

**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	)	Application 06-08-010
Necessity for the Sunrise Powerlink	)	(Filed August 4, 2006)
Transmission Project.	)	
_____	)	

**PHASE 1 OPENING BRIEF OF THE CALIFORNIA  
INDEPENDENT SYSTEM OPERATOR CORPORATION**

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## SUMMARY OF RECOMMENDATIONS

The California Public Utilities Commission (“Commission”) should grant San Diego Gas & Electric Company (“SDG&E”) a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project (“Sunrise”) based on the following considerations:

- A resource deficiency/reliability need exists in SDG&E’s service area beginning in 2010.
- Sunrise will increase SDG&E’s import capability into its service area from 2850 MW to at least 4000 MW, thus enabling SDG&E to meet its resource deficiency/reliability need in 2010 and beyond without introducing new reliability concerns.
- A conservative estimate of the net economic benefits of Sunrise is \$52 million per year (levelized) and could exceed \$200 million per year depending on the actual of renewable development scenario that is realized.
- The California Independent System Operator Corporation (“CAISO”) evaluated over 60 proposed alternatives to Sunrise and ran more than 80 models analyzing the reliability and economic impacts of these alternatives. Based on the CAISO’s analysis, Sunrise provides superior long-term benefits to any of the alternatives.
- Sunrise facilitates SDG&E compliance with California’s renewables portfolio standard requirements by providing access to renewable resources expected to be developed in the Salton Sea and other areas in the Imperial Valley.
- Sunrise will provide options for future expansion of import capability and strategic interconnections between SDG&E and Southern California Edison.
- Sunrise will provide much needed long-term improvement to California’s aging transmission infrastructure.
- Sunrise will facilitate the replacement of old and inefficient power plants currently needed to ensure reliability in SDG&E’s service area.
- Sunrise will provide insurance against unexpected load growth and/or extreme weather conditions, such as the July 2006 heat storm experienced in Southern California.

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**PHASE 1 OPENING BRIEF OF THE CALIFORNIA  
INDEPENDENT SYSTEM OPERATOR CORPORATION**

Pursuant to the July 13, 2007 ruling of Administrative Law Judge Weissman, the California Independent System Operator Corporation (“CAISO”) submits its Phase 1 opening brief in support of California Public Utilities Commission (“Commission”) approval of a Certificate of Public Convenience and Necessity (“CPCN”) for the Sunrise Powerlink Transmission Project (“Sunrise”). The record in this proceeding demonstrates a resource deficiency and long-term reliability need in SDG&E’s service area beginning in 2010. Based on its analysis, the CAISO has determined that Sunrise is needed to meet SDG&E’s reliability need, will provide significant net economic benefits, and is a critical component to SDG&E meeting renewables portfolio standard (“RPS”) requirements. For these and other reasons discussed herein, the CAISO strongly supports the granting of the requested CPCN for Sunrise.

**I. INTRODUCTION**

Public Utilities Code section 345 provides that the CAISO “shall ensure efficient and reliable operation of the transmission grid.” In the most general sense, this means that CAISO is responsible for keeping the lights on. To do this, the CAISO operates and maintains a network of transmission lines needed to get power to load centers, acts as a clearinghouse for thousands of market transactions every day, and operates competitive markets to ensure reliability of the

grid. The CAISO also plays a critical role with respect to renewable energy resources by helping provide these resources with access to the grid and markets.

In order for the CAISO to meet its statutory responsibilities, critical infrastructure must be in place when and where it is needed. This means that, although the CAISO serves as an independent evaluator of transmission projects, it is not indifferent to which projects are approved by the Commission. On the contrary, because Commission decisions on transmission projects have a direct impact on the CAISO's ability to "ensure efficient and reliable operation of the transmission grid," the CAISO has a significant interest in ensuring that needed infrastructure projects are approved by the Commission. Thus, the CAISO has a significant interest in the outcome of this proceeding.

Ensuring that needed infrastructure is in place requires both short- and long-term planning. In particular, orderly and efficient long-term transmission planning is essential to ensuring electric reliability, minimizing energy costs, and meeting RPS requirements. Having said this, long-term transmission planning is not an exact science. Planners must necessarily make "judgment calls" regarding the inputs and assumptions used to determine the need, timing, and benefits associated with new infrastructure investments. To be sure, the stakes are high – approving projects that are not needed could raise costs to ratepayers while failing to approve a project needed for reliability could lead to severe consequences with respect to the availability and quality of supply. To better ensure the correct decision is made in this case, the CAISO has taken a conservative approach in its evaluation of Sunrise. Notwithstanding this conservative approach, the CAISO's analysis demonstrates a need for Sunrise and identifies significant net benefits to be realized from Commission approval of the project.

Ensuring reliability in SDG&E's service area poses unique challenges. Much like California's other investor-owned utilities, SDG&E is a net importer of power which means that

transmission infrastructure is crucial to SDG&E meeting its customers' energy needs. Unlike California's other utilities, however, SDG&E has only a single 500 kV transmission line – the Southwest Power Link (“SWPL”) – for importing power into its service area.<sup>1</sup> The CAISO has been studying ways to expand the transmission system to increase the import capability into SDG&E's service area (as well as other areas in Southern California) for several years and, along with other stakeholders, began looking at prototypes of what would become Sunrise, in addition to alternatives to the project, as part of the Southwest Transmission Expansion Plan (“STEP”) group, which was formed in 2002.<sup>2</sup>

In early 2006, the CAISO South Regional Transmission Plan Group (“SRTP”) was formed under the umbrella of the STEP group to specifically study Sunrise, along with transmission projects associated with Tehachapi wind development and the Lake Elsinore Advanced Pumped Storage (“LEAPS”) project.<sup>3</sup> The SRTP group concluded that Sunrise would meet SDG&E's reliability needs beginning in 2010, provide net economic benefits, and facilitate compliance by SDG&E and other load-serving entities with RPS requirements.<sup>4</sup> In August 2006, the CAISO Board of Governors approved Sunrise confirming the conclusions reached by the SRTP group and finding that Sunrise is a necessary and cost-effective upgrade to the transmission network that will also facilitate compliance with RPS requirements.<sup>5</sup>

Over the course of this proceeding, the CAISO continued its evaluation of Sunrise and possible alternatives to the project. As part of this process, the CAISO brought together members of the CAISO staff and outside experts that had *not* previously worked on the SRTP process to conduct a comprehensive review of the SRTP analysis and independently determine

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<sup>1</sup> CAISO Ex. I-1 at 5.

<sup>2</sup> CAISO Ex. I-6 at 6-7.

<sup>3</sup> CAISO Ex. I-1 at 6.

<sup>4</sup> CAISO Ex. I-1 at 6-7.

<sup>5</sup> SDG&E, Ex. SD-5 at II-11.

the need for Sunrise, and the benefits to be expected from the project.<sup>6</sup> As a result of this review, the CAISO made several modifications to the inputs and assumptions used in its models based on new, updated, information and input from intervenors. In addition to revising certain inputs and assumptions, the CAISO evaluated more than 60 alternative scenarios proposed by intervenors, the Commission's Energy Division, and the Commission's environmental consultants – and ran more than 80 models analyzing the reliability and economic impacts associated with these alternatives.<sup>7</sup> The level of scrutiny applied to Sunrise in this proceeding has been unprecedented, providing the Commission with an independent and comprehensive record demonstrating the need for, and the benefits to be realized from, the project.

As the CAISO's testimony demonstrates, the relative benefits of Sunrise have changed as inputs and assumptions have been modified. However, even with these changes, the fundamental conclusion that Sunrise will provide net economic benefits and is the superior long-term solution to meeting SDG&E's reliability needs has not changed. *Specifically, using conservative assumptions, the CAISO expects Sunrise to produce levelized net benefits of at least \$52 million per year.*<sup>8</sup> Moreover, depending on the actual cost of certain renewable resources and the status of certain long transmission lines,<sup>9</sup> these benefits could reach *\$226 million per year.*<sup>10</sup>

In addition to these benefits, Sunrise will provide much-needed long-term improvement to California's aging transmission infrastructure, options for future expansion of import capabilities and strategic interconnections, facilitate the replacement of aging power plants, and

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<sup>6</sup> CAISO Ex. I-6 at 6.

<sup>7</sup> By the end of March, 2007, the CAISO had produced 39 intervener alternative model runs, 24 of which were described in Part III of the Initial Testimony. The CAISO presented the results of 14 more model runs in the Part IV Testimony, and the results of another 9 model runs were provided in Part V. In addition, the CAISO prepared its own base case and compared those results to a Sunrise case, LEAPS + TE/VS + Green Path North and South Bay Replacement in Parts I, II and the Rebuttal Testimony, as well as presenting the results of these scenarios in Part V.

<sup>8</sup> CAISO Ex. I-5 at 83 (Table 49)

<sup>9</sup> See CAISO Ex. I-6 at 43-45.

provide insurance against unexpected increases in load growth.<sup>11</sup> While these benefits may not be quantifiable, they are nevertheless real and important considerations.

Equally important, Sunrise will help provide access to renewable resources being developed in the Imperial Valley area. Access to these resources – many of which may not be developed if Sunrise is not built – will be critical if SDG&E is to meet upcoming RPS obligations and future greenhouse gas emission limits. Absent new transmission infrastructure, SDG&E may not be able to meet the goals set out in these two important State policies.

The timing of Sunrise has engendered considerable controversy in this proceeding, spurred on by intervener arguments that a delay in the in-service date of the project will produce savings for the ratepayers. The CAISO would caution the Commission that attempting to predict the exact date upon which a transmission line will produce the highest economic benefits could have serious consequences for ratepayers that far exceed any perceived ratepayer savings. Calculating the full economic benefits of a transmission line with a life expectancy of forty years or more involves making long-term assumptions that are difficult to accurately develop using short-term planning information. Furthermore, depending on the assumptions used in the analysis, the range of marginal yearly benefits will be a very small portion of the total costs of the project and will actually have very little impact on ratepayers one way or the other. In a worst case scenario, the cost of advancing a project a few years before its “optimal” least cost implementation date (if the assumptions are conservative) will not have a significant impact when compared to the risks associated with grid reliability if the project is not placed in service on time or potential routes disappear altogether. Finally, the costs of renewable energy procurement have been increasing in real dollars over the last several years. This assumption

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<sup>10</sup> CAISO Ex. I-5 at 83 (Table 49).

<sup>11</sup> CAISO Ex I-1 at 52.

was not included in the CAISO's conservative assumptions and building Sunrise sooner mitigates a portion of this cost increase risk as well.

The CAISO strongly supports Commission approval of Sunrise because, on a head-to-head basis, the project provides greater net benefits than any of the proposed alternatives evaluated in this proceeding, is needed to address SDG&E's long-term reliability needs, and will increase access to much needed renewable energy resources. Long-term needs have been identified in this proceeding and, based on its analysis, the CAISO believes that Sunrise is a critical component in addressing these needs.

## **II. PROCEDURAL HISTORY**

### Overview

From the standpoint of the Commission and most other parties, this proceeding was initiated when SDG&E filed its initial CPCN application in December 2005.<sup>12</sup> However, the CAISO had been studying SDG&E's reliability needs and ways to meet those needs for several years prior to SDG&E first seeking a CPCN for Sunrise. Thus, the CAISO has a long-standing appreciation of SDG&E's long-term reliability needs and the challenges inherent in trying to meet those needs.

Since SDG&E filed its amended CPCN application and this docket was initiated, the CAISO's role has been unique relative to other transmission proceedings before the Commission and continuously evolving. In response to various rulings, discovery requests, and discussions with Commission staff, the CAISO submitted over 400 pages of testimony. This testimony not only demonstrates the need for, and benefits to be realized from, Sunrise, but includes the results of the CAISO's evaluation of over 60 proposed alternatives to Sunrise and more than 80 models analyzing the reliability and economic impacts associated with these alternatives. In effect, the

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<sup>12</sup> San Diego Gas and Electric Co., A.05-12-014 (December 16, 2005).

CAISO has served as an independent and transparent “clearing house” for project alternatives – dedicating substantial time and resources to ensure the record in this proceeding is full and complete. The net result has been a level of scrutiny applied to Sunrise that, to the best of the CAISO’s knowledge, is unprecedented in both scope and detail. Given the scope and detail of its analysis, the CAISO is confident that the need for Sunrise has been shown and approval of the project is warranted.

STEP & CSRTP

The CAISO and other interested parties have been involved with transmission planning for southern California and the regional southwest since the formation of the STEP group in 2002.<sup>13</sup> As part of the STEP process, infrastructure additions – including a Sunrise “prototype” and the LEAPs project – were examined for purposes of meeting southern California’s long term reliability needs.<sup>14</sup>

For the specific purpose of this proceeding, CSRTP was the process initially used by the CAISO to evaluate Sunrise. As described in the CSRTP report, the CAISO’s analysis of Sunrise was done in conjunction with the evaluation of the LEAPS project and the Tehachapi transmission line.<sup>15</sup> With respect to Sunrise, the CSRTP report concluded that Sunrise would meet SDG&E’s reliability need beginning in 2010, provide net economic benefits, and facilitate RPS compliance.<sup>16</sup> In August 2006, just prior to SDG&E filing its amended CPCN application in this proceeding, the CAISO Board approved Sunrise, confirming the conclusions reached by the CSRTP group.<sup>17</sup>

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<sup>13</sup> CAISO Ex. I-6 at 6-7

<sup>14</sup> CAISO Ex I-6 at 7

<sup>15</sup> See Appendix I-1 to SDG&E’s Amended Application.

<sup>16</sup> CAISO, Ex. I-1 at 6-7.

<sup>17</sup> CAISO Ex. I-6 at 6-7; see also Amended Application at 6.

The basic analytical approach used by the CAISO in assessing the benefits of Sunrise is described in the CSRTP Report and did not change throughout the course of its post-CSRTP evaluation of the project. To evaluate reliability impacts and benefits of both Sunrise and alternatives to the project, the CAISO performed power flow studies of the grid under normal conditions, transient stability studies of the grid's ability to absorb the initial electric shock of the loss of one or more elements, and post-transient studies of the grid's electrical sustainability after absorbing the initial shock of a contingency.<sup>18</sup> For calculating net economic benefits, the CAISO used the Transmission Economic Assessment Methodology ("TEAM") approach as directed by the Commission.<sup>19</sup> Specifically, the TEAM approach was used to find a resource plan that would minimize the expected electricity expenditures paid by CAISO consumers over the forecast period, subject to the following constraints: (a) CAISO and Western Electricity Coordinating Council ("WECC") reliability standards; and (b) compliance with mandated RPS targets of 20% by 2010 and 33% by 2020.<sup>20</sup>

As a general matter, the TEAM approach captures the economic benefits of a project from the standpoint of consumers, producers, and transmission owners – based on nodal market prices and an assumed producer bidding strategy. These nodal prices reflect a constrained least cost dispatch in a network model of the WECC grid, subject to generation and transmission capacity and the laws of physics that govern power flows, solved by a constrained optimal dispatch algorithm.<sup>21</sup>

Although the analytical approach employed in the CSRTP process did not change during the CAISO's post-CSRTP evaluation of Sunrise, as described below certain planning

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<sup>18</sup> CAISO Ex. I-1 at 12.

<sup>19</sup> *San Diego Gas and Electric, Co.*, A.05-12-014 Assigned Commissioner's Ruling (July 5, 2006).

<sup>20</sup> CAISO Ex. I-1 at 14.

<sup>21</sup> Both the CAISO and SDG&E used the Gridview production cost model to solve this constrained optimization problem. CAISO Ex. I-1 at 13, 16; *see also* Ex. S-31.

assumptions and inputs were revised during the CAISO's Phase 1 analysis of the project. These changes, however, did not change the fundamental conclusion that Sunrise will provide net economic benefits, is needed to meet SDG&E's reliability needs, and will increase access to much needed renewable energy resources.

Overview of Phase 1 Testimony

In the November 1, 2006 Assigned Commissioner and Administrative Law Judge's Scoping Memo and Ruling ("Scoping Memo"), the Commission acknowledged the CSRTP's findings, but nevertheless found that additional analysis was necessary before the Commission would make a determination on the need for Sunrise.<sup>22</sup> Specifically, the Commission directed the CAISO to submit testimony that evaluated non-wires alternatives, analyzed the interdependencies of Sunrise, Tehachapi and LEAPS, and evaluated non-generation alternatives proposed by the Utility Consumers Action Network ("UCAN") in its prehearing statement.<sup>23</sup> A process was also set-up to allow other intervenors to submit potential alternatives to Sunrise to the CAISO for evaluation.<sup>24</sup>

UCAN, Ranchos Penasquitos Concerned Citizens ("RPCC"), the South Bay Replacement Project ("SBRP"), Mussey Grade Road Alliance ("Mussey Grade"), and the Nevada Hydro Company ("TNHC") each submitted proposed alternatives to Sunrise. The Commission's Energy Division and the Aspen Environmental Group ("Aspen") also presented alternatives to the CAISO for analysis. Ultimately, a list of 101 additional studies (46 economic and 55 reliability) was compiled based on proposed alternatives submitted to the CAISO by intervenors, the Energy Division, and Aspen. From this list, the CAISO evaluated more than 60 proposed

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<sup>22</sup> Scoping Memo at 7.

<sup>23</sup> Scoping Memo at 11-12.

<sup>24</sup> Scoping Memo at 1, *see also* November 27, 2006 Ruling at 2.

alternatives to Sunrise and ran more than 80 models analyzing the reliability and economic impacts of these alternatives.

As part of the CAISO's participation in this proceeding, CAISO witnesses Robert Sparks and Dr. Ren Orans were tasked with conducting a comprehensive and independent assessment of the CRTSP process and developing Phase 1 testimony, which included an evaluation of proposed project alternatives.<sup>25</sup> Neither Mr. Sparks nor Dr. Orans had been involved in developing the CSRTP Report; thus, they were able to evaluate the CSRTP process through a truly independent and critical lens. With respect to the CAISO's Phase 1 testimony, their analysis was consistent with the TEAM approach adopted by the Commission in Decision 06-11-018.<sup>26</sup>

*Initial Testimony, Part I*

The CAISO submitted its Initial Testimony, Part I on January 26, 2007. Substantively, the Part I testimony evaluated the CAISO Base Case; the Base Case plus Sunrise; the Base Case plus the replacement of the South Bay power plant ("South Bay Replacement"); and the Base Case plus the Green Path North transmission project, LEAPS and the Talega-Escondido/Valley-Serrano ("TE/VS") transmission project.<sup>27</sup>

The Part 1 testimony also addressed the results of Mr. Sparks' and Dr. Orans' evaluation of the CSRTP process. Specifically, Dr. Orans and Mr. Sparks assessed whether the TEAM approach had been correctly applied in the CSRTP process.<sup>28</sup> As part of this assessment, interviews were conducted with the analysts who had participated in CSRTP process, the CAISO department of market analysis, and a member of the CAISO Market Surveillance Committee.<sup>29</sup> Dr. Orans also reviewed the CSRTP Report, the assumptions documents supporting the report,

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<sup>25</sup> CAISO Ex. I-6 at 6

<sup>26</sup> See *infra* Section III.

