Docket No.:	R.10-05-006 (Track 1)
Exhibit No.:	
Witness:	Timothy M. Mason
Commissioner:	Michael R. Peevey
ALJ:	Peter V. Allen

PREPARED DIRECT TESTIMONY OF TIMOTHY M. MASON

ON BEHALF OF THE LARGE-SCALE SOLAR ASSOCIATION

August 4, 2011

Prepared Direct Testimony of Timothy M. Mason

TABLE OF CONTENTS

PREPARED DIRECT TESTIMONY OF TIMOTHY M. MASON

ON BEHALF OF THE LARGE-SCALE SOLAR ASSOCIATION

1. *Introduction*

Q. What is your name and by whom are you employed?

A. My name is Timothy M. Mason and I work for Black & Veatch Corporation (B&V) as a Renewable Energy Senior Consultant.

Q. Please describe your educational and professional background.

A. As further described in the Statement of Qualifications, which appears at the conclusion of my prepared testimony, I have over two decades of experience in the energy and environmental industries, including extensive experience in strategic planning, analytical consulting, and project management. I have a Master of Arts degree in Technology, Strategy, and Policy from Boston University, and have dual majors in Political Science and Employment Relations from Michigan State University

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to sponsor the Prepared Direct Testimony of Timothy M. Mason on Behalf of the Large-scale Solar Association in Track I (System Plan) of R.10-05-006 (Long Term Procurement Plan (LTPP))

2. *Using appropriate environmental scoring criteria:*

Q. Are you familiar with the Renewable Energy Transmission Initiative (RETI) environmental scoring methodology?

A. Yes. Black & Veatch was the technical consultant to the RETI process during Phase 1 of the effort, conducting the technical analysis to identify and quantify renewable resources in California and developing the Competitive Renewable Energy Zones (CREZs). I was actively involved with the identification and characterization of CREZs as well as identifying the conceptual transmission requirements to interconnect the resource to the electrical grid. Black & Veatch was not directly involved in the development or the environmental criteria, since this was completed by the RETI Environmental Working Group (EWG). I was however, actively involved in the development of the methodology for scoring and ranking the economic and environmental criteria in RETI Phase 1, when the initial CREZs were developed.

Q. Have you reviewed the Aspen environmental scoring methodology included with the attachments to the CPUC LTPP scoping memo?

A. Yes, I have.

Q. How would you compare the Aspen environmental scoring criteria relative to the RETI environmental scoring criteria?

A. The two approaches are very different in their goals and methodology. While Aspen does use (mostly) the same categories of environmental impacts that RETI did, this is where the parallels end.

First, the Aspen and RETI environmental criteria measure are designed for fundamentally different purposes. Aspen states in its Environmental Scoring White Paper "Aspen Environmental Group shows a way of scoring individual renewable energy projects based on the relative environmental rankings of its locations [using the Renewable Energy Transmission Initiative (RETI) Competitive Renewable Energy Zones (CREZs)] and the technology of the

resource."[1] While Aspen has developed the scores for individual projects as described, the RETI criteria were not designed for this purpose and, thus, the act of converting the RETI numbers to individual project scores is a misapplication of the RETI criteria.

The RETI environmental scoring criteria were developed in order to quantify certain environmental impacts of developing renewable resources located in identified CREZs. These scores were used to provide, along with a range of non-environmental factors, a ranking of the CREZs to identify high-potential renewable resource areas for potential transmission development. The use of the EWG scores was discussed in the RETI Phase 1B Report: "The assessment performed by the EWG of potential environmental concerns associated with energy development in CREZs is intended to provide guidance to RETI on the relative merits of development in these areas for the purposes of designing conceptual and specific transmission plans, and is *not* intended for the use in evaluating the merits of individual projects."[2] (Emphasis in original text.)

Further, the method used to measure environmental impacts by Aspen and RETI is fundamentally different. The RETI criteria measure the environmental impact per mega-watt hour (MWh) of renewable generation. By contrast, the Aspen approach measures environmental impact of land development. As Aspen explains, it "uses the RETI data on environmental indicators divided by the CREZ area, rather than the energy output".[3] I will explain how this difference distorts individual project scoring later.

