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# SDG&E Sunrise Powerlink Alternatives Reducing the impacts through: 1. Route selection, 2. underground DC, and 3. local sustainable generation.

Dear planners and participants,

At the meeting on Friday February 9th we discovered for the first time that cross country extra high-powered lines from Imperial County, costing $1.4 billion, could go directly through the middle of our most actively utilized project sites in Southeastern San Diego County and 160 foot tall towers or pylons could be mounted on our mountain tops with devastating impact.[1] The 500,000 volt cross country high power lines would go directly above and bisect 4 of our largest and most actively used parcels[2] adversely impacting over 400 acres and negating our plans for about 400 additional acres at our site. I attached an overview map, which includes our directly affected parcels along with one of the proposed routes for a set of 500 kV high power lines superimposed. Our project extends contiguously east and west a distance of almost 2 miles and up to 1.5 miles north and south, and provides visibility of over 3.25 miles of our boundaries and

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[1] Sunrise Powerlink Project SDG&E Notice of October 2006 Meetings: Project Configuration. The SRPL in the Imperial Valley Link would require construction of a total of 205 new 500 kV towers with an average height of 160 feet.
http://www.cpuc.ca.gov/environment/info/aspen/sunrise/nop-noi/nop.pdf

[2] (3, 10, 12, 9)

wilderness viewshed along Interstate 8, and over 4.25 miles of visibility of our boundaries and wilderness viewshed along Old Highway 80.

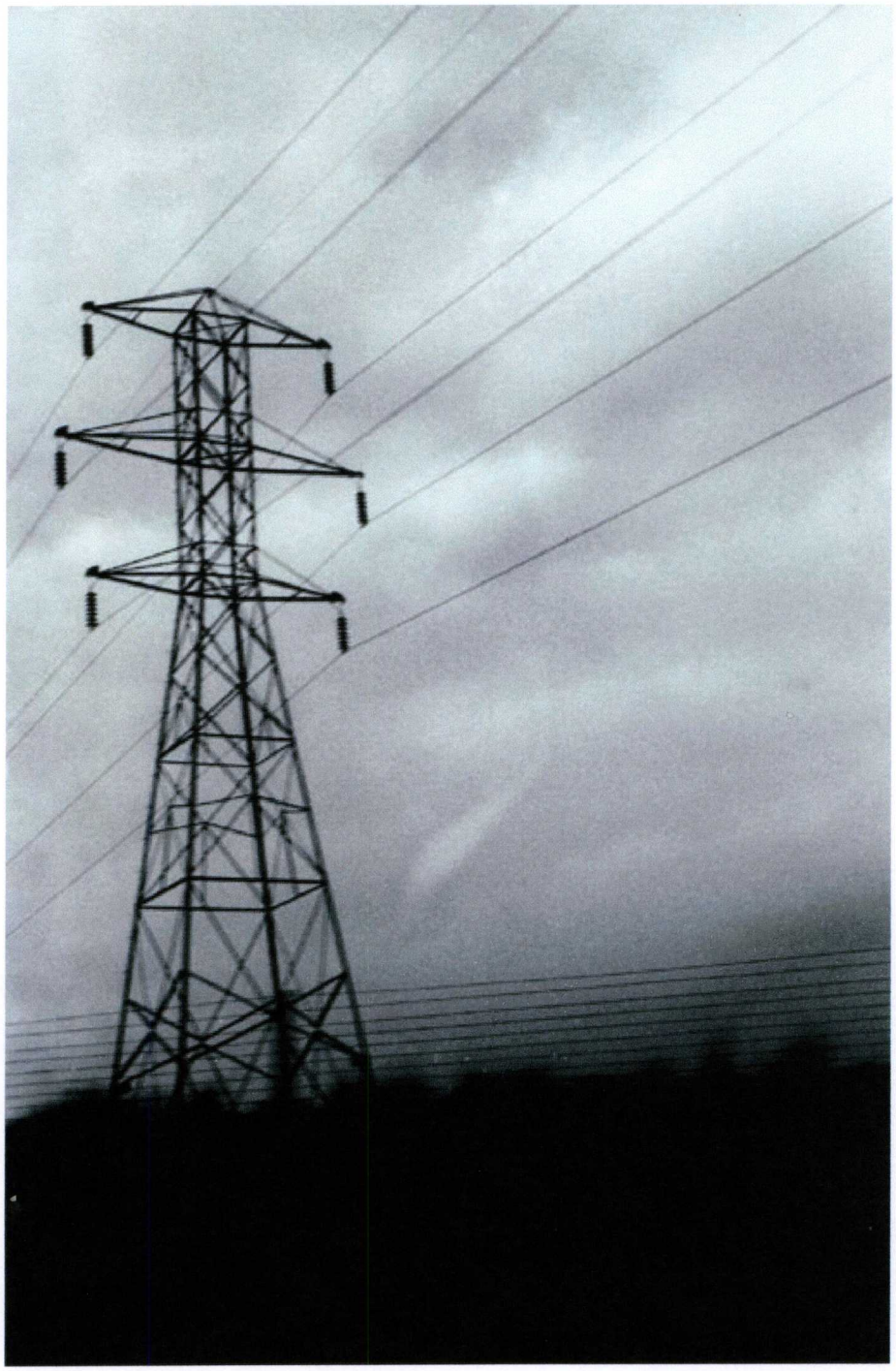
I mentioned our deep apprehension regarding this proposed route at this meeting along with several alternatives that could accomplish the same goal with far lower impacts. Naturally I greatly appreciate your attention to our concerns along with your evaluation of several of the sustainable alternatives which were mentioned by the participants, which can no doubt help resolve the concerns described in a way that is universally beneficial.