<sup>27</sup> Motion for Extension at 7. As explained in the CAISO Rebuttal Testimony, these scenarios were requested by the Energy Division during the informal discussions that led up to the Motion for Extension (Ex. I-6 at 50).

<sup>28</sup> CAISO/Orans, Tr. at 2572.

<sup>29</sup> CAISO/Sparks, Tr. at 2165.

and CPUC background materials.<sup>30</sup> Based on his initial assessment, Dr. Orans found that the methodology used in the CSRTP process to provide the economic analysis of Sunrise appeared to be “fairly standard.”<sup>31</sup> Dr. Orans, however, did find that adjustments to certain CSRTP inputs and assumptions were necessary.<sup>32</sup>

As a result of Dr. Orans’ analysis, the Part I testimony contained adjustments to some of the input assumptions used in the CSRTP process for analyzing the base case and project alternatives.<sup>33</sup> Based on this updated analysis, the CAISO determined that Sunrise would produce an \$87 million reduction in electricity costs for CAISO consumers. This represented the largest net benefit among the four alternatives evaluated in the Part I testimony. The testimony also noted that Dr. Orans would be submitting supplemental testimony offering his independent review of the reasonableness of these findings.<sup>34</sup>

### *Initial Testimony, Part II*

A workshop was held after the CAISO submitted its Part 1 testimony to allow intervenors an opportunity to ask questions regarding the CAISO’s testimony and propose revisions to the study assumptions and inputs used by the CAISO. Based in part on comments from interveners and updated information provided by SDG&E, the CAISO’s Initial Testimony, Part II contained additional adjustments to its analysis of Sunrise and project alternatives.

Specifically, following the workshop, the CAISO identified 10-12 issues with the Seams Steering Group- Western Interconnection (“SSG-WI”) database that it believed could affect its analysis. In light of these issues, the CAISO undertook a complete review of the SSG-WI database. As part of this review, the CAISO examined the evolution of the root database, using

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<sup>30</sup> CAISO/Orans, Tr. at 2572.

<sup>31</sup> CAISO/Orans, Tr. at 2572-73.

<sup>32</sup> CAISO/Orans, Tr. 2572-2576; *see also* CAISO Ex. I-1 at 5, 30; Tables 4.1 and 5.1. At the time of this initial assessment, the reliability models used in the CSRTP process raised less concern and the models were used to evaluate alternative scenarios and provide updated reliability results. CAISO/Sparks Tr. at 2165.

<sup>33</sup> CAISO Ex.I-1at 30 (Table 5.1), 33 (Table 5.2).

documents available on the WECC website<sup>35</sup> and interviews with various WECC staff. The CAISO's goals were to determine the plausibility of assumptions contained in the database for purposes of inclusion in the modified database that the CAISO would use for its analysis in this proceeding.<sup>36</sup> Dr. Orans described the criteria for his review of each of these assumptions as: "Could I testify that this is a reasonable input assumption and go from there?"<sup>37</sup> During this review, the CAISO also considered several input assumptions proposed by UCAN and adopted several UCAN changes where the CAISO believed that the changes improved the accuracy of the CAISO analysis.<sup>38</sup>

During cross-examination, Dr. Orans explained that getting the base case to be compliant with the RPS requirements (*i.e.*, 20% by 2010 and an assumed 26.5% for 2015) was probably the biggest change he made to the CAISO's analytical approach, followed by modifying gas price assumptions, and including combustion turbines ("CTs") rather than combined cycle gas turbines ("CCGTs") at Palo Verde.<sup>39</sup> These changes also embody the biggest differences between the CAISO and the SDG&E base cases.<sup>40</sup>

The Part II testimony was modified twice by Errata. These modifications include updating the Green Path North + LEAPS transmission costs;<sup>41</sup> reducing the amount of CTs avoided under the Green Path North + LEAPS scenario;<sup>42</sup> and modifying the reliability must run ("RMR") cost computation so that RMR operating costs vary directly with the RMR contract

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<sup>34</sup> CAISO, Ex. I-1 at 9-10

<sup>35</sup> In particular "Lessons from the 2015 SSG-WI Database." See CAISO Ex. I-7.

<sup>36</sup> Appendix A sets forth a non-exhaustive list of all Gridview assumptions used by the CAISO to develop the base case, including identification of the differences between the updated CAISO base case and SDG&E's base case. See CAISO Ex. I-2 at Appendix A. See also CAISO Ex. I-2 at 16 (Table 2.1).

<sup>37</sup> CAISO/Orans, Tr. at 2580-2585.

<sup>38</sup> See CAISO Ex. I-6 at 4.

<sup>39</sup> CAISO/Orans, Tr. at 2590.

<sup>40</sup> CAISO/Orans, Tr. at 2590-2592.

<sup>41</sup> CAISO Ex. I-2 at 46-49

<sup>42</sup> CAISO Ex. I-2 at 23

capacity levels.<sup>43</sup> After incorporating these modifications, the CAISO estimated the levelized net benefits of Sunrise to be \$84 million per year.<sup>44</sup> The CAISO found these net benefits to be greater than those provided by the South Bay Replacement project and Green Path North + LEAPS.<sup>45</sup>

*Initial Testimony, Part III and Part IV*

Part III and Part IV of the CAISO's Testimony sets forth the results of the CAISO's analysis of the alternative scenarios proposed by interveners and Aspen. These studies were not updated to reflect changed input assumptions reflected in the Rebuttal Testimony and the Part V testimony discussed below.<sup>46</sup>

*Initial Testimony, Part V*

Part V of the CAISO's Initial Testimony addresses alternative scenarios that were requested by the Energy Division. Aspen also requested that the CAISO analyze Aspen alternatives 1, 10 and 13 at 4200 MW of imports into the San Diego area (the previous reliability analysis had been run at 3000 MW).

Part V incorporated the assumption changes adopted in the Rebuttal Testimony described below. For cases involving the TE/VS transmission line, the CAISO revised its analysis to account for the impacts on RMR prices in the Los Angeles Basin ("LA Basin"). This modification required incorporation of LA Basin Resource Adequacy ("RA") into the base case but only for scenarios that showed a net change in the LA Basin.

Following the submission of Part V, Energy Division requested that the CAISO analysis be expanded and modified. Specifically, Energy Division asked the CAISO to extend the LA

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<sup>43</sup> CAISO Ex. I-2 at 27

<sup>44</sup> *Id.*, at 6.

<sup>45</sup> *Id.*, at 8.

<sup>46</sup> At the June 26, 2007 prehearing conference, counsel requested that the active parties advise the CAISO team if they wanted the results of their scenarios to be updated in the same way that the CAISO had modified its own base case and the three scenarios. No party requested such an update.

Basin locational capacity requirement (“LCR”) analysis into the base case for every scenario, even if there was no impact on the results. The CAISO was also requested to study LEAPS as merchant generation and to analyze the ancillary services benefits associated with the project. Finally, the CAISO was asked to present a summary table showing the net benefits of all of the Energy Division scenarios, as well as the CAISO base case and the three scenarios studied in Part II, using a consistent set of assumptions including the LA Basin cost information.

On July 12, 2007, the CAISO submitted Errata to both Part V and the Rebuttal testimony. These Errata made the following changes to both sets of testimony, reflected throughout the text and tables:

- Inclusion of LA Basin reliability costs, to reflect the refined analyses performed for the Energy Division. This includes recognition of the impact of: (1) LCR increases in the LA Basin from reductions in San Diego generation; and (2) LCR reductions allowed by the renewables.
- Refinement of the level of renewable generation in the Imperial Valley under the Green Path North scenario. The refinement results in about 74% of the Imperial Valley renewables identified for Sunrise being developed for Green Path North.
- Revision of the LEAPS scenario to treat the generator as merchant generation, rather than a transmission asset. The revision includes removal of the generator costs from the transmission costs and inclusion of a cost-based RMR payment for the generator.
- Refined LEAPS as a transmission scenario. The refinement reduces the transmission cost of LEAPS to net out the ancillary services and energy benefits of the plant. The refinement also assumes that LEAPS provides RMR capacity at zero cost (any capacity payment would be a transfer from San Diego to all TAC participants).

Table II-1 below shows the total levelized benefits for Sunrise and the main project alternatives analyzed by the CAISO as shown in the CAISO’s Part V testimony.

**Table II-1: Total Levelized Net Benefits (\$M/yr)<sup>47</sup>**

	A	B		C		D	E	F
Case	Transmission Cost (\$M/yr)	Total Benefits (\$M/yr)		Net Benefit (\$M/yr)				Source
		RPS Base Case	RPS Alt Case	RPS Base Case	RPS Alt Case			
1 Sunrise + South Bay Repower (ED7)	166	236	410	70	245			(Part V Errata, Table 34)
2 <b>Sunrise</b>	<b>157</b>	<b>209</b>	<b>383</b>	<b>52</b>	<b>226</b>			(Rebuttal, Table 6)
3 <b>TE/VS + LEAPS + Green Path</b>	<b>97</b>	<b>142</b>	<b>271</b>	<b>45</b>	<b>174</b>			(Rebuttal, Table 6)
4 Sunrise + South Bay Repower + Green Path (ED8)	196	230	404	34	208			(Part V Errata, Table 38)
5 <b>South Bay Repower</b>	<b>9</b>	<b>37</b>	<b>37</b>	<b>29</b>	<b>29</b>			(Rebuttal, Table 6)
6 TE/VS + Green Path (ED2)	97	125	255	28	158			(Part V Errata, Table 9)
7 Sunrise + Green Path (ED9)	188	206	380	18	193			(Part V Errata, Table 42)
8 Sunrise + TE/VS + LEAPS (ED5)	224	226	401	2	177			(Part V Errata, Table 24)
9 Sunrise + TE/VS (ED3)	224	207	382	(16)	158			(Part V Errata, Table 14)
10 <b>TE/VS + LEAPS</b>	<b>67</b>	<b>43</b>	<b>43</b>	<b>(23)</b>	<b>(23)</b>			(Part V Errata, Table 46)
11 Sunrise + TE/VS + LEAPS + Green Path (ED6)	254	221	396	(33)	142			(Part V Errata, Table 29)
12 TE/VS (ED1)	67	24	24	(42)	(42)			(Part V Errata, Table 4)
13 Sunrise + TE/VS + Green Path (ED4)	254	203	377	(51)	123			(Part V Errata, Table 19)

Note: “RPS Alt Case” represents a plausible alternative RPS scenario described in the Rebuttal Testimony with higher RPS benefits.

As shown in Table II-1, Sunrise has a levelized annual net benefit of between \$52 million and \$226 million depending on whether the RPS base case or RPS alternative case is used. These benefits are greater than the net benefits associated with the South Bay Replacement project and any combination of LEAPS, Green Path North and TE/VS. The only scenario that the CAISO modeled that shows greater net benefits than Sunrise alone, is Sunrise plus the South Bay Replacement project. Such greater benefits, however, are contingent on Sunrise being in-service and would not be realized by the South Bay Replacement project on a stand alone basis.

Rebuttal Testimony

As was the case with the Part II testimony and Errata, the CAISO Rebuttal Testimony contained modifications to the CAISO’s assumptions and evaluation based on testimony filed by

<sup>47</sup> CAISO Ex. I-5 at 83 (Table 49). As discussed below, Columns B and D reflect the benefits produced at the low end of a range of plausible RPS procurement costs and Columns C and E reflect the benefits resulting from the high end of the range.

the interveners. In particular, the CAISO accepted UCAN's suggestion that \$27/kW-yr be used as the floor for RA payments, as well as UCAN's recommended discount rate of 8.23%.<sup>48</sup> The CAISO also agreed with UCAN that a decrease in local RA obligations would increase non-local RA, and increased non-local RA requirements by 660 MW. These three adjustments had the effect of reducing the levelized annual benefits of Sunrise.<sup>49</sup>

In addition, the CAISO accepted a general recommendation made by the Division of Ratepayer Advocates ("DRA") that the RPS benefit estimation should exclude non-CAISO customers. Excluding RPS benefits from non-TAC paying customers from the CAISO's RPS analysis reduced the estimated net benefits of Sunrise.<sup>50</sup> The CAISO agreed that Advanced Metering Infrastructure ("AMI"), demand response, and planned new generation should be part of an LCR determination and updated its calculations accordingly. In reassessing its LCR analysis, however, the CAISO also found that the San Diego loads are growing faster than initially anticipated, as evidenced by the latest California Energy Commission ("CEC") staff forecast.<sup>51</sup>

In addition to items discussed above, the Errata to the rebuttal testimony corrected capacity losses for the South Bay Replacement case, corrected the \$27/kW-yr floor price to be in 2006 dollars instead of 2010 dollars, corrected the calculation of CT costs in the base case to be consistent with the assumption that new CTs continue to receive capacity payments once built,<sup>52</sup> and corrected the CAISO's LCR analysis by including loss-adjusted AMI data.<sup>53</sup>

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<sup>48</sup> CAISO Ex. I-6 at 15-16.

<sup>49</sup> CAISO Ex. I-6 at 25-27.

<sup>50</sup> CAISO Ex. I-6 at 35-37.

<sup>51</sup> CAISO Ex. I-6 at 30.

<sup>52</sup> San Diego LCR declines in 2011. The original analysis held the in-area RMR capacity of existing generators constant and reduced the CT capacity needed in 2011. The corrected analysis holds the CT capacity at the higher 2010 level, and temporarily reduces the amount of existing generation capacity under RMR contracts in 2011.

<sup>53</sup> See CAISO Ex. I-6 at 39. The results of the CAISO's LCR analysis is also reproduced *infra* as Table V-1.

### Summary

The CAISO analysis of the Sunrise and alternatives to the project evolved as part of its review and reassessment of the CSRTP results. Each modification reflects the CAISO's desire to develop plausible and conservative assumptions providing a reasonable basis for evaluation of Sunrise. As noted above, the CAISO's guiding principle with respect to the inputs and assumptions used in its analysis was:

*Could I testify that is a reasonable input assumption?*

The answer is yes. In applying this principle, many of the modifications adopted by the CAISO ultimately served to reduce the benefits of Sunrise. Nevertheless, as shown in Table II-1 above, the CAISO's updated analysis demonstrates that Sunrise will provide net benefits that are greater than the net benefits that would be provided by the project alternatives evaluated by the CAISO.

With respect to the individual parts of the CAISO's testimony, the tables in the CAISO's Part V and Rebuttal Testimony contain the updated results of the CAISO's analysis and should be relied upon by the Commission in making a decision in this proceeding. The Part III and IV studies, to the extent they are based on assumptions that have not been updated, should be viewed as sensitivity runs for informational purposes only. Parts I and II provide textual context for the CAISO evaluation.

### **III. STANDARD OF REVIEW**

On November 9, 2006, the Commission issued Decision 06-11-018. In that decision, the Commission approved and adopted many aspects of the CAISO's TEAM approach and established a rebuttable presumption in favor of the CAISO's economic evaluations in a CPCN proceeding when certain conditions are met. Specifically, the Commission concluded that, with safeguards in place to protect the public interest and meet the Commission's statutory standards,

a CAISO Board-approved economic evaluation will be given deference. As a result, parties opposing a transmission project would have the burden of demonstrating either that (1) the CAISO Board-approved evaluation does not comply with the economic principles adopted in Decision 06-11-018; or (2) the project is not cost-effective.<sup>54</sup>

The safeguards established in Decision 06-11-018 are as follows:

- (1) The CAISO must sponsor at least two public participation meetings, with opportunities for public comment, both early in the assessment process and after the draft evaluation is available, but before it is submitted to the CAISO Board;
- (2) The final evaluation must include reasoned responses to all public comments;
- (3) The public process must provide sufficient time for the parties to review and comment on the draft evaluation;
- (4) The final evaluation must meet all of the requirements of Decision 06-11-018 and find that the project promotes economic efficiency “in that it constitutes a cost effective upgrade to the CAISO Controlled Grid based on clearly defined information, assumptions, and weighting or combination of the relevant benefit-cost ratios and other economic criteria, including (but not limited to) difficult to quantify economic benefits, such as system operational benefits.”<sup>55</sup>

In addition, the CAISO must submit the Board-approved evaluation in time for the analysis to be included in the scope of the CPCN proceeding, update outdated or inaccurate facts, and become a party to the Commission proceeding.<sup>56</sup> Finally, the Commission held that the rebuttable presumption granted would not apply to CPCN applications filed prior to the effective date of the Decision, unless the economic analysis complies with the safeguards and requirements set forth above, and the assigned commissioner elects to apply it to the particular application.<sup>57</sup>

Pursuant to Decision 06-11-018, a rebuttable presumption in favor of the CAISO’s evaluation cannot be triggered in this case absent an affirmative election by the assigned

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<sup>54</sup> Decision 06-11-018, mimeo at 23.

<sup>55</sup> Decision 06-11-018, mimeo at 23-24.

<sup>56</sup> Decision 06-11-018, mimeo at 24-25.

<sup>57</sup> Decision 06-11-018, mimeo at 26.

commissioner. However, the admitted lack of technical compliance with the precepts of Decision 06-11-018 should not preclude the Commission from granting the CAISO's conclusions substantial deference. Granting such deference would be consistent not only with the rationale underlying Decision 06-11-018, but also with the reality that the CAISO has functionally complied with the safeguards adopted by the Commission in that decision.

The fundamental point of Decision 06-11-018 is to ensure that the CAISO process is open and transparent, and that its analysis be consistent with the methodological guidelines acceptable to the Commission. Each of the factors has been met with respect to the CAISO's analysis in this proceeding. From a process standpoint, the CAISO held numerous public meetings and "open houses" prior to the issuance of the CSRTP Report, collaboratively developed scenario alternatives with intervenors in November and December 2006, and participated in a workshop after submission of its Part 1 testimony in which study assumptions were presented and debated. Recommended changes in study assumptions and inputs have been either adopted or addressed in the CAISO's testimony. In fact, intervenor recommendations led to revisions in the CAISO's analysis, which was continually revised and updated following additional workshops. In this regard, the CAISO has, consistent with Decision 06-11-018, continuously updated its studies through the use of Errata to revise outdated or inaccurate information. With respect to the CAISO's methodological approach, the CAISO's economic evaluation has *strictly* followed the TEAM approach as described in Part 1 of the CAISO's testimony and addressed repeatedly throughout the other parts of its testimony.

The foregoing demonstrates that the CAISO has conducted an open, transparent, and technically sound analysis of Sunrise under the auspices of this CPCN proceeding. Through the Commission's process and the independent efforts of the CAISO, intervenors and interested parties have been accorded the opportunity to actively participate in, and closely scrutinize, the

CAISO's evaluation of Sunrise. Accordingly, the results of the CAISO's analysis of Sunrise should be given great weight and substantial deference, establishing that the project is necessary as a cost-effective addition to the transmission grid. In stark contrast, the record demonstrates that intervenors have failed to marshal evidence to rebut the conclusions reached by the CAISO or otherwise overcome the deference warranted by Decision 06-11-018.