[1] See Administrative Law Judge's Ruling Modifying System Track I Schedule and Setting Prehearing Conference dated Feb. 10, 2011, Attachment 2 "Standardized Planning Assumptions (Part 2 – Renewables) for System Plans, Appendix E, Environmental Scoring (February 10, 2011, p.73/94)

[2] RETI Phase 1B Final Report – Environmental Assessment of CREZ, p. 1-1, 31 December 2008

[3] Appendix E, Environmental Scoring (February 10, 2011, p.74/94)

Finally, the analyses use slightly different criteria. The RETI analysis used the following criteria in its environmental assessment: transmission and project footprint; Sensitive Areas in CREZs; Sensitive Areas in CREZ buffer zones; Significant Species; Wildlife Corridors; and Important Bird Areas. To this Aspen added EPA Tracked Degraded Lands. Neither RETI nor Aspen considered air emissions, water impacts, waste streams or numerous other environmental criteria that may be applicable to the evaluation of the environmental impacts of individual projects.

Q. Aspen included EPA Tracked Degraded Lands in the environmental criteria. Do you agree with this?

A. I do not disagree with adding new criteria, though I have two observations regarding this change. First, Aspen states that it considers degraded land within the CREZ and within a 10-mile buffer of the CREZ, noting "many large-scale renewable energy proposals currently under review in California specify a distance of 10 miles or less from transmission as one of the project objectives."[4] I question the logic for the 10-mile buffer, and how this impacts the scores. The RETI CREZ areas are large and irregularly shaped, and increasing these by applying a 10-mile buffer around their boundaries can dramatically increase the size of the CREZs. It is difficult from the Aspen report to assess exactly how the buffer will impact CREZ scores, and the subsequent impact on individual project scores.

Second, on a broader level, if the Commission wants to change the vetted RETI criteria for project analysis, it should review the entirety of the potential criteria that may be considered. As Aspen stated in the White Paper "Additional environmental concerns, including aesthetics (visual impact) Native American concerns (cultural resources), and some land use conflicts (regarding forest use) are neither represented in the existing RETI data nor the criteria in this

[4] Appendix E, Environmental Scoring (February 10, 2011, p.78/94)

white paper…However, these concerns could be addressed by the environmental scores in future updates of this work as criteria become available." [5] The consideration of environmental criteria in the long-term procurement planning process is a new and laudable effort on the Commission's part, and it is wholly unrealistic to expect that the myriad of potential factors that may be included can be quantified and objectively applied on a project-level basis. That said, Aspen does not explain why it chose to add the degraded lands criteria while ignoring all of the other criteria it discusses.

Q. Why does it matter if the environmental measurement uses an impact per acre of land developed approach, as Aspen does, versus an environmental impact per MWh of renewable generation, as RETI does?

A. It matters a great deal to resource selection and the environmental scenario development. The goal of the CPUC environmental portfolio scenario development is to identify a set of resources with the lowest environmental impact. This is very difficult since different renewable resources have varying environmental impacts and land requirements. Biomass resources generally have a very small footprint, but have environmental externalities such as air emissions, fuel consumption for delivering the feedstock, and ash residue. Wind facilities, on the other hand, generally have very large land footprints, but without intensive land development, so the environmental impact on land is more limited. However, they do have substantial visual impact, avian impacts, and other impacts such as impacts on bat populations, trees, and potentially water if the project crosses streams or is located on or near wetlands. Solar facilities generally have intensive land development in concentrated areas, but relatively few non-land impacts.

[5] Appendix E, Environmental Scoring (February 10, 2011, p.78/94)

The best way to measure the relative environmental impact of these disparate renewable resources is to use a common metric. In RETI the common metric is the generation output of the area. Using generation output allows the evaluation of a range of disparate environmental impacts and externalities to be included in the evaluation, and will normalize scores for projects with different land use footprints and land-use intensities. In the Aspen model, the calculation of the environmental score is heavily weighted by the land intensity and the size of the CREZ where the project is located. Further, the calculation uses CREZ area as factor in the calculation, which is concerning since the RETI CREZ were not designed for this purpose. As described below, the acreage and area were not an explicit consideration in CREZ design and therefore CREZ acreage is not appropriate to normalize scoring.

