable energy, an order of magnitude greater than the state's peak demand and far beyond the ability of our electric grid to handle, although not all of this potential resource is located in environmentally desirable places.

More recently, the California Desert Renewable Energy Working Group (CDREWG), a group including industry and environmental organization participants, including most of the signers of this comment letter, submitted recommendations regarding project siting to the Department of the Interior (*see* Attachment #2).[2] Criteria were developed which categorized the level of potential conflict (and, by extension, the potential ease of receiving a permit) associated with different types of sites with various types of resources present. Sites were grouped into Low Conflict Areas, Areas with Potentially Resolvable Conflicts, and High Conflict Areas.

While there are differences in the two sets of recommendations, both emphasize that previously disturbed sites that are served by existing infrastructure should be prioritized for renewable energy development.[3] The overall goal of these criteria is to steer projects to areas with comparatively low potential for conflict and controversy in order to facilitate their timely development. Regrettably, the project currently under review meets few of these criteria—and as such there is an increased risk that the project will not be permitted or constructed with a minimum of delay and/or controversy and that, as a result, the delivery of clean, renewable energy to the grid will also be delayed.

D34-2 Cont.

It should also be noted that in the middle of the comment period for this project, the Department of Interior issued a series of guidance documents covering a variety of issues which are directly or indirectly relevant to this project. The guidance documents involving NEPA compliance and eagle management are directly relevant to the agency's consideration of this project, and we appreciate that

D34-3

[2] While we recognize that the ecological criteria discussed in the June 29, 2009 letter were intended for application to projects proposed in the California Desert Conservation Area (CDCA), and the CDREWG recommendations were focused on solar projects, we believe they can be useful in screening potentially suitable wind energy sites as well. This broader applicability is specifically referenced in the December 22, 2010 cover letter to Secretary Salazar which accompanied the CDREWG recommendations: "To facilitate coming to agreement on these recommendations, we focused our comments on ways to improve planning and permitting for large-scale solar energy projects on BLM lands here in California. That being said, we realize that many of these recommendations may also apply to other states and to other technologies, and encourage you and your team to think of them in a broader context." This cover letter was signed by all members of the CDREWG who signed onto the recommendations, and the group has since expanded to include representatives of the wind industry.

D34-2a

[3] *Criteria from the June 29, 2009 letter* (edited somewhat for clarity and brevity):
*Lands that have been mechanically disturbed, such as lands that have been "type-converted" from native vegetation through plowing, bulldozing or other mechanical impact often in support of agriculture or other land cover change activities (mining, clearance for development, heavy off-road vehicle use).
*Public lands of comparatively low resource value, particularly lands located adjacent to degraded and impacted private lands
*Brownfields
*Locations adjacent to urbanized areas--including rural communities that welcome local industrial development, but not communities that are dependent on tourism for their economic survival
*Locations that are served by existing infrastructure, such as existing roads, substations, or sources of municipal wastewater for use in cleaning
*Locations proximate to load centers.
*Locations adjacent to federally designated corridors with existing major transmission lines.

Criteria from the CDREWG recommendations:
*Mechanically disturbed lands such as fallowed agricultural lands.
*Brownfields, idle or underutilized industrial areas.
*Locations adjacent to urbanized areas and/or load centers where edge effects can be minimized.
*Locations that minimize the need to build new roads and that meet the one or more of the following transmission sub-criteria: transmission with existing capacity and substations is already available; minimal additional infrastructure would be necessary, such as incremental transmission re-conductoring or upgrades, and development of substations; if a new line is needed, the line has already been permitted and is not the subject of pending litigation.

For a full comparison of relevant language, please consult the attachments.

D34-2b

the agency granted a three week extension to allow us and others concerned about the project to digest the new guidance and re-consider the project in light of the new recommendations. That said, we would have preferred if the agency had re-published the document after incorporating its own changes made necessary by the new direction. Moreover, we wish that the agency had taken the opportunity to join with the CDREWG members in support of the evolving consensus on siting issues, rather than release guidance some of which, as the group told Interior Department officials in a meeting in Washington, DC on February 11, 2011, is likely to perpetuate siting problems experienced over the course of the past year.

D34-3 Cont.

While we have endeavored to focus our comments below on the project currently being considered, we believe this broader context is important, and request that the agency consider our comments with this broader context in mind.

Purpose and Need

In our opinion, the purpose and need statement for this project is too narrow, and this has negatively affected the range of alternatives examined. The DEIR/DEIS states that the purpose and need is "to respond to" the Pacific Wind Development and SDG&E's right-of-way applications. DEIR/DEIS at A-6. Such a statement places undue emphasis on BLM's procedural authority, and fails to adequately capture the *underlying* purpose and need to facilitate environmentally responsible commercial development of renewable energy projects.

BLM should broaden its purpose and need statement to help ensure that this EIS is legally defensible. In place of the current purpose and need statement, we urge the adoption of the following:

> The purpose and need of the proposed action is to facilitate environmentally responsible commercial development of renewable energy projects consistent with the statutory authorities and policies applicable to the Bureau of Land Management, including those providing for contributions towards achieving the renewable energy development objectives under the Energy Policy Act of 2005 (EPAct), economic benefits under the American Recovery and Re-Investment Act, as well as the general land management provisions of the Federal Land Policy and Management Act (FLPMA), and all relevant Presidential and Secretarial orders. These laws and policies establish a Department of the Interior goal to approve at least 10,000 MW of non-hydropower renewable energy on public lands by 2015, and a Federal policy goal of producing 10% of the nation's electricity from renewable resources by 2010 and 25% by 2025.

D34-4

This kind of purpose and need statement would clearly satisfy applicable legal requirements, *see, e.g.*, National Parks Conservation Assn v. BLM, 606 F.3d 1058 (9th Cir. 2010), and thus help ensure that environmentally acceptable projects will not only be permitted but will also be built without unnecessary delays.

We note that the recent guidance on NEPA compliance for renewable energy projects suggests Bureau support for the type of purpose and need statement used in the present document, particularly the "to respond to an application" language. We continue to have serious concerns regarding this characterization of purpose and need, and encourage the agency to work with us and others who share these concerns to develop acceptable language to avoid unnecessary litigation on the matter.

Alternatives

The alternatives section is "the heart of the environmental impact statement." 40 C.F.R. § 1502.14. NEPA requires BLM to "rigorously explore and objectively evaluate" a range of alternatives to proposed federal actions. *See* 40 C.F.R. §§ 1502.14(a), 1508.25(c). "An agency must look at every reasonable alternative, with the range dictated by the nature and scope of the proposed action." Nw. Envtl. Defense Center v. Bonneville Power Admin. 117 F.3d 1520, 1538 (9th Cir. 1997). An agency

D34-5

violates NEPA by failing to "rigorously explore and objectively evaluate all reasonable alternatives" to the proposed action. City of Tenakee Springs v. Clough, 915 F.2d 1308, 1310 (9th Cir. 1990) (quoting 40 C.F.R. § 1502.14). This evaluation extends to considering more environmentally protective alternatives and mitigation measures. *See, e.g.*, Kootenai Tribe of Idaho v. Veneman, 313 F.3d 1094, 1122–23 (9th Cir. 2002) (and cases cited therein). For this project and EIS, the consideration of more environmentally protective alternatives is also consistent with the Federal Land Policy and Management Act's requirement that BLM "minimize adverse impacts on the natural, environmental, scientific, cultural, and other resources and values (including fish and wildlife habitat) of the public lands involved." 43 U.S.C. §1732(d)(2)(a).

The mere fact that lands are not administered by BLM does not render an offsite alternative unreasonable. In its "40 Questions" guidance, the Council on Environmental Quality (CEQ) advised that in defining what is a "reasonable" range of alternatives, NEPA requires consideration of alternatives "that are practical or feasible" and not just "whether the proponent or applicant likes or is itself capable of carrying out a particular alternative"; in fact, "[**a]n alternative that is outside the legal jurisdiction of the lead agency must still be analyzed in the EIS if it is reasonable**." Council on Environmental Quality, *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, *Questions 2A and 2B* (emphasis added), *available at* http://ceq.hss.doe.gov/nepa/regs/40/40p3.htm; 40 C.F.R. §§ 1502.14, 1506.2(d). We note that the California Energy Commission considers alternatives that include private lands provided site control can be obtained in a reasonable timeframe and with some certainty.

D34-5 Cont.

The alternatives presented in the DEIR/DEIS are relatively numerous, owing to the fact that the project has several components, and multiple development scenarios are analyzed for each component. Notably, the BLM has analyzed a reduced development scenario for the Tule Wind portion of the overall project, and in fact identified an alternative including a reduced development scenario for the wind project as its preferred alternative at the draft stage.

Several additional alternatives were proposed by stakeholders during the scoping phase. Many of these scoping comments addressed the need to look at alternative sites and technologies. The scoping letter from Defenders of Wildlife, dated Jan. 28, 2010, stated: "The DEIS must include alternative project sites or locations, including those that may not fall under the jurisdiction of the BLM; project extent and electrical power generation that differ from the applicant's proposal; and the potential for different technology that may lead to lesser potential impacts on sensitive environmental resources." We later learned that similar comments were made by the U.S. Environmental Protection Agency (EPA) in their comment letter, also dated Jan. 28, 2010.[4] That letter stated: "Reasonable alternatives should include, but are not necessarily limited to, alternative sites, capacities, and technologies as well as alternatives that identify environmentally sensitive areas or areas with potential use conflicts." The project record also indicates that a specific request was made to analyze distributed energy generation and efficiency improvements as a means of achieving project objectives.

These suggestions, and the alternatives which would logically result from their consideration, were either rejected or dealt with in a cursory fashion. Agency rationale for eliminating various alternatives from further consideration is provided in Section C of the DEIR/DEIS, starting at page 43. The rationale for rejecting distributed energy generation and energy efficiency alternatives is provided at pages C-60-63. With respect to the distributed energy generation and energy efficiency suggestion, we believe the agency should have considered these issues in combination, rather than as individual proposals.

D34-6

[4] For reasons unknown, EPA's comment letter was not included in the scoping report which was posted online at http://www.blm.gov/ca/st/en/fo/elcentro/nepa/tule/scoping_report.html. Accordingly, there is no way to know if these comments were taken into account during the alternative selection process.

D34-6a

On page C-56, the agency provides its rationale for rejecting an alternative labeled "Tule Alternative Site Closer to Demand Areas, Near Existing Transmission Facilities." Reference is made to figure A-1 which shows wind resource data for San Diego County and part of neighboring Imperial County. This alternative is considered infeasible due to a lack of wind velocity in "more urban areas to the west." This statement, however, is not fully responsive to the specific concerns raised during comments and more generally in other forums where appropriate project siting of renewable energy projects has been discussed. As discussed above in our comments regarding appropriate project siting, the ideal scenario would be to site such facilities in areas where there is a convergence of exploitable wind resources and previously disturbed (not necessarily "urban") land, provided these locations do not negatively impact other important resources such as wildlife or cultural resources. While figure A-1 provides useful information on the wind resource, it is of little value in the context of this analysis—a more useful figure would have overlaid areas of suitable wind resources with the locations of previously disturbed land, and in addition marked any "exclusion zones" as identified in existing land management plans.

D34-7

While we acknowledge the considerable effort which went into selecting the alternatives to be carried forward for analysis in the DEIR/DEIS, we are forced to conclude that the agency has not been rigorous enough in considering proposals for alternative sites and technologies, and its rejection of otherwise reasonable alternatives was arbitrary and capricious. We view this as a significant defect in the document that warrants the preparation of a Supplemental Draft.

We are concerned that the recent BLM guidance with respect to analysis of alternatives will limit consideration of otherwise reasonable alternative sites for this and other projects. This is particularly true of the guidance language under the heading "Non-Federal Lands:" "The BLM will not typically analyze a non-Federal land alternative for a right-of-way application on public lands because such an alternative does not respond to the BLM's purpose and need to consider an application for the authorized use of public lands for renewable energy development." When considered in combination with the overly-narrow "respond to an application" purpose and need guidance discussed previously, we fear that this guidance will preclude a full consideration of suitable public, private, or mixed-ownership sites as required by NEPA.