## Our project history

During the past three decades we researched wilderness sites in the San Diego region and proceeded with acquisition in three phases. Some of the factors that make this an unexpected wilderness preserve, include its extraordinary views of clear blue skies and distant mountains at almost 4000 feet elevation, along with hundreds of rock formations and caves sculpted over millions of years, combined with a rare diverse intact botanical ecosystem, along with threatened and endangered species, as well as prehistoric human artifacts and ancient burial sites, which we continue to preserve and maintain as designated for permanent cemetery purposes. During this period we initiated efforts to restore native plants and protect the site from off-road impacts as well as began research to develop new techniques for habitat restoration.

During the past decade we have designated portions of the property for compatible uses including energy independent support and research facilities based on solar and wind resources, as well as to demonstrate ultra low impact ecological solutions. The physical, visual and radiation impacts of extra high voltage lines directly overhead would effectively terminate decades of our efforts in the region, leaving us with no affordable options to continue with our projects.

# Three low-impact high power-line alternatives



Overhead high-voltage AC

## Alternative 1, Route selection:

Naturally many others would also be impacted along the proposed route, between Jacumba and Boulevard, including numerous ranch properties, consequently I suggested a route that could continue underground along the north side of Interstate 8 between McCain Valley Road and the San Diego County line, as another alternative.[3] Of course high-power lines anywhere along the interstate would also defeat one of California's most extraordinary scenic highways, which would undoubtedly be an exceptional loss of a valuable asset to the people of San Diego county and millions of visitors. Naturally the alternatives available need to be carefully evaluated, even if the installation cost would be higher, since the environmental damages that would be imposed by an overhead AC Sunrise Powerlink could be vastly more costly, involving the loss of irreplaceable resources and many property uses. Fortunately there are cost effective underground alternatives.

Installing two 1840-megawatt underground DC circuits, totaling 3680-megawatts in four 8-inch conduits all in 1 trench, which can be protected with a concrete cap or under a highway.

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[3] Southwest Powerlink Alternatives, figure 8, map for Southeast San Diego County:
http://www.cpuc.ca.gov/environment/info/aspen/sunrise/nop2/nop2_fig08.pdf

## Alternative 2, Underground high-voltage DC:

A second alternative, could more completely and more economically resolve all the power-line issues brought up with a set of high capacity 300 kV DC underground lines, which can be installed in two 8-inch conduits, separated by 8 to 10 inches. Our preliminary review of the equipment indicates that it costs far less for underground DC than the conventional overhead AC high power lines as proposed for the Sunset Powerlink, when the ground impacts, overhead maintenance and property costs are included. The typical underground AC high-voltage lines as proposed to cross the Miramar Naval Air Station have serious distance or capacitance limitations which restricts runs to between 20 an 24 miles (without shunt reactors); however high-voltage DC has no comparable length restrictions and requires only 2 insulated cables which can be spaced only 8 to 10 inches apart in sand or preferably in a 10 inch conduit for easier maintenance; all of which can be backhoed and placed in a one foot wide trench 3 feet below the surface, or 5 feet in total depth perhaps under county highways; which is far less work and less expense than installing an ordinary drainage pipe. Of course installing 2 additional empty conduits could leave the system fully prepared to quickly or incrementally increase the capacity to 2760 megawatts or 3680 megawatts when temperatures are normal.