Q. How does the Aspen model unduly weigh land use intensity as a factor in the calculation compared with RETI?

A. The model overstates land use in several ways. First, Aspen used the RETI environmental factors, which considers a number of land factors including transmission footprint and the sensitive areas in CREZs and buffer zones. To this, Aspen added "EPA Tracked Degraded Land" located inside of a CREZ or within 10 miles of the CREZ boundary, another factor focused on land. These combined factors are then multiplied by an "Undisturbed Land" factor, which measures the portion of undeveloped land in the CREZ. This amplifies the impact of the previous factors. Finally, this in turn is multiplied by the size of the project development area "(acre per GWh/year)". The result of this is that land use scores increase geometrically in the model, substantially disadvantaging any project with a large footprint, regardless of its overall environmental impact.

Q. Why does using the size of the RETI CREZ in the model matter and how will this affect the results?

A. As noted above, the Aspen methodology uses the RETI data on environmental indicators divided by the CREZ area, rather than the energy output. This means the size of the RETI CREZs have a major impact on the scores. This is very concerning since RETI CREZ boundaries and acreage are largely arbitrary. In identifying CREZ areas Black & Veatch characterized areas of high quality renewable resource development, but the RETI process did not attempt to identify specific development sites, nor was size a consideration in the CREZ designation process. The RETI Phase 1B report discusses how CREZ were developed, explaining "CREZ were identified based on the density of resources in different areas, estimated cost of developing them, and shared transmission constraints. Using these considerations Black & Veatch identified approximate geographic boundaries of each CREZ in California."[6] Further detailing the CREZ development process, "Once the projects were identified they were grouped into CREZs that shared common geography and transmission requirements. An effort was made to keep the CREZs to a manageable size, which practically worked out to be less than 10,000 MW and more than 250 MW. A conceptual transmission gathering system was designed within each CREZ including gen-ties and trunk-lines… When necessary, CREZs were split into "sub-CREZs" based on economics."[7]

Acreage and area of CREZ were never an explicit consideration in CREZ design. The draft CREZ in RETI Phase I included large areas of development potential to reflect "likely" development on dis-contiguous parcels of land. Due to stakeholder concerns regarding how disbursed the development could be, the appearance of CREZs encroaching on sensitive and prohibited development areas (yellow and black areas), and the difficulty of estimating transmission

[6] Renewable Energy Transmission Initiative; Phase 1B Final Report, January 2009, p. ES-3.
[7] Renewable Energy Transmission Initiative; Phase 1B Final Report, January 2009, p. 3-2.

requirements over a broad area, we narrowed ("shrink-wrapped") the CREZ areas. CREZs were re-shaped based on perceived development in a contiguous area, which resulted in some CREZs becoming larger and others becoming smaller.

The concern is that the Aspen model scoring is dependent on the size of the CREZ where each project is located. This means that identical projects on identical land with identical environmental impact will have difference scores based on the CREZ that they are located in. This could lead to bizarre and perverse results in portfolio development.

Q. So are the CREZs developed in RETI incorrect, and can these be corrected?

A. The CREZs are not incorrect, nor is there any benefit to changing them. They are indications of areas of renewable developments only--they are not sacrosanct. What's important to remember is that CREZs were developed as an indication of areas of high renewable development potential for transmission purposes, and I don't believe it was envisioned during RETI that the CREZ definition itself would ever be used to assess the impacts of individual projects.

Q. Do you have any other concerns with the calculations in the model?

A. A concern I noted in reviewing the Environmental Scoring Worksheet is the application of the wind discount factor to environmental criteria. Consistent with RETI, the wind land use area was discounted by 96.5% of project total land requirement to account for the disbursed development of wind on a given site. I would expect this de-rate factor to apply to project acreage, but I don't believe this discounting should apply to all environmental factors. The discounting is effectively applied by summing the environmental scores calculated in Aspen's table 4 and multiplying that number by an *adjusted wind area*. The *adjusted wind* area is

calculated using the 96.5 percent discount rate that is applied to wind project footprints. For example the Barstow CREZ *adjusted wind* area is calculated by Aspen to be 0.74 acre per GWh/year. This factor is then applied to the environmental criteria; this effectively discounts transmission area and important bird area scores by nearly one-third. The transmission right-of-way requirements are based on the capacity of the facility and should not be discounted. Further I would not expect that the "Important Bird Areas" would be discounted for wind since the impact on birds would be over the entirety of the site.