D34-8

Project Impacts

As detailed in the DEIR/DEIS, the proposed project, considered in combination with the Campo, Manzanita, and Jordan wind energy projects, would have adverse impacts that cannot be mitigated to biological resources, visual resources, cultural resources, noise, air quality, water resources, and fire and fuels management. *See* ES-18. The proposed Tule Wind project, which is our chief concern, would have significant adverse impacts in the following issue areas: biological resources (bird/golden eagle strikes with turbines), visual resources (impacts to scenic vistas, existing visual character, light/glare, and inconsistency with policies/plans), cultural resources (potential adverse change to traditional cultural properties), short-term construction noise and air emissions, and wildland fire and fuels management. *See* ES-20. BLM's preferred alternative, which removes 62 turbine sites (11 turbines adjacent to the BLM In-Ko-Pah Mountains Area of Critical Concern (ACEC) and 51 turbines adjacent to wilderness areas on the western side of the project site) would purportedly "substantially reduce the risk of golden eagle mortality." However, "the risk of mortality due to collision with operating turbines by golden eagle remains adverse and unmitigable due to the fact that the remaining turbines would continue to present risk, albeit with lower risk of collision to golden eagles foraging in the vicinity of the project." *See* ES-21. It remains to be seen whether this level of risk will be deemed consistent with the Bald and Golden Eagle Protection Act, which imposes strict limitations on take of eagles. The Final Rule on Eagle Act Take Permits (74 FR 48635) establishes a "no net loss" standard for eagles, and it is unknown whether proposed mitigation efforts as reflected in an avian protection plan will pass muster with the U.S. Fish & Wildlife Service (USFWS).

D34-9

Construction Impacts

Construction and operation of the Tule Wind Project will require the construction of 36.38 miles of new roads in an area which is currently used primarily as open space. See DEIR/DEIS Page B-8 and Figure D-4-8. The analysis treats this new construction as of little consequence in terms of environmental impacts—an approach that appears to have been taken because this construction is not otherwise precluded in the areas targeted for development, and these roads are expected to be decommissioned at the conclusion of the project's operation.[5] In our experience, however, roads which are constructed on public lands have a tendency to remain on the landscape, despite the original purpose of their construction or well-intentioned plans for their eventual removal. In addition, such routes often serve as jumping-off points for additional route pioneering by off-road vehicle enthusiasts. Given the proximity of the project to wilderness and ACEC lands, this issue has the potential to become a significant concern in the future. D34-10

Accordingly, we suggest proactive mitigation efforts within or outside the project area to reduce environmental impacts associated with road and motorized trail development. Such efforts would be particularly useful if they focused on areas where existing motorized recreation is having an adverse effect on sensitive species, including species which stand to be impacted by the project as a whole.

Effect on designated management areas

Defenders raised the issue of impacts to designated management areas and their associated wildlife resources in their January 28, 2010 scoping letter on this project. We are extremely concerned that the DEIR/DEIS has not addressed these impact issues and the compatibility of the proposed projects with the goals and objectives established for those designated wildlife management areas. Rather, the rationale is simply that the plans allow for consideration of multiple use activities and that the recent Eastern San Diego County Resource Management Plan specifically designated McCain Valley for renewable energy development. We do not consider the proposed project or the alternatives with regard to McCain Valley consistent with the land designations and the wildlife goals and objectives in existing management plans. Specific designated wildlife management areas we are concerned about include: D34-11

- McCain Valley National Cooperative Land and Wildlife Management Area: Among the first actions taken to conserve lands and wildlife resources in McCain Valley was establishment of the McCain Valley National Cooperative Land and Wildlife Management Area in 1961 by Secretary of the Interior Stuart Udall. It was established by Public Land Order 2460. According to the USDI, Office of the Secretary, in an information notice dated August 16, 1961, the McCain Valley Cooperative Land and Wildlife Management Area was established for the purpose of "…development of wildlife, recreational, and other natural resources for benefit of the entire Nation." D34-12

- McCain Valley Wildlife Habitat Management Plan: BLM, in cooperation with the California Department of Fish and Game, prepared the first McCain Valley Wildlife Habitat Management Plan in 1978 and an updated version in 1984. The purpose of these habitat management plans is to establish policies to protect and enhance wildlife habitat and numerous species of plants and animals occurring on public lands in McCain Valley. Wildlife species and their habitats addressed in the plan included upland game birds, raptors, Mule Deer, and Peninsular Bighorn Sheep. Several species of rare plant species were noted and habitat protection goals were established. D34-13

Lands acquired for conservation

According to the BLM's 1981 Eastern San Diego County Management Framework Plan (MFP), certain nonfederal land parcels for acquisition to facilitate management of critical wildlife and cultural resources and enhance and recreational opportunities. That MFP indicated BLM has acquired non- D34-14

[5] Per the DEIR/DEIS at Page D-4-104: "When the Tule Wind Project is decommissioned the project area would be restored to pre-construction conditions according to the applicable federal and local land use designations."

federal parcels of land in the McCain Valley Wildlife Habitat Management Area through purchase using funding from the Land and Water Conservation Fund (LWCF), and that such land acquisition would continue with the goal of securing remaining private lands within McCain Valley into public ownership. The DEIS/DEIR was silent on the issue of impact to lands acquired for conservation and recreation from the proposed project.

D34-14 Cont.

Scope of Analysis of Biological Resources

The DEIR/DEIS should address potential impacts to biological resources of the United States that may result from the construction and operation of the ESJ Wind Project in Mexico. Per NEPA, by considering the ESJ Gen-Tie line within the U.S. as part of the proposed PROJECT, this document is required to address potential impacts from ESJ wind turbines in Mexico that could potentially impact the United States. Consideration of potential impacts to the United States' biological resources from turbines constructed and operated in Mexico would require technical studies for the generation project in Mexico be made readily available to the public for review. Assessments, including detailed assessment of avian/bat risk of turbine collision, should include consideration of species protected under the Federal Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act and the Federal Endangered Species Act.

D34-15

Migratory Birds

The document generally discusses migratory birds and migratory pathways in southern California. Nocturnal bird migration was not studied, but from two diurnal survey reports the claim is made that nocturnal migratory bird mortality is generally very low based on one citation (Erickson 2007, cited in the avian survey reports). However, Erickson's work predated the accelerated deployment of ever-taller wind turbines over ever-more-expansive portions of the Pacific Flyway. Moreover, recent research has established that species such as Golden Eagles tend to hunt or migrate at or below ridgelines, potentially putting these species at risk if turbines are deployed in these ridge areas (Manville 2009). Furthermore, the document establishes that the Tule Wind project is located on the Pacific Flyway but provides no clear data for the impacts of the project on nocturnal migratory birds and bats or on migratory pathways for birds and bats. Migratory birds are protected by the Migratory Bird Treaty Act of 1918 and the project must address these impacts. We recommend the use of publicly available NEXRAD data that can be delimited rather inexpensively and quickly to determine quantity, magnitude and timing of nocturnal migratory birds and bats on the project site and adjacent areas, and to help determine if on site radar studies should be conducted for further analysis. Recent published scientific reports indicate that greater than 10% of nocturnal migrating songbirds migrating over ridges fly at elevations putting them within the area of rotating turbines (Mabee at al. 2006, WILDLIFE SOCIETY BULLETIN 34(3):682–690

D34-16

An on site radar study in California's desert at San Gorgonio Pass reported that "approximately 37 million birds passed through the Coachella Valley in the fall and an additional "approximately 32 million birds flew through the Coachella Valley during spring 1982," making the total in 1982 approximately 70 million birds. The study concludes "we estimate that approximately 256,000 birds/km could potentially come into contact with wind turbine generators each fall in the WRSA" and "approximately 182,000 birds/km potentially come into contact with wind turbine generators each spring."[6] The document needs to analyze the on site impacts of the larger turbines proposed at Tule Wind project on nocturnal migratory songbirds and bats in comparison to this data on a nearby site.

In addition, the bird use counts for avian species on the site every two weeks as reported in the avian reports do not conform to California Energy Commission guidelines, which recommend:

[6] Nocturnal Avian Migration Assessment of the San Gorgonio Wind Resource Study Area, Spring 1982 (McCrary, et al (1982), p. 105

"Bird Use Counts. The bird use count (BUC) is a modified point count that involves an observer recording bird detections from a single vantage point for a specified time period. Sampling Duration/Frequency. Conduct BUCs for 30 minutes once a week for one year, covering most daylight hours and weather conditions"[7]

D34-16 Cont.

Raptors

Raptors are highly vulnerable to collision with wind turbines. The document reports raptor surveys for 20 minutes and concludes that raptor use is low. Twenty minute surveys are inadequate to draw this conclusion. Industry standards for large bird surveys defined by Hawk Migration Association of North America, Hawk Watch International, Cape May Bird Observatory and others recommend all day surveys every day to determine raptor use on the site. Only by using this method can relatively rare events such as occasional large migration flocks of Swainson's Hawks, which are known to congregate nearby, Turkey vultures or White Pelicans be detected. The 20 minute survey approach in the document would easily miss the presence of Golden Eagles during migration or from nearby nests that were documented, one of which is reported active yet no Golden Eagles were observed.

D34-17

Nesting raptor species on the proposed project site are protected under the federal Migratory Bird Treaty Act, including those species known to be vulnerable to turbine collision such as the red-tailed hawk. Aside from the aerial survey completed by the Wildlife Research Institute (WRI), were focused ground-based raptor nest surveys completed within the Tule Wind project site in order to accurately characterize the resident population density of particularly vulnerable raptor species? How close are red-tailed hawk nests and other raptor species nests located to proposed wind turbines?

Combined with nest survey results, is red-tailed hawk use (data from point count surveys) of the Tule Wind project considered reflective of a low or high density of this species as compared to other parts of the County? Is the proposed Tule Wind project likely to result in impacts to the local population of red-tailed hawks from turbine collision and if so, how will these impacts be minimized?

Golden Eagle

The DEIR/DEIS cites a study in footnotes entitled WRI (Wildlife Research Institute). 2010. *Golden Eagle Aerial Surveys Surrounding Tule Wind Energy Developments in San Diego County, California. Prepared by the Wildlife Research Institute for Iberdrola Renewables, Inc*. Ramona, California: Prepared by Wildlife Research Institute for Iberdrola Renewables, Inc. June 11, 2010.. However, the cited report is not provided as an Appendix. Instead, the proponent has provided a document from proponent's environmental consultant WEST with a brief statement of some data from the report, and a long analysis of Golden Eagle mortality at sites that are not comparable to Tule Wind. The sites in the report in Minnesota, Washington and other locations in the U.S. are not comparable as these sites do not have 11 Golden Eagle territories on them and are of a very different ecology. The study that is cited in the DEIR/DEIS must be provided for public review, rather than the abbreviated and/or non-relevant information that has so far been provided as a substitute.

D34-18

Additionally, the DEIR/DEIS reports conflicting Eagle counts:

One section of the DEIR/DEIS reports that "Within 10 miles of the ECO project area, three golden eagle territories were observed, none which were currently active."[8]

Another section the DEIR reports that "10 known golden eagle territories have been documented within 10 miles of the proposed project (WRI 2010)."[9]

[7] CALIFORNIA GUIDELINES FOR REDUCING IMPACTS TO BIRDS AND BATS FROM WIND ENERGY DEVELOPMENT, California Energy Commission, 2007, p. 10

[8] East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects DEIR/DEIS D.2 BIOLOGICAL RESOURCES, p. D-2-72

The site specific evaluation and analysis of the results of this survey are provided by WEST (2010b)."[10] It reports that "Eleven golden eagle territories were identified based on their historical occurrence and the 2010 surveys. Of the 11 territories, the 2010 surveys found nests in all areas except for one."[11]

These conflicting data of Golden Eagle territories contained in the DEIR/DEIS would suggest that the analysis of Golden Eagle needs in the document is inadequate.

Additionally, the findings in the DEIR/DEIS that impacts to Golden Eagle are significant and unmitigable under the California Environmental Quality Act (CEQA) conflict with the findings of proponent's environmental consultant that the site has low risk to Eagles.

The DEIR/DEIS also reports that "In general, specific and consistent raptor nest buffers at wind projects have not been established" and recommends a "1-mile buffer for ferruginous hawk nests and a 0.5-mile buffer for golden eagle nests for surface occupancy for turbines (WGFD 2009)"[12] citing a Washington state guideline. The National Golden Eagle Colloquium on March 2-3, 2010 attended by 85 participants from various agencies and Golden Eagle and raptor scientists from across the country contradicts this analysis. The scientists concluded that "Buffers we currently recommend are at least 4 - 10 air miles from a golden eagle territory."[13]

The document also reports that "Half of the active nests documented during the surveys are greater than five miles (eight kilometers [km]) from the project boundary. One of the active nests is within ½ mile (0.8 km) of proposed project turbines but the nest is protected below the ridgeline and birds from that nest are not in view of wind turbines. Two others are within one mile (1.6 km) of the proposed project turbines, but these two only have one turbine within 1-mile of the nests (Table 1)." If 50% of the nests are further than 5 miles, then 50% have home ranges that are closer than 5 miles and are at high risk for mortality from collision with turbines. Additionally, the document should analyze the territory size of each eagle territory and not just the distance of the turbine from the nest. Eagles often fly further than a five mile territory. A nest as close as 0.5 miles would predictably kill adult and fledgling eagles, and eleven territories of Golden Eagle indicate an unacceptable risk of "take" for Golden Eagle in mortality and disturbance for a wind project.

