BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Application of	)	Application No. 06-08-010
San Diego Gas & Electric Company	)	(Filed August 4, 2006)
(U-902) for a Certificate of Public	)	
Convenience and Necessity for the	)	
Sunrise Powerlink Transmission Project.	)	

PHASE 2 REBUTTAL TESTIMONY OF DR. REN ORANS ON BEHALF OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

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I. INTRODUCTION

Q. Please state your name, titles and employer.

A. My Name is Ren Orans, Managing Partner of Energy and Environmental Economics, Inc. (E3)

Q. Are you the same Ren Orans who provided direct testimony in Phase 2?

A. Yes.

Q. On whose behalf are you submitting this rebuttal testimony?

A. I am submitting this testimony on behalf of the California Independent System Operator Corporation (CAISO).

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to rebut the Phase 2 Direct Testimony of Daniel Suurkask on behalf of the Division of Ratepayer Advocates (DRA) addressing renewable procurement standard (RPS) compliance benefits associated with the Sunrise Powerlink Project (Sunrise) as proposed by San Diego Gas & Electric Company (SDG&E) or another Imperial Valley-San Diego transmission line (IV-SD TL);[1] to rebut the Phase 2 Direct Testimony of Kevin Woodruff of the DRA addressing the reasonableness of reducing reliability must-run (RMR) costs and the impact of the amount of Locational Capacity Requirments (LCR) provided by Imperial Valley renewable (IV) generation; and to update the

[1] For purposes of his analysis, Mr. Suurkask focuses on IV-SD TLs, which apparently includes Sunrise and the environmentally superior southern (DEIR/EIS Alternative 4) and northern (DEIR/EIS Alternative 5) route alternatives. For consistency, this testimony will use the "IV-SD TL" acronym.

CAISO's cost and benefit summary tables to conform to recently filed changes made by SDG&E in its Phase 2 direct testimony.

II. DRA'S PROPOSED MODIFICATIONS TO THE CAISO'S RPS COMPLIANCE BENEFITS ANALYSIS.

Q. Please describe the modifications to the CAISO's RPS compliance benefits analysis proposed by DRA witness Suurkask.

A. Mr. Suurkask proposes several modifications to the CAISO's RPS compliance model for the purpose of "updating its benefit-cost estimates" and "shedding light on particular questions of relevance to this proceeding."[2] In particular, the changes he proposes are largely based on information from the California Public Utilities Commission (CPUC) regarding approved or pending RPS contracts, a Western Electricity Coordinating Council (WECC) economic analysis, and the Greenhouse Gas (GHG) modeling that has been performed by E3 for the CPUC in Docket 06-04-009.

Q. Please describe the results of DRA's updated analysis of the renewable procurement benefits associated with an IV-SD TL?

A. DRA's base case analysis shows that an IV-SD TL would produce $30.5 million per year in renewable procurement benefits. While lower than the $45M/yr base case RPS benefits described in the CAISO's Phase 1 Rebuttal Testimony,[3] DRA's $30.5M/yr benefit estimate is significant, and as a general matter corroborates the CAISO's analysis in Phase 1 that a IV-SD TL would lower California's cost of

[2] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 3.
[3] CAISO Ex. I-6 at 29.

RPS compliance. Moreover, the DRA analysis acknowledges that an IV-SD TL line has "considerable upside potential" depending on the potential of solar thermal technology cost reductions.[4]

Q. What is the CAISO's opinion of the results of DRA's updated analysis of the renewable procurement benefits associated with a IV-SD TL?

A. The CAISO believes the range of benefits, which Mr. Suurkask estimates to be between $0/yr to $100.2M/yr, is unreasonably low. As the CAISO testified in Phase 1, "[a]lthough zero benefits is possible, it is extremely unlikely and therefore should *not* be the low end of a plausible range."[5] Rather, for the reasons explained in Phase 1, the CAISO's RPS benefit estimate for Sunrise "is conservative and should be adopted as the low end of a plausible range."[6] Accordingly, Mr. Suurkask's estimate of zero RPS benefits should not be used to establish the low end of the expected range of benefits of Sunrise. Additionally, the high end of the expected range of benefits identified by Mr. Suurkask fails to account for the full extent of the upside potential in RPS benefits, as I discuss in more detail below.