In contrast, keeping with the Barstow example, these same criteria are multiplied by a factor of 2.99 acres per GWh/year to determine the solar environmental score. Similarly, the transmission area requirements should not be multiplied nearly three times for solar projects. Moreover, avian impacts by solar projects are much less than for wind projects and the Aspen methodology not merely assumes equal impact but actually assigns greater avian impacts to solar technologies by multiplying this by the land usage factor.

3. *Scoring Variability*

Q. How are the scores changed if the size or shape of the CREZ is revised?

A. The scores change dramatically with variations in the CREZ size. Take the Lassen North and Lassen South CREZs, for example. Lassen North CREZ is nearly six times the size of Lassen South CREZ. The CREZ acreages and solar environmental scores assessed using the Aspen methodology for these two zones are shown in the table below.

CREZ name	CREZ size (acres)[8]	Aspen Solar Envr. Score[9]
Lassen North	185,291	48.8
Lassen South	32,393	**104.5**

Based on this it would appear that solar development in Lassen South would have approximately twice the environmental impact of development in Lassen North. However, if everything else remained equal except the CREZ zones were made the same size, the results would change dramatically:

CREZ name	MODIFIED CREZ size (acres)	MODIFIED Aspen Solar Envr. Score
Lassen North	185,291	48.8
Lassen South	185,291	**43.1**

To understand the dependency that the Aspen model has on the CREZ zone size, we increased by 50% the acreage of selected CREZs to assess the impact this would have on the scores. As detailed in the table below, the impact is negligible in some CREZ (i.e. Carrizo South had virtually no change) to extremely significant (i.e. Imperial North).

[8] See Administrative Law Judge's Ruling Modifying System Track I Schedule and Setting Prehearing Conference dated Feb. 10, 2011, Attachment 2 "Standardized Planning Assumptions (Part 2 – Renewables) for System Plans, Table 1, p.76/96.

[9] See id. at Table 7, page 88.

CREZ	Area (acres)	Adjusted Area (acres)	Percent Change in Environmental Scores
Barstow	98,687	148,030	-0.67%
Carrizo North	45,868	68,802	-29.94%
Carrizo South	47,181	70,771	0.00%
Cuyama	6,150	9,225	0.00%
Fairmont	95,391	143,086	-10.18%
Imperial East	66,724	100,086	-0.11%
Imperial North-A	52,073	78,109	-80.86%
Imperial North-B	67,901	101,851	-31.08%
Imperial South	77,172	115,758	-42.63%
Inyokern	71,605	107,408	-1.42%

Q. How will the scores change if the footprint of the technology changes relative to the CREZ size?

A. If the 96.5 percent discount rate that is levied on the wind projects were removed, the results would be dramatically different. Because the Aspen model heavily weights land usage, removing the discount rate would serve to demonstrate the level of dependency that the model calculations have on technology land sizes. As the technology that requires the most land, wind environmental scores would increase more than 2,700% over the Aspen-calculated values if the land usage rates were not discounted. The purpose of this illustration is not to argue that wind land usage should not be discounted, but rather to dramatize to what extent the Aspen model heavily weights technology land usage criteria.

CREZ	Aspen Wind Score	Adj. Wind Score	Percent Change from Aspen scores
Barstow	20.0	572.4	2757.14%
Carrizo North	9.8	279.6	2757.14%
Carrizo South	21.8	622.4	2757.14%
Cuyama	28.2	804.6	2757.14%
Fairmont	10.0	285.7	2757.14%
Imperial East	42.9	1,225.2	2757.14%
Imperial North-A	20.1	574.1	2757.14%
Imperial North-B	21.3	607.7	2757.14%
Imperial South	16.6	474.6	2757.14%
Inyokern	28.9	825.8	2757.14%

Q. Within a CREZ, how much variability could there be between individual projects?

A. There can be substantial environmental differences between projects located within a single CREZ. Most of the defined CREZs are a combination of developed and undeveloped land, and applying a single factor to all projects belies the unique nature of the individual development. Some projects may be located more on developed land and some will be on green field sites. Using an average of the environmental score for a CREZ is meaningful for comparing different CREZs, as RETI did, but it can be misleading to assume that all projects within a CREZ will have similar impact.