It is unclear in the document if aerial surveys were completed within 10 miles of the proposed turbines or within 10 miles in all directions of all components of the proposed project, including the ECO Substation and ESJ Gen-Tie. Were surveys completed in Mexico to consider a 10-mile radius, as recommended in the Draft Interim USFWS Golden Eagle Technical Guidance (February 2010), around this component of the proposed project?

We recommend that the DEIR/DEIS be revised and re-circulated in order to reconsider impacts to Golden Eagle more thoroughly using recommendations and analysis by Eagle experts who performed the surveys as well as peer review by qualified Eagle experts. The next iteration of the DEIR/DEIS should also consider USFWS Draft Eagle Conservation Plan Guidance issued January 2011 to Federal Register (76 R 9529 - Docket ID: FWS-R9-MB-N018), as applicable per the Bald and Golden Eagle Protection Act. Such a reconsideration would allow the Bureau, the proponent and the USFWS to fully evaluate the site and whether it should be abandoned due to unacceptable, unmitigable risk to Golden Eagle.

D34-18
Cont.

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[9] Ibid, p. D-2-46
[10] Ibid, p. D-2-4
[11] Golden Eagle Information Tule Wind Project *Prepared for :*Iberdrola Renewables, Inc. *Prepared by:* Wallace Erickson
Western EcoSystems Technology, Inc. 2003 Central Avenue, Cheyenne, Wyoming 82001. June 2010, p. 2
[12] Ibid, p. 6
[13] National Golden Eagle Colloqium, March 2-3,2010: Carlsbad Fish and Wildlife Office, Carlsbad, California, p. 26

Condor

The DEIR/DEIS's discussion of the California condor does not address San Diego Zoo's Institute for Conservation Research/San Diego Zoo Global's current and future reintroduction plan to increase the population size of this species inhabiting the region south of the proposed project in Baja California. Consideration of potential impacts to California condors from risk of collision with turbines appears inadequate to address expanding range of this species in vicinity of project and ramifications of proposed wind development on ability of this species to continue to persist. The DEIR/DEIS does not address presence/absence/proximity of potential food sources/attractants of California condor to the proposed project, such as livestock or large game species.

D34-19

Peninsular Bighorn Sheep

Unfortunately, the DEIR/DEIS fails to provide adequate identification and analysis of the potentially significant impacts to the federally endangered and state fully protected Peninsular bighorn sheep. While the DEIR/DEIS recognizes that the projects are not within the currently designated critical habitat for peninsular bighorn, it fails to acknowledge that the projects fall within previously designated critical habitat. Currently, the Center for Biological Diversity, Sierra Club and others are challenging the 2009 designation in court. We provide Attachment 3 that maps the current 2009 and previous 2006 final critical habitats for the sheep. As proposed the projects currently appear to overlap with habitat previously designated as critical for the survival and recovery of the Peninsular bighorn sheep. In addition, as Figure D.2-9 – Key Wildlife Species clearly identifies, Peninsular bighorn sheep range into areas outside of designated critical habitat. Therefore, regardless of the current designation, the project will impact habitat for this imperiled species, and comprehensive surveys should have been done for the sheep, upon which a robust analysis of potential should have been based. Because these data and subsequent analysis is lacking for this imperiled species, the DEIR/DEIS fails to comply with CEQA or NEPA.

Another issue that the DEIR/DEIS fails to evaluate is the movement of Peninsular bighorn sheep and habitat due to climate change. Plant communities in bighorn habitat have been documented to be moving up in elevation[14]. As climate change continues, Peninsular bighorn ranges will shift to appropriate habitat areas which will generally be higher elevations[15]

D34-20

By assuming that Peninsular bighorn sheep were not and in the future will not be present on the proposed project site, the DEIR/DEIS failed to evaluate the impact on the species from increased human activities and the wind towers themselves. While no published literature is available on the effects of wind towers on activities of bighorn sheep, data does exist that indicates increased human presence cause sheep to avoid portions of habitat.[16]

Additionally, incomplete analysis was provided on the cumulative impacts to the Peninsular bighorn from these and adjacent proposed projects including Ocotillo Wind Express, which also has potential significant impact on the Peninsular bighorn. The combination of these two proposed projects significantly narrows the movement corridor for bighorn in this area. The cumulative analysis also failed to assess the metapopulational impacts from not only these proposed projects, but the projects in Mexico, which will likely cut off connectivity between Peninsular bighorn sheep in Baja and the United States, further isolating both populations which will cause continued declines on both sides of the border for this iconic species.

[14] Kelley and Goulden 2008. Rapid shifts in plant distribution with recent climate change. Proceedings of the National Academy of Sciences 105(33): 11823-11826.
[15] Epps et al. 2004. Effects of climate change on population persistence of desert-dwelling mountain sheep in California. Conservation Biology 18(1): 102-113.
[16] Papouchis et al. 2001. Responses of Desert Bighorn Sheep to Increased Human Recreation. The Journal of Wildlife Management65(3): 573-582

Because of the short-comings in the CEQA/NEPA review, a revised or supplemental draft EIR/EIS needs to be produced.

D34-20 Con't

Cumulative impacts

We appreciate the comprehensive listing of existing and planned projects within the eastern San Diego County region that cumulatively impact the natural landscape and diverse animal and plant communities, and the explanation of the approach taken to assess the effects of land use activities of the environment. However, for avian and bat species, the DEIR/DEIS's geographic scope of analysis is inadequate, as more fully outlined below.

Moreover, for all biological resources, we believe the cumulative impact analysis needs to consider their condition and trend under the current or baseline condition, and then account for the anticipated impacts added to the baseline due to proposed and reasonably foreseeable land use activities. A projected condition and trend should then be established. We think this is a critical missing component of the analysis under NEPA, and one which the BLM, California Public Utility Commission, U.S. Fish and Wildlife Service and California Department of Fish and Game need to carry out under their legal and regulatory responsibilities. The condition and trend analysis for biological resources should, at a minimum, include those species of plants and animals that warrant special management attention, such as the BLM's Special Status Species, Sensitive Species, and California's fully protected species, as well as avian and bat species known to be especially at risk from wind turbines, either through barotrauma or collision.

D34-21

The cumulative impact analysis (Appendix F) identifies a wide range of impacts attributed to the proposed project and each alternative, and combines them with the potential effects of planned and foreseeable projects. The impacts are then subjectively described as either below the significance threshold under CEQA for cumulatively or individually significant. We appreciate the candid statements regarding the efficacy of proposed mitigation measures to reduce anticipated impacts and whether or not the residual impacts would be reduced below the significance threshold. We find, however, that the cumulative impact analysis does not appear to take into account the condition and trend of biological resources within the affected region, some of which are at-risk and potentially in decline. The analysis needs to be strengthened through the use of data that demonstrates the magnitude of impacts to at-risk plants, animals and their habitats, and to what degree the applied mitigation measures would reduce impacts.

Cumulative impacts to avian and bat species

In particular, the DEIS cumulative impacts analysis fails to adequately analyze the Project's cumulative impacts to avian species, especially Golden Eagle, Swainson's Hawk and bat species. The Bureau must consider the Project in combination with existing and foreseeable avian and bat mortality factors, such as other wind development, transmission lines, loss of foraging habitat, loss of prey base to drought, poisoning and other factors. The document itself reports that "Currently, this region has been undergoing a prolonged drought, which has resulted in a reduced population size of jackrabbits, a primary prey source for golden eagles (WRI 2010). As a correlate to the lower prey population size, WRI has confirmed unusually low reproductive levels of golden eagles in other regions of Southern California (WRI 2010).[17]

D34-22

Regarding Golden Eagle, there is a strong likelihood that cumulative mortality will drive Golden Eagles extinct in California, or at the very least cause the species to be listed. It has been documented that 40 to 60 Golden Eagles are killed by turbines at Altamont Pass each year. Just to recoup for the loss of 50 eagles a year on average at Altamont requires the production of 167 breeding pairs due to infant mortality rates. There are only some 1000 breeding pairs in the state today, and there are many other

[17] East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects Draft DEIR/DEIS D.2 BIOLOGICAL RESOURCES, p. D-2-45

causes of mortality in addition to Altamont Pass turbines.[18] Therefore, the DEIS must address the grave potential for mortality by anthropogenic causes to exceed the ability of Golden Eagles to reproduce in California.

It is generally acknowledged that current mortality rates of Golden Eagles (and other aerial species) from wind farms are not well known or not known at all for turbines which are not monitored (such as those on Indian Reservation land and others). In fact, it is thought by most experts that actual mortality is far greater than documented, as monitoring is not conducted on all wind turbine operations, and many dead birds and bats are never found or documented, due to scavenging and other factors. Monitoring and documentation are sorely lacking. But given current mortality rates of Golden Eagles from all causes including turbines, it is foreseeable that if enough wind farms are deployed, then the mortalities will exceed the threshold beyond which the state population of Golden Eagles is too small to be genetically fit, if not to exceed the ability of Golden Eagles to repopulate.

While Golden Eagles could be driven to the point of no net gain in nest production in California, it would be expected that migrating eagles would still enter the state. However, their mortality rate would be expected to increase as well. The EIR/EIS must analyze the cumulative effects of massively deploying 400' and 500' tall wind turbines on the crests of ridges throughout the state and the potential impact on raptor migration, which generally follows these ridges (Manville 2009).

D34-22 Cont.

Although little is known about migration routes for Golden Eagle and Swainson's Hawk, which is the subject of annual surveys in this same region, experts believe there are probably multiple parallel routes running north/south through the state. As stated by Manville and others, these routes likely follow the mountainous ridges, many of the very same places where wind farms are being proposed. The DEIR/DEIS must address this issue.

Likewise, little is really known about foraging patterns. But clearly Golden Eagles may fly great distances as needed for foraging, and regardless, the bulk of the proposed Tule Wind lies within five miles of known Golden Eagle nesting sites.

Regarding bats, fatalities in the southwestern United States are poorly understood. But like raptors, bats are experiencing population declines and these declines are even steeper in the case of bats. Even the Brazilian Free-Tailed Bat, one of the most numerous species in the U.S., appears to be vulnerable and comprises 41%-86% of the bats documented killed by turbines, at those few locales where such surveys have been conducted in the species' range. (Arnett et al. 2008, Miller 2008). Yet the DEIR/DEIS fails to adequately consider the cumulative impacts to this and other bat species and to assess the trend and its import for these species.

D34-23

The DEIR/DEIS has an affirmative obligation to gather known information, and use expert guidance where there are gaps in information, to make a reasoned in-depth analysis of cumulative effects on sensitive raptors. What is the viability of Golden Eagle, Swainson's Hawk, and other bird and bat populations, given this unprecedented potential massive disruption to aerial habitat? In addition to NEPA, the Bureau's own policies require it to manage resources to avoid contributing to listings of species. Thus, BLM must revise the EIS to take a hard look at the cumulative impacts of Tule Wind on avian species and bats.

Moreover, by limiting consideration of cumulative impacts to San Diego and Imperial Counties, the Bureau is failing to fulfill its responsibilities under NEPA, the Migratory Bird Treaty Act, and other applicable law and regulation. In order to properly assess affects on both resident and migratory birds,

D34-24

[18] See *Golden Eagles in a Perilous Landscape: Predicting the Effects of Mitigation for Wind Turbine Blade-Strike Mortality.* (P500-02-043F. July 2002.) [available for download at www.energy.ca.gov/reports/2002-11-04_500-02-043F.PDF]; *The Trend of Golden Eagle Territory Occupancy in the Vicinity of the Altamont Pass Wind Resource Area: 2005.* (P500-2006-056) [available for download at www.energy.ca.gov/pier/final_project_reports/CEC-500-2006-056.html]

it must expand the geographic scope of the analysis to include: Altamont Pass; San Gorgonio Pass; and existing and proposed wind development on Indian Reservations, the Tehachapis, the southern Sierra and elsewhere in the state, as well as Baja California and elsewhere along the Pacific Flyway. The Tule Wind project is not occurring in isolation and cumulative impacts are potentially profound and irreversible for migratory species utilizing the Pacific Flyway.