Q. Please summarize the model, data and assumptions used by the DRA in their analysis.

A. The analysis Mr. Suurkask presents relies on the same model that I used in Phase 1 to estimate renewable energy procurement benefits.[7] As far as I can determine,

[4] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 9.
[5] CAISO Ex. I-6 at 43 (emphasis in original).
[6] CAISO Ex. I-6 at 43.
[7] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 4.

Mr. Suurkask makes no modifications to the costing methodology used in the model; however, he makes a number of changes to the input data and assumptions I used.

Q. How did Mr. Suurkask modify the input data you used in Phase 1?

A. Mr. Suurkask modified the input data in the following four significant ways:

1. He uses a new set of generator costs, transmission costs, capacity factors and wind integration costs from a set of interim results produced by a study that E3 is currently working on for the CPUC and California Air Resources Board on the costs of complying with GHG legislation in California.[8]
2. He adds a cost to each resource zone for new transmission line losses calculated as 1% losses for every 100 miles of transmission line length.[9]
3. He adds to the model 575 MW of wind resources in the Santa Barbara/LA Basin, 400 MW of geothermal resources in the Reno Area, and 1000 MW of renewable resources to the British Columbia (BC) region. He also removes from the model 1500 MW of wind from Montana and 3000 MW of wind from Wyoming.[10]
4. He modifies the resource mix of renewables in the San Bernardino/Mono Area by reducing the amount of solar thermal

[8] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 5, 7.
[9] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 7.
[10] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 4, 5. BC resource addition is shown in DRA Workpaper "DRA_RPSBenefitEstimate.xls", Table 4.5, cell N17.

resources in that region by 2000 MW and increasing the amount of wind from that region by 2000 MW.[11]

Q. How did Mr. Suurkask modify the assumptions you used in Phase 1?

A. Mr. Suurkask modified the following fourassumptions:

1. He assumed that 100 percent of the out-of-state renewable energy potential in the model would be available for development and import into California, with the exception of Montana and Wyoming, which he cut by 50 percent. This assumption is reflected in his high, medium, and low cases.[12]
2. To create the low value case, he increases by 5 percent the costs of all geothermal resources, which are found in abundance in the Imperial Valley.[13]
3. In the low value case, he lowers the cost of wind by 5 percent, which makes up a large share of the resources that would replace those developed in the study area.[14]
4. In the high value case, he increases the cost of wind by 5 percent, decreases the cost of geothermal resources by 5 percent, and decreases the cost of solar thermal resources by 20 percent.[15]

[11] DRA Workpaper "DRA_RPSBenefitEstimate.xls", Table 4.5, Sheet "Table_4.3 Modified", cells K23 and K24.
[12] DRA Workpaper "DRA_RPSBenefitEstimate.xls", Table 4.5, Sheet "Supply_Curve_Scenario." The Resource Cluster Scenario is set to "All resource clusters" in the model version DRA used to calculate the line's benefits.
[13] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 7 (Table 3-3).
[14] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 7 (Table 3-3).
[15] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 7 (Table 3-3).

Q. Do you believe that the changes to the input data and assumptions made by Mr. Suurkask produce an implausibly low renewable energy procurement benefit?

A. Yes. I believe the resulting benefit level is unreasonably low for three reasons. First, given the difficulty of siting, developing and obtaining regulatory approval for out-of-state transmission facilities -- particularly transmission facilities that would be designed for the primary purpose of exporting energy to California, I believe that DRA's modified assumption that 100 percent of out-of-state renewable generation is available for import into California is so improbable that the assumption is not even useful for purposes of developing a low estimate of RPS benefits, let alone for the medium and high cases where this improbable scenario is also used by Mr. Suurkask. Second, the arbitrary modifications of the costs of one resource versus another are not based on any studies or data and appear to me to be solely designed to produce a zero benefit. Finally, the modifications to the levels of resources in each zone blend the data and results of two different models, which I believe produces misleading results.