#### **IV. PROJECT DESCRIPTION AND SCOPE**

The Sunrise plan of service that was studied by the CSRTP group and modeled in the CAISO's reliability and economic analysis consists of the following facilities:

- A 500 kV transmission line from the Imperial Valley (IV) Substation to a new Imperial Irrigation District (IID)-owned San Felipe substation.
- A 500 kV transmission line from the San Felipe Substation to a new SDG&E-owned Central Substation in central San Diego county.
- A double circuit 230 kV transmission line from Central Substation to the existing Sycamore Canyon Substation.
- A 230 kV transmission line from Sycamore Canyon Substation to Penasquitos Substation.
- A 3<sup>rd</sup> San Luis Rey 230/69 kV transformer.
- Re-conductor of the Sycamore Canyon- Elliott 69 kV line.
- A total of 240 MVAR reactive support at Central, San Luis Rey and South Bay substations.<sup>58</sup>

The CAISO was asked to study many different plan of service configurations and these variations are described in detail in other sections of this brief. However, references in this brief to "Sunrise" are to the plan of service described above.

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<sup>58</sup> CSRTP Report, pp. 3-4. *See also* Ex. SD-5 (SDG&E Vol. II, Chapter II).

## V. NEED FOR THE PROJECT

### A. Analytical Baseline

Table V-1 below illustrates SDG&E's LCR for the years 2008 through 2020.<sup>59</sup> As shown in the table, a capacity deficiency is expected to occur in 2010 and continue through the remainder of the decade. As discussed in more detail below, in creating an analytical baseline for evaluating Sunrise, the CAISO considered the CEC's May 2007 forecast of peak demand for 2008 (adjusted going forward based on historical load growth), demand reduction programs, new resource additions, and line losses. The resulting resource deficiency represents the amount of capacity – whether procured via new transmission, in-area generation, or load/demand reduction – that is needed for SDG&E to meet the CAISO's grid planning criteria.

**Table V-1: San Diego Locational Capacity Requirement**<sup>60</sup>

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Reference
<b>Load Forecast</b>														
1 1 in 10 CEC Forecast	4999	5084	5170	5258	5348	5439	5531	5625	5721	5818	5917	6017	6120	CEC-200-2007-006
2 -CA Solar Initiative	2	6	10	25	60	100	130	150	150	150	150	150	150	SDGE testimony 1/26/07
3 -Celerity(Demand Response)	20	20	20	20	20	20	20	20	20	20	20	20	20	SDGE testimony 1/26/07
4 -Comverge(Demand Response)	9	9	9	9	9	9	9	9	9	9	9	9	9	SDGE testimony 1/26/07
5 -EnerNOC(Demand Response)	30	30	30	30	30	30	30	30	30	30	30	30	30	
6 -AMI(Demand Response)	0	47.07	88.9	194	203	213	218	223	229	234	240	246	252	SDGE data response
7 Net 1 in 10 Load Forecast	4938	4972	5012	4980	5025	5067	5124	5193	5283	5375	5468	5563	5659	
<b>Generation</b>														
8 2008 Posted NQC	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	Net Qualifying Capacity Values and LCR for Compliance Year 2008 - Corrections as of 30-May-2007
9 +SDCWA - Rancho Penasquitos	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	SDGE testimony 8/4/06
10 +Bull Moose (Biomass)		20	20	20	20	20	20	20	20	20	20	20	20	SDGE testimony 8/4/06
11 +Otay Mesa Combined Cycle		561	561	561	561	561	561	561	561	561	561	561	561	CEC website
12 +Lake Hodges Pump Storage Hydro	40	40	40	40	40	40	40	40	40	40	40	40	40	ISO Queue
13 +J Power (Pala)	94	94	94	94	94	94	94	94	94	94	94	94	94	2008 SDGE contract info
14 +Wellhead Power Margarita	44	44	44	44	44	44	44	44	44	44	44	44	44	2008 SDGE contract info
15 +Palomar inlet air chiller			20	20	20	20	20	20	20	20	20	20	20	
16 -South Bay Retirement			-702	-702	-702	-702	-702	-702	-702	-702	-702	-702	-702	
17 Total Generation	3100	3681	2999	2999	2999	2999	2999	2999	2999	2999	2999	2999	2999	
<b>Locational Capacity Requirement</b>														
18 Largest G-1	541.5	561	561	561	561	561	561	561	561	561	561	561	561	Table 5.1 ISO testimony 4/20/07 (Reference case vs N-1)
19 Loss Adjustment (Note 2)	58	58	58	58	58	58	58	58	58	58	58	58	58	
20 Import Capacity Need (Load-Gen)	2438	1910	2633	2600	2646	2687	2744	2813	2903	2995	3088	3183	3279	
21 Import Capacity Limit	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	
22 Surplus (Deficiency)	62	590	(133)	(100)	(146)	(187)	(244)	(313)	(403)	(495)	(588)	(683)	(779)	

Note 1: Sunrise Powerlink or alternative transmission projects are not considered in this table

Note 2: Loss adjustment needed to reflect N-1/G-1 condition

In determining whether Sunrise is the best project to meet this LCR, the CAISO evaluated the project relative to alternatives identified during the course of this proceeding.

<sup>59</sup> Local capacity requirements in the San Diego area are set so that during the outage of the largest generating unit followed by worst single transmission line outage all load in the San Diego area can be reliably served.

Based on the CAISO's evaluation, Sunrise will provide greater net benefits than these alternatives.

### **1. Analysis Period**

In determining the need for Sunrise, the CAISO considered SDG&E's LCR through the year 2020. For purposes of comparing Sunrise to various alternatives for meeting the LCR, reliability costs and benefits were calculated for the years 2015 and 2020, and then levelized over 40 years to be comparable to the life of transmission projects.<sup>61</sup>

### **2. Consistency with Prior Rulings and Decisions**

As noted above, the Scoping Memo directed the CAISO to evaluate non-wires alternatives to Sunrise, provide additional analysis related to LEAPS, and evaluate non-generation alternatives proposed by UCAN in its prehearing statement.<sup>62</sup> In addition, a July 5, 2006 Assigned Commissioner's Ruling, directed the CAISO to calculate net economic benefits using the TEAM approach.<sup>63</sup> As discussed herein, the CAISO performed the additional analysis and evaluation requested in the Scoping Memo and has followed the TEAM approach in its economic analysis.

### **3. Energy Efficiency, Demand Response, and Onsite Generation Additions**

Energy efficiency, demand response and onsite generation additions were fully considered by the CAISO in determining SDG&E's LCR. Reductions in the load forecast resulting from energy efficiency are included in the CEC forecast used by the CAISO. Thus, although Table V-1 does not show a specific line item for energy efficiency, energy efficiency has been taken into account. Specific line items are, however, shown for on-site generation related to the California Solar Initiative, as well as three different demand response programs

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<sup>60</sup> CAISO Ex. I-6 at 39 (Table 5).

<sup>61</sup> CAISO Ex. I-2 at 24.

(Celerity, Comverge, and EnerNOC).<sup>64</sup> In addition, AMI was treated as a demand response program for the purposes of the CAISO's analysis.<sup>65</sup> The net effect of these programs is to reduce the growth adjusted CEC 1-in-10 extreme weather peak demand by 158 MW in 2010 and 461 MW in 2020.<sup>66</sup>

#### 4. Generation and Transmission Additions

Line 8 of Table V-1 represents the net qualifying capacity ("NQC") of generation expected to be in operation in 2008, kept constant through 2020 but offset by the expected retirement of the existing South Bay power plant ("South Bay") beginning in 2010.<sup>67</sup> Given the age and condition of other existing generation located in SDG&E's area, assuming only the retirement of South Bay in 2010 and otherwise keeping the 2008 NQC constant through 2020 represents a *very conservative* approach in calculating total generation over the analysis period and, as a result, a conservative forecast of SDG&E's LCR. For instance, DRA Witness Woodruff testified that the Commission should assume that 1,822 MW of local generation formerly owned by SDG&E will be retired by 2020.<sup>68</sup> Although the actual date of retirements cannot be known with exact precision, for planning purpose DRA clearly expects there to be 1120 MW less generation in the San Diego area by 2020 than assumed by the CAISO. The 1120 MW is about the equivalent import capability of Sunrise. Although the CAISO did not include these additional retirements in its LCR analysis, it does not disagree with DRA that such retirements will likely occur, which, when they occur, will increase SDG&E's LCR needs.<sup>69</sup>

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<sup>62</sup> Scoping Memo at 11-12.

<sup>63</sup> Assigned Commissioner's Ruling (July 5, 2006).

<sup>64</sup> CAISO Ex. I-2 at 39-40. Table V-1 reflects demand reduction amounts supported by DRA.

<sup>65</sup> CAISO, Ex. I-2 at 40-41. The CAISO adopted the AMI peak load reduction assumptions provided by SDG&E, adjusted upward for 5.86% distribution losses and 2.68% transmission losses.

<sup>66</sup> CAISO Ex. I-2 at 39.

<sup>67</sup> See Table V-1, line 16.

<sup>68</sup> DRA Ex. D-66 at 50.

<sup>69</sup> The CAISO does, however, disagree with DRA's assumption that, for planning purposes, retirements should be considered to occur in 182 MW increments starting in 2011. See DRA/Woodruff, Tr. at 2715:18-2718:6.

Lines 9 through 15 of Table V-1 represent new resources expected to come into operation over the next few years, based on resource procurement information for SDG&E.<sup>70</sup>

## **5. Load Growth Scenarios**

The load forecast shown at line 1 of Table V-1 is based on the CEC's San Diego area 1-in-10 year extreme weather peak demand for 2008. Starting from the San Diego area peak demand for 2008, the CAISO then adjusted the forecast for each year through 2020 to reflect historical load growth in the San Diego area between 2006 and 2008 to be about 1.7% per year.<sup>71</sup>

### **B. Project costs**

#### **1. Cost Estimates**

SDG&E identified the cost of Sunrise to be \$1.265 billion.<sup>72</sup> During the hearings, SDG&E witnesses were questioned as to the reasonableness of the cost number and confirmed that its estimate of the cost of the project has not changed:

Q [ALJ Weissman] But you continue to stand by this cost estimate as being the most current and reliable estimate?

A [SDG&E/Avery] Yes, we do.<sup>73</sup>

In its analysis of the project, the CAISO assumes a cost of \$1.265 billion. Based on the statements of SDG&E, the CAISO believes this amount is the appropriate cost to use for evaluation purposes.

#### **2. Cost Cap**

Public Utilities Code section 1005.5(a) provides that:

Whenever the [C]ommission issues to an electrical or gas corporation a certificate authorizing the new construction of any addition to or extension of the corporation's plant estimated to cost greater than fifty million dollars (\$50,000,000), the [C]ommission

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<sup>70</sup> See also CAISO Ex. I-6 at 41.

<sup>71</sup> CAISO Ex. I-6 at 40.

<sup>72</sup> SDG&E/Avery, Ex.SD-5 at I-4.

<sup>73</sup> SDG&E/Avery, Tr. at 332.

shall specify in the certificate a maximum cost determined to be reasonable and prudent for the facility.

The Commission has regularly interpreted section 1005.5(a) to authorize it to establish a cost cap for new transmission projects.<sup>74</sup> For instance, in issuing Pacific Gas and Electric Company (“PG&E”) a CPCN to construct the Jefferson-Martin transmission project, the Commission found that, while the Federal Energy Regulatory Commission (“FERC”) “will decide how much of the costs for the project PG&E may recoup in transmission rates,” the Commission’s cost cap “has bearing on the amount PG&E may seek from FERC.”<sup>75</sup>

In light of SDG&E’s statements regarding its cost estimate and prior Commission decisions adopting a cost cap, the CAISO believes it is reasonable to use a cost of \$1.265 billion in its analysis of Sunrise. Using this project cost, the CAISO’s analysis demonstrates that Sunrise will provide significant net economic benefits.

### **C. Reliability**

As noted above, ensuring reliability in the SDG&E service area poses unique challenges and has been a concern for the CAISO for several years. SDG&E is a net importer of power; yet, unlike PG&E and Southern California Edison (“SCE”), SDG&E has only one 500 kV transmission line – SWPL - for importing power into its service area.<sup>76</sup> In the absence of SWPL, SDG&E’s ability to import power is limited to Path 44 – which consists of five 230 kV lines that all connect to SCE at the San Onofre Nuclear Generating Station (“SONGS”) As a result, SDG&E’s ability to import power necessary to meet its customer load is at risk when SWPL is forced out of service and it must depend on Path 44 to maintain system reliability.

Sunrise would provide SDG&E with a second 500 kV transmission line and an additional, independent, path for importing power into its service area. In Decision 04-08-046,

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<sup>74</sup> See e.g., Decision 04-08-046, mimeo at 129; Decision 07-01-040, mimeo at 45; Decision 01-10-029, mimeo at 136-137.

the Commission found that the addition of a new transmission path that is separate from existing transmission corridors into a load center is a benefit that should be considered when evaluating proposed new transmission lines.<sup>77</sup> Moreover, in addition to increasing the import capability into SDG&E's service area, Sunrise will also provide much needed long-term support for an aging transmission system that is increasingly stressed by high load growth and adverse operating conditions, and provide options for future expansion and strategic interconnections.<sup>78</sup>

For purposes of determining compliance with the CAISO's grid planning criteria,<sup>79</sup> SDG&E's import capability is defined by two constraints: (1) its Simultaneous Import Limit ("SIL"), which is an "all lines in service" scenario; and (2) its Non-Simultaneous Import Limit ("NSIL"), which represents the maximum import capability when the largest single transmission element (*i.e.*, SWPL) is out of service. SDG&E's SIL is 2850 MW and its NSIL is 2500 MW. With Sunrise in service, SDG&E's import capability with SWPL out of service (*i.e.*, NSIL) will increase to 3500 MW. Thus, Sunrise will provide SDG&E with 1000 MW of additional import capacity to meet the generation deficiency forecast for the San Diego load pocket beginning in 2010.<sup>80</sup>

The need for a second 500 kV transmission line to increase SDG&E's import capability has been previously identified by the STEP group, the CEC's Integrated Energy Policy Report, the Imperial Valley Study Group, and the CS RTP group.<sup>81</sup> Furthermore, as early as 2003, SDG&E identified a reliability need as part of its long-term resource procurement plan approved

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<sup>75</sup> Decision 04-08-046, mimeo at 129; *see also* Decision 01-10-029, mimeo at 137.

<sup>76</sup> CAISO Ex. I-1 at 5-6.

<sup>77</sup> Decision 04-08-046, mimeo at 47.

<sup>78</sup> CAISO Ex. I-1 at 52.

<sup>79</sup> The CAISO's grid planning criteria consists of the WECC Reliability Criteria for Transmission System Planning; the North American Electric Reliability Council ("NERC") Planning Standards; certain operating criteria for the Diablo Canyon and SONGS nuclear units; and the CAISO's G-1/N-1 reliability requirement. SDG&E Ex. SD-5. The "G-1/N-1" criteria requires a utility system to be able to withstand the loss of the largest generating unit and largest interconnection, and then the loss of the next most critical transmission element, under adverse weather conditions, without shedding load.

by the Commission in Decision 04-12-048.<sup>82</sup> As discussed above, the CAISO's analysis of SDG&E's LCR demonstrates a resource need beginning in 2010. Furthermore, power flow studies show that Sunrise will reduce SDG&E's locational capacity requirement by 1000 MW. As a result, Sunrise will enable SDG&E to meet its LCR for several years beginning in 2010.

For the most part, interveners do not dispute that SDG&E will experience a resource deficiency at some point between 2010 and 2020. It is the size of the deficiency, the timing of the reliability need, and the appropriate means for meeting the need that varies widely among the parties in this proceeding.<sup>83</sup> For example, parties assert that other transmission projects, combined wires and non-wires projects, or in-area generation should be used to meet SDG&E's reliability need. As discussed herein, such alternatives will not provide the same level of reliability, economic, and RPS benefits as Sunrise.

#### **D. Access to Renewables**

Access to the renewable generation resources, particularly in the Imperial Valley and Salton Sea areas, was identified in the CSRTP process as an important benefit of Sunrise.<sup>84</sup> In developing its testimony in this proceeding, the CAISO conducted a rigorous evaluation of the RPS benefits of Sunrise and the alternative scenarios, based on plausible and conservative assumptions regarding renewable generation development both within and outside California. In conducting this analysis, the CAISO confirmed the CSRTP findings that Sunrise provides RPS benefits without which it will be difficult for California LSEs to comply with RPS requirements.

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<sup>80</sup> *Id.*, at II-4-II-5.

<sup>81</sup> SDG&E, Ex. SD-5 at II-7 - II-11.

<sup>82</sup> Decision 04-12-048, mimeo at 34.

<sup>83</sup> *E.g.* UCAN Ex. U-4 at 104, "The reliability needs that SDG&E faces are real but small, and don't require an STP[Sunrise]-sized solution."

<sup>84</sup> CSRTP Report at 66-67; SDG&E Ex. SD-5.

### Background

In its amended application, SDG&E provided information as to its efforts to procure renewable generation resources in order to meet RPS requirements in 2010 and 2020. In its amended application, however, SDG&E did not conduct an evaluation of the impact that Sunrise would have on renewable resource development or the RPS economic benefits that could be attributable to the project.<sup>85</sup>

In its January 26, 2007 Supplemental Testimony, SDG&E analyzed the potential for, and value of, the development of renewable energy projects closer to its load center, as well as the near-term and long-term capability of existing and other proposed transmission lines to import renewable energy from areas, such as the Imperial Valley or the Tehachapi area, to the San Diego basin.<sup>86</sup> In performing this analysis, SDG&E assumed that “the same amount and type of renewable resources will be developed in the Imperial Valley, with the same timing, whether or not the Sunrise Powerlink is built.”<sup>87</sup>

Apparently because SDG&E believed that renewable resource development in the Imperial Valley is largely speculative,” it concluded that “a more straight-forward economic analysis is achieved by assuming the same amount of generating capacity is available both with and without the new line.”<sup>88</sup> Notwithstanding this assumption, SDG&E found that Sunrise would benefit Imperial Valley renewable development by reducing congestion and power flows on SWPL, therefore reducing costs to CAISO consumers. Specifically, SDG&E concluded that, while the existing transmission network between the Imperial Valley and the San Diego Basin, and between the Tehachapi area and the San Diego Basin, is *physically* capable of delivering

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<sup>85</sup> SDG&E Ex. SD-5, Chapter III.

<sup>86</sup> Assigned Commissioners and Administrative Law Judge’s Scoping Memo and Ruling at 16 (November 1, 2006).

<sup>87</sup> SDG&E Ex. SD-14 at 59.

<sup>88</sup> SDG&E Ex. SD-14 at 60.

enough renewable energy to meet RPS targets, this energy cannot be *economically* delivered without substantial upgrades.<sup>89</sup>

In addition, SDG&E witness Avery testified repeatedly that, without Sunrise, it is unlikely that SDG&E will be able to meet its state-mandated RPS requirements.<sup>90</sup> Indeed, in light of the sheer magnitude of renewable resource interconnection requests presently in the CAISO queue – more than 6,000 MW – Mr. Avery testified that Sunrise “is the only viable alternative by which this energy can be delivered to San Diego without creating undue congestion.”<sup>91</sup>

The CAISO approached the development of the Sunrise RPS benefits from a different standpoint, assuming that a limited amount of renewable resources would be developed in the Imperial Valley/ Salton Sea areas without Sunrise (or a transmission alternative), but that the Base Case and all of the alternative scenarios would be compliant with the RPS targets of 20% in 2010 and 33% in 2020. Part I of the CAISO Initial Testimony contained a first cut, under very limited time constraints, at the development of a per MWh RPS compliance cost. The CAISO explained that the methodology would be refined in its Part II testimony with a study based on estimates of an actual renewable energy development plan, including cost of the plan, estimates of transmission costs, and energy and capacity values to California consumers.<sup>92</sup> Nonetheless, some of the RPS compliance cost study assumptions were developed in the Part I Testimony and modified at various points based on additional analysis and, to a certain extent, input from other parties. For example, the CAISO modeled a total of 2700 MW of new renewable generation (1800 MW geothermal and 900 MW solar) in the Sunrise and Green Path North + LEAPS

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<sup>89</sup> SDG&E Ex. SD-14 at 62-66.