D34-24 Cont.

Mitigation

The document identifies various measures and best management practices that could be employed to minimize impacts to biological resources. In general, these are largely terms and conditions in a permit or authorization for the project. Examples are plans that would be developed and implemented after the project has been authorized but before construction could commence, such as for dust control; weed control; special status plant and animal avoidance/impact minimization, etc. NEPA requires that all mitigation measures, including best management practices, impact avoidance plans, and habitat compensation and enhancement, must be applied and analyzed in the NEPA document rather than after a final decision has been made. Therefore, the DEIS should be revised to unambiguously incorporate all proposed mitigation measures and clearly state them in its mitigation and monitoring plan. Where proposed measures are untested or hypothetical, they must be so identified and their ability to mitigate must be discounted accordingly.

D34-25

The document also implies that mitigation may involve habitat loss compensation through acquisition of similar natural habitats within the analysis area by the project proponent: "Although land ownership and other factors determine the availability of land for mitigation, a sufficient supply of land suitable to provide mitigation for the long-term maintenance of vegetation communities is available within the analysis area." (DEIR/DEIS, Page F-24). Habitat loss compensation should be required for all unmitigated impacts to public resources. Furthermore, impacts to fully protected species under CEQA must be fully mitigated. According to the DEIR/DEIS, significant impacts resulting from the proposed project and the alternatives that cannot be avoided through mitigation measures will occur to the following:

- Quino checkerspot butterfly occupied habitat, including designated critical habitat (federally listed under the Endangered Species Act)
- Golden eagle injury and mortality due to collisions with turbines

Compensation for unmitigated impacts through habitat acquisition should be based on a habitat acquisition and protection strategy and, depending on the ratio of habitat loss to habitat acquisition, habitat enhancement. We are concerned with the conclusion in the document that "a sufficient supply of land suitable to provide mitigation for the long-term maintenance of vegetation communities is available within the analysis area." This needs to be confirmed and will most likely be based on a willing-seller basis. A habitat compensation plan for the proposed project needs to be developed in advance and the public assured that is feasible and will be successfully implemented in a timely fashion.

D34-26

Much more stringent mitigation for the Quino checkerspot and golden eagle needs to be required. For example, impacts to Quino checkerspot habitat was required at a 5:1 mitigation ratio in the Sunrise-Powerlink FEIR/S. Here, however, mitigation is only proposed at a 2:1 or 3:1 ratio, which is woefully inadequate. Even with this higher level of mitigation that needs to be instituted, we agree that the impacts are significant and unmitigable. The Quino checkerspot butterfly is particularly vulnerable to climate change,[19] and careful analysis of impacts of this project in light of how it will be moving on the landscape also need to be evaluated and analyzed in the supplemental or revised DEIR/DEIS.

D34-27

[19] Parmesan et al 2000.

Treatment of Climate Change

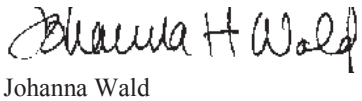
The DEIR/DEIS discussion of climate change focuses on the reduction of greenhouse gases and the development of renewable energy resources. That is, it looks at the effects of the proposed action on climate change. It does not, however, analyze the impacts of climate change on species of concern in the project area or on their habitats. The latter impacts are clearly relevant. *See, e.g.*, Secretarial Order 3289, Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources (February 22, 2010). Such an analysis will allow the BLM to assess and reduce the vulnerabilities of the proposed action to climate change, integrate climate change adaptation into the proposed action and alternatives and produce accurate predictions of environmental consequences of the proposed actions and alternatives.

D34-28

Conclusion

Thank you for your consideration of our comments. If you have any questions about them, please do not hesitate to contact Johanna Wald of NRDC at 415-875-6100 or jwald@nrdc.org.

Sincerely,



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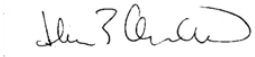

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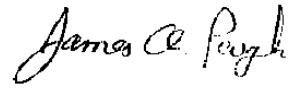

Jim Peugh
San Diego Audubon Society

The following material is considered Comment D34-29.

Audubon California
California Native Plant Society * California Wilderness Coalition
Center for Biological Diversity * Defenders of Wildlife
Desert Protective Council * Mojave Desert Land Trust
National Parks Conservation Association
Natural Resources Defense Council * Sierra Club * The Nature Conservancy
The Wilderness Society * The Wildlands Conservancy

Renewable Siting Criteria for California Desert Conservation Area

Environmental stakeholders have been asked by land management agencies, elected officials, other decision-makers, and renewable energy proponents to provide criteria for use in identifying potential renewable energy sites in the California Desert Conservation Area (CDCA). Large parts of the California desert ecosystem have survived despite pressures from mining, grazing, ORV, real estate development and military uses over the last century. Now, utility scale renewable energy development presents the challenge of new land consumptive activities on a potentially unprecedented scale. Without careful planning, the surviving desert ecosystems may be further fragmented, degraded and lost.

The criteria below primarily address the siting of solar energy projects and would need to be further refined to address factors that are specific to the siting of wind and geothermal facilities. While the criteria listed below are not ranked, they are intended to inform planning processes and were designed to provide ecosystem level protection to the CDCA (including public, private and military lands) by giving preference to disturbed lands, steering development away from lands with high environmental values, and avoiding the deserts' undeveloped cores. They were developed with input from field scientists, land managers, and conservation professionals and fall into two categories: 1) areas to prioritize for siting and 2) high conflict areas. The criteria are intended to guide solar development to areas with comparatively low potential for conflict and controversy in an effort to help California meet its ambitious renewable energy goals in a timely manner.

Areas to Prioritize for Siting

- Lands that have been mechanically disturbed, i.e., locations that are degraded and disturbed by mechanical disturbance:
  - Lands that have been "type-converted" from native vegetation through plowing, bulldozing or other mechanical impact often in support of agriculture or other land cover change activities (mining, clearance for development, heavy off-road vehicle use).[1]
- Public lands of comparatively low resource value located adjacent to degraded and impacted private lands on the fringes of the CDCA:[2]
  - Allow for the expansion of renewable energy development onto private lands.
  - Private lands development offers tax benefits to local government.
- Brownfields:
  - Revitalize idle or underutilized industrialized sites.
  - Existing transmission capacity and infrastructure are typically in place.

- Locations adjacent to urbanized areas:[3]
    - Provide jobs for local residents often in underserved communities;
    - Minimize growth-inducing impacts;
    - Provide homes and services for the workforce that will be required at new energy facilities;
    - Minimize workforce commute and associated greenhouse gas emissions.
- Locations that minimize the need to build new roads.
- Locations that could be served by existing substations.
- Areas proximate to sources of municipal wastewater for use in cleaning.
- Locations proximate to load centers.
- Locations adjacent to federally designated corridors with existing major transmission lines.[4]

High Conflict Areas

In an effort to flag areas that will generate significant controversy the environmental community has developed the following list of criteria for areas to avoid in siting renewable projects. These criteria are fairly broad. They are intended to minimize resource conflicts and thereby help California meet its ambitious renewable goals. The criteria are not intended to serve as a substitute for project specific review. They do not include the categories of lands within the California desert that are off limits to all development by statute or policy.[5]

- Locations that support sensitive biological resources, including: federally designated and proposed critical habitat; significant[6] populations of federal or state threatened and endangered species,[7] significant populations of sensitive, rare and special status species,[8] and rare or unique plant communities.[9]
- Areas of Critical Environmental Concern, Wildlife Habitat Management Areas, proposed HCP and NCCP Conservation Reserves.[10]
- Lands purchased for conservation including those conveyed to the BLM.[11]
- Landscape-level biological linkage areas required for the continued functioning of biological and ecological processes.[12]
- Proposed Wilderness Areas, proposed National Monuments, and Citizens' Wilderness Inventory Areas.[13]
- Wetlands and riparian areas, including the upland habitat and groundwater resources required to protect the integrity of seeps, springs, streams or wetlands.[14]
- National Historic Register eligible sites and other known cultural resources.
- Locations directly adjacent to National or State Park units.[15]

EXPLANATIONS

[1] Some of these lands may be currently abandoned from those prior activities, allowing some natural vegetation to be sparsely re-established. However, because the desert is slow to heal, these lands do not support the high level of ecological functioning that undisturbed natural lands do.

[2] Based on currently available data.

[3] Urbanized areas include desert communities that welcome local industrial development but do not include communities that are dependent on tourism for their economic survival.

[4] The term "federally designated corridors" does not include contingent corridors.

[5] Lands where development is prohibited by statute or policy include but are not limited to:

National Park Service units; designated Wilderness Areas; Wilderness Study Areas; BLM National Conservation Areas; National Recreation Areas; National Monuments; private preserves and reserves; Inventoried Roadless Areas on USFS lands; National Historic and National Scenic Trails; National Wild, Scenic and Recreational Rivers; HCP and NCCP lands precluded from development; conservation mitigation banks under conservation easements approved by the state Department of Fish and Game, U.S. Fish and Wildlife Service or Army Corps of Engineers a; California State Wetlands; California State Parks; Department of Fish and Game Wildlife Areas and Ecological Reserves; National Historic Register sites.

[6] Determining "significance" requires consideration of factors that include population size and characteristics, linkage, and feasibility of mitigation.

[7] Some listed species have no designated critical habitat or occupy habitat outside of designated critical habitat. Locations with significant occurrences of federal or state threatened and endangered species should be avoided even if these locations are outside of designated critical habitat or conservation areas in order to minimize take and provide connectivity between critical habitat units.

[8] Significant populations/occurrences of sensitive, rare and special status species including CNPS list 1B and list 2 plants, and federal or state agency species of concern.

[9] Rare plant communities/assemblages include those defined by the California Native Plant Society's Rare Plant Communities Initiative and by federal, state and county agencies.

[10] ACECs include Desert Tortoise Desert Wildlife Management Areas (DWMAs). The CDCA Plan has designated specific Wildlife Habitat Management Areas (HMAs) to conserve habitat for species such as the Mohave ground squirrel and bighorn sheep. Some of these designated areas are subject to development caps which apply to renewable energy projects (as well as other activities).

[11] These lands include compensation lands purchased for mitigation by other parties and transferred to the BLM and compensation lands purchased directly by the BLM.

[12] Landscape-level linkages provide connectivity between species populations, wildlife movement corridors, ecological process corridors (e.g., sand movement corridors), and climate change adaptation corridors. They also provide connections between protected ecological reserves such as National Park units and Wilderness Areas. The long-term viability of existing populations within such reserves may be dependent upon habitat, populations or processes that extend outside of their boundaries. While it is possible to describe current wildlife movement corridors, the problem of forecasting the future locations of such corridors is confounded by the lack of certainty inherent in global climate change. Hence the need to maintain broad, landscape-level connections. To maintain ecological functions and natural history values inherent in parks, wilderness and other biological reserves, trans-boundary ecological processes must be identified and protected. Specific and cumulative impacts that may threaten vital corridors and trans-boundary processes should be avoided.

[13] Proposed Wilderness Areas: lands proposed by a member of Congress to be set aside to preserve wilderness values. The proposal must be: 1) introduced as legislation, or 2) announced by a member of Congress with publicly available maps. Proposed National Monuments: areas proposed by the President or a member of Congress to protect objects of historic or scientific interest. The proposal must be: 1) introduced as legislation or 2) announced by a member of Congress with publicly available maps. Citizens' Wilderness Inventory Areas: lands that have been inventoried by citizens groups, conservationists, and agencies and found to have defined "wilderness characteristics." The proposal has been publicly announced.

[14] The extent of upland habitat that needs to be protected is sensitive to site-specific resources. For example: the NECO Amendment to the CDCA Plan protects streams within a 5-mile radius of Townsend big-eared bat maternity roosts; aquatic and riparian species may be highly sensitive to changes in groundwater levels.

[15] Adjacent: lying contiguous, adjoining or within 2 miles of park or state boundaries. (Note: lands more than 2 miles from a park boundary should be evaluated for importance from a landscape-level linkage perspective, as further defined in footnote 12).

Recommendations to Secretary of the Interior Ken Salazar on Ways to Improve Planning and Permitting for the Next Generation of Solar Energy Projects on BLM Land in the California Desert

California Desert & Renewable Energy Working Group
December 22, 2010

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Table of Contents

I. Reduce Speculation in Solar ROW Applications[1]

Issue: The Bureau has made significant progress in reducing speculative applications for solar development in California. As a result of the Bureau's enforcement of its Plan of Development ("POD") policies in California, the total quantity of applications and acreage has declined substantially. The Bureau's adoption of enhanced guidance, such as the October 7, 2010, Instruction Memorandum (the "Oct. 2010 IM"),[2] promises further improvement. However, speculative applications remain, both in terms of applications that may not be technically and economically feasible, and in terms of the size of applications relative to the reasonably likely size of facilities (even accounting for additional acreage reserved to allow for reconfiguration, which we support).