Q. What is a more plausible range of assumptions for the development and import of out-of-state resources?

A. Assuming that half of the out-of-state resources are available for development and import into California is an optimistic assumption that is suitable for calculating the low benefits case. In Phase 1, the CAISO addressed out-of-state project

development risk by assuming that only 50 percent of the projects requiring long line transmission to other jurisdictions could be completed. Given the difficulty of siting, developing and obtaining regulatory approval for out-of-state transmission facilities, I believe this assumption is appropriate for producing a conservative estimate of the renewable procurement benefits of Sunrise. In my Phase 1 Rebuttal Testimony, however, I suggested that given recent opposition to transmission developed solely for the purpose of importing energy into California, even this 50 percent assumption may be too high, and it may be more accurate to assume that only 25 percent of such projects could be constructed.[16]

Q. Please explain how changing this one assumption regarding the availability of out-of-state renewable generation affects Mr. Suurkask's estimates of the RPS benefits of Sunrise?

A. Adjusting Mr. Suurkask's model to include only 50% of out-of-state renewable generation potential increases his base case value of the IV-SD TLs to $41.9M/yr, and raises the low estimate to $6.8M/yr and the high estimate to $123.3M/yr. If only 25% of out-of-state renewable generation potential is assumed, the base case benefits estimate for Sunrise and other IV-SD TLs would be $78.5M/yr, bounded by the low estimate of $30.3M/yr and the high estimate of $183.6/yr.[17] Every state in the Western Interconnect except three have adopted RPS standards as of this date. The combination of both RPS standards and proposed federal and

[16] CAISO Ex. I-6 at 35.
[17] Note: In making this modification, we have left the resource availability from Wyoming and Montana unchanged from DRA's analysis because DRA has already reduced the wind resources in these regions by 50% from the original estimate.

regional efforts to regulate GHG emissions makes it increasingly unlikely that California will be able to develop and construct the necessary transmission facilities to import large amounts of renewable generation from out-of-state. While it is reasonable to assume that some out-of-state generation can be imported into California, particularly from resource rich areas like Wyoming and Montana, it is not reasonable to assume that California will be able to develop and import all of the renewable resources from areas like the Pacific Northwest, where both the resource constraints and energy value are similar to those in California.

Q. Please explain why Mr. Suurkask's modified costs for wind and geothermal resources cause an implausibly low renewable energy procurement benefit?

A. I believe that Mr. Suurkask's low case sensitivity, in which he assumes that geothermal costs rise by 5% while wind costs fall by 5% relative to the base case costs is possible but unlikely; moreover, it is not supported by any data or studies. Wind and geothermal generation technologies are both mature technologies and both use many similar materials, such as steel and concrete. Accordingly, generation costs for these two technologies are more likely to move in the same direction rather than in opposite directions. The value of a sensitivity analysis is much more useful when it is associated with potential events that are *likely to occur*, as opposed to a sensitivity analysis that simply, and arbitrarily, changes input values. Any number of changes to geothermal and wind technology costs could be offered as alternative sensitivities to DRA's high and low cases, creating a very wide range of resulting benefits, but these results would not be particularly

useful in a resource evaluation. In contrast, the sensitivity assumption in Mr. Suurkask's high case that tests the effect of a 20% decrease in solar thermal costs is more relevant and useful because he explains that the potential success of the Stirling solar thermal project (which is a relatively immature technology at this time) could help lock-in or raise the renewable procurement benefits.[18]

Q. Please explain how Mr. Suurkask's misuse of two different models contributes to his implausibly low estimate of renewable energy procurement benefits?

In his analysis, Mr. Suurkask replaces 2000 MW of solar thermal resources located in the San Bernardino/Mono zone with 2000 MW of wind resources, which results in a lower renewable energy procurement benefit. In his workpapers, Mr. Suurkask notes the change as follows: "Reduce relative weighting of solar thermal relative to wind, per E3's GHG calculator."[19] I believe this change to the input data inappropriately blends information from the procurement benefits model used by the CAISO in Phase 1 and E3's GHG calculator producing misleading results. The CAISO's unaltered renewable procurement benefits model from Phase 1 used a single data source, an analysis by the Center for Resource Solutions (CRS),[20] for all of its zonal estimates of in-state renewable resource availability. Relying on this single source ensures that a consistent methodology is used for the resource availability of each zone and

[18] DRA Phase 2 Direct Testimony Volume 2 (Suurkask) at 9.
[19] DRA Workpaper "DRA_RPSBenefitEstimate.xls", Table 4.5, Sheet "Table_4.3 Modified", cells K23 and K24.
[20] Center for Resource Solutions (CRS), Achieving a 33% Renewable Energy Target – Prepared for the CPUC, 2005.

guards against having a more conservative estimate of resources in one zone and a more optimistic estimate for another zone.