<sup>90</sup> SDG&E Ex. SD-5, at I-13-14; SDG&E Ex. SD-15 at 3-8; SDG&E Tr. at 302.

<sup>91</sup> SDG&E Ex. SD-15 at 6. The CAISO agrees that undue congestion is a concern, but more importantly, reliability problems such as the transient frequency dip problem are expected to severely limit the amount of renewable generation that can be interconnected.

<sup>92</sup> SDG&E Ex. SD-15. at 51.

scenarios, while for the Base Case and the South Bay Replacement project, 800 MW of new renewable generation in the Salton Sea area was modeled (the 800 MW was later reduced to 700 MW due to frequency dip violations occurring in Mexico and the Green Path North + LEAPS/TE/VS renewable generation level was later reduced to 2000 MW for the same reason<sup>93</sup>). The contract costs of wind, geothermal and solar energy were assumed to be \$66, \$86 and \$120 per MWh, respectively, in 2015 dollars.<sup>94</sup>

RPS compliance costs were calculated for each scenario by first calculating the state RPS requirement, assuming 75% of the non-Commission regulated utilities would voluntarily comply with the 20% requirement, and then determining the cost of compliance in the Base Case and in each alternative. To develop the “all-in” price of renewable energy necessary to meet RPS requirements, the CAISO made simplifying assumptions about the mix and cost of resources. In light of the uncertainties surrounding renewable energy development, a range of per MWh renewable costs for procuring the shortfall was developed from which the average locational marginal pricing (“LAMP”) cost was subtracted to produce the net benefits. Using this set of plausible procurement cost assumptions, Sunrise produced the greatest net benefits relative to the Base Case and alternatives, except in the low end of the per MWh compliance cost range.<sup>95</sup> Despite the modifications made to the CAISO’s renewable resource procurement analysis, this conclusion did not change.

*The CAISO Renewable Resource Development Study*

In its Part II Testimony, the CAISO modified the Base Case to be RPS-compliant in 2015, which included an additional 20.2 TWh of incremental renewable energy (above the resources already identified in the SSG-WI database) based on specific resources both inside and

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<sup>93</sup> CAISO Ex. I-6 at 21.

<sup>94</sup> CAISO Ex. I-6 at 30-31 (Table 5.1).

<sup>95</sup> CAISO Ex. I-6 at 47-52 (Table 7.4).

outside the Salton Sea area. Additional transmission capacity was also modeled in Gridview to facilitate renewable generation without a significant increase in congestion.<sup>96</sup> The specific incremental resources added to the Base Case and the Sunrise case to make these cases RPS-compliant were based largely on the Center for Resource Solutions (“CRS”) 2005 report for the CPUC *Achieving a 33% Renewable Energy Target*.<sup>97</sup> The renewable energy mix for the South Bay Replacement alternative was assumed to be the same as the Base Case, and the mix for Green Path North + LEAPS was assumed to be the same as Sunrise.<sup>98</sup>

Part II of the CAISO’s testimony also describes the CAISO’s calculation of the procurement cost of meeting the RPS requirements in 2015 and 2020, the change in which is included in calculating the total net benefit for each alternative.<sup>99</sup> To estimate the procurement cost for each case, the CAISO calculated the statewide RPS requirement for 2015 and 2020, identified the RPS-eligible generation resources potentially available in those years, estimated the average cost of groups of RPS-eligible resources in each of 17 geographic areas (including transmission upgrades, using levelized cash flows at a discount rate of 8.18%), and developed a portfolio of RPS resources for each of the four cases in 2015 and 2020.<sup>100</sup> These costs were then adjusted according to resource supply curves that reduced the availability of generation from outside California by 50%.<sup>101</sup> The following table depicts the RPS compliance cost results for each case, developed in the Part II testimony:

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<sup>96</sup> CAISO Ex. I-2 at 13-16 (Table 2.1).

<sup>97</sup> CAISO Ex. I-2 at 32. The resources added to the Base Case and Sunrise case are shown in Table 2.2. *See* CAISO, Ex. I-2 at 33.

<sup>98</sup> CAISO Ex. I-2 at 34.

<sup>99</sup> CAISO, Ex. I-2 at 46-70.

<sup>100</sup> CAISO Ex. I-2 at 46-49.

<sup>101</sup> CAISO Ex. I-2 at 62.

<b>Cost of RPS Compliance by Case</b>						
Scenario	2015 (Nominal \$)		2020 (Nominal \$)		40 Year Levelized (2010 \$)	
	Total Cost	Cost relative to	Total Cost	Cost relative to	Total Cost	Cost relative to
		Base Case		Base Case		Base Case
Case 0. Base Case	\$ 4,125	\$ -	\$ 6,683	\$ -	\$ 5,320	\$ -
Case 1. Sunrise	\$ 4,318	\$ 192	\$ 6,678	\$ (5)	\$ 5,428	\$ 108
Case 2. South Bay	\$ 4,125	\$ -	\$ 6,683	\$ -	\$ 5,320	\$ -
Case 3. Greenpath	\$ 4,336	\$ 211	\$ 6,696	\$ 13	\$ 5,447	\$ 127

Notwithstanding potential uncertainty, the RPS benefit calculated for Sunrise in the Part II Testimony was conservative.<sup>102</sup> Thus, in its Rebuttal Testimony the CAISO developed an alternative RPS compliance case by re-evaluating the projected costs for each type of renewable resource using updated information identified in the testimony. Specifically, the CAISO study found that the projected costs for solar thermal resources are currently in the 8-10 cents per kWh range, as opposed to the 12 cents per kWh used in the CAISO's analysis.<sup>103</sup> On the other hand, the updated cost estimates and actual bids for wind resources are substantially higher than the \$66 MWh assumed in the CAISO's Part II analysis, and have been estimated to be as high as \$99/MWh.<sup>104</sup> Using a conservative estimate of \$85 MWh for wind costs, and 10 cents per kWh for solar, the annual RPS benefits to CAISO consumers would jump s by \$67 million per year.<sup>105</sup>

In addition, based on the rejection of the Palo Verde-Devers II project by the Arizona Corporation Commission, the CAISO determined that it would be reasonable to adjust the percentage of renewables available from outside California from the 50% assumed in the Base Case to 25%.<sup>106</sup> This adjustment increases the RPS benefits by another \$108M/year, bringing the upper bound of a plausible range of benefits to \$220M/year (\$45M/year + \$67M/year from adjusted resource prices + \$108M/year reduction in out-of-state resources).<sup>107</sup> In addition, it is

<sup>102</sup> CAISO Ex. I-6, at 43.

<sup>103</sup> CAISO Ex. I-6 at 43-44.

<sup>104</sup> CAISO Ex. I-6 at 44.

<sup>105</sup> CAISO Ex. I-6 at 43-44.

<sup>106</sup> CAISO Ex. I-6 at 44-45.

<sup>107</sup> CAISO Ex. I-6 at 45. *See also* the discussion and revised RPS supply curves at 46-48.

important to note that, under this alternative RPS case, any possible benefit associated with delaying Sunrise beyond 2010 disappears, as shown below.<sup>108</sup>

**Sunrise Project Levelized Net Benefits - Alternate RPS Scenario**

	Transmission cost escalation rate				
	2.2%	3.1%	5.5%	9.0%	15.0%
2010	\$ 226.4	\$ 226.4	\$ 226.4	\$ 226.4	\$ 226.4
2011	\$ 224.9	\$ 223.6	\$ 220.1	\$ 215.0	\$ 206.3
2012	\$ 223.8	\$ 221.3	\$ 214.6	\$ 204.6	\$ 186.5
2013	\$ 220.4	\$ 216.8	\$ 207.1	\$ 192.2	\$ 164.2
2014	\$ 214.8	\$ 210.4	\$ 197.9	\$ 178.2	\$ 139.5
2015	\$ 206.8	\$ 201.5	\$ 186.5	\$ 162.0	\$ 112.0
2016	\$ 196.8	\$ 190.8	\$ 173.5	\$ 144.3	\$ 82.2
2017	\$ 186.5	\$ 179.8	\$ 160.3	\$ 126.6	\$ 51.5
2018	\$ 176.0	\$ 168.8	\$ 147.3	\$ 109.1	\$ 20.2
2019	\$ 165.4	\$ 157.7	\$ 134.3	\$ 91.8	\$ (12.0)
2020	\$ 154.2	\$ 146.1	\$ 121.1	\$ 74.2	\$ (45.3)

The results of the CAISO’s RPS compliance cost analysis are discussed in further detail in Section VII. 3 below.

## VI. ALTERNATIVES

### A. Transmission

#### 1. Path 44 upgrades

Upgrades to Path 44 as an alternate to Sunrise have been proposed by UCAN.

Specifically, UCAN proposes that:

SDG&E take the actions necessary to upgrade Path 44 enough to allow an N-1 import limit for Path 44 from 2500 M[W] to 2850 M[W]. The N-1 increase would directly reduce SDG&E’s local RA needs by 350 M[W], saving both local RA costs associated with the need to build new generation in the SDG&E as early as 2010 (with AMI but nothing else) or 2013 (with AMI and either Mexico Light or the CT PPAs presented to the Commission in A.07-05-023).<sup>109</sup>

Increasing the Path 44 import level to 2850 MW was an assumption modeled by the CAISO in several scenarios requested by UCAN. In each case where Path 44 was assumed to have increased import capability, transient frequency dip violations were identified in Mexico.

<sup>108</sup> CAISO Ex. I-6 at 67 (Figure 5).

For example, in the UCAN18 alternative, which modeled the UCAN base case + Green Path North + Path 44 Upgrade (2850 for emergency rating) in 2010 + Sunrise in 2015, the CAISO found the alternative failed the reliability test due to transient frequency dip violations in Mexico caused by a contingency of the Imperial Valley-Miguel 500 kV line in the year 2014 and potentially earlier. In its Rebuttal testimony, the CAISO explained that these reliability issues are primarily caused by increasing renewable generation in the Imperial Valley without adding Sunrise, and that increased reliance on Path 44 would tend to exacerbate this problem.<sup>110</sup> The CAISO's analysis also identified thermal overloads due to several NERC category B contingencies caused by the proposed increase in the Path 44 emergency rating.<sup>111</sup> In its Rebuttal testimony, the CAISO explained that these reliability performance issues are primarily caused by increasing renewable generation in the Imperial Valley without adding Sunrise, and that increased reliance on Path 44 would tend to exacerbate this problem.<sup>112</sup>

Much of the UCAN direct testimony focuses on the identified thermal overloads on SCE's Barre-Ellis line that would be caused by an upgrade to Path 44 under N-1-1 conditions, and addressing possible mitigations for that line, as well as the costs of other upgrades that would be required (according to UCAN). The frequency dip violations that were identified by the CAISO were discussed during the cross-examination of CAISO witness Sparks. Mr. Sparks stated that the frequency dip violations occur after a trip of the IV-Miguel portion of SWPL when followed by a cross trip of the IV-Rosarita ("IV-ROA") 230 kV line.<sup>113</sup> As more resources are added in the Imperial Valley area, the loads on the IV-ROA line will increase and a shock will be imposed on the Mexican system if the IV-Miguel trip causes a cross trip of IV-ROA.<sup>114</sup>

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<sup>109</sup> UCAN Ex U-1 at 17.

<sup>110</sup> CAISO Ex. I-6 at 56.

<sup>111</sup> CAISO Ex. I-3 at 27-28.

<sup>112</sup> CAISO Ex. I-6 at 56.

<sup>113</sup> CAISO/Sparks, Tr. at 1899: 21-25.

<sup>114</sup> CAISO/Sparks, Tr. at 1904:17-28.

The source of the power flows make a difference under these circumstances, as explained by Mr.

Sparks:

Q.[Marcus] If the current system in Mexico can handle a trip of IV-ROA when IV-ROA is at or near its maximum capability, why can't the future system in Mexico handle equally well a trip of the IV-ROA line?

A. [Sparks] Well, the source of the flow is also a factor in the problem. If the source of the flow is, say, Palo Verde, then there would be less of a voltage angle difference—power angle difference between Imperial Valley and San Diego, whereas if all of the generation is right at Imperial Valley, then there would be more of an angle difference between Imperial Valley and San Diego.

Q. [Marcus] Why does that matter to CFE?... Whether the zero it's getting is not coming from Palo Verde or not coming from Imperial Valley, why does it matter since it's zero at that point?

A. [Sparks] Well, the frequency dip is caused by the need to rapidly change the power angle after the line opens [in Mexico]... And so when you open up the line, with the Imperial Valley-Miguel and the IV-ROA line closed in and flowing, the power angle between Imperial Valley[,] Mexico and southern San Diego, I suppose, are all fairly close because you have a strong tie—strong electrical tie.

But as soon as you open up that line, now the Mexican angle actually has to be even greater than the San Diego angle because all the power is coming from Southern California Edison area, and in order for that power to flow, the angle has to—has to change quite a bit, and that's what causes the frequency dip.<sup>115</sup>

This phenomenon cannot be mitigated by setting phase regulators to shift the flow to the Tijuana-Otay-Mesa line,<sup>116</sup> and is exacerbated by the Path 44 upgrade causing higher flows from the SCE area.

In addition, UCAN's LCR assumptions associated with the Path 44 upgrade are faulty because UCAN assumed that a 350 MW increase in import capability would decrease SDG&E's LCR requirement. However, there are not likely to be cost savings resulting from this reduction

because the LCR reduction in the San Diego area would cause a 350 MW increase in LCR requirements in the LA Basin.<sup>117</sup> As demonstrated in the CAISO's studies, Path 44 upgrades are not a substitute for Sunrise and cannot support a deferral of Sunrise until 2015.

## 2. Mexico Light

The "Mexico Light" alternative as proposed by UCAN would have SDG&E contract with generators in Mexico for emergency supplies during an outage of the IV-Miguel line. Currently, under peak load conditions (1 in 10) and assuming an outage of IV-Miguel, the existing remedial action scheme ("RAS") will trip generation in Mexico and will likely trip the IV-ROA line connecting San Diego to Mexico.<sup>118</sup> UCAN proposes that "when a Miguel-IV outage occurs during peak load hours with a cross-trip of the IV-ROA line, measures be taken to allow some of the curtailed Mexican generation to resume flowing to San Diego over a new route, through northern Baja California rather than through IV substation."<sup>119</sup>

Mexico Light was initially proposed by UCAN during the CSRTP process and evaluated by the CAISO as a transmission alternative. The CSRTP Report concluded that the alternative caused overloads at the La Rosita Plant and that the alternative did not address SDG&E's long-term needs for additional capacity to meet its growing load.<sup>120</sup> In this proceeding, the CAISO modeled Mexico Light as part of several Sunrise alternatives presented by UCAN.<sup>121</sup> Although UCAN includes a discussion of the Mexico Light alternative in its testimony, it acknowledges that the alternative is fatally flawed. Specifically, in 2006 SDG&E and the CAISO approved, CFE's request to change the IV-ROA cross-trip to Tijuana-Otay Mesa on a temporary basis

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<sup>115</sup> CAISO/Sparks, Tr. at 1905: 5- 1906:16.

<sup>116</sup> CAISO/Sparks, Tr. at 1906:17-23.

<sup>117</sup> CAISO/Sparks, Tr. at 56:12-57:6.

<sup>118</sup> UCAN Ex. U-3 at 51.

<sup>119</sup> UCAN Ex. U-3 at 52.

<sup>120</sup> CSRTP Report at 45 SDG&E Ex. SD-5.

<sup>121</sup> *See, e.g.* CAISO Ex. I-3 at 23-26.

during summer peak months. This uncertainty in the RAS configuration to cross-trip Tijuana-Otay Mesa makes Mexico Light a nonviable alternative to Sunrise.<sup>122</sup>

### 3. Second SWPL

“Second SWPL” has been used by DRA to describe a second IV-Miguel 500 kV line that would parallel the existing 500 kV line plus more than ten associated transmission facility upgrades.<sup>123</sup> In presenting this alternative, DRA recognizes that such a parallel line had been evaluated by SDG&E assuming an N-2 contingency such that the San Diego import capability with both lines would remain at 2500 MW. The reasoning for this more restrictive N-2 contingency is the increased risk of fire outages in areas where the lines would parallel for long distances and there have been more than two outages per year over the past 10 years.<sup>124</sup> In DRA’s opinion, employing the more restrictive N-2 contingency should be reviewed because it may be “overly conservative.”<sup>125</sup>

The CAISO notes that SDG&E presented its analysis of alternative routes that parallel SWPL for portions of the route on October 2, 2006. These routes were identified in SDG&E’s filing as corridors B, C and D. In the filing, SDG&E stated that the three corridors would not meet its reliability criteria because the G-1/N-2 contingency for all three corridors would require a mitigation scheme that could include a high risk of substantial load shedding, a result that would not be acceptable to the CAISO.

On October 12, 2006, the CAISO filed comments regarding the reliability aspects of using the B, C and D corridors. In essence, the CAISO agreed with SDG&E’s assessment of the N-2 contingency, and stated that the anticipated 900-1000 MW of load shedding that could be

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<sup>122</sup> UCAN Ex. I-3 at 58-59.

<sup>123</sup> DRA Ex. D-19 at 3.

<sup>124</sup> DRA Ex. D-19 at 6.

<sup>125</sup> DRA Ex. D-19 at 7.

required in a common mode outage would be unacceptable.<sup>126</sup> The CAISO also noted that the frequency of fires in certain areas where the lines would parallel would cause the outage of the two 500 kV lines in the same corridor to be evaluated in accordance with NERC Performance Category B as a single element outage (N-1), rather than Performance Category C. Under Category B, load shedding is not permitted and therefore the capability of the transmission system with two SWPL lines is similar to that with only one SWPL line. Thus, the “second SWPL” alternative should not be considered a viable alternative to Sunrise.

#### **4. Talega-Escondido/Valley-Serrano**

TE/VS was studied by the CAISO as a stand alone project and in various combinations with LEAPS and Green Path North. Specifically, the LEAPS + TE/VS +Green Path North alternative was studied by the CAISO at the request of the Energy Division<sup>127</sup> and the TE/VS + LEAPS scenario was presented by *TNHC* to the CAISO for evaluation.<sup>128</sup> The Energy Division also asked the CAISO to study TE/VS as a stand-alone project, as well as a variety of scenarios involving the transmission and pumped hydro storage projects, as well as the energy and ancillary services benefits for LEAPS.<sup>129</sup> As a result, the LEAPS + TE/VS projects have been studied by the CAISO in a variety of scenarios.<sup>130</sup>

TNHC asserts that TE/VS – as a stand alone project - provides the same level of reliability benefits as Sunrise and, as a result, is a less costly transmission alternative.<sup>131</sup> This conclusion, however, is based on the faulty assumption that the additional import capability provided by TE/VS, with SWPL out of service, is the same as the Sunrise - 1000 MW. The CAISO’s reliability analysis of the LEAPS + TE/VS + Green Path North scenario shows that

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<sup>126</sup> See Comments of the CAISO Regarding the Alternate Route Proposal Submitted by SDG&E, filed October 11, 2006, at 2.