Solution: To ensure that the most suitable lands for solar development are used appropriately, and that real solar development is not displaced from those lands onto other lands that may be less suitable, the Right-of-Way ("ROW") application process requires further reform. It will be particularly important to avoid unduly oversize ROW applications, relative to actual project size, in Solar Energy Study Areas/Zones, as these are intended to be the place for focused, large-scale, solar development. If areas in those zones are taken up with speculative applications, the purpose of the Solar Energy Study Areas/Zones will be frustrated, and real solar development will be diverted elsewhere.

To that end, the California BLM office should resume its enforcement of the existing POD policy, and other state BLM offices should follow California's example. In addition, the Bureau should build on the concepts in its Oct. 2010 IM, and on its existing regulations, to provide for earlier screening to eliminate speculative applications. This process should focus on objectively-determined assessments of site development progress.

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[1] Although these recommendations are intended for implementation in California, the Bureau may wish to consider how they may apply to other states

[2] IM 2010-003 (Oct, 2010) , available at http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2011/IM_2011-003.html

2011 Q1 Progress Assessments

The Bureau can act to focus its resources on the most viable 2011 projects, and reduce speculation, through assessments of the projects' progress in achieving the milestones discussed below. These milestones address aspects of financial and technical viability but do not address other aspects of project viability, including the appropriateness of the site for solar energy development, as discussed in Section II of these recommendations.

A. Enforcing Plan of Development Standards

As noted above, the California state office has made substantial progress in reducing speculative applications by requiring Plans of Development that meet the Bureau's standards. Resuming enforcement of this requirement will undoubtedly continue to provide good results. As part of this effort, the Bureau should ensure that the size of the applications is reasonably related to the size of the project described in the Plan of Development, with flexibility to allow for reconfiguration to avoid or minimize environmental, cultural or other impacts.

B. Applying Financial Viability Screens

The Oct. 2010 IM provides for assessment of financial viability, providing a presumption of viability for entities that have successfully owned, developed, or managed similarly-sized electric generation projects, and allowing individual demonstrations for others, which may be evaluated jointly with the Department of Energy. Projects proposed for potential approval in 2011 should be evaluated in the first quarter of 2011. To ease administrative burdens, avoid duplicative governmental efforts, and make use of reasonable market-based indicators of financial viability that can be objectively ascertained, the Bureau should expand its presumptions of financial viability to include projects that have (i) a conditional commitment for a DOE loan guarantee; (ii) a power purchase agreement that has been approved by the California Public Utilities Commission or municipal power authority; or (iii) an engineering, procurement and construction ("EPC") contract with an entity that has successfully constructed electric generation projects of similar capacity within the last five years. As provided in the Oct. 2010 IM, projects that do not meet these presumptive tests should be allowed to make individual demonstrations of financial viability to the Bureau.

C. Applying Technical Viability Screens

Technical viability should be presumed, similar to financial viability, if (i) the DOE has provided a conditional commitment for a loan guarantee; (ii) the basic technology to be deployed has been demonstrated for at least one year in a commercial or demonstration plant; or (iii) the key components of the technology have been demonstrated, and the applicant has supply contracts with credible third-party vendors for the manufacture and/or supply of those demonstrated, key components. These technical viability tests would not apply to demonstration projects.

D. Evaluating Site Development Progress

To ensure sites are being actively evaluated for approval and development, and not held speculatively, developers should demonstrate that they are undertaking the necessary assessments. For 2011 projects, site-specific technical assessments, including meteorological and geotechnical data collection and evaluation, as well as biological surveys, should either already have been completed or should be planned. All applicants should be required to provide a schedule for conducting remaining technical assessments needed to complete timely NEPA analyses, consistent with completing the permitting process in 2011. Applicants should be required to demonstrate diligent progress on the schedule through regular reports.

E. Assessing Permitting & Transmission Viability

All solar development projects require state and/or local government permitting for construction and operation, as well as approval to interconnect their facility with transmission. As with technical assessments, solar development applicants should provide the Bureau with a schedule for applying for all necessary permits, as well as for interconnection with transmission. The timetable should demonstrate that the necessary permits will be obtained to allow timely construction commencement and completion, consistent with the deadlines provided in the Oct. 2010 IM. The Bureau may wish to consult with the California ISO or other appropriate permitting or transmission oversight entities to determine whether proposed schedules are reasonable. Applicants should be required to demonstrate diligent progress on the schedule through regular reports.

II. Apply Screening Criteria for California Desert Solar Projects on BLM Land

Issue: BLM has limited resources to apply to the review of proposed renewable energy projects in the California Desert in 2011. The agency should focus first on those projects with the greatest technical and financial viability and the fewest environmental conflicts.

Solution: BLM should adopt criteria to help ensure that it moves forward expeditiously to prioritize those projects that have the highest likelihood of permit approval by the end of 2011 – i.e., likely to be permitted and built with a minimum of time and controversy. Priority projects include those in low conflict areas and those with potentially resolvable conflicts where attention is paid to resolving the conflicts.

Ground rules: The criteria set out below are designed only for allocation of BLM resources in 2011 for solar projects on BLM land in the California desert.[3] Moreover, they are not comprehensive criteria for BLM: there are other important criteria such as cultural and historic criteria that are not addressed here, because our group does not include representatives of those interests

[3] To be clear, we did not develop these criteria for use outside of the California desert, by other agencies, other than in 2011, or for technologies other than solar.

The criteria should be applied on the basis of currently available data by multi-disciplinary teams that include biologists and botanists familiar with the California Desert. In addition, they should be applied to projects concurrently with the technical and financial viability screens that are also part of our suggested guidance. Projects should be placed in one of the three proposed categories if they meet some or all of the criteria provided for that category. The number of criteria for a given category that a project meets will be highly relevant. For example, in the case of the criteria designed to help identify "low conflict areas," the more of those criteria that a project appears to meet, the better.

Projects identified by DOI as potentially able to meet 2010 ARRA deadlines, and listed in Appendix A would be exempt from these screening criteria.[4]

Recommended Guidance for use in prioritizing 2011 projects:

Low Conflict Areas: timely or expedited permitting/probable permit approval
As indicated above, projects should be placed in this category if they fit some or all of the following criteria. In addition, they should be included here if it appears that they can be revised or modified relatively easily in order to address conflicts identified in the categories below. That being the case, it is entirely possible that once additional data are obtained from site-level surveys, BLM may find that sites that initially appear to meet these criteria may nonetheless present conflicts.

- Mechanically disturbed lands such as fallowed agricultural lands.[5]
- Brownfields, idle or underutilized industrial areas.
- Locations adjacent to urbanized areas[6] and/or load centers where edge effects[7] can be minimized.
- Locations that minimize the need to build new roads and that meet the one or more of the following transmission sub-criteria: transmission with existing capacity and substations is already available; minimal additional infrastructure

[4] However, even for those projects, these screening criteria may provide useful information regarding potential high conflict sites and, accordingly, the BLM should ensure that developers are aware of these criteria.

[5] This criterion covers lands that have been "type-converted" from native vegetation through plowing, bulldozing or other mechanical impact often in support of agriculture or other land cover change activities (mining, clearance for development, heavy off-road vehicle use). Some of these lands may be currently abandoned from those prior activities, allowing some natural vegetation to be sparsely re-established. However, because the desert is slow to heal, these lands do not support the high level of ecological functioning that undisturbed natural lands do.

[6] Urbanized areas include desert communities that welcome local industrial development but do not include communities that are dependent on tourism for the economic survival.

[7] The edge effect in ecology is the effect of the juxtaposition or placing side by side of contrasting environments on an ecosystem. This term is commonly used in conjunction with the boundary between natural habitats and disturbed or developed land. Edge effects are especially pronounced in small habitat fragments where they may extend throughout the patch. See Harris, Larry D., *"Edge Effects and Conservation of Biotic Diversity,"* Conservation Biology, Vol. 2, No. 4 (December 1988).

would be necessary, such as incremental transmission re-conductoring or upgrades, and development of substations; if a new line is needed, the line has already been permitted and is not the subject of pending litigation.
- Proposed Solar Zones that will be published in the BLM's draft Solar PEIS with the exception of the proposed Iron Mountain and Pisgah zones[8]
- Areas in the West Mojave that have been run through the criteria above and previously identified for BLM by environmental groups as potentially appropriate for development.[9]

Areas with Potentially Resolvable Conflicts: more difficult permitting process unless conflicts are resolved

- Wetlands, riparian areas, and areas required to protect the integrity of seeps, springs, washes, streams or wetlands that have been previously identified by the BLM, the Army Corps of Engineers, or other relevant state or federal agencies.[10]
- Lands that have been formally identified as including plant communities that are both unique and rare by the BLM, California Department of Fish and Game (CDFG) or USFWS, including areas containing or designated Unique Plant Assemblages (UPAs), Stands, or Vegetation Alliances that are limited in distribution or that support sensitive or endemic species.[11]
- Dunes and the sand transport systems and corridors that support them.[12]
- Locations within one mile of National or State Park units.
- Landscape-level biological linkage areas that have been identified in reports listed in Appendix C as key connectivity references for the desert; or by state or federal agencies as necessary and required for the continued functioning of biological and ecological processes (e.g., connectivity); and that have been mapped by, contracted for, or used in state or federal agency maps provided in land management plans and proposed plans. For these areas closer scrutiny of the broad-scale maps and reports will be necessary.

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[8] This is not a consensus position of the CDREWG. However, the environmental organizations that are members of the group are on record stating that both the Iron Mountain and Pisgah Solar Energy Study Areas are inappropriate for development and should be deleted.

[9] A map of these areas is attached and explanatory material is included in Appendix B.

[10] These areas may include the upland habitat as well as groundwater resources that are proposed to be used. The extent of upland habitat that needs to be protected is sensitive to site-specific resources. For example: the NECO Amendment to the CDCA Plan protects streams within a 5-mile radius of Townsend big-eared bat maternity roosts. Aquatic and riparian species may be highly sensitive to changes in groundwater levels.

[11] These areas are identified in the California Desert Conservation Area Plan of 1980, in the California Department of Fish and Game's List of California vegetation alliances (2009), and in NatureServe's Community Heritage Program, which is internationally recognized as the Natural Communities Conservation Ranking system.

[12] The USGS document Muhs et al 2003 "Eolian sand transport pathways in the southwestern United States: importance of the Colorado River and local sources" will be helpful in identifying these areas.

High Conflict Areas: very difficult permitting process

Members of this group agree that the following areas are high conflict areas:

- Designated critical habitat for federally threatened and/or endangered species.
- Designated special management areas such as Areas of Critical Environmental Concern (ACECs), Desert Wildlife Management Areas and Wildlife Habitat Management Areas.[13]
- Lands that have been formally proposed by federal agencies for designation as wilderness, or proposed for a national monument or wilderness designation in S.2921 (111th Congress).
- Lands that were originally part of a renewable energy right of way application and were eliminated from a ROW application by BLM or the applicant due to resource conflicts.[14] For example, where the final project represents a smaller or different footprint to avoid wildlife habitat, rare vegetation or desert washes, the excluded portion of the right of way should no longer be available for development.[15]
- Lands that have conservation value and were purchased with federal, state or private funds, and donated or transferred to the BLM for conservation purposes.
- Lands purchased with federal, state or private funds, and donated or transferred to the BLM expressly as mitigation for project impacts.

The group also agrees that projects that propose to use wet cooling will likely face additional controversy in the permitting process.

The environmental groups signatory to this document believe that there are other factors that will be controversial within their community, as noted below.[16]

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[13] ACECs include Desert Tortoise Desert Wildlife Management Areas (DWMAs). The California Desert Conservation Area Plan has designated specific Wildlife Habitat Management Areas (WHMAs) to conserve habitat for species such as the Mojave ground squirrel and bighorn sheep and to preserve connectivity. Some of these designated areas are subject to development caps which apply to renewable energy projects (as well as other activities).

[14] This category also includes the projects in the West Mojave that were rejected by BLM solely because they were located in areas subject to a 1% development cap. This group continues to believe that the agency should develop guidance regarding how that cap will be applied to subject areas, but development in these areas will likely remain controversial.