In contrast, E3's GHG calculator has its own methodology for estimating wind, solar thermal, and geothermal resource availability in each zone that relies on an extensive GIS database from the National Renewable Energy Laboratory (NREL), and significant care was taken to keep this methodology as consistent as possible across different zones and generation technologies.

Mr. Suurkask's selective use of portions of the resource availability data from the two different models undermines the intended consistency of each set of data and produces misleading results. For instance, one could choose data from the two different models and combine it in any number of ways to produce a wide range of resulting renewable benefits, including benefits that are even higher than those shown by the CAISO for Sunrise. However, as I described earlier, it is preferable to rely on a single data source to the greatest extent possible. Because the CRS resource data in the original Phase 1 data is what has been used by the CAISO to calculate renewable benefits throughout this proceeding, it is reasonable and good practice to continue using this same data source.

Q. Could you, as Mr. Suurkask suggests, use the GHG data to estimate the RPS procurement benefits of an IV-SD TL?

A. Yes, the GHG calculator was designed to allow state agencies and third parties to develop estimates of the costs to meet GHG reductions targets using different resources. For example, the model allows the user to procure different amounts

of renewable resources from identified renewable resource zones in California and see the costs associated with each portfolio. It is important to note that the GHG calculator and its data are an interim product that is still being revised as part of ongoing analysis for the CPUC and CARB.

Q. Please describe the methodology used in the procurement benefits model from Phase 1 and in your GHG Calculator.

A. The methodology used in the procurement benefits model from Phase 1 is described in the CAISO's Phase 1 Initial Testimony Part II, at section 4, pages 46 to 70. The GHG calculator computes the incremental cost of reducing electricity sector carbon emissions to a designated target level by 2020. This incremental cost is calculated as the amount over and above the cost of a 2020 reference case, in which California utilities meet obligations to serve their growing loads while also complying with existing state policies, such as energy efficiency mandates and RPS targets.

The calculator, which is a Microsoft Excel-based model, contains a pre-loaded reference and target case in which E3 has selected one particular combination of new generation resources and energy efficiency that complies with the relevant policy targets. The model also, however, has an interface that allows a user to select a different combination of clean new generation and energy efficiency and to recalculate resulting costs of the user-entered case. The cost calculations are based largely on E3-developed supply curves of new energy efficiency and new renewable generation available to California.

Q. Please compare the basic sources of data used in the procurement benefits model from Phase 1 and your GHG Calculator for the renewable energy supply curves?

A. As I mentioned above, the CAISO's renewable procurement benefits model from Phase 1 used a single data source, an analysis by CRS, for all its zonal estimates of in state renewable resource availability. The GHG Calculator primarily uses data from the Energy Information Administration (EIA) of the U.S. DOE for a baseline generation cost for each technology. To estimate renewable resource availability the Calculator relies on resource potential data throughout the WECC to ensure comparability across regions. Wind and solar thermal resource estimates are from National Renewable Energy Laboratory (NREL) and rely on Geographic Information Systems (GIS) data that estimates the amount of land area with a particular level of resource quality—either wind speed or solar insolation—which is grouped into 5 levels or classes after applying exclusions for particular lands such as water bodies and protected park lands. Using the NREL data, along with additional information from the CEC for greater California-specific detail, the Calculator assigns higher and lower capacity factors to resources depending on their particular resource class. The calculator also makes use of site-specific geothermal and small hydro data from the Energy Information Association (EIA), which provided individual cost estimates for developing each site. Additionally, the GHG Calculator relies on transmission costing data from existing planning studies to estimate the cost of new transmission of various sizes from California

load centers to the general locations of the renewable resources. The transmission costs were sized in 250 MW increments from 250 MW to 1000 MW and in 500 MW increments up to 6000 MW. Full documentation for the renewable data is described in the following papers listed on our website: GHG Modeling Stage 1 Documentation,[21] and Corrections to Stage 1 Documentation.[22] All information on the GHG Calculator is available on E3's website.[23]

Q. Please describe the methodology used to construct the renewable energy supply curve used in your GHG Calculator?

The GHG calculator groups the total resources identified into 11 renewable resources regions within California and 13 different regions throughout the rest of the WECC. The designated regions are listed in Table 1 below.