Two underground 6-inch DC cables in 8-inch conduits can carry 300 kV DC (+300 and –300 kV = 600 kV capacity), which is considerably underrated to about 2300 amps (600 kV * 2300 amps = 1380 MW) providing 1380 megawatts or alternatively 1,840 megawatts when temperatures are normal or low. The reason for underrating the 3066 amp copper cable with a 3000 square mm cross-section, to three-quarters of its full capacity is to reduce summer heat build-up to maintain an optimal 70 degree centigrade cable operating temperature. Also the 6.2-inch (155mm) cable, delivers 38% greater capacity than the overhead AC cable

proposed for the Sunrise Powerlink even when underrated by 25%, and can deliver 84% greater capacity (1840 megawatts) when temperatures are normal, or utilize that capacity to provide for more efficient transmission. So a single trench that is one-foot in width, with 2 cables installed in 2000-foot runs, could carry the entire 1380 to 1840-megawatt load in two 8-inch conduits, all completely underground without bothering anybody and with vastly lower impacts, as well as lower total costs. The cable length runs can be greatly increased if larger cable reels can be conveniently carried to the installation sites.

The cost of an insulated DC underground cable was mentioned by the manufacturer (ABB) as being approximately double that of an equivalent uninsulated overhead AC line. However this is not a cost-of-wire problem alone, because also absent from the underground DC, is naturally the costs of the towers, and the absence of installing an additional cable needed for AC, as well as the absence of all the roads needed to access the remote towers, along with the absence of sustaining damages due to wind, lightening, storms, aircraft or health hazards, which include cancer risk studies that cannot exclude an association with AC high-power lines, nor decrease the costs of denying cancer losses through unrelated arguments, which may continue for over a century into the future;[4] along with the absence of catastrophic failures that can occur through intentional damages to towers or the normal ageing and deterioration process, along with

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[4] Children living near overhead power lines may have an increased risk of leukemia but the association may not be causal, UK researchers say. They were able to map how far each child lived from a high voltage overhead power line. Comparing the children who had cancer with a control group of 29,000 children without cancer but who lived in comparable districts, found that children whose birth address was within 200 metres of an overhead power line had a 70% increased risk of leukemia. Children living 200 to 600 m away from power lines had a 20% increased risk.

http://www.newscientist.com/article.ns?id=dn7460
http://news.bbc.co.uk/2/hi/sci/tech/933678.stm

normal maintenance and replacement costs, naturally without having to do repairs or replace components 160 feet above the ground in remote locations using 200 foot hydraulic lifts regularly costing over $1 million in rental or acquisition costs, and naturally without the tremendous destruction of the viewshed along our scenic highways, nor the devastation of property values under and around high-power lines, nor the acquisition and replacement costs for property and the years of legal expenses; all of which can result in vastly lower costs for underground DC than overhead AC high-power lines.

If we assume that all these peripheral costs related to AC high-power lines don't exist or will be born by victims of an inconsiderate decision making process, then that could be disastrous. The process of using DC instead of AC is becoming more common in the United States, Brazil, Japan and China; apparently there are minor educational differences involved in installing the transformers at the converter stations. Underground and underwater high voltage DC has been installed commercially worldwide since 1954, supporting some of the world's largest cities; so this is not a particularly new or unproven technology; which significantly does however address and resolve every critical issue brought-up against overhead AC high-power lines and pylons. Further any actual construction cost difference which is distributed over many millions of users, perhaps over at least a 100 year useful lifespan of a cable amounts to one or two pennies on any electric bill; and if the detrimental impacts to property, viewshed, maintenance and the potential health impacts of overhead AC are included, there's no doubt going to be an even greater savings on every electric bill, along with significant public support for making a safer and more environmentally considerate choice by utilizing underground utilities.