<sup>127</sup> CAISO Ex. I-6 at 50.

<sup>128</sup> CAISO Ex. I-3 at 68-71.

<sup>129</sup> See, generally, CAISO Ex. I-5 at 10-44; Ex. I-6 at 76-80.

<sup>130</sup> CAISO Ex. I-5 at 83 (Table 49).

during peak load conditions, at import levels of 3000 MW, this alternative would provide only a 500 MW reduction of LCR in San Diego – significantly less than Sunrise.<sup>132</sup> Further increases in the level of imports produced thermal overloading on three large transmission lines, as well as transient frequency criteria violations at various CFE load buses and post-transient voltage deviations.

As the CAISO explained:

We gradually increased the import flow into the San Diego area under the G-1/N-1 condition, which is the condition that drives the local capacity requirements of the San Diego area, and we increased that—that import level until we observed bulk transmission facility overloads. Then we [] just selected the highest import level that did not have any bulk transmission system overloads.<sup>133</sup>

Based on these results, the CAISO has determined that without substantially increasing the cost of the transmission portion of the project, the additional import capability expected to be provided by TE/VS should be limited to 500 MW.<sup>134</sup>

During the hearings, TNHC witness Depenbrock raised the specter that the phase-shifting transformers that are part of the TE/VS plan of service could be used to manage flows in such a way as to increase the import capability above 500 MW.<sup>135</sup> Mr. Depenbrock, however, admitted that he had not completed an import study to verify his hypothesis that phase shifters could have an impact on the import limit.<sup>136</sup> In response to questions on this issue, Mr. Sparks testified that it is possible that changing the angle of the phase-shifters could raise the import capability into the San Diego Area with SWPL out of service by a small amount but such increase would have little impact on the results of the CAISO’s analysis:

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<sup>131</sup> TNHC Ex. N-9 at 33.

<sup>132</sup> CAISO, Ex. I-3 at 74-79.

<sup>133</sup> CAISO/Sparks, Tr. at Tr. 2154 – 2155.

<sup>134</sup> CAISO Ex. I-2 at 76. Note that the 500 MW limit assumes that the subtransmission thermal overloads, similar to those observed for Sunrise, could be mitigated at a relatively low cost.

<sup>135</sup> TNHC/Depenbrock, Tr. at 2343-2345.

Q. (Thompson) What effects did you find when you changed the angles on the phase shifters? Or did you use just one fixed angle?

A. (Sparks) I had that same question and did some sensitivity analysis adjusting the balance of flows between the existing 230-kV path out of SONGS and the TE- -- proposed TE/Vs line; and I found that for the overloads that we've identified it didn't make much difference.

And as I looked at the topology of the system, it's mostly because of the TE/Vs line feeds into two of the lines -- there's five lines that come out of SONGS, the TE/Vs line essentially taps into two of them, although I think we're adding another one. But, um --so all that I ended up doing was either pushing more flow on the west side, and I guess the bottom line is it really made little difference in the overload regardless of which -- how -- how the flow -- the balance of flows is adjusted because once they get to the Valley Sub- -- the Talega-Escondido portion, they are pretty much using the same facilities.<sup>137</sup>

Thus, while changing the angle of the phase-shifters could raise the import capability into the San Diego Area, such an adjustment would not increase the import capability to any level remotely close to the 1000 MW increment assumed by TNHC.

The CAISO's analysis demonstrates that TE/Vs, as a stand alone project, has negative net benefits:

**Total levelized Net Benefits (\$M/yr)<sup>138</sup>**

Case	Transmission Cost (\$M/yr)	Total benefits (\$M/yr)		Net benefit (\$M/yr)	
		RPS Base Case	RPS Alt Case	RPS Base Case	RPS Alt Case
Sunrise	157	209	383	52	226
TE/Vs	67	24	24	(42)	(42)
<b>Difference</b>				<b>94</b>	<b>268</b>

Given the lack of net benefits, TE/Vs is not a viable alternative to Sunrise.

<sup>136</sup> TNHC/Dependbrock, Tr. at 2345-2346.

<sup>137</sup> CAISO/Sparks, Tr. at 2157-2158.

<sup>138</sup> See *supra* Table II-1.

## 5. Southern Route Alternatives

The CAISO evaluated four scenarios involving different route configurations presented for analysis by the Aspen.<sup>139</sup> The CAISO was asked to conduct reliability studies for these alternatives but not to evaluate economic benefits. At an import level of 3000 MW, the CAISO found no reliability criteria violations for any of the scenarios.<sup>140</sup> Aspen also asked that three of the four alternatives (Aspen 1, 10 and 13) be run at the 4200 (ultimately 4000) MW import level.

Of these alternatives, Aspen 10 presents a scenario where a second 500 kV line is built that runs parallel to SWPL up to the existing Boulevard substation. This parallel portion would be about 42 miles in length (SWPL is 83 miles long). The frequency of fire outage on the portion of the line that would parallel SWPL was found by Aspen to be less than 1 in 20 years, causing the common mode outage to be evaluated as Category C rather than Category B. Except for the common mode outage of the two 500 kV lines west of the IV substation, the performance of Aspen 10 was found to be equivalent to Sunrise.<sup>141</sup>

Based on the CAISO's analysis, both Aspen 1 and 10 had performance similar to Sunrise, but are not superior to the Sunrise plan of service as proposed by SDG&E. This result is due to the fact that neither Aspen 1 nor Aspen 10 provide the same potential for connecting the 500 kV facilities serving the SDG&E and SCE systems. Connecting 500 kV facilities would improve economic transfers between the SDG&E and SCE systems, which may become more important as intermittent sources of wind and solar resources are integrated into the grid. The potential for a 500 kV connection to resource areas to the north (such as Tehachapi) that is provided by

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<sup>139</sup> In its Rebuttal Testimony, the CAISO mistakenly referred to the reliability results for the Aspen scenarios as "SWPL II." CAISO Ex. I-6 at 71. This mistake was corrected in the CAISO's Part V testimony. CAISO, Ex. I-5 at 77-85.

<sup>140</sup> CAISO Ex. I-3 at 61-64.

<sup>141</sup> CAISO Ex. I-5 at 80.

Sunrise, coupled with a stronger connection to Imperial Valley and the Salton Sea resources, make Sunrise a more flexible alternative from an engineering standpoint.<sup>142</sup>

## 6. Coastal Route Alternatives

RPCC proposes a coastal route alternative to the Sunrise plan of service consisting of the elimination of the 13.5 miles of 230 kV line between the Sycamore Canyon and Penasquitos substations and either adding two transformers at existing substations, or alternatively, re-conductoring an existing line and adding one transformer, to mitigate thermal overloads.<sup>143</sup> The CAISO studied several alternative scenarios presented by RPCC under 3500 MW and 4200 MW import limits and compared the results to the results of the Sunrise power flow studies under similar conditions.<sup>144</sup>

The study results for RPCC Alternative 1 indicate that this alternative has the best reliability performance of the three scenarios because it caused the least number of new thermal overloading concerns. The CAISO did not have the cost information necessary for an economic evaluation of RPCC Alternative 1, but concluded that:

If the transmission upgrades, as identified above (*i.e.*, third 230/69 kV transformer at Sycamore Canyon, and overload mitigation for the Poway-Pomerado 69 kV, Pomerado-Sycamore 69 kV and Sycamore-Chicarita 138 kV lines) cost less than the proposed 230 kV line then these alternative upgrades together can be considered an adequate substitute for the Sycamore-Penasquitos 230 kV underground line.<sup>145</sup>

The CAISO's study results are discussed in the RPCC testimony, as well as RPCC's estimate of the costs associated with Alternative 1. The CAISO did not submit rebuttal testimony responding to RPCC's testimony.

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<sup>142</sup> CAISO Ex. I-5 at 81.

<sup>143</sup> RPCC Ex. R-6 at 2.

<sup>144</sup> CAISO Ex. I-3 at. 53:-56; Ex. I-4 at 35-42.

<sup>145</sup> CAISO Ex. I-3 at 42.

## 7. Others

Green Path North, which is being proposed by the Los Angeles Department of Water and Power (“LADWP”), the Imperial Irrigation District, and Citizens Energy Corporation, was analyzed by the CAISO as a stand alone alternative to Sunrise, and in combination with a variety of alternative scenarios. Specifically, Green Path North was studied in combination with LEAPS + TE/VS as one of the four scenarios initially requested by Energy Division. The Energy Division also asked that the CAISO include Green Path North in five of the ten scenarios evaluated in the CAISO’s Part 5 testimony. Green Path North as a stand-alone project, as well as Green Path North + Sunrise, were alternative scenarios requested by Mussey Grade.

For the purposes of deriving net benefits for the scenarios including Green Path North, the CAISO used a total project cost of \$400M and allocated \$226.8M to CAISO ratepayers. These costs were obtained from a public workshop presented by LADWP.<sup>146</sup> The CAISO also determined that only 2000 MW of renewable generation could be delivered via Green Path North as opposed to the 2700 MW of renewable generation that Sunrise would allow, based on the CAISO’s transient stability studies.<sup>147</sup> When analyzed as a stand-alone project, with 2700 MW of renewable generation, Green Path North failed the reliability test due to transient frequency dip violations in CFE caused by the SWPL contingency. Accordingly, the CAISO did not conduct an economic analysis of the stand-alone project.<sup>148</sup>

When combined with other projects, several scenarios which include Green Path North show positive net economic benefits, including Green Path North + LEAPS + TE/VS and Green Path North + TE/VS. However, in all cases, the net benefits of the Green Path North alternatives are less than Sunrise:

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<sup>146</sup> CAISO Ex. I-2 at 42-43.

<sup>147</sup> CAISO Ex. I-6 at 21-22.

<sup>148</sup> CAISO Ex. I-3 at 64-65.

**Total levelized Net Benefits (\$M/yr)**<sup>149</sup>

Case	Transmission Cost (\$M/yr)	Total benefits (\$M/yr)		Net benefit (\$M/yr)	
		RPS Base Case	RPS Alt Case	RPS Base Case	RPS Alt Case
Sunrise	157	209	383	52	226
TE/VS +LEAPS + Green Path	97	142	271	45	174
<b>Difference</b>				<b>7</b>	<b>52</b>

**Total levelized Net Benefits (\$M/yr)**<sup>150</sup>

Case	Transmission Cost (\$M/yr)	Total benefits (\$M/yr)		Net benefit (\$M/yr)	
		RPS Base Case	RPS Alt Case	RPS Base Case	RPS Alt Case
Sunrise	157	209	383	52	226
TE/VS + Green Path	97	125	255	28	158
<b>Difference</b>				<b>24</b>	<b>68</b>

In addition to having smaller net benefits than Sunrise, it is important to recognize that the Commission has no siting authority, environmental responsibility, or jurisdiction over the Green Path North project or the entities developing the project, and the line would be outside the CAISO control area. In other words, the Commission has no say with regard to whether the project goes forward or not, and the CAISO would have no operational control over the facility. Accordingly, considering Green Path North an alternative to Sunrise is, at best, poor public policy and, at worst, an abdication of the Commission’s statutory responsibilities. Accordingly, any alternative that relies on Green Path North to show net benefits should not be considered a viable alternative to Sunrise.

**B. Non-Wires**

**1. AMI**

As discussed above, the CAISO considered AMI in its analysis of the need for Sunrise.<sup>151</sup> Specifically, AMI was treated as an enabling technology demand response programs with the

<sup>149</sup> See *supra* Table II-1.

<sup>150</sup> See *supra* Table II-1.

effect of reducing the 1-in-10 load forecast for SDG&E's LCR through 2020. As is shown in Table V-1 above, the CAISO estimates that AMI induced demand response may reduce SDG&E's LCR by almost 80 MW in 2010, increasing to more than 250 MW in 2020. Notwithstanding this reduction in SDG&E's LCR, the CAISO's analysis still shows a resource deficiency beginning in 2010. Thus, AMI, while helpful in meeting a portion of SDG&E's capacity needs, is not eliminate the need for additional capacity from either local generation or imported capacity over a transmission line like Sunrise.

## **2. Other Demand Response**

In addition to the standard programs induced by AMI, the CAISO considered other demand response programs in its analysis of the need for Sunrise.<sup>152</sup> As is shown in Table V-1 above, the CAISO estimates that these other demand response programs may reduce SDG&E's LCR by 59 MW from 2010 through 2020. Notwithstanding this reduction in SDG&E's LCR, the CAISO's analysis still shows a resource deficiency beginning in 2010. As is the case with AMI, the combined AMI and other demand response still produces leaves SDG&E with a substantially large need for new a project like Sunrise in 2010.

## **3. Energy Efficiency**

As discussed above, the CEC load forecast used by the CAISO takes into account reductions in load resulting from energy efficiency.<sup>153</sup> While energy efficiency measures serve to reduce SDG&E's LCR, the CAISO's analysis nevertheless shows a resource deficiency beginning in 2010 that will require the need for additional resources.

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<sup>151</sup> See *supra* Section V.A.3.

<sup>152</sup> See *supra* Section V.A.3.

<sup>153</sup> See *supra* Section V.A.3.

#### 4. In-Area Combined Cycle Generation

The addition of in-area CCGTs to meet SDG&E’s 2010 reliability needs was evaluated as part of the CAISO’s evaluation of the South Bay Replacement project. The CAISO’s analysis demonstrates that the annual net benefits of Sunrise are significantly higher than benefits associated with adding in-area CCGTs:

**Total levelized Net Benefits (\$M/yr)**<sup>154</sup>

Case	Transmission Cost (\$M/yr)	Total benefits (\$M/yr)		Net benefit (\$M/yr)	
		RPS Base Case	RPS Alt Case	RPS Base Case	RPS Alt Case
Sunrise	157	209	383	52	226
South Bay Replacement	9	37	37	29	29
<b>Difference</b>				<b>23</b>	<b>197</b>

Energy and reliability benefits are greater for Sunrise relative to the South Bay Replacement project because the South Bay Replacement project is not reducing SDG&E’s LCR; but rather, simply providing local capacity at an RMR price. In contrast, Sunrise *reduces* SDG&E’s LCR.<sup>155</sup>

In addition, because alternatives limited to the addition of new in-area generation (whether CCGTs or CTs) will not include new transmission necessary to increase SDG&E’s ability to import renewable energy for RPS compliance purposes, this alternative will not facilitate the development of new renewable energy resources in the Imperial Valley or other places outside SDG&E service area, nor facilitate SDG&E meeting RPS requirements. Moreover, the CAISO’s analysis of the South Bay Replacement project shows that this alternative has *zero* RPS benefits under both the RPS base case and the RPS alternative case.<sup>156</sup>

<sup>154</sup> See *supra* Table II-1.

<sup>155</sup> CAISO Ex. I-6 at 42 (Table 6, lines 6 & 7).

<sup>156</sup> CAISO Ex. I-6 at 42 – 43 (Tables 6 and 6B); see also CAISO Ex. I-2 at 7 (“The South Bay [Replacement] case . . . has the same renewable mix as the Base Case so there is no RPS procurement benefit.”)

In contrast, Sunrise facilitates the development of Imperial Valley renewables, which includes a significant amount of low-cost, base load, renewable generation.

## **5. In-Area Peaking Generation**

The addition of in-area peaking generation (*i.e.*, CTs) as the way to meet SDG&E's 2010 reliability needs is, essentially, the CAISO's Base Case resource plan.<sup>157</sup> As the base case resource plan, the addition of new CTs in SDG&E's service area represents the baseline against which Sunrise and all project alternatives were evaluated. The CAISO's analysis demonstrates that the annual net benefits of Sunrise relative to adding new CTs in SDG&E's service area will range from \$52 million to \$226 million range (levelized) depending on the level of renewable development that ultimately takes place.<sup>158</sup> In addition, for the reasons discussed above, the addition of new CTs will not facilitate SDG&E meeting RPS requirements nor provide any RPS benefits under either the RPS base case or the RPS alternative case.

## **6. In-Area Renewables (Wind, PV, Biomass, other)**

The CAISO's analysis accounted for renewable resources located both in and out of SDG&E's service area. In addition, the Base Case, Sunrise, and project alternatives were all modeled "RPS compliant" taking into account the relative cost of renewable resources in different locations.<sup>159</sup> That is, the base case includes a similar mix of resources as those developed by Sunrise, but in different locations. By modeling the Base Case, Sunrise, and project alternatives as RPS compliant, the CAISO cases highlight the differences in the cost of procuring renewable similar or "best fit" resources for SDG&E. The CAISO analysis excludes PV due to its high costs. We have not been aware of substantial amounts of Biomass potential,

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<sup>157</sup> CAISO Ex. I-1 at 21.

<sup>158</sup> *See supra*, Table II-1.

<sup>159</sup> *See supra* Section V.D.

In-Area wind, to the extent that it is induced by Sunrise, will provide less capacity benefits from Sunrise, but lead to an overall increase in the benefits of Sunrise, as we will describe below.

### 7. Out-of-Area Renewables (North of SONGS)

As described above, because the CAISO modeled the Base Case, Sunrise, and project alternatives as RPS compliant, the addition of cost-effective out-of-area (north of SONGS) renewables was necessarily included in the CAISO’s analysis.

### 8. Out-of-Area Renewables (Imperial Valley and Mexico)

For the same reasons discussed above, the addition of cost-effective out-of-area (Imperial Valley and Mexico) renewables was necessarily included in the CAISO’s analysis.

### 9. LEAPS

LEAPS does not represent a true “non-wires” alternative to Sunrise because LEAPS requires new transmission to connect to the CAISO grid. Accordingly, the CAISO’s analysis of LEAPS includes the TE/Vs transmission line.<sup>160</sup> As shown in the table below, the CAISO’s analysis demonstrates that the annual net benefits of Sunrise are significantly higher than benefits associated with LEAPS + TE/Vs:

**Total levelized Net Benefits (\$M/yr)<sup>161</sup>**

Case	Transmission Cost (\$M/yr)	Total benefits (\$M/yr)		Net benefit (\$M/yr)	
		RPS Base Case	RPS Alt Case	RPS Base Case	RPS Alt Case
Sunrise	157	209	383	52	226
TE/Vs +LEAPS	67	43	43	(23)	(23)
<b>Difference</b>				<b>75</b>	<b>249</b>

It is important to note that the CAISO’s analysis likely *overstates* the net benefits associated with LEAPS + TE/Vs (and all alternatives involving LEAPS for that matter). Net benefits are likely overstated for all alternatives involving LEAPS because the cost assumed for

<sup>160</sup> CAISO Ex. I-5 at 70.

<sup>161</sup> See *supra* Table II-1.