Table 1: Renewable Resource Zones used in the GHG Calculator

California Regions	Rest of WECC
Northeast CA	CFE
Geysers/Lake	Reno Area/Dixie Valley
Bay Delta	NE NV
Tehachapi	Alberta
San Bernardino	Arizona-Southern Nevada
Mono/Inyo	British Columbia
San Diego	Colorado
Imperial	Montana
Riverside	New Mexico
Santa Barbara	South Central Nevada
CA - Distributed	Northwest
	Utah-Southern Idaho
	Wyoming

Within each region, the Calculator ranks 500 MW increments of resources based on the costs of delivering energy from those resources to the high voltage grid in

[21] E3, GHG Modeling Stage 1 Documentation, http://www.ethree.com/GHG/R0604009_Attachment_B_v2.pdf.
[22] http://www.ethree.com/GHG/CorrectionsStage1.doc
[23] http://www.ethree.com/cpuc_ghg_model.html

California. The model allows a user to enter a specific number of renewable MW to add from each resource zone up to the zone's maximum value. The total cost of the selected group of renewables is then used by the GHG Calculator as a portion of the total cost of meeting the GHG reduction policy target.

The GHG Calculator user interface also displays the cost of the least expensive increment to add in each zone (on a $/MWh basis), and shows the rank of that increment compared to other zones. Based on these rankings, a user wishing to add the least expensive bundle of renewables to meet a particular target of GHG emissions or renewable energy production could iteratively add resources in the lowest cost region until the target is reached.

Q. Can the GHG calculator be used to estimate the procurement benefits of an IV-SD TL?

A. Yes, and in fact as part of my review of Mr. Suurkask's use of data from the GHG calculator, I used the GHG Calculator to estimate the total cost of meeting the RPS target levels for 2010, 2015, and 2020 if California added (a) only 600 MW of new renewable generation from the Imperial Valley region (for the base case) versus (b) if California added 2500 MW of new renewable generation from the Imperial region (for the Sunrise case).

By comparing the results of these two cases, I found that an IV-SD TL RPS benefit would be $306.1 M/yr. These results indicate that by enabling the full development of 2500 MW from the Imperial Valley, with its rich, high capacity factor geothermal resources, the IV-SD TL would allow California to meet its

RPS targets at significantly lower cost than if only 600 MW could be developed in the area and other resource zones had to be developed to meet the same RPS targets.

To ensure comparability between the results of the GHG Calculator and the RPS benefits model, I removed all wind from the Imperial Valley renewable resource mix in the GHG Calculator and replaced it with solar thermal resources. This substitution guarantees that the renewable resources assumed to be developed in the Imperial Valley and delivered through the IV-SD TL would provide at least as much local and system reliability benefit as the Imperial Valley resource mix in the RPS model and in the CAISO's analysis related to reliability.

Q. Are you suggesting that the GHG Calculator estimate of RPS procurement benefits replace the estimates you provided in Phase 1?

A. No. I continue to believe that my base case RPS procurement benefit provides a plausible and conservative low end estimate. However, in response to DRA's continued assertions that uncertainty analysis lowers the expected benefits of transmission solutions that bring renewable resources into the San Diego load pocket, the results of running the GHG Calculator verifies my assertion that my estimates of RPS procurement benefits were very conservative and one could easily justify a much higher estimate of benefits.

III. THE EFFECT CAUSED BY DELAY IN THE DEVELOPMENT OF RENEWABLE RESOURCES IN THE IMPERIAL VALLEY.

Q. In his Phase 2 direct testimony, Mr. Woodruff states that "the CAISO is making some very specific – and possibly optimistic – assumptions about the development of renewable resources in the IV."[24] Would more "pessimistic" assumptions change the CAISO's results dramatically?

A. No. First of all, it should be noted that the CAISO does not model capacity benefits from renewable generation until the year after the generation is assumed to be installed. Thus, for a 2011 Sunrise in-service date, new IID renewables are not valued for capacity benefits until 2012.

Nonetheless, to assess the sensitivity of the benefit estimates to the assumed renewable installation schedule as suggested by DRA, the CAISO analyzed the case where only 500MW of renewables were developed in IID through 2011 (as compared to 1080 MW in the CAISO's prior analyses). Starting in 2012, the renewables then ramped up so that the total MW installed in 2015 matched the CAISO's prior analysis. Under this phased-in construction schedule for new renewable generation (580 MW less renewable generation in 2011), the levelized reliability benefits of Sunrise declined by only $11 million.