[15] We urge the BLM to develop and maintain a publicly accessible database of lands that have been eliminated from ROW applications due to resource conflicts.

[16] These factors include the following:

- Lands that have been designated or are undergoing a formal review process by Bureau of Land Management (BLM) or the U.S. Fish and Wildlife Service (USFWS) for designation for protection of federally-listed, state-listed or candidate species in any past or present recovery plan as of November 19, 2010, in any past or present critical habitat proposal or in any areas formerly designated as critical habitat as of November 19, 2010, or in any past or present ACEC proposal by BLM as of November 19, 2010. In addition, lands that have been formally identified by CDFG, BLM, or USFWS as critical to the survival and/or recovery of federal or state listed or candidate species as of November 19,

III. Ensure early and ongoing input from stakeholders

Issue: The public had little input into the selection of the initial BLM "fast-track" projects in 2009, and few opportunities to provide input into alternative project configurations or ROW footprints. Lack of early public input can result in significant investments of time and money by companies with little opportunity to obtain clear signals on potential conflicts and controversies associated with their proposals prior to committing resources.

Solution: Provide guidance to the BLM to establish a process to facilitate early and ongoing input and coordination with interested stakeholders, per the Oct. 2010 IM, including project developers, regulators, conservation groups and other members of the public, while ensuring a workable process:

- Provide opportunity for early input in connection with initial agency review of projects. This could include, for example, sponsoring preliminary public workshops prior to official scoping.

- Provide, and encourage developers to participate in, forum(s) where the public can interact with them, regulators and other interested parties, including tribes, to ensure early (i.e., prior to NEPA) as well as ongoing input into:
  - project configuration and potential modifications to minimize environmental impacts,
  - disclosure and analysis of likely mitigation requirements, and
  - identification of appropriate alternatives.

  Any project modifications made prior to NEPA review that reduce potential project impacts should be recognized in the agency's NEPA document.

- Ensure stakeholders can provide early and ongoing input to inter -governmental entities that are established to coordinate renewable energy development (such as those established under MOUs with states, like the REPG and REAT in California), and that applicants are made aware of the substance of suggested project modifications in a timely fashion.

2010 should be included in this category. Lastly, lands identified as "ecologically core" and "ecologically intact" by The Nature Conservancy in its October 2010 Mojave Desert report.

- Lands that have been: inventoried by trained citizen groups, conservationists and/or agency personnel using BLM protocols; found to meet Congress' definition of "wilderness characteristics;" and publicly identified as of November 19, 2010. Maps of these lands in California (and other western states) as of November 19, 2010 can be found at http://www.nrdc.org/land/sitingrenewables/default.asp.

- Ensure that all forums for public involvement, including workshops and public meetings, are, to the maximum extent possible, designed to provide effective and meaningful opportunities for interested stakeholders to provide their views about proposed projects. Examples include but are not limited to: group question and answer sessions following presentations, ways to submit questions both during presentations and online, site visits with agency and company representatives, etc.

IV. Improve the quality and consistency of environmental reviews

Issue: The environmental reviews for the first set of fast track projects have varied widely in quality and thoroughness across BLM districts and states.

Solution: Through specific, clear guidance to BLM managers, ensure that moving forward, NEPA reviews are internally consistent, thorough, and reflect strong data-based analysis of the likely impacts from proposed projects. The overall NEPA review process should also be designed to identify, and facilitate, modifications that will result in improved projects. Not only will this inspire public and stakeholder confidence in the Bureau's management of the new program, it will likely insulate well-sited, designed and analyzed projects from legal challenge.

The Interior Secretary should direct the BLM to issue guidance to project managers, supervisors, and state directors that clearly spells out the following elements of strong NEPA reviews and recommended practices:

- Provide opportunities for early public involvement in the process, before investments are irrevocably committed to a specific design within a right of way (ROW), to diminish unacceptable impacts of renewable energy projects, identify potential improvements, and increase public support.

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- A consistent structure for environmental documents, to ease public review and help avoid missing elements.

- Purpose and need statements must include broader objectives, rather than solely responding to an application for a ROW; for example, the purpose and need statement should incorporate a phrase similar to the following: "To consider the proposed siting of a (large scale solar) project on public land consistent with national and state renewable energy and climate goals while protecting important natural values and environmental and cultural resources." This broader purpose and need objective would logically lead to a broader range of alternatives than project/no project.

- Analysis of a full range of alternatives is one of the most important aspects of NEPA. In the case of renewable energy projects, such a range may include, in addition to the proposed project and no action alternatives, alternative sites on public land as well as private land or "conjunctive use" involving both private and public land where appropriate, projects of reduced size and configuration, and

alternatives that include phasing the project based on successfully meeting specific benchmarks before proceeding from one phase to the next.

- A strong evaluation of impacts must be based on adequate site-specific data that stakeholders can fully evaluate, with specific requirements for data adequacy including appropriate protocol wildlife and plant surveys. Depending on the site and the likely species, this may require multiple surveys at different times of the year. Surveys of reasonable areas beyond the project footprint, should be conducted so that different configurations may be fully analyzed. Where surveys indicate changes in configuration would reduce impacts, BLM should expressly allow the applicant to expand or change the area(s) subject to the project application.

- A robust cumulative impacts analysis will ensure sufficient review of the project, focusing on quantitative assessments to the extent practicable, including all past, present and reasonably anticipated future projects within the relevant area, considering the resources at issue. In contrast, the direct and indirect impacts of connected actions (such as any additional transmission lines or substations that are required to serve a proposed project) should be fully evaluated as part of the proposed project, as well as reasonably anticipated additional projects within the relevant area, considering the resources at issue.

- The substance of important NEPA-related reports and plans (for example, a desert tortoise translocation plan, an avian protection plan, and mitigation plans) should be provided in time to allow for public review and comment in the Draft EIS. While we understand that it may be difficult to provide completed reports and plans at Draft EIS stage, any reports and plans that have been drafted or completed should be provided in the Final EIS and all final plans and reports should be issued at the time the ROD is released, along with the USFWS biological opinion.

- Project design changes that reduce environmental or other undesirable impacts are positive results of the NEPA process and such changes should not cause undue delays; however, major changes that have not been proposed or analyzed previously may require supplemental analysis.

- BLM should develop and apply consistent guidance to address issues that apply to several types of projects, and work with the U.S. FWS to develop such guidance in areas of their jurisdiction, such as desert tortoise translocation protocols. Such issues should be addressed in a standard manner across different projects, where practical, and where the standard approach is in the best interest of the impacted resources.

- Where project approval contemplates a plan amendment as well as issuance of a ROW, and information collected through the NEPA process suggests part of the ROW applied for is important for conservation and incompatible with

development, the plan amendment approved contemporaneously with the ROW should also designate the excluded areas within the original ROW application as unavailable for future such development.

- If a plan amendment is not contemplated as part of project approval, and areas within the ROW application have been identified as incompatible with development, BLM should initiate a separate plan amendment process to designate such areas as unavailable for future development.

V. Standardize and clarify mitigation procedures

Issue: While renewable energy at scale provides benefits for forestalling climate change impacts to species and habitat, large-scale solar projects also generally require large-scale mitigation. The current approach of project-by-project mitigation has resulted in a piece-meal and inefficient process for assessing and carrying-out mitigation, and fails to make the best use of mitigation resources to provide more comprehensive, coordinated benefits for affected species and their habitat.

Solution: Better defined, more uniform, and more coordinated approaches should be taken to address mitigation associated with these projects. The fast-track renewable projects have provided a number of important lessons in how to do mitigation, for the benefit of both the project proponents and the impacted natural resources. We believe that mitigation can be done with better coordination, greater efficiency, and strategic investment resulting in an improved conservation result on the ground, while retaining the beneficial aspects of large-scale solar projects.

We recommend that DOI adopt the following principles in directing its agencies on how to improve mitigation for renewable energy projects approved in 2011:

1. **Strategic & Effective Investment:** DOI and state agencies should develop a regional strategic mitigation process founded on habitat conservation planning principles that generates more robust and effective mitigation than can be achieved on a project-by-project basis. This effort can be informed by endangered species recovery plans and other long-term land and wildlife conservation plans. Strategic mitigation planning must address the following:
    a. Incorporation of biodiversity sustainability/viability indicators, including long term surface and groundwater supplies
    b. Designation of regions, based on biological integrity and ecosystem functions
    c. Designation of target mitigation acquisition lands and public land actions within each region that will maximize habitat, maintain and protect migration corridors, and maximize species survival and recovery.
    d. Allocation of pooled mitigation funds and activities for larger scale land acquisitions of designated property and mitigation measures.
    e. Long term stewardship and funding of stewardship of mitigation lands

f. Mechanisms to ensure mitigation investments are enduring and mitigation investment decisions are science-based

2. **Improved Coordination:** Mitigation measures should be formulated as a comprehensive package, in which all jurisdictional agencies coordinate their requirements and review, and in which other state, federal and local resource agencies with relevant expertise and information are consulted to the maximum extent possible. The comprehensive package for any individual project should, to the maximum extent possible, contribute along with measures taken for other projects to provide coordinated and increased benefits to impacted species, habitat and corridors. Federal and state agencies should also consult with local land agencies, land trusts, and other local experts.

3. **Consistency in Mitigation Approaches:** Project proponents and conservation NGOs believe that it is important to apply basic mitigation principles of how and when to assess mitigation in a uniform manner, so that all parties have a clear understanding of what is expected by the DOI agencies. The following are recommended mitigation principles to ensure consistency across projects:

    a. Mitigation Hierarchy: Mitigation must follow the hierarchy of avoid first, then minimize, then restore, then offset. The first step ("avoid") refers to measures taken (e.g., siting decisions) to preclude significant impacts from the outset, in order to completely eliminate such impacts on certain components of biodiversity or to meet specific conservation goals. The second step ("minimization") refers to changes (e.g., to project design or operations) that reduce site-specific impacts.

    b. Specific Mitigation Requirements: Mitigation measures for individual projects should be clearly justified, specific to the impact, and enduring. They should also be formulated to clearly link the impact to be mitigated to one or more specific mitigation measures. For example, tortoise fencing requirements should first explain how the tortoise fencing contributes to compensating for unavoidable harm, and should prescribe how many miles must be fenced, where the fencing is to be placed, and who will maintain it. Finally, specific alternative mitigation measures of equivalent mitigation value should be identified, in the event a specified mitigation measure proves to be infeasible or impracticable.

    c. Mitigate Appropriate Level and Scale of Impacts: Mitigation must be required for significant impacts resulting from the renewable project, whether direct, indirect or cumulative, including significant impacts resulting from the scale of the project. Mitigation of cumulative impacts should be developed for areas and resources impacted by multiple renewable energy projects and should address impacts to habitat quality (e.g., connectivity), ground and surface water resources, and air quality.

d. Address Climate Change Impacts: In determining appropriate mitigation, DOI agencies should consider changes in habitat, corridors, and species needs as the climate changes.

4. **Compensatory Mitigation Principles:** Compensatory mitigation for individual projects should include:
    a. As a first preference, acquisition, restoration and long-term management of private lands, providing replacement habitat of at least equivalent size and function ("compensation lands"), provided that:
        i. Compensation lands are managed as conservation lands. If compensation lands are to be transferred to agencies, they should be legally protected and held solely for conservation purposes. For example, any compensation lands transferred to BLM should be permanently segregated or withdrawn from all non-conservation use under the mining, grazing and other land use laws, using legally effective means (e.g., deed restrictions with enforcement rights held by third parties).
        ii. Mitigation value of compensation lands may be increased by enhancements and/or restoration to improve habitat value, in the same fashion as provided below with respect to public lands;

    b. As a second preference, enhanced conservation management and/or restoration of specified public lands that would not have otherwise been conducted by the agency using public funds. For example, lands should be permanently segregated or withdrawn from all non-conservation use under the mining, grazing and other land use laws, and BLM should consider mitigation mechanisms identified in the CDCA Plan as amended, including construction and maintenance of fencing near roads, buy-outs and retirement of grazing allotment permits, route closure, and re-vegetation of closed routes, etc.

    c. Compensation lands, whether owned or managed by public or private entities, must be accompanied by assurance of adequate long-term conservation management. For example, this assurance could be addressed through a committed, non-wasting fund adequate to provide long-term conservation management to enhance and maintain the required resource values, or other enduring measures.

VI. Standardize requirements for scientific monitoring

Issue: BLM's "use authorization" process does not currently have in place a standardized set of requirements for scientific monitoring. Thus, when BLM issues use authorizations, the requirements for scientific monitoring are inconsistent across BLM offices and personnel. This inconsistency wastes time and money, and interferes with the collection of information that could be used by the agencies, project developers and other

stakeholders to improve planning, review, management, and decision-making for renewable energy and other desert resources.