LEAPS does not contain the full costs of network upgrades that would be required for the project.<sup>162</sup> In addition, the CAISO's cost assumptions for LEAPS did not include all the equipment, controls, and construction requirements associated with the project.<sup>163</sup> The CAISO believes that, if included, such additional equipment, controls, and construction costs could increase the cost of LEAPS by up to \$17 million per year (annualized)<sup>164</sup> - further widening the benefits differential between Sunrise and LEAPS + TE/VS.

In addition, as discussed above, the import capability of TE/VS into the San Diego area is significantly less than the 1,000 MW increase that is provided by Sunrise. Because of this fact, among other reasons, the LEAPs alternative would result in significantly less energy and reliability benefits relative to Sunrise.<sup>165</sup> Furthermore, because the LEAPS + TE/VS does not increase transmission into the Imperial Valley area, the alternative does not provide any RPS benefit.<sup>166</sup> The net result is that the LEAPS + TE/VS alternative has negative net benefits relative to the CAISO's Base Case.

## **10. Others**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

### **C. Combined Wires/Non-wires Alternatives**

#### **1. UCAN**

Essentially, UCAN has taken a "throw it against the wall and see if it will stick" approach in this proceeding. By its own admission, its proposal "does not contain one, two, or even three

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<sup>162</sup> CAISO Ex. I-2 at 43.

<sup>163</sup> CAISO Ex. I-2 at 44 ("Although the CAISO has requested a cost estimate for the additional equipment, controls and construction from the manufacturer (Voith Siemens), the CAISO has not received a response yet.")

<sup>164</sup> CAISO Ex. I-2 at 43-44.

<sup>165</sup> Compare CAISO Ex. I-5 at 71 (Table 46); CAISO Ex I-6 at 42 (Table 6).

<sup>166</sup> CAISO Ex. I-5 at 70.

discrete replacements for [Sunrise].”<sup>167</sup> On the contrary, UCAN cobbles together a “panoply of options” from which it asserts SDG&E can meet its regional energy needs.<sup>168</sup> Such an approach is not a substitute for thoughtful, integrated, long-term planning, but rather is a risky strategy that will not provide the same level of long-term reliability that will be provided by Sunrise.

Reliance on a variety of patchwork fixes - In place of a coherent long-term solution - can unnecessarily complicate grid operations, and in some cases, actually compromise reliability. For instance, one UCAN alternative would have the Commission order SDG&E to pursue the Mexico Light alternative which, as discussed above, UCAN itself has acknowledged is “fatally flawed.” Another alternative would require the *Commission* to redefine the *CAISO*’s grid reliability criteria – something the Commission has no authority to do - by changing the definition of a G-1 outage.<sup>169</sup> Even the one UCAN alternative that seems technically possible – the Path 44 upgrade – is not an effective substitute for Sunrise, based on the *CAISO*’s analysis.<sup>170</sup>

The Commission has recently acknowledged the benefits of being proactive – as opposed to reactive – when addressing reliability issues. In Decision 07-01-041, the Commission authorized SCE to enter into a 10-year power purchase agreement (“PPA”) for 260 megawatts of peaking capacity. The additional peaking capacity was not procured to meet an identified reliability need – as is the case in this proceeding – but as a response to the Heat Storm of 2006, which the Commission acknowledged did not result in “service interruptions related to a lack of adequate generation.”<sup>171</sup> In approving the PPA, the Commission found that:

In the face of assumptions, predictions and forecasts, rather than certainty about the weather in summers 2007 through 2009 and the

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<sup>167</sup> UCAN Ex. U-4 at 6.

<sup>168</sup> UCAN Ex. U-4 at 6.

<sup>169</sup> UCAN Ex. U-4 at 65.

<sup>170</sup> See *supra* Section VI.A.1.

<sup>171</sup> Decision 07-01-041, mimeo at 21.

availability of reserves at any given date at any given time, we find it prudent to add the 260 MW. . . .<sup>172</sup>

In this proceeding, the record establishes that SDG&E has a long-term reliability need beginning in 2010. This long-term need mandates a well thought-out, cost-effective long-term solution in other words, Sunrise. As discussed above, the net benefits of Sunrise are significantly higher than the benefits associated with the project alternatives and Sunrise will meet SDG&E's reliability need beginning in 2010. Moreover, the increase in import capability related to Sunrise will provide additional insurance against the same concerns that the Commission found justified approving the SCE PPA in Decision 07-01-041. UCAN's "panoply of options" cannot match these benefits nor provide similar long-term reliability or "insurance."

## **2. DRA**

DRA acknowledges that Sunrise will yield value to ratepayers yet it does not recommend that the Commission approve (or reject) the project. Rather, DRA believes more information is needed before the Commission should make a decision.<sup>173</sup> At the same time, DRA believes that there are other options that merit consideration, including increased local capacity, non-wire and short-wire alternatives, and continued operation of existing resources in SDG&E's service territory. The Commission has sufficient information to make a decision in this proceeding and, as discussed herein, the record clearly demonstrates that the Commission's decision should be to approve Sunrise.

In its analysis, the CAISO has considered new in-area peakers (Base Case) and combined cycle facilities (South Bay Replacement project), transmission alternatives (TE/VS, Green Path North, Path 44 upgrade, SWPL II), non-wires solutions (AMI, demand response, energy efficiency), and combinations of them all. It has also considered the continued operation of

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<sup>172</sup> Decision 07-01-041, mimeo at 29 (Findings of Fact 16).

<sup>173</sup> DRA/Woodruff, Ex. D-66 at 60.

existing resources in SDG&E's service territory and, in fact, assumes less retirements than DRA. After considering all of these alternatives, the CAISO has determined that Sunrise is needed to meet SDG&E's reliability need in 2010, provides the significant net benefits, and will facilitate compliance with RPS requirements. DRA has not proposed any alternative or course of action that will ensure a similar level of reliability and provide the amount of benefits to be realized from Sunrise.

### **3. SBRP**

SBRP does not propose a combined wires/non-wires alternative but rather the focus of its participation in this proceeding has been on the value "in-area generation can play in supporting reliable operation of the grid."<sup>174</sup> While in-area generation *can* be an effective way to support grid reliability in some instances, *in this case*, the CAISO's analysis of the South Bay Replacement project demonstrates that the net benefits of Sunrise significantly exceed the net benefits of the in-area generation alternative.<sup>175</sup> Specifically, unlike Sunrise, in-area generation does not reduce SDG&E's LCR. Rather, as discussed above, in-area generation only helps SDG&E meet its LCR at an RMR price.<sup>176</sup>

### **4. TNHC**

TNHC has an interest in both the LEAPS and TE/VS projects. As discussed in detail above, the CAISO has analyzed both projects and Green Path North alone and in combination. The results of the CAISO's analysis is that Sunrise provides greater net benefits than any combination of these projects.

### **5. Others**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

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<sup>174</sup> SBRP/Cragg, Tr. at 151 (Opening Statement).

#### **D. Delay in the Online Date for the Project**

As discussed above, the record demonstrates that SDG&E has a reliability need in 2010 and that Sunrise provides the most cost efficient option, among the alternatives presented for study, for serving that need. In making this determination, the CAISO performed both a reliability “needs” analysis for the San Diego area, and an economic analysis of the net benefits that might be produced by deferring the project and meeting SDG&E’s reliability needs through generic CTs “plugged into” the analysis.

As noted at the outset of this brief, a delay in the timing of Sunrise could have significant reliability consequences while affording ratepayers very little in terms of cost savings when viewed over the lifespan of a transmission project. For this reason, the CAISO did not initially present a deferral analysis but instead, for the purposes of the Rebuttal Testimony, developed its own economic evaluation in response to the studies presented by UCAN and DRA, using many of the assumptions that they recommended. As discussed in detail below, the CAISO analysis found that the incremental benefits associated with deferral are highly sensitive to the assumed construction cost escalation rate and the assumptions used to forecast the cost of renewables benefits. According to the CAISO’s analysis, using plausible assumptions regarding construction and RPS costs, deferring the project could result in negative incremental benefits.<sup>177</sup> Based on the range of escalation rates considered by the CAISO, “the ‘optimal’ in-service date under the CAISO’s assumptions would be 2013, assuming a 5% cost escalation factor.”<sup>178</sup>

This use of the word “optimal” created considerable confusion as to the date the CAISO believes Sunrise is needed. During the cross-examination, CAISO witness Orans explained that “optimal” referred only to the CAISO’s economic evaluation and net benefits - it does not

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<sup>175</sup> See *supra*, Section VI.B.4.

<sup>176</sup> See *supra* Section VI. B.4.

<sup>177</sup> CAISO Ex. I-6 at 57:14-16.

consider need or reliability and should *not* be relied upon by the Commission to establish the in-service date for the project.<sup>179</sup> Dr. Orans further explained that the CAISO's deferral analysis looked only at the incremental cost of the line replaced with inflation, and did not assume a specific plan of service requiring that the needs analysis should be rerun.<sup>180</sup> Counsel for UCAN also questioned Dr. Orans regarding the use of the deferral analysis results for the purpose of establishing the Sunrise in-service date:

Q. (Shames) ... And the question I wanted to ask you was isn't it true that, based on your analysis, that if the line were not built until 2014, that the lights would not go out in San Diego; in other words, that you built in the costs of CTS that would be necessary to maintain reliability until 2014?

A. (Orans) The fact that I built in the cost doesn't mean that the lights aren't going to go out.

My analysis includes costs of capacity that I deemed as— that I thought was a reasonable estimate for costs of capacity. But I don't --- I don't have [a] plan of service that says: Here's the CTs, here's the locations, and we can put them in an L&R table in the same kind of confidence. It's very much a cash-flow analysis that I show in all the different cases.

But that I—I will grant you I had a replacement cost for capacity.<sup>181</sup>

Thus, the CAISO's deferral analysis provides the Commission with a range of plausible construction cost escalation and RPS cost assumptions showing that the Sunrise deferral benefits claimed by UCAN and DRA are, at a minimum, much too high and are either flat or negative in most years. A 5.5% inflation rate would be at the low end of an inflation range that could be as high as 9% and above.<sup>182</sup>

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<sup>178</sup> CAISO Ex. I-6 at 58.

<sup>179</sup> CAISO/Orans, Tr. at 2239:11- 2240:2.

<sup>180</sup> *Id.*, at 2240:13- 2242:19.

<sup>181</sup> *Id.*, at 2250:4-26.

<sup>182</sup> CAISO/Orans, Tr.at 2620: 5-19.

## 1. CAISO

UCAN states that “the ISO’s own numbers, in their current state, no longer support proceeding with [Sunrise] for operation prior to 2018.”<sup>183</sup> To test this statement, the CAISO conducted a deferral analysis based on its Part II testimony, modified by assumptions suggested by UCAN and DRA as well as other updates.<sup>184</sup> By varying the in-service date of the project, the CAISO was able to establish the pattern of benefits<sup>185</sup>. Based on this analysis, the net benefit of deferring Sunrise until 2018 was \$3.8M (assuming \$157M levelized benefits in 2010 dollars, escalated at UCAN’s 3.1% escalation rate and discounting that figure by UCAN’s 8.23%).<sup>186</sup>

However, this net benefit level does not provide a reasonable basis upon which to base a decision regarding the deferral of the Sunrise in-service date because, as noted above, the results are highly susceptible to changes in the escalation rate and RPS costs. In particular, the CAISO does not believe that a 3.1% construction cost escalation rate is reasonable, due to steep increases in the global demand for raw materials in India and China. Indeed, the Edison Electric Institute shows transmission costs escalation rates averaging 9.0% for the 2004-2006 time frame, and other transmission projects are experiencing inflation rates of 10%. SDG&E provided information to the CAISO showing labor cost increases of 30% over the past two years, and material cost increases of approximately 80%. Even DRA acknowledged such rapid cost increases.<sup>187</sup> Thus, the CAISO calculated the Sunrise net benefits by in-service date and cost escalation rate.<sup>188</sup> Based on the CAISO’s analysis, a 5.5% escalation rate produces the highest net benefits in 2013 and at a 9.0% rate the highest level of benefits is achieved in 2010. At

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<sup>183</sup> UCAN Ex. U-4 at 73.

<sup>184</sup> CAISO Ex. I-6 at 58-60. The CAISO also rejected the UCAN \$8M per year benefit from having more CTs for some years than if Sunrise was not deferred, at 70-71.

<sup>185</sup> CAISO Ex. I-6 at 62 (Figure 3).

<sup>186</sup> CAISO Ex. I-6 at 6-13.

<sup>187</sup> CAISO Ex. I-6 at 63.

<sup>188</sup> CAISO Ex. I-6 at 65 (Figure 4 and Table 8A).

higher inflation rates, the net benefits of Sunrise decline rapidly after 2010 and turn negative in 2014.

As part of its deferral analysis, the CAISO also developed the alternative RPS scenario discussed above. Using this RPS alternative, the levelized net benefits of deferring Sunrise completely disappear at each escalation rate above 2.2%.<sup>189</sup> The CAISO also analyzed the Sunrise deferral benefits for 2010 using Gridview energy-related benefits and interpolating those benefits between 2010 and 2015. As shown on Figure 6 and Table 9 of the CAISO's Rebuttal Testimony,<sup>190</sup> the results of the CAISO deferral analysis were not materially altered. The same is true under the CAISO alternative RPS scenario.

## **2. DRA**

The DRA deferral analysis is based on Table 3-3 on page 22 of DRA witness Woodruff's testimony (DRA Ex. D-\*\*\* ) which purports to show that SDG&E does not have a need for additional capacity until 2015. The CAISO adopted most of the DRA-suggested modifications in developing its own LCR table,<sup>191</sup> but does not agree that the appropriate in-service date for Sunrise should be 2015 because the CAISO also modified the load forecast to reflect the latest CEC staff forecast.<sup>192</sup> This issue has been previously addressed in Section \*\*\* above.

## **3. UCAN**

UCAN's deferral analysis is based on a cost escalation assumption that is not reasonable, and that fails to take into account the effect that deferring the Sunrise project could have on RPS compliance costs. In contrast, the CAISO has presented a much more conservative and plausible analysis for the Commission's consideration.

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<sup>189</sup> *Id.*, at 65:7-67.

<sup>190</sup> CAISO Ex. I-6 at 69.

<sup>191</sup> *See* CAISO Ex. 6 at 39 (Table 5).

<sup>192</sup> *Id.*, at 37:9- 38:6.

In response to questions posed by the ALJ, UCAN witness Marcus made an observation about the CAISO's inflation analysis that warrants a response. When asked about how the CAISO escalation factor analysis would impact the UCAN analysis, Mr. Marcus opined that the Sunrise costs prior to 2010 should also be subject to an inflation factor: "If you change the inflation assumption post-2010, it seems inescapable that you should also be changing the inflation assumption pre-2010."<sup>193</sup>

This rumination has no basis in the record. As Dr. Orans explained during his cross examination by UCAN, the CAISO verified with SDG&E that the \$1.265 billion estimated cost for Sunrise is an inflation-adjusted cost at which the company intends to bring the project on line. Although Dr. Orans was unaware of any SDG&E policy statement that a cost cap had been accepted at that level, it was the CAISO's understanding that its analysis was to be performed using the SDG&E cost estimate as a cap.<sup>194</sup> Under the circumstances, it would make little sense to adjust the cap for inflation prior to 2010.

#### **4. Others**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

#### **E. Other**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

### **VII. ECONOMICS**

#### **A. Cost/benefit analysis**

The CAISO has described in detail above the iterative process by which its cost/benefit analysis developed, from the CSRTP Report findings to the results of the modified net benefits

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<sup>193</sup> UCAN/Marcus, Tr. at 2695:18-21.

analysis set forth at Table 6 of the Rebuttal testimony (page 42, showing the CAISO base case and the three alternative scenarios) and at Table 6 of Part V (page 83, showing the ED-requested scenarios). When compared with all other scenarios, Sunrise shows the highest range of economic benefits, consistent with the original findings of the CSRTP study group and the approval of the project by the CAISO Board. The CAISO's economic benefit analysis was developed in accordance with the TEAM methodology and, as described at the outset, should be given the substantial deference in this proceeding.

In summary, Sunrise produces positive benefits in all three categories of cost savings: energy, reliability and RPS compliance, but the most significant categories of value derived from the project to CAISO consumers are the reliability and RPS benefits that it provides. Thus, while much time and effort was spent in this case on the relative merits of the production cost simulation models espoused by the various parties, any changes to the production cost analysis resulting from modeling changes likely will have little effect on the total benefits that Sunrise brings to the table. To be sure, the parties have criticized the CAISO's assumptions and methodologies, and to the extent that time allowed, the CAISO adopted the majority of the intervenors' assumptions. The CAISO believes that the few remaining energy benefits issues are very unlikely to reduce its estimates of energy benefits below their conservatively estimated level and therefore should be rejected as immaterial by the Commission.

### **1. Production Cost Savings**

Using the language of the TEAM methodology formula, production cost savings are the sum of changes in consumer surplus, producer surplus and transmission surplus.<sup>195</sup> These elements, calculated for CAISO consumers and relabeled, can be located on Table 6 in the Rebuttal testimony. As an example, for 2015 the Sunrise consumer surplus was \$121M/yr,

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<sup>194</sup> CAISO/Orans, Tr.at 2248-2250.

reduced by changes in producer surplus and transmission surplus (congestion costs, generator profits and line loss over-collections) to produce net energy benefits (production cost savings) of \$35M/yr. Using the same comparison framework, the consumer surplus for the South Bay repowering project was \$53M/yr, producing \$1M/yr in net energy benefits (production cost savings), and the Green Path + LEAPS scenario provides \$10M/yr in net energy benefits (production cost savings).

SBRP, DRA and TNHC all sponsored testimony taking issue with the CAISO's calculation of Sunrise energy benefits. Of these parties, SBRP and TNHC used different cost models to arrive at their own energy benefit calculations. Specifically, SBRP used a transportation cost model (EnerPrise Market Analytics, a Prosym regional analysis model) and TNHC relied on PLEXOS, the latter being a Power Transfer Distribution Factor (PTDF) full network model similar to the Gridview model used by the CAISO and SDG&E.<sup>196</sup> While the CAISO has used the PLEXOS model in the past and believes that PLEXOS can produce reasonable results, transportation models produce less accurate results and are generally regarded by power engineers as "ignoring the laws of physics."<sup>197</sup> In particular, a PTDF model depicts the entire transmission network, whereas a transportation model is based on zones and does not provide the same level of detail.<sup>198</sup> Although there might be circumstances where a transportation model could provide the level of economic analysis required by the TEAM methodology, there has been no evidence provided on the record of this proceeding that would cause the Commission to reject the CAISO's use of Gridview and substitute the SBRP analysis based on the transportation model.

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<sup>195</sup> CAISO/Sparks, Tr. at 2057:18- 2058: 6.

<sup>196</sup> The differences between modeling assumptions are set forth on joint comparison Ex. SD-31.

<sup>197</sup> CAISO Ex. I-6, at 11: 6.

<sup>198</sup> CAISO/Sparks, Tr. at 2051: 6-10.