[24] DRA Phase 2 Direct Testimony Volume 1 (Woodruff) at 20.

IV. THE CAISO'S RMR COST ASSUMPTIONS

Q. In his Phase 2 direct testimony, Mr. Woodruff states that "DRA believes the CAISO's assumption that Reliability Must-Run (RMR) process will be reduced in the presence of new 'competition' is incorrect. DRA does not believe that the costs of contracting for RMR units should be assumed to be able to fall appreciably below RMR units' cost of service' established by the FERC."[25] Did the CAISO's Phase 1 analysis assume that RMR costs fall below cost of service?

A. No. The CAISO did not, and does not, assume that the price reduction is a result of RMR units being paid appreciably below their cost of service. Rather, the CAISO recognizes that RMR units have different cost of service levels. As the need for RMR capacity declines, the CAISO assumes that SDG&E will generally be able to contract with the lower cost RMR units, thus reducing its average RMR costs on a $/kW basis. The CAISO's assumptions reflect this reality of lowest-cost contracting, not an assumption that RMR units would be forced to accept payments that do not compensate their full cost of service.

[25] DRA Phase 2 Direct Testimony Volume 1 (Woodruff) at 21.

V. UPDATES TO THE CAISO'S NET BENEFITS ANALYSIS TO REFLECT SDG&E'S PHASE 2 DIRECT TESTIMONY

Q. SDG&E's Phase 2 direct testimony uses a 58 year levelization term and a 7.81% discount rate for transmission expenditures for its cost analyses. These differ from what the CAISO used for the analyses in its Phase 2 direct testimony. Has the CAISO updated the costs used in its analysis to reflect these changes?

A. Yes. The CAISO has extended the cost and benefits streams in its economic models to reflect 58 years, and has levelized the costs and benefits over 58 years using the 7.81% discount rate. These changes are described in SDG&E's Phase 2 direct testimony in Chapters 3 and 11, SDG&E's Phase 2 Direct Testimony Workpapers 3/12/08 CD, and the FERC Offer of Settlement dated 27 March 2007 (Docket ER07-284-000). The updated costs and benefits are shown in Phase 2 Rebuttal Table 1 below.

Phase 2 Rebuttal Table 1: Levelized Costs and Benefits of Alternatives using updated costs, 58 year term and 7.81% discount rate

	A	B	C	D	E
		Total Benefits		Net Benefit	
Case	Transmission Cost ($M/yr)	RPS Base Case	RPS Alt Case	RPS Base Case	RPS Alt Case
Sunrise + South Bay Repower (ED7)	191	420	594	229	403
Sunrise	183	327	500	145	318
TE/VS + LEAPS + Green Path	140	271	394	131	254
Sunrise + South Bay Repower + Green Path (ED8)	221	415	589	194	368
South Bay Repower	8	112	112	104	104
TE/VS + Green Path (ED2)	140	218	342	78	202
Sunrise + Green Path (ED9)	212	334	508	122	296
Sunrise + TE/VS + LEAPS (ED5)	293	356	518	63	225
Sunrise + TE/VS (ED3)	293	301	473	8	180
TE/VS + LEAPS	111	85	85	(26)	(26)
Sunrise + TE/VS + LEAPS + Green Path (ED6)	323	371	546	48	223
TE/VS (ED1)	111	20	20	(91)	(91)
Sunrise + TE/VS + Green Path (ED4)	323	301	475	(22)	152
DEIR/EIS Alternative 4	164	319	484	155	320
DEIR/EIS Alternative 5	306	319	484	13	178
SDG&E Enhanced Northern Route	184	327	500	143	316

Differences may exist due to rounding

Q. Does Phase 2 Rebuttal Table 1 incorporate any other changes?

A. Yes, the CAISO has added a row for SDG&E's Enhanced Northern Route. Similar to the assumption made for DEIR/EIS Alternatives 4 and 5 in the CAISO's Phase 2 direct testimony, the CAISO has assumed that the benefits of

the Enhanced Northern Route are the same as the Sunrise route. The CAISO has also corrected its estimated project costs to conform to SDG&E's Phase 2 direct testimony.