4. *Recommendation*

Q. Do you have any recommendations regarding the Aspen environmental scoring?

A. Yes. First, however, I want to commend the Commission for attempting to quantify the environmental scoring criteria in this proceeding. Given the novelty of implementing this and the inherent uncertainty in developing comparable scores for disparate environmental impacts, I recognize the challenges that the Commission faced in developing this scoring.

As detailed above, however, the methodology developed by Aspen is deeply flawed and should be reconsidered prior to it being used again, either in the next long-term procurement plan proceeding or any other forum. In its current form, the scoring may result in resource portfolios that are inappropriately skewed against certain types of resource or resources located in certain locations.

Q. Does this complete your testimony?

A. Yes.

STATEMENT OF QUALIFICATONS OF TIMOTHY M. MASON

Q. Please state your name and business address

A. My name is Timothy M. Mason and my business address is 650 California Street, Fifth Floor, San Francisco, CA.

Q. Please state your present employer and position.

A I work for Black & Veatch Corporation (B&V) and am a Renewable Energy Senior Consultant.

Q. Briefly describe your present employment.

A. I am a Senior Consultant in B&V Energy's Renewable Energy group. I focus on renewable technology assessments and strategic development and integration of renewables, working with a wide range of industry and government clients. My project experience includes strategic planning for renewable resources, renewable resource assessments, energy portfolio design, analytical model development, and transmission grid planning

Q. Please summarize your professional background.

A. I have 24 years of experience in the energy and environmental industries, including extensive experience in strategic planning, analytical consulting, and project management. My additional experience includes environmental commodity trading, facility permitting, government relations, and regulatory compliance. My recent project experience includes:

California Renewable Energy Transmission Initiative (RETI); California Public Utilities Commission; 2008-2010
Project Consultant. Manages development of transmission analysis and renewable energy zone identification for a multi-stakeholder process to integrate potential renewable development in western North America into the California grid in support of the California renewable procurement requirements.

Western Governors Association; Western Renewable Energy Zones (WREZ); Lawrence Berkeley National Laboratory; 2008-2010
Project Manager. Managed B&V's development of the Generation and Transmission Model for the Western Governor's Association's WREZ project, a regional collaborative effort to identify development of renewable energy projects and accompanying transmission in western North America.

Renewable Energy Transmission Development Plan; California Independent System Operator; 2009
Project Manager. Working collaboratively with the CAISO and investor owned utilities participating in the CAISO, developed a conceptual long-term transmission plan to access renewable resources in California for the CAISO 2010 Transmission Plan.

Renewable Energy Plan Development; Sacramento Municipal Utility District (SMUD); 2008-2010
Project Consultant. Assists SMUD to identify and perform technical and economic valuation of renewable energy resources to meet long-term renewable energy objectives.

Presentations and publications include:

Mason, Tim M., "Can We Meet Western Renewable Portfolio Standards?" EUCI Webcast. March 2010.

Mason, Tim M., "Clearing the Transmission Pipeline: Collaborative Transmission Planning." Renewable Energy World Conference. February 2010.

Mason, Tim M., "Transmission Planning in the West: A Collaborative Approach." EUCI Midwestern Transmission Conference. December 2009.

Mason, Tim M., "Renewable Energy and Technologies, Transmission, Economics, and Markets." EUCI Western RPS Conference. July 2009.

Mason, Tim M., "Integrated Renewable Energy Systems Issues." Western Energy Institute, 2009 Operations Conference, Long Beach, California. April 2009.

Mason, Tim M., "Transmission for Renewable Energy Development: A Collaborative Approach." EUEC 2009, Phoenix, Arizona. February 2009.

Mason, Tim M., "Special Report: Executive Roundtable on Renewable Energy." *Power Engineering,* January 2009.

Mason, Tim M., "Transmission and the Geothermal Market." Panelist at Geothermal Finance and Investments Summit. November 2008.

Mason, Tim M., "Renewable Energy and Transmission in the Western U.S." EUCI Western Transmission Conference. August 2008.

Mason, Tim M., "Renewable Energy and Transmission in the Western U.S." Association of Defense Communities Conference. August 2008.

Q. Please summarize your educational background.

A. I received a Master of Arts degree in Technology, Strategy, and Policy from Boston University, and have dual majors in Political Science and Employment Relations from Michigan State University.

Q. Have you previously testified at a hearing before the California Public Utilities Commission?

A. No, I have not.