Solution: Building on the Instruction Memorandum guidance issued on October 7, 2010, BLM should identify a comprehensive set of monitoring requirements to be used in all future use authorizations. Clear and consistent criteria will have multiple benefits, including increased cost-effectiveness for BLM, taxpayers, and project developers, and the creation of a "level playing field" for solar project developers and the utility customers who buy the solar electricity. In addition, the adoption of clear, consistent monitoring criteria will help to improve scientific understanding of desert resources, including desert wildlife species, their habitats and their needs, and the effects of large scale projects, information which can be used to improve environmental reviews, design better mitigation plans, and support the development of projects with fewer impacts. Such information can also be used to inform larger scale analyses of eco-regions, species and other key indicators, and be shared with other agencies working to improve resource management.

BLM's guidance should establish clear and consistent criteria for gathering the biological and other resource data needed to establish the appropriate "baseline", and to monitor these resources over the life of the "use authorization" at both individual project sites and across multiple project sites. Such standardized criteria shall specify:

- The type of scientific data needed, including the identification of control sites;
- Responsibility for each kind of data collection and monitoring;
- The timing and frequency of data collection and monitoring;
- Protocols for collecting and modeling the data;
- Protocols for managing the data collected;
- Protocols for analyzing the data collected;
- Limits of acceptable change in resource conditions, and actions to be taken if those limits are exceeded;
- "Fallback" measures to be put into effect in the event that specified monitoring activities are not carried out;
- The need to make all monitoring data available for public review and evaluation; and
- The need to finalize a detailed monitoring plan, and commitment to fund the plan, prior to initiating project construction.

VII. Improve coordination within and between agencies and departments

Issue: Experience with the "fast-track" projects has shown that coordination within and between federal agencies, as well as with appropriate state agencies, is critical to a timely and efficient permitting process. The approach to federal-state coordination taken in California (where there is a separate state permitting process for solar thermal projects through the California Energy Commission) ultimately worked well. This approach may also be helpful in other states. However, coordination between federal agencies is in serious need of improvement.

Solution: In specific and clear guidance, adopt an improved process for coordination within and between federal agencies as outlined below. Such guidance should also capture the essence of the approach to federal-state coordination taken in California. In this way, the Department can ensure that key federal agencies work together efficiently and effectively, and that the benefits of the California approach can be exported to other states. We provide these recommendations to help facilitate a robust and timely permitting process for appropriately sited projects.

Guidance should be issued that directs the following:

1. At the national level:

- Establish a coordinating council within DOI that includes representatives of the Secretary's office, Assistant Secretary of the Interior for Lands and Minerals, BLM, FWS, NPS, the Solicitor's office and other relevant agencies (BIA) to review status of project reviews and related policy development, including the solar PEIS, and identify barriers to realization of the Administration's and the Secretary's goals. Council to meet at least monthly (preferably every 2 weeks).

- Convene an inter-agency group composed of relevant agencies outside of DOI – i.e., DOD, EPA, ACOE, FAA, Forest Service, and DOE – on a regular basis to discuss cross-cutting issues relating to planning and permitting.

- Designate a single lead official whose full-time job is to coordinate and facilitate project reviews over the next 18 months and to oversee the building of the framework for a more efficient, effective and coordinated "long-term" policy.

2. Establish a similar structure at the state level, led by each BLM state office, to identify issues, barriers and problems for resolution. These groups should meet every two weeks and should report on these issues etc. to the federal coordinator on a regular basis. Identify key contacts within all federal agencies from the top offices to the district level.

3. Encourage state governments to enter into MOUs with DOI that will create parallel structures in each state to interact with the federal representatives. The groups established in California, i.e., the REPG and REAT, have been instrumental in ensuring improved communication and coordination. Ensure all key contacts are identified as in #2 above and seek to identify effective ways to include counties as appropriate.

4. Establish a process, goals and timeline for project reviews during the "transition period" between the fast track projects and the Solar PEIS (i.e., next 18 months) and for completion of the long-term policy.

5. Require state teams and the federal government to establish goals and a workplan to achieve those goals that identifies resource needs and deficiencies.

6. Work through the above DOI processes to complete the solar PEIS and to review existing policies re: wind and geothermal development.

7. Use the above DOI processes to evaluate whether a dispute resolution-like process could assist in resolving conflicts earlier between agencies, developers and the public.

8. At the same time, encourage CEQ to provide a forum for interdepartmental coordination and cooperation between agencies (including FERC, Treasury and Energy) and tribal governments to discuss policy and other issues essential to achieve Administration's clean energy strategy/goals.

Appendix A
List of Solar Fast Track Projects on Public Lands in CA as of October 16, 2009

CA Tessera, Imperial Valley
Bright Source, Ivanpah
First Solar, Desert Sunlight
Solar Millennium, Palen
Solar Millennium, Blythe
Solar Millennium, Ridgecrest
Tessera, Calico
Nextera Genesis, Ford Dry Lake
Chevron, Lucerne Valley

Appendix B

Additional Solar Energy Development Study Areas in the Western Mojave
Explanatory Narrative (8/18/2010)

Background: Several prominent national environmental organizations[17] are actively participating in identifying issues and seeking appropriate opportunities for renewable energy development in the California Desert by developing recommended siting criteria that would potentially allow for development of projects in the an environmentally sustainable manner.

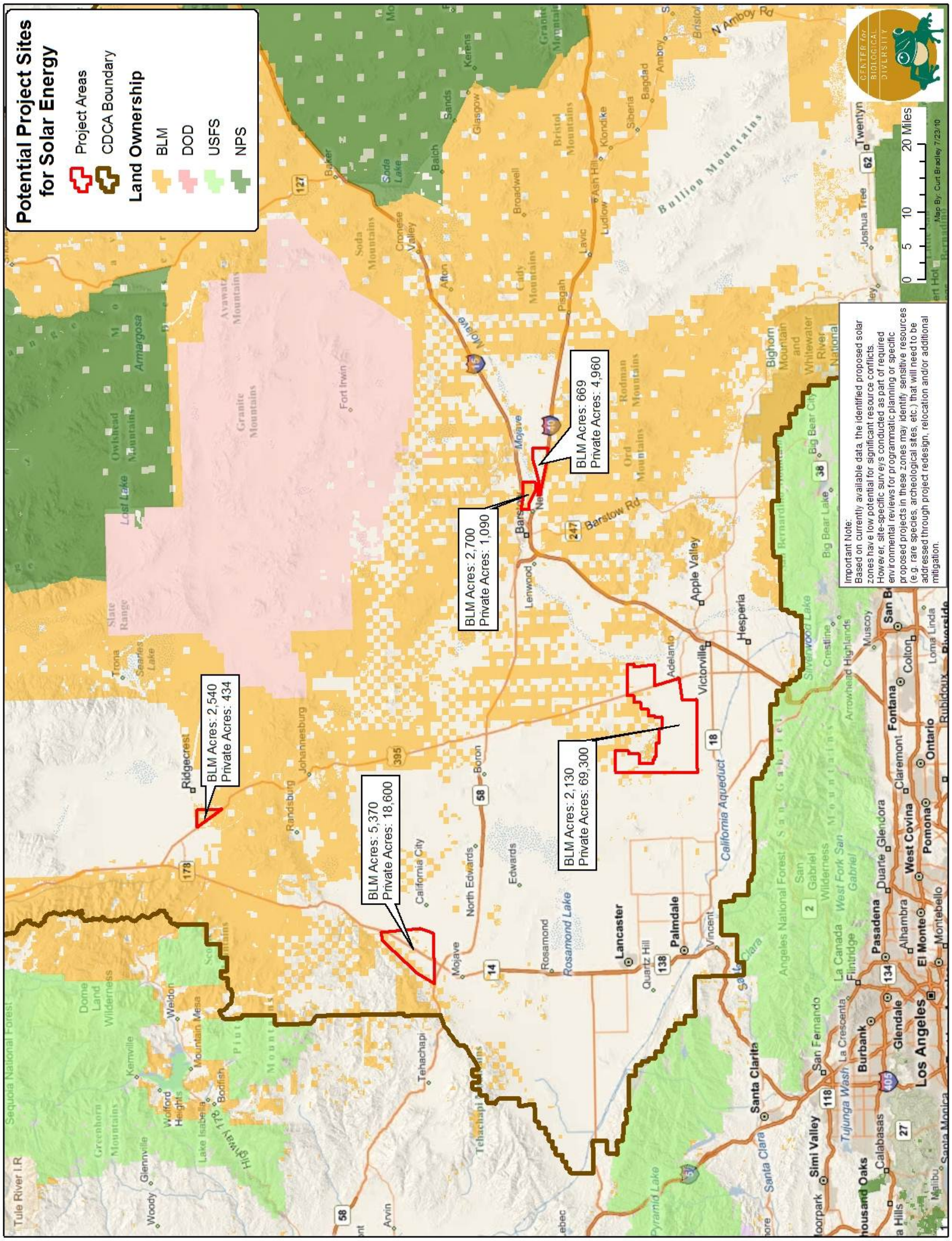
In April 2009 these organizations identified draft recommended solar energy development study areas consistent with their recommended siting criteria. These 2009 draft study areas were comprised of 53,400 acres of public land administered by the Bureau of Land Management and 242,200 acres of adjacent private lands. Subsequently these organizations sought to identify additional Western Mojave areas.

In recognition of the interest in the western Mojave region of California for solar energy development by industry, and the need to direct any such development to locations that are consistent with the siting criteria of the environmental organizations, additional potential solar study areas have been identified, as shown in the following table and on the attached map which consolidates the original study areas from 2009 with newly identified ones in the western Mojave desert.

Area Name	Acres		Total Acres	MW Potential[18]	
	Public (BLM)	Private		Public	Private
Ridgecrest	2,540	434	2,974	318	54
Mojave	5,370	18,600	23,970	671	2,325
Yermo	2,700	1,090	3,790	338	136
Newberry	669	4,960	5,629	84	6,200
Adelanto	2,130	69,300	71,430	266	8,662
Total	13,409	94,384	107,793	1,677	17,377

These potential study areas were selected based on a cursory analysis of slope, proximity to existing development and transmission infrastructure, and the same criteria used to select the original study areas in 2009. These additional locations are likely to have fewer biological values for conservation than other areas of the western Mojave desert due to existing disturbance, fragmentation of habitat and proximity to existing development. All of these areas include substantial private lands, because private lands tend to have sustained more disturbance and fragmentation as well as often being close to existing energy infrastructure

[17] Center for Biological Diversity, Defenders of Wildlife, Natural Resources Defense Council, Sierra Club, The Wilderness Society, Western Watersheds Project
[18] Assuming average of 8 acres/MW


Potential Project Sites for Solar Energy
Project Areas
CDCA Boundary
Land Ownership
BLM
DOD
USFS
NPS
BLM Acres: 2,540
Private Acres: 434
BLM Acres: 5,370
Private Acres: 18,600
BLM Acres: 2,130
Private Acres: 69,300
BLM Acres: 2,700
Private Acres: 1,090
BLM Acres: 669
Private Acres: 4,960
Important Note:
Based on currently available data, the identified proposed solar zones have low potential for significant resource conflicts. However, site-specific surveys conducted as part of required environmental reviews for programmatic planning or specific proposed projects in these zones may identify sensitive resources (e.g. rare species, archeological sites, etc.) that will need to be addressed through project redesign, relocation and/or additional mitigation.
0 5 10 20 Miles
Map By: Curt Bradley 7/23/10
CENTER for BIOLOGICAL DIVERSITY