Indeed, SBRP has based its conclusion that building local generation in San Diego is more cost effective than Sunrise entirely on the change in production cost in the WECC, a misspecification of the TEAM methodology which focuses on the economic benefits of a project from the standpoint of the CAISO customers.<sup>199</sup> Similarly, SBRP seems to misunderstand the calculation of the producer surplus and the appropriate identification of resources in the SSG-WI database by accusing the CAISO (and SDG&E) of including “significantly less generation than what would be required to meet the 15% PRM [Planning Reserve Margin]”, thus leading “to a substantial understatement of this element in their benefits calculation (and a resulting overstatement of the benefits of the Sunrise line).”<sup>200</sup> The CAISO explained, in its Rebuttal testimony and on cross-examination, that the producer surplus is intended to estimate generation profits that flow back to CAISO consumers. Profits on non-IOU owned generation do not flow back to these customers just because the generation capacity is dedicated to serving CAISO load for RA purposes.<sup>201</sup>

In direct testimony, both SBRP and DRA postulated that the SSG-WI database contains excessive generation resources and therefore the model produces results that are not credible.<sup>202</sup> However, because the TEAM methodology measures the *change* in consumer costs between the base case and the Sunrise case, the results of the analysis would only be biased towards Sunrise if the excessive level of generation created more energy related benefits for Sunrise. The CAISO’s Gridview analysis shows that market prices in California and its nearest trading partners are driven primarily by gas prices. The CAISO was careful to assume relatively small differences in gas prices by location (*e.g.*, 0.20 \$/MMBTU difference between Arizona and California) that could create benefits for Sunrise. If indeed there are excessive amounts of new

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<sup>199</sup> CAISO Ex. I-6 at 12: 4-8.

<sup>200</sup> SBRP Ex. S-5 at 16:21- 17:2.

<sup>201</sup> CAISO Ex. I-6 at 12:10-6; CAISO/Sparks, Tr. at. 2062: 21-2064:1.

resources in regions outside of California, as some members of the WECC now believe are embedded in the SSGWI 2015 database, these resources do not seem to be driving market clearing prices inside or outside of California and are therefore unlikely to have a substantial impact on the already low estimates of energy benefits for Sunrise. Furthermore, as Mr. Sparks explained on cross-examination, although the CAISO's estimate of the planning reserve margin set forth on SD Ex. S-31 (37% PRM) would be high for generation forecast purposes, the purpose of the database is not to calculate PRM, conduct loss of load probability studies or address reliability issues in the WECC.<sup>203</sup>

## **2. Reliability Cost Savings**

Similar to the other elements of the CAISO's economic analysis, the reliability benefits evaluation changed substantially between the Part I and Part II testimony, and was modified again in the Rebuttal Testimony and in Part V with the inclusion of the LA Basin impacts in the LCR study. Turning again to the Rebuttal Testimony, Table 6 on page 42, the elements of the incremental costs making up the CAISO reliability benefits analysis include capacity and operating payments (costs) for RMR units, CT capacity and transmission costs and remediation costs to provide reactive support, reduced by the avoided costs of system RA provided by local capacity and RPS. The levelized reliability benefits for the four alternatives are \$129M/yr for Sunrise, \$37M/yr for South Bay and \$109M/yr for Green Path + LEAPS.

The CAISO modeled reliability costs over 40 years beginning in 2010.<sup>204</sup> As a starting point, the CAISO determined the amount of new CT capacity that would be required to meet reliability criteria starting in 2015. To model RMR costs, the CAISO assumed that future

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<sup>202</sup> *Id.*, at 10: 4-10.

<sup>203</sup> According to the latest WECC 2008 case, Arizona has approximately 16,000 MW's (or 13,000 if you count reserve margins) of resources above the level needed to serve their own load growth. It is difficult to determine what will happen to this excess by 2015.

<sup>204</sup> CAISO Ex. I-2 at 22: 22- 23:5.

capacity costs would be established via competitive procurement auction producing higher capacity prices during shortage periods and lower prices where there is excess supply. The pattern of capacity pricing used by the CAISO mimics RMR Type 1 capacity payments during periods of excess local supply and Type 2 contracts when there are local capacity shortages. Finally, additional RMR operating costs associated with pre-dispatch requirements were added to the Gridview model.<sup>205</sup>

CT costs are the MWs of new CTs, priced at \$78/kW year in 2006 dollars, increased each year by 2% to reflect inflation. The required MWs of new CTs assumed for each of the alternatives were derived from the updated CAISO studies producing a need for local resources of 313 MW in 2015 avoided by Sunrise (reduced from the original assumption of 565 MW in the Part II testimony).<sup>206</sup> The costs of transmission interconnection required for new CTs were estimated to be 35.2% of the CT annual cost.<sup>207</sup>

To calculate RMR prices, the CAISO started with average actual 2005 fixed capacity payments for Type 2 contracts in the SDG&E zone, and then escalated these costs by a 2% inflation factor. For the Type 1 contract prices, the CAISO assumed that the payment level would be no higher than the Type 2 payments in the presence of transmission import capability in excess of in-area CT displacement. For the year 2010, the Type 1 capacity payments were calculated to be about 21% of a Type 2 payment, using the \$27/kW-yr O&M “floor” assumption recommended by UCAN and escalating to a cap of \$50/kW-yr in 2010 dollars. In year 2022, the Type 1 contract price is assumed to be 100% of the Type 2 level as the average demand growth

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<sup>205</sup> *Id.*, at 22-23.

<sup>206</sup> CAISO Ex. I-6 at 40 1-7. As was the case with many other updates, this lower LCR requirements reduced the amount of RMR capacity and CT capacity required in the CAISO base case and the alternative cases, as well as lowering the RMR capacity price in those years when the RMR capacity requirement is lower than the available in-area RMR.

<sup>207</sup> CAISO Ex. I-2 at 25: 6-11.

would exhaust the import capability of the new line.<sup>208</sup> The CAISO adjusted the relationship between the RMR surplus levels and capacity prices in the Rebuttal and Part V testimonies to reflect the lower local capacity requirements set forth on Table 5 of the Rebuttal testimony. Specifically, the lower LCR requirements caused a reduction in the RMR capacity price in years when the RMR capacity requirement is lower than the available total in-area RMR.<sup>209</sup>

Also described in the Rebuttal testimony is the UCAN-recommended adjustment reflecting an increase in non-local RA requirements by the 1000 MW reduction in local RA obligations produced by Sunrise, valued at \$27 kW/yr. Because some of the non-local RA is provided by the renewable resources in the Sunrise case, the net increase in non-local RA obligations was estimated to be 660 MW. Renewable resources can meet RA obligations because the CAISO modeled the full cost of the resource, including capacity and energy outputs. Table 2 on page 26 of the Rebuttal testimony reflects the CAISO mix of renewable resources used to offset the 1000 MW of local RA. The impact of this 660 MW adjustment on levelized net benefits for each alternative can be found on Table 3 on page 27 of that testimony.

Finally, the CAISO adjusted its original reliability benefits analysis to consider the impact of Sunrise on local capacity requirements in the LA Basin. This RMR/LCR analysis was performed similar to the San Diego evaluation, using the same assumptions about RMR pricing and the costs associated with procuring system RA.<sup>210</sup> The TE/VS project was assumed to decrease LCR in San Diego by 500 MW and this reduction would increase LCR requirements in the LA Basin by 500 MW. To facilitate a comparison of the alternative scenarios, the Base Case, TE/VS + LEAPS, Sunrise and South Bay cases were all modified to reflect the 500 MW increase in LA Basin LCR requirements. The CAISO estimates of the LA LCR requirements can be

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<sup>208</sup> *Id.*, at 27 :18-28:18.

<sup>209</sup> CAISO Ex. I-6 at. 4:12- 42:2.

<sup>210</sup> CAISO Ex. I-2, at 6: 4-15.

found on Table of the Rebuttal Testimony, page 19. The CAISO also assumed that there are reliability-related benefits from renewable resources in the Base Case, Sunrise and Green Path North cases in the form of reductions to the LA Basin LCR requirements. For example, in the Base Case the CAISO assumed that 700 MW of renewable resources would be developed without any major transmission upgrades, and these could offset approximately 525 MW of LCR in LA. Similarly, in the Sunrise case, the new transmission line will provide access to 2000 MW of incremental renewable resources, reducing both San Diego's LCR and providing a 298 MW reduction in the LA Basin LCR in addition to the 525 MW already provided in the base case.<sup>211</sup> The decreases to the LA LCR provided by renewables in the LEAPS + Green Path scenario is lower due to the CAISO's revised determination that only 2000 MW of renewables could be reliably interconnected and delivered under that scenario.<sup>212</sup> The result of the CAISO's modification for the LA Basin LCR is that the 500 MW provided by TE/VS decreases the RMR prices and quantity of RMR needed in San Diego and decreases the need for future capacity provided by CTs. For Sunrise, the inclusion of the LA Basin reliability costs increased the project's levelized net benefits by \$16M to \$18M, depending on other case assumptions.<sup>213</sup> In the South Bay alternative, reliability benefits were not affected by a decrease in LA LCR.<sup>214</sup>

As part of the additional scenarios requested by ED, the CAISO was asked to study the LEAPS facility as merchant generation. For this analysis, the CAISO estimated that the costs of the facility would be above the cost of RMR payments to generators, even after crediting the plant with ancillary service and energy benefits, and increased the RMR payments for pumped storage to \$51.30/kW-yr in 2010 dollars.<sup>215</sup>

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<sup>211</sup> CAISO Ex. I-6 at. 18-20.

<sup>212</sup> *Id.*, at 21: 3- 22: 2.

<sup>213</sup> *Id.*, at 24:1-25:3, line 3.

<sup>214</sup> *Id.*, at 22: 14-18.

<sup>215</sup> *Id.*, at 23: 5-20.

DRA has claimed that the CAISO's reliability benefits are too high, based on its determination that there will be no capacity need for Sunrise until 2015, and has estimated that the range of reliability cost savings should be \$33M/yr to \$66M/yr.<sup>216</sup> As discussed above, the CAISO does not agree with this date, although some of DRA's recommendations with respect to the needs calculation have been adopted. The CAISO's recalculation of its L & R table (Table 5 of the Rebuttal Testimony) supports the 2010 capacity deficiency determination. DRA's reduced reliability benefit analysis is also driven by its assumption that SDG&E's local generation will retire at a continuous rate over a ten year period until it is entirely replaced.<sup>217</sup> However, DRA was unable to explain with clarity why this resource planning assumption was more reasonable than the CAISO assumptions regarding the retirement of the South Bay units and the continued availability or mothballing of other units.<sup>218</sup>

### **3. Renewable Cost Savings**

#### *The CAISO Study Results*

The methodology used by the CAISO to estimate the RPS benefits of Sunrise and the other alternatives has been described in detail above. In summary, in the Part II testimony the CAISO produced two renewable generation resource plans which were used to estimate RPS benefits for the Base Case and South Bay (scenarios without transmission) and Sunrise and Green Path North + LEAPS (scenarios with transmission). Modifications were made to some of the underlying assumptions in the Rebuttal Testimony, responding to modifications recommended by the interveners, and the CAISO also developed two alternative RPS plans to reflect updated cost estimates for wind and solar thermal resources.<sup>219</sup> Table 6 of the Rebuttal Testimony provides the low end of this range of plausible (and highly likely) renewable resource

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<sup>216</sup> DRA/Woodruff, Ex.D-66, ES-2-3 (Table ES-1).

<sup>217</sup> *Id.*, at 25: 18-29.

<sup>218</sup> CAISO Ex. I-6 at 28: 4-9. *See also* DRA/Woodruff, Tr.at 2702-2718.

assumptions, reflecting resource procurement costs of \$4,265 M/yr for the Base Case and South Bay, and \$4,220M/yr and \$4,232M/yr for Green Path North + LEAPS, respectively. On Table 7, the high end of range is \$4,718M/yr for the Base Case and South Bay, and \$4,498M/yr and \$4,555M/yr for Sunrise and Green Path North, respectively. The range of RPS benefits for Sunrise is \$45M/yr- \$220M/yr.

*The Intervenors' Positions on the CAISO's Renewable Resource Development Study and the Calculation of RPS Benefits*

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DRA used the CAISO renewables procurement cost model (“Renewables Supply Curve”) to produce its own estimate of the Sunrise RPS benefits. Two modifications were made to the model: the elimination of the benefits associated with non-TAC customers, and the treatment of the Tehachapi transmission costs as “sunk”, thus removing the impact of these costs from the analysis and reducing the Sunrise benefits.<sup>220</sup> As noted above, the CAISO agreed with the elimination of the non-TAC customers and modified its analysis accordingly in the Rebuttal Testimony. However, the suggestion that the costs of the Tehachapi project be removed from the study was rejected for the following reasons. While Tehachapi segments 1-3 have been approved by the Commission, at a cost of approximately \$250M, the bulk of the project’s \$1.8 billion costs have not yet been approved. By removing the entire cost of the transmission from the benefits estimation, the 4500 MW of wind generation becomes much less expensive than the geothermal and solar resources in Imperial Valley. This is not a reasonable assumption and, in fact, moves the price of wind in the opposite direction from recent market price indicators and the actual bids being received by utilities in their RFO processes.<sup>221</sup> Indeed, the CAISO’s alternative renewables scenario pegs wind at much higher, and more realistic, prices. Thus, the DRA recommendation regarding the Tehachapi “sunk” transmission costs should not be adopted.

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<sup>219</sup> *Id.*, at 43: 8-49: 8.

<sup>220</sup> DRA Ex. D-66, at 33: 8-16.

TNHC used the CAISO renewables benefit analysis to develop its own estimate of the benefits of the stand-alone TE/VS line as an alternative to Sunrise. However, TNHC incorrectly assigned the RPS procurement costs used by the CAISO to evaluate Sunrise in comparison to the TE/VS line, thus dramatically increasing the benefits of TE/VS, apparently based solely on the assumed 1000 MW import capability of the line (a conclusion with which the CAISO does not agree).<sup>222</sup> This modeling assumption makes no sense. Because the TE/VS line without Green Path will not provide access to the Salton Sea/Imperial Valley renewables, the RPS resource development will be the same as the CAISO Base Case.<sup>223</sup> The RPS benefits of the TE/VS line are zero, as shown in the CAISO's evaluation of TE/VS in the Part V testimony.<sup>224</sup>

UCAN did not conduct its own RPS benefits analysis of Sunrise. Instead, UCAN's objections to the CAISO's renewable benefits analysis (and SDG&E's assumptions as well) focus on the amount of renewable resources that will be developed in the Salton Sea/Imperial Valley and the deliverability of those resources to San Diego. In particular, UCAN asserts that the 2700 MW of renewable generation in Imperial Valley will be developed and can be delivered to San Diego with or without Sunrise. This assertion erroneously is based, in part, on the studies conducted by the CAISO for UCAN.<sup>225</sup>

The CAISO was asked to run a series of scenarios for UCAN, using a base case that modeled, *inter alia*, 2700 MW of renewables in Imperial Valley, adding a third Miguel 500/230 kV transformer and assuming that Path 42 had been upgraded.<sup>226</sup> The CAISO modeled the case according to UCAN's specifications, performed a reliability analysis using the 2015 Heavy Summer power flow model, and also conducted Gridview economic studies. In its Part III

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<sup>221</sup> CAISO Ex. I-6 at 35:10- 37: 6.

<sup>222</sup> TNHC/Auclair, Ex. N-9 at 32: 9-15

<sup>223</sup> CAISO Ex. I-6 at 49:9- 50: 3.

<sup>224</sup> See CAISO, Ex. I-5 at 14 (Table 4).

<sup>225</sup> UCAN Ex. U-3 at 90-93.

<sup>226</sup> CAISO Ex. I-6 at 33-34.

testimony, the CAISO repeatedly explained that the use of these assumptions causes the scenarios upon which they are based to fail the reliability test due to transient frequency dip violations in Mexico CFE caused by a contingency of the IV-Miguel 500 kV line in the year 2014 and possibly earlier.<sup>227</sup> This contingency limits the addition of new generation to 700 MW, and additions of more than 700 MW would worsen the results of the contingency.<sup>228</sup> The CAISO also provided additional information to UCAN about these reliability violations in the form of a confidential workpaper.<sup>229</sup>

Nonetheless, ignoring the CAISO's reliability analysis results, UCAN apparently relied on the CAISO's Gridview economic analysis to support its claim that 2700 MW of renewable generation would be deliverable without Sunrise. The CAISO explained in its rebuttal testimony that although the Gridview runs and the power flow analyses were produced simultaneously, the CAISO's standard two-pronged approach renders the economic analysis unnecessary once a scenario has failed the reliability criteria.<sup>230</sup>

The deliverability issue was also addressed through the cross-examination of Mr. Sparks. During questioning by SDG&E, Mr. Sparks explained that, according to CAISO Planning Standards' Guides for New Generator Special Protection Systems, up to 1150 MW of generation interconnected to SWPL (IV-Miguel, including the IV substation) could be tripped by a Remedial Action Scheme (RAS) to protect the reliability of the system following the single contingency of the SWPL. Currently, 1070 MW are connected to and tripped by the RAS.<sup>231</sup> The CAISO would not allow additional generation to be interconnected if more than 1150 MW

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<sup>227</sup> See, e.g. CAISO I-3 at 27:18-24, repeated at 31: 18-21, 35: 1-4, 38: 14-17 and 42 1:4-7.

<sup>228</sup> Prior to the discovery of this frequency dip violation, 800 MW is the maximum level of renewable resources that the CAISO assumed could be developed in the Imperial and delivered to San Diego without Sunrise.

<sup>229</sup> CAISO Ex. I-6, n.54.

<sup>230</sup> *Id.*, at 34: 7-16.

<sup>231</sup> CAISO/Sparks, Tr. at 1852: 27-1853:20.

would have to be tripped.<sup>232</sup> However, for the purposes of the CAISO’s renewables deliverability analysis, the estimated 700 MW of additional generation that could be developed in the Imperial Valley was assumed to be developed in the IID territory and not at the Imperial Valley bus.<sup>233</sup>

Given the 1150 MW limit on generation that could be simultaneously tripped to mitigate the SWPL single contingency, UCAN questioned Mr. Sparks about the CAISO’s generation interconnection queue and the amount of new generation that the CAISO would approve for interconnection at the IV substation. Specifically, regarding Project 78, a 300 MW solar project interconnecting at the IV substation with an approved System Facilities Study, Mr. Sparks was asked how this project could be approved for interconnection because the 1150 MW limit apparently would be exceeded by 220 MW. , Mr. Sparks explained that CAISO planning criteria limits the amount of generation that can that can be simultaneously tripped, as opposed to the amount that can be hooked up.<sup>234</sup>

Mr. Sparks was not familiar with the design of the RAS for that project, if any (which would be confidential information under any circumstances)<sup>235</sup>, and also was not familiar with other projects in the CAISO interconnection queue with completed system impact studies during the Sunrise hearings that were proposed for interconnection to SWPL. Nonetheless, the CAISO study results demonstrate that the amount of generation that can be reliably interconnected and delivered to San Diego is limited to 700 MW and is consistent with interconnection studies.

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<sup>232</sup> CAISO/Sparks, Tr. at 1856: 5-17.

<sup>233</sup> CAISO/Sparks Tr. at 1853: 28- 1854:18; *see* 1855 :27-1856:4:

“Q. (Walsh) Is—are you assuming that 700 MW is connected to the Imperial Valley substation?