Q. Please describe the adjustments the CAISO made to the cost of Sunrise.

A. The direct cost of Sunrise increased from $1,015 million ($2010) to $1,518 ($2011). The CAISO updated the levelization term from 41 years to 58 years and Weighted Average Cost of Capital (WACC) from 8.23% to 7.81% to be consistent with SDG&E's FERC Offer of Settlement. The Revenue Requirement Multiplier changed from 1.68 to 1.41 and the Levelization Factor changed from 8.6% to 7.9%, based on the updated term, discount rate, and to be consistent with SDG&E's revenue requirement models. The resulting levelized cost equals $182.5 million ($2010), including mitigation, O&M, working capital and franchise fees and uncollectables (FFU). Previously, the levelized Revenue Requirement was $173.4 million ($2010).

Q. Has the CAISO updated costs for Green Path North and South Bay?

A. Yes. The CAISO updated the South Bay levelization factor and Revenue Requirement Multiplier to be consistent with Sunrise. The direct costs were not changed. The updated levelized revenue requirement for South Bay is $8.4 million ($2010). Previously, the levelized Revenue Requirement was $9.3 million ($2010). The levelized revenue requirement for Green Path is $29.9 million ($2010). Previously, the levelized Revenue Requirement was $33.2 million ($2010).

Q. Has the CAISO updated costs for TE/VS?

A. Yes. The direct cost of TE/VS has been increased from $722 million ($2012) to $968 million ($2012). A mitigation cost of $124 million, in $2012, was added. The levelization term changed from 41 years to 58 years and WACC changed from 8.23% to 7.81%. Using 58 years and a WACC of 7.81%, the levelized Revenue Requirement, including Mitigation, O&M, working capital and FFU, equals $110.5 million ($2010). Previously, the levelized Revenue Requirement was $94.3 million ($2010).

Q. Has the CAISO updated costs for the environmentally superior southern route (DEIR/EIS Alternative 4)?

A. Yes. The direct cost of DEIR/EIS Alternative 4 decreased from $1,514 million ($2012) to $1,502 million ($2012). The Mitigation cost of $155 million, in $2012, did not change. Using 58 years and a WACC of 7.81%, the levelized Revenue Requirement, including Mitigation, O&M, working capital and FFU, equals $164.2 million ($2010). Previously, the levelized Revenue Requirement was $217.7 million ($2010).

Q. Has the CAISO updated costs for the environmentally superior northern route (DEIR/EIS Alternative 5)?

A. Yes. The direct cost of DEIR/EIS Alternative 5 decreased from $2,978 million ($2012) to $2,968 million ($2012). Using 58 years and a WACC of 7.81%, the levelized Revenue Requirement, including Mitigation, O&M, working capital and FFU, equals $305.9 million ($2010). Previously, the levelized Revenue Requirement was $414.6 million ($2010).

Q. Why was the SDG&E Enhanced Northern Route added to the CAISO's analysis?

A. The Enhanced Northern Route was added to the analysis to reflect SDG&E's Phase 2 direct testimony. Mr. Sparks provides additional testimony about the Enhanced Northern Route.

Q. What are the costs related to the Enhanced Northern Route?

A. As provided by SDG&E, the direct cost of the Enhanced Northern Route is $1,532 million ($2011) and Mitigation Cost is $191 million ($2011). Using 58 years and a WACC of 7.81%, the levelized Revenue Requirement, including Mitigation, O&M, working capital and FFU, equals $183.7 million ($2010), or $192.9 million ($2011).