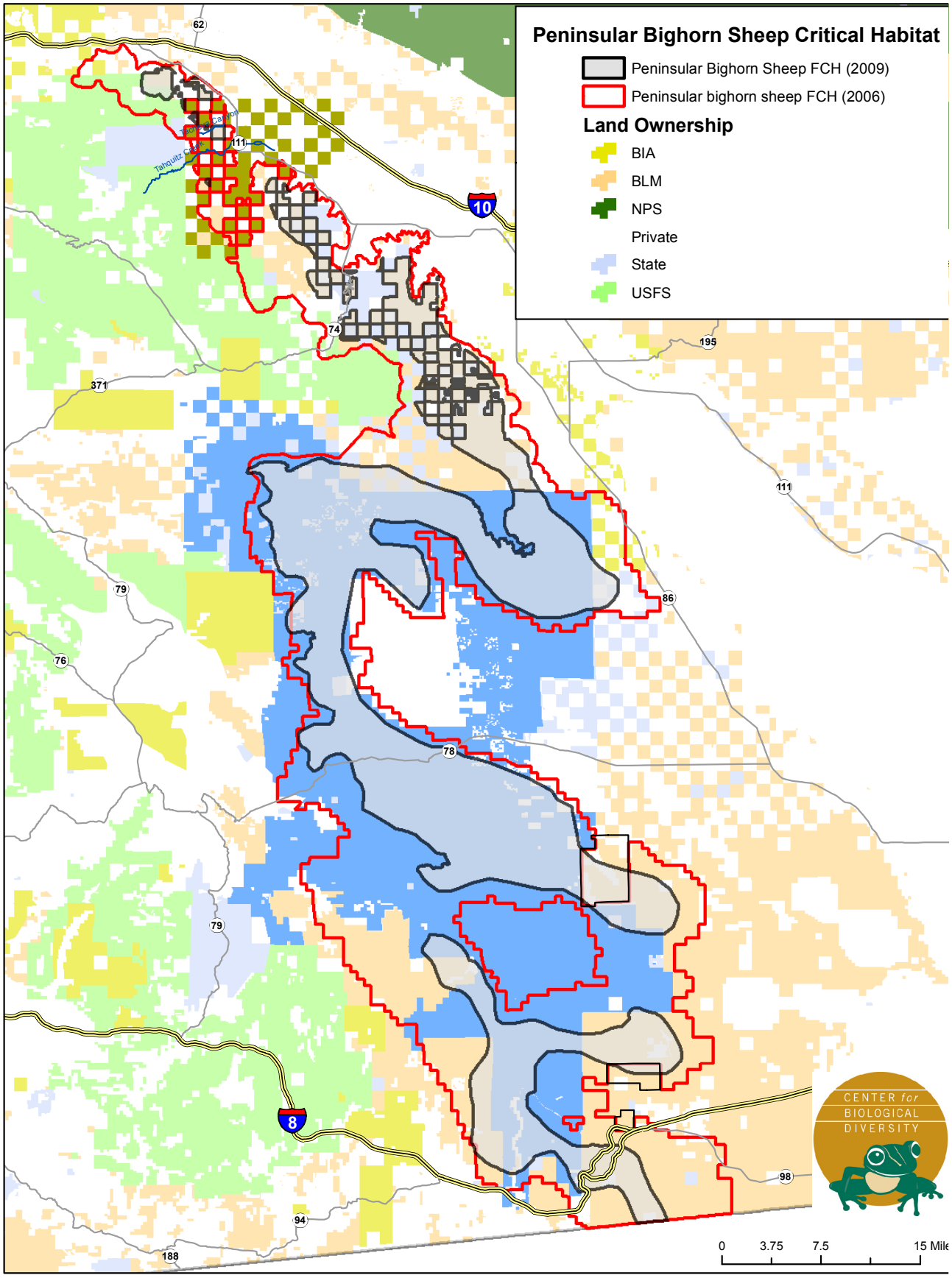
Appendix C
Reference list for landscape-level biological linkage areas

Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. California Essential Habitat Connectivity Project: A strategy for conserving a connected California. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration. February. (Spencer et al. 2010)

Beier, P., K. Penrod, C. Luke, W. Spencer, and C. Cabanero. 2006. South Coast Missing Linkages: restoring connectivity to wildlands in the largest metropolitan area in the United States. Pages 555-586 in: K. Crooks and M. Sanjayan (eds.). Connectivity Conservation. Cambridge University Press. (Beier et al. 2006)

Penrod, K., C.R. Cabanero, P. Beier, C. Luke, W. Spencer, E. Rubin, and C. Paulman. 2008. A linkage design for the Joshua Tree-Twentynine Palms connection. South Coast Wildlands, Fair Oaks, CA. www.scwildlands.org. (South Coast Wildlands 2008)
(http://www.scwildlands.org/reports/JT_TP_Connection.pdf)

Epps, C.W., J.D. Wehausen, V.C. Bleich, S.G. Torres, and J.S. Brashares. 2007. Optimizing dispersal and corridor models using landscape genetics. Journal of Applied Ecology 44:714-724. (Epps et al. 2007)


Peninsular Bighorn Sheep Critical Habitat
Peninsular Bighorn Sheep FCH (2009)
Peninsular bighorn sheep FCH (2006)
Land Ownership
BIA
BLM
NPS
Private
State
USFS
CENTER for BIOLOGICAL DIVERSITY
0 3.75 7.5 15 Mile

Comment Letter D35

From: Sharon Courmousis <guidesharon@gmail.com>
Sent: Friday, March 04, 2011 2:32 PM
To: ECOSUB; catulewind@blm.gov
Subject: Proposed Tule Wind Power Project

Iain Fisher, California Public Utilities Commission

Greg Thomsen, Bureau of Land Management

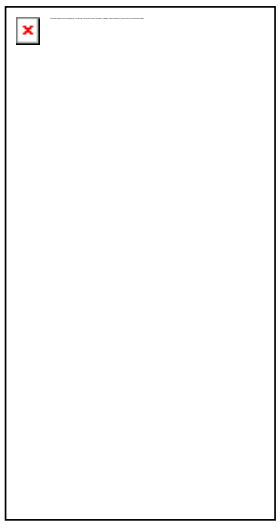
c/o Dudek

605 Third Street

Encinitas, CA 92024

Re: Proposed Tule Wind Power Project

Dear Bureau of Land Management and California Public Utilities Commission



February 24, 2011;

To Mr. Dudek, CPUC and Mr. Thomsen, BLM;

We are writing to you in support of the wind farm project known as Tule Wind Farms and the company running the project, Iberdrola Renewables. Our business is the third largest business in the mountain area, after the US Border Patrol and the local casinos. As business owners and personally , we see many benefits which are listed below:

- We believe it is our collective responsibility to reduce dependence on fossil fuels and the political machinations associated
- We believe that using a renewable source of energy is a smart move for now and for the future
- We believe that in understanding and using nature, we will create a better future for our children and grandchildren
- We believe the local economy will benefit, in the short run, with the influx of paid workers who may purchase local goods and services
- We believe that once up and running, some permanent jobs will be offered to local residents

D35-1

Like every big project there are also downsides. We have heard about views being spoiled, electricity not benefitting the local area, birds flying into the propellers, and fire danger. We think these issues have been properly and thoroughly addressed by Iberdrola.

In the final analysis, we support this project because we believe that more good than bad will come from it.

Sincerely,

Sharon Courmousis, President

Sacred Rocks Reserve

1331 Shasta Way

Boulevard, CA 91905

--

Sharon Courmousis
www.SacredRocksReserve.com
1331 Shasta Way
Boulevard CA 91905
619.295-5151 cell 619-818-8575

PS LET ME KNOW IF YOU WANT REGULAR INFO EMAILS ABOUT SPECIAL EVENTS.

Comment Letter D36

From: ceo <ceo@eastcountychamber.org>
Sent: Friday, March 04, 2011 11:58 AM
To: ECOSUB
Subject: East County Substation Project support
Attachments: Alevy Letter 030411.docx

Please accept this letter of support for the East County Substation Project, submitted as the President/CEO of the San Diego East County Chamber of Commerce. Please advise if you need me to send a hard copy via conventional mail as well. Thanks. D36-1

Scott Alevy

Scott Alevy
President & CEO
San Diego East County Chamber of Commerce
201 S. Magnolia Ave, El Cajon, CA 92020
(619) 440-6161
Visit us at www.eastcountychamber.org

March 3, 2011

Iain Fisher, CPUC
Greg Thomsen, BLM
c/o Dudek
605 Third Street
Encinitas, CA 92024
Via Email: ecosub@dudek.com

RE: Comments on the ECO Substation Project

Dear Mr. Fisher and Mr. Thomsen,

I appreciate the opportunity to submit these comments in support of the East County Substation Project.

As a resident of the East County, I recognize the concerns that have been voiced by some of my neighbors in our expanded community. I do not take their concerns lightly. But I also recognize the tremendous quality of life afforded by reliable electricity, and it's inherent necesity. When all of us flip a switch, at home or at work, we expect the lights to come on. We also depend on a steady supply of power to run our computers, without which our businesses would be lost.

Increasingly, we expect that electricity to come from clean sources.We need improved electric infrastructure in our region and we have an opportunity to develop renewable energy projects in a responsible manner. None of us want to lose the natural beauty of San Diego's East County. But with a balanced approach, I believe this can be a win-win situation for all concerned.

Sincerely,

Scott Alevy
President/CEO
San Diego East County Chamber of Commerce

D36-1
Cont.

Comment Letter D37

From: Christina Luhn <cl@sandiegobusiness.org>
Sent: Friday, March 04, 2011 11:55 AM
To: ECOSUB
Subject: Letter of Support for the ECO Substation
Attachments: support ltr for eco substation march 4 2011.pdf

March 2, 2011

The Honorable Michael Peevey and Members
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102

Dear President Peevey and Commissioners,

The San Diego Regional Economic Development Corporation supports the approval of the ECO Substation Project being proposed by San Diego Gas & Electric. This vital energy project will benefit businesses and residents in East San Diego and the entire region.

As the director of the Cali Baja Mega Region, comprised of San Diego County, Imperial County and Northern Baja California, I am intricately involved with the economic development of the region. San Diego East County has the potential to be one of the best sources of clean wind and solar energy in California.

It is essential that we have a reliable and modern electric system to facilitate the development of clean renewable energy. The ECO Substation Project will enable hundreds of megawatts of wind power to be developed, creating green jobs and generating millions of dollars of economic opportunities.

D37-1

San Diego Regional EDC and the Cali Baja Mega Region have determined that renewable energy development is one of the primary sources of jobs and economic growth. However, we must have the necessary infrastructure to enable the development and ensure reliable electric service. The environmental assessment has determined the ECO Substation Project is the only alternative to achieve both objectives.

We urge you to approve the ECO Substation Project to allow clean energy, green jobs and economic vitality.

Sincerely,

Christina

Christina Anne Luhn, Ph.D.
Director
Mega-Region Initiative
San Diego Regional Economic Development Corporation
530 B Street, 7th Floor
San Diego, CA 92101
ph:619.234.8484
cell: 760.271.1290

www.sandiegobusiness.org
cl@sandiegobusiness.org

San Diego
Regional
Economic
Development
Corporation

March 3, 2011

The Honorable Michael Peevey and Members
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102

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We urge you to approve the ECO Substation Project to allow clean energy, green jobs and economic vitality.

Sincerely,

Christina Anne Luhn, Ph.D.
Director
Mega-Region Initiative

D37-1
Cont.

530 B Street
Seventh Floor
San Diego
CA 92101

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Comment Letter D38

From: Vincent Signorotti <vsignorotti@terra-genpower.com>
Sent: Friday, March 04, 2011 9:49 AM
To: ECOSUB
Subject: ECO Substation
Attachments: SKMBT_C35311030410280.pdf

Terra-Gen Power, LLC
Vincent Signorotti
Vice President Land Management

11512 El Camino Real
Suite 100
San Diego, CA 92130

Phone: 858.764.3736
Mobile: 760.604.1490

vsignorotti@tgpnyc.com
www.terra-genpower.com

Terra-Gen Power, LLC

March 4, 2011

President Peevey and Honorable Commissioners
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102

Dear President Peevey and Commissioners,

The ECO Substation Project would be a significant asset to the development of clean renewable energy in the San Diego region. As Vice President of Terra-Gen Power, I have more than 29 years of experience in the renewable energy industry.

Terra-Gen currently has more than 1,281 megawatts of geothermal, wind and solar generating capacity producing clean, environmentally responsible renewable energy. The ECO Substation Project would provide the critical infrastructure necessary to facilitate new wind and solar energy projects that can help California meet its renewable energy mandates.

D38-1

In addition to reducing harmful greenhouse gas emissions, renewable energy development in East San Diego County will help to create hundreds of green jobs. Furthermore, the investment of billions of dollars for wind turbines and solar panels will have a positive impact on economic development and the San Diego tax base.

The environmental impact report conducted by the CPUC for the ECO Substation Project clearly determined that the proposed project is the only alternative that will accomplish the stated goals of meeting the California renewable standards, improve electric reliability and reduce harmful emissions.

Terra-Gen Power encourages the CPUC to approve the proposed ECO Substation Project to enable new wind and solar generation projects to be developed providing numerous benefits to the San Diego region. Thank you.

Sincerely,

Vincent J. Signorotti
Vice President, Land Management

Terra-Gen Power, LLC