Q. Please provide a summary of these project costs.

A. Phase 2 Rebuttal Table 2 below summarizes the results associated with adjusting the costs.

Phase 2 Rebuttal Table 2: Project Cost Estimates

		A	B	C	D	E	F	G
		Sunrise	South Bay	Green Path	TE/VS	DEIR Alt 4	DEIR Alt 5	Enhanced
1	Direct Cost incl AFUDC ($M)	1,518	63	400	968	1,502	2,968	1,532
2	*Costs expressed in year X dollars*	*2011*	*2006*	*2006*	*2012*	*2012*	*2012*	*2011*
3	Costs in $2010 ($M)	1,446	75	472	878	1,362	2,692	1,459
4	Mitigation or interconnection ($M)	199			124	155	198	191
5	*Costs expressed in year X dollars*	*2011*			*2012*	*2012*	*2012*	*2011*
6	Costs in $2010 ($M)	190	-	-	112	140	180	182
7	Total Cost (2010$M)	1,636	75	472	990	1,503	2,872	1,641
8	Share included for TAC customers	100.0%	100.0%	56.7%	100%	100%	100%	100%
9	Total TAC Cost (2010$M)	1,636	75	268	990	1,503	2,872	1,641
10	Revenue Requirement Multiplier	1.41	1.41	1.41	1.41	1.38	1.35	1.42
11	TAC PV Revenue Requirement ($M)	2,307	106	378	1,397	2,076	3,866	2,322
12	Levelization Factor (7.81%, 58 yrs)	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%
13	**Levelized Cost (2010$M/yr)**	**182.5**	**8.4**	**29.9**	**110.5**	**164.2**	**305.9**	**183.7**

A1: Tables 3.2 and 11.5. Table 11.5 figures are inclusive of mitigation costs.
B1: Cost of transmission from CAISO March 1, 2007 Filing
C1: April 20 GPN Cost: 1/4/07 note from LADWP
D1: Tables 3.2 and 11.5, and CAISO DR3-28-08 Part2. $1.7 billion Associated Cost excluded.
E1: Confidential Attachment 3-4 dated 3/24/08. Includes Coastal Link System Upgrade.
F1: Confidential Attachment 3-4 dated 3/24/08. Includes Coastal Link System Upgrade.
G1: Tables 3.2 and 11.5. Table 11.5 figures are inclusive of mitigation costs.
Line 3: Line 1 adjusted to 2010 by Handy-Whitman escalation factors:
2006-7: 3% 2007-8: 5% 2008-9: 6% 2009-10: 3% 2010-1: 5% 2011-2: 5%
Line 4 and Line 5: Table 3.2
D4: SDG&E and SCE interconnection costs not included.
Line 6: Line 4 adjusted to 2010 by Handy-Whitman escalation factors.
Line 7: Line 3 + Line 6
C8: 56.7% is the CAISO's estimate of the percentage of the GPN capacity that would be available for transportation of renewables for parties other than LADWP, SCPPA, or IID.
Line 9: Line 7 * Line 8
Line 10: Revenue requirement multiplier = (PVRR/capital cost).
Column A,E,F,G PVRR calculated from SDG&E Revenue Requirement models.
Columns B,C,D use Sunrise multiplier because revenue requirements model not available for these costs.
Line 11: Line 9 * Line 10 (for Columns B, C, and D).
Line 12: Levelization factor for 58 years, using 7.81% discount rate
Line 13: Columns A, E, F, G are calculated 58-yr results from SDG&E revenue requirements models.
Columns B,C,D are Line 11 * Line 12 (No SDG&E revenue requirements model for these costs).
Levelized cost does not include RMR, Consumer Energy or Capital Replacement costs.

Q. What impact has the cost updates and other input assumption changes described above had on the cost-effectiveness of Sunrise?

A. Similar to the analysis described in my Phase 2 direct testimony, the CAISO's updated analysis demonstrates that Sunrise still has positive levelized net benefits and remains cost effective.

Q. How does Sunrise compare to TE/VS, TE/VS + LEAPS, DEIR/EIS Alternatives 4 and 5 and the Enhanced Northern Route?

A. Phase 2 Rebuttal Table 1 above shows that the use of SDG&E's updated costs still result in substantial positive net benefits for Sunrise, the DEIR/EIS Alternative 4 and SDG&E's Enhanced Northern Route. All three of these alternatives now are expected to produce between 143 and 155 million dollars per year of net benefits under the conservative Base Case RPS assumptions. The higher cost DEIR/EIS Alternative 5 has an estimated 13 million dollars per year of net benefits under the conservative Base Case RPS assumptions. The TE/VS (ED1) alternative costs approximately 91 million dollars per year more than its estimated benefits and TE/VS + LEAPS is estimated to cost approximately 26 million more per year than its benefits.

Q. Does this conclude your Phase 2 rebuttal testimony?

A. Yes, it does.

CERTIFICATE OF SERVICE

I hereby certify that I have served, by electronic and United States mail, a copy of the foregoing Phase 2 Rebuttal Testimony of Dr. Ren Orans on Behalf of The California Independent System Operator to each party in Docket No. A.06-08-010.

Executed on March 28, 2008 at Folsom, California.

/s Susan L. Montana
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An Employee of the California
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