A. (Sparks) No. That 700 MW was in the IID system.

Q. All 700 MW?

A. Yes.”

<sup>234</sup> Tr. at 1859; 9-12.

<sup>235</sup> *Id.*, at 1858: 2-13; 1863:6- 1866:28.

Despite the fact that UCAN did not perform its own renewable resource procurement cost study, and used the CAISO cost estimates for its own studies,<sup>236</sup> UCAN nonetheless raised the specter that the CAISO's studies did not take into account the effect on the level of Sunrise benefits should the CAISO's mix of renewable resources substantially change. During questioning by the ALJ about whether or not he agreed that Dr. Orans' estimates of benefits were conservative, Mr. Marcus speculated that he did not agree because the "with Sunrise" renewables study scenario would look very different if the Stirling solar project did not develop but the Mexican wind projects did.<sup>237</sup>

The CAISO agrees that Mr. Marcus' scenario is another plausible case. The replacement of solar thermal with wind has two partially offsetting affects in the economic analysis. First, assuming that the Sunrise line would be utilized by 900 MW of wind, rather than 900 MW of solar thermal in the Imperial Valley reduces the amount of RA provided by the Sunrise renewables as well as reduces the amount of capacity that can be counted for the Los Angeles LCR. The reductions occur because the CAISO has counted 70% of solar thermal installed capacity for RA and LCR, but only 20% of wind installed capacity. The changes in the RA and LCR MWs are summarized below. These changes results in a reliability cost increase of \$38M/yr in the Sunrise case and \$27M/yr in the Green Path North + LEAPS case.

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<sup>236</sup> UCAN Ex. U-3 at 210.

<sup>237</sup> UCAN/Marcus, Tr. at 2704: 7-22: Marcus: "In Dr. Orans' analysis, in his rebuttal testimony, he changes prices for—changes his assumptions about prices for renewables...But I think what he hasn't looked at is what happens if he changes the assumption about which renewables get developed where...if the Stirling project does happen or doesn't happen on schedule and if the Mexican wind does happen, then Sunrise will be—the with Sunrise world will be the one with a lot of wind ...."

**Reliability Costs (Levelized \$M/yr)**

	Sunrise Case (\$M/yr)	Sunrise with 900MW of MX Wind in place of Solar Thermal	Sunrise Difference (\$M/yr)	GPN (\$M/yr)	GPN with 900MW of MX Wind in place of Solar Thermal in IV	GPN Difference (\$M/yr)
RMR Capacity Payments	287	295	8	320	326	6
RMR Operating Payments	43	43	-	55	55	-
CT Capacity Costs - Levelized	278	298	20	276	289	13
Transmission for new CTs	98	105	7	97	102	5
System RA Provided by local capacity & RPS	(327)	(324)	3	(339)	(336)	3
<b>Total Reliability Costs</b>	<b>379</b>	<b>417</b>	<b>38</b>	<b>409</b>	<b>436</b>	<b>27</b>

The assumption of 900 MW of wind in place of 900 MW of solar thermal also changes the cost of meeting the RPS goals in the Sunrise and Green Path North + LEAPS cases. RPS compliance costs would decline to the extent that wind power is less expensive than solar thermal. Costs could also decrease because the wind power provides more MWh per MW of installed capacity. This essentially extends the RPS supply curve and could allow utilities to complete their RPS compliance purchases at a lower cost marginal resource. The RPS compliance costs under both the base case and high RPS cases are shown below. The cost savings under the High End RPS case are significantly lower than under the base case because the assumed cost differential between wind and solar thermal costs is \$15/MWh in the high end case, whereas it is \$54/MWh in the base case.

**RPS Levelized Costs (\$Millions per year)**

	Sunrise Case (\$M/yr)	Sunrise with 900 MW of MX Wind in place of Solar Thermal	Sunrise Difference (\$M/yr)	GPN (\$M/yr)	GPN with 900MW of MX Wind in place of Solar Thermal in IV	GPN Difference (\$M/yr)
Based Case RPS	\$ 4,220	\$ 4,112	\$ (108)	\$ 4,232	\$ 4,152	\$ (80)
High End RPS	\$ 4,498	\$ 4,453	\$ (45)	\$ 4,555	\$ 4,522	\$ (33)

The combined effects of the reliability and RPS cost changes are a substantial net increase in benefits for both Sunrise and Green Path North + LEAPS cases in the base RPS case and a slight increase in net benefits for both alternatives in the High End RPS cases as shown above.

The table below shows the results of Sunrise economic analysis assuming that Stirling Solar thermal is not developed, but replaced with wind, under the base case RPS assumptions.

**Levelized costs and benefits by alternative assuming Supplemental Non-Local Capacity Purchases, the \$27/kW-yr RA price floor, Exclusion on Non-TAC paying utilities, Revised Local Capacity Requirement, and replacement of 900 MW of IV Solar Thermal with Wind.**

	A	B	C	D	E	F	G
Summary of Levelized Costs and Benefits	Costs (\$ millions per year, nominal)				Net Benefits (Base case cost - Alt. case)		
	Base Case - San Diego & LA	Sunrise	South Bay	Green Path + LEAPS	Sunrise	South Bay	Green Path + LEAPS
<b>Energy and Reliability Costs</b>							
Customer Payments from Gridview	15,736	15,615	15,684	15,694	121	53	42
Less CAISO congestion cost (reduces TAC)	(123)	(88)	(102)	(110)	(36)	(21)	(13)
Less URG Margin (reduces URG bal acct)	(4,744)	(4,710)	(4,719)	(4,735)	(34)	(24)	(9)
Less IOU excess loss payments	(808)	(792)	(802)	(799)	(16)	(6)	(9)
<b>Subtotal Energy Cost and Benefit</b>	<b>10,061</b>	<b>10,026</b>	<b>10,060</b>	<b>10,051</b>	<b>35</b>	<b>1</b>	<b>10</b>
RMR Capacity Payments - Levelized	312	295	341	326	17	(29)	(14)
RMR Operating Payments - Levelized	60	43	60	55	17	(0)	5
CT Capacity Costs - Levelized	363	298	315	289	65	49	74
Transmission cost for new CTs-Levelized	128	105	111	102	23	17	26
Remediation cost to provide reactive support	-	-	-	-	-	-	-
System RA Provided by local capacity & RPS	(356)	(324)	(356)	(336)	(32)	-	(20)
<b>Subtotal Reliability Cost and Benefit</b>	<b>507</b>	<b>416</b>	<b>471</b>	<b>436</b>	<b>91</b>	<b>37</b>	<b>72</b>
<b>Total Energy and Reliability Benefits</b>					<b>126</b>	<b>37</b>	<b>82</b>
<b>RPS Procurement Cost</b>							
Adjusted RPS Cost	4,265	4,112	4,265	4,152	153	-	114
<b>Total Benefits</b>					<b>280</b>	<b>37</b>	<b>196</b>
<b>Transmission Cost</b>							
Levelized Cost of Transmission	-	157	8.5	97.0	(157)	(8.5)	(97.0)
<b>Total Costs and Benefits</b>	<b>14,834</b>	<b>14,711</b>	<b>14,805</b>	<b>14,735</b>	<b>123</b>	<b>29</b>	<b>99</b>

In the high RPS benefits case, the levelized net benefits of Sunrise are only slightly higher when we replace solar thermal with wind (234 compared to 226 million dollars), due to higher costs of wind procurement in the high RPS case. Table XX below shows the economics in the 4 cases under the assumption of more wind and less solar thermal suggested by Mr. Marcus.

**Levelized costs and benefits by alternative assuming Supplemental Non-Local Capacity Purchases, the \$27/kW-yr RA price floor, Exclusion on Non-TAC paying utilities, Revised Local Capacity Requirement, replacement of 900MW of IV Solar Thermal with Wind, and High End RPS Benefits.**

	A	B	C	D	E	F	G	
Summary of Levelized Costs and Benefits	Costs (\$ millions per year, nominal)				Net Benefits (Base case cost - Alt. case)			
	Base Case - San Diego & LA	Sunrise	South Bay	Green Path + LEAPS	Sunrise	South Bay	Green Path + LEAPS	
<b>Energy and Reliability Costs</b>								
1	Customer Payments from Gridview	15,736	15,615	15,684	15,694	121	53	42
2	Less CAISO congestion cost (reduces TAC)	(123)	(88)	(102)	(110)	(36)	(21)	(13)
3	Less URG Margin (reduces URG bal acct)	(4,744)	(4,710)	(4,719)	(4,735)	(34)	(24)	(9)
4	Less IOU excess loss payments	(808)	(792)	(802)	(799)	(16)	(6)	(9)
5	<b>Subtotal Energy Cost and Benefit</b>	<b>10,061</b>	<b>10,026</b>	<b>10,060</b>	<b>10,051</b>	<b>35</b>	<b>1</b>	<b>10</b>
6	RMR Capacity Payments - Levelized	312	295	341	326	17	(29)	(14)
7	RMR Operating Payments - Levelized	60	43	60	55	17	(0)	5
8	CT Capacity Costs - Levelized	363	298	315	289	65	49	74
9	Transmission cost for new CTs-Levelized	128	105	111	102	23	17	26
10	Remediation cost to provide reactive support	-	-	-	-	-	-	-
11	System RA Provided by local capacity & RPS	(356)	(324)	(356)	(336)	(32)	-	(20)
12	<b>Subtotal Reliability Cost and Benefit</b>	<b>507</b>	<b>416</b>	<b>471</b>	<b>436</b>	<b>91</b>	<b>37</b>	<b>72</b>
13	<b>Total Energy and Reliability Benefits</b>					<b>126</b>	<b>37</b>	<b>82</b>
<b>RPS Procurement Cost</b>								
14	Adjusted RPS Cost	4,718	4,453	4,718	4,522	265	-	196
15	<b>Total Benefits</b>					<b>391</b>	<b>37</b>	<b>278</b>
<b>Transmission Cost</b>								
16	<b>Levelized Cost of Transmission</b>	-	157	8.5	97.0	(157)	(8.5)	(97.0)
17	<b>Total Costs and Benefits</b>	<b>15,286</b>	<b>15,052</b>	<b>15,257</b>	<b>15,105</b>	<b>234</b>	<b>29</b>	<b>181</b>

Unlike, all other cases that Mr. Marcus has proposed, this final case that he suggests is both plausible and clearly demonstrates why the conservative nature of the assumptions used by the CAISO to develop the benefits of Sunrise vis-à-vis its alternatives.

#### 4. Other Savings

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

#### 5. Project Costs

The CAISO has addressed the Sunrise costs in Section V.B. above. The costs provided by SDG&E were used consistently throughout the CAISO's economic models. A discussion of the costs of alternative project scenarios has been included in the sections addressing the specific alternatives.

## **6. Results**

The CAISO has discussed in detail the specific results of its analysis throughout this brief. As shown in the tables below, the CAISO's analysis demonstrates a reliability need in SDG&E's service area beginning in 2010 and that Sunrise can meet this need while providing significant net benefits relative to the project alternatives:

Rebuttal Testimony, Table 5 (*San Diego Locational Capacity Requirement*):

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Reference
<b>Load Forecast</b>														
1 1 in 10 CEC Forecast	4999	5084	5170	5258	5348	5439	5531	5625	5721	5818	5917	6017	6120	CEC-200-2007-006
2 -CA Solar Initiative	2	6	10	25	60	100	130	150	150	150	150	150	150	SDGE testimony 1/26/07
3 -Celerity(Demand Response)	20	20	20	20	20	20	20	20	20	20	20	20	20	SDGE testimony 1/26/07
4 -Comverge(Demand Response)	9	9	9	9	9	9	9	9	9	9	9	9	9	SDGE testimony 1/26/07
5 -EnerNOC(Demand Response)	30	30	30	30	30	30	30	30	30	30	30	30	30	
6 -AMI(Demand Response)	0	47.07	88.9	194	203	213	218	223	229	234	240	246	252	SDGE data response
7 Net 1 in 10 Load Forecast	4938	4972	5012	4980	5025	5067	5124	5193	5283	5375	5468	5563	5659	
<b>Generation</b>														
8 2008 Posted NQC	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	Net Qualifying Capacity Values and LCR for Compliance Year 2008 - Corrections as of 30-May-2007
9 +SDCWA - Rancho Penasquitos	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	SDGE testimony 8/4/06
10 +Bull Moose (Biomass)		20	20	20	20	20	20	20	20	20	20	20	20	SDGE testimony 8/4/06
11 +Otay Mesa Combined Cycle		561	561	561	561	561	561	561	561	561	561	561	561	CEC website
12 +Lake Hodges Pump Storage Hydro	40	40	40	40	40	40	40	40	40	40	40	40	40	ISO Queue
13 +J Power (Pala)	94	94	94	94	94	94	94	94	94	94	94	94	94	2008 SDGE contract info
14 +Wellhead Power Margarita	44	44	44	44	44	44	44	44	44	44	44	44	44	2008 SDGE contract info
15 +Palomar inlet air chiller			20	20	20	20	20	20	20	20	20	20	20	
16 -South Bay Retirement			-702	-702	-702	-702	-702	-702	-702	-702	-702	-702	-702	
17 Total Generation	3100	3681	2999	2999	2999	2999	2999	2999	2999	2999	2999	2999	2999	
<b>Locational Capacity Requirement</b>														
18 Largest G-1	541.5	561	561	561	561	561	561	561	561	561	561	561	561	
19 Loss Adjustment (Note 2)	58	58	58	58	58	58	58	58	58	58	58	58	58	Table 5.1 ISO testimony 4/20/07 (Reference case vs N-1)
20 Import Capacity Need (Load-Gen)	2438	1910	2633	2600	2646	2687	2744	2813	2903	2995	3088	3183	3279	
21 Import Capacity Limit	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	
22 Surplus (Deficiency)	62	590	(133)	(100)	(146)	(187)	(244)	(313)	(403)	(495)	(588)	(683)	(779)	

Note 1: Sunrise Powerlink or alternative transmission projects are not considered in this table  
 Note 2: Loss adjustment needed to reflect N-1/G-1 condition

Rebuttal Testimony, Table 6 (*Levelized costs and benefits by alternative assuming Supplemental Non-Local Capacity Purchases, the \$27/kW-year RA price floor, Exclusion of Non-TAC paying utilities, and Revised Local Capacity Requirements*):

Summary of Levelized Costs and Benefits	A B C D				E F G		
	Costs				Net Benefits		
	(\$ millions per year, nominal)				(Base case cost - Alt. case cost)		
	Base Case - San Diego & LA	Sunrise	South Bay	Green Path + LEAPS	Sunrise	South Bay	Green Path + LEAPS
<b>Energy and Reliability Costs</b>							
1 Customer Payments from Gridview	15,736	15,615	15,684	15,694	121	53	42
2 Less CAISO congestion cost (reduces TAC)	(123)	(88)	(102)	(110)	(36)	(21)	(13)
3 Less URG Margin (reduces URG bal acct)	(4,744)	(4,710)	(4,719)	(4,735)	(34)	(24)	(9)
4 Less IOU excess loss payments	(808)	(792)	(802)	(799)	(16)	(6)	(9)
5 <b>Subtotal Energy Cost and Benefit</b>	10,061	10,026	10,060	10,051	35	1	10
6 RMR Capacity Payments - Levelized	312	287	341	320	25	(29)	(8)
7 RMR Operating Payments - Levelized	60	43	60	55	17	(0)	5
8 CT Capacity Costs - Levelized	363	278	315	276	85	49	87
9 Transmission cost for new CTs-Levelized	128	98	111	97	30	17	31
10 Remediation cost to provide reactive support	-	-	-	-	-	-	-
11 System RA Provided by local capacity & RPS	(356)	(327)	(356)	(339)	(29)	-	(17)
12 <b>Subtotal Reliability Cost and Benefit</b>	507	379	471	409	129	37	98
13 <b>Total Energy and Reliability Benefits</b>					164	37	109
<b>RPS Procurement Cost</b>							
14 Adjusted RPS Cost	4,265	4,220	4,265	4,232	45	-	33
15 <b>Total Benefits</b>					209	37	142
<b>Transmission Cost</b>							
16 Levelized Cost of Transmission	-	157	8.5	97.0	(157)	(8.5)	(97.0)
17 <b>Total Costs and Benefits</b>	14,834	14,782	14,805	14,789	52	29	45

Rebuttal Testimony, Table 7 (*Levelized costs and benefits by alternative assuming Supplemental Non-Local Capacity Purchases, the \$27/kW-year RA price floor, Exclusion of Non-TAC paying utilities, and Revised Local Capacity Requirements and High End RPS Benefits*):

		A	B	C	D	E	F	G
Summary of Levelized Costs and Benefits		Costs				Net Benefits		
		(\$ millions per year, nominal)				(Base case cost - Alt. case cost)		
		Base Case - San Diego & LA	Sunrise	South Bay	Green Path + LEAPS	Sunrise	South Bay	Green Path + LEAPS
<b>Energy and Reliability Costs</b>								
1	Customer Payments from Gridview	15,736	15,615	15,684	15,694	121	53	42
2	Less CAISO congestion cost (reduces TAC)	(123)	(88)	(102)	(110)	(36)	(21)	(13)
3	Less URG Margin (reduces URG bal acct)	(4,744)	(4,710)	(4,719)	(4,735)	(34)	(24)	(9)
4	Less IOU excess loss payments	(808)	(792)	(802)	(799)	(16)	(6)	(9)
5	<b>Subtotal Energy Cost and Benefit</b>	<b>10,061</b>	<b>10,026</b>	<b>10,060</b>	<b>10,051</b>	<b>35</b>	<b>1</b>	<b>10</b>
6	RMR Capacity Payments - Levelized	312	287	341	320	25	(29)	(8)
7	RMR Operating Payments - Levelized	60	43	60	55	17	(0)	5
8	CT Capacity Costs - Levelized	363	278	315	276	85	49	87
9	Transmission cost for new CTs-Levelized	128	98	111	97	30	17	31
10	Remediation cost to provide reactive support	-	-	-	-	-	-	-
11	System RA Provided by local capacity & RPS	(356)	(327)	(356)	(339)	(29)	-	(17)
12	<b>Subtotal Reliability Cost and Benefit</b>	<b>507</b>	<b>379</b>	<b>471</b>	<b>409</b>	<b>129</b>	<b>37</b>	<b>98</b>
13	<b>Total Energy and Reliability Benefits</b>					<b>164</b>	<b>37</b>	<b>109</b>
<b>RPS Procurement Cost</b>								
14	Adjusted RPS Cost	4,718	4,498	4,718	4,555	220	-	163
15	<b>Total Benefits</b>					<b>383</b>	<b>37</b>	<b>271</b>
<b>Transmission Cost</b>								
16	<b>Levelized Cost of Transmission</b>	-	157	8.5	97.0	(157)	(8.5)	(97.0)
17	<b>Total Costs and Benefits</b>	<b>15,286</b>	<b>15,060</b>	<b>15,257</b>	<b>15,112</b>	<b>226</b>	<b>29</b>	<b>174</b>

Initial Testimony, Part V, Table 49 (Total Levelized Net Benefits):

		A	B	C	D	E	F
		Transmission Cost (\$M/yr)	Total Benefits (\$M/yr)		Net Benefit (\$M/yr)		Source
Case			RPS Base Case	RPS Alt Case	RPS Base Case	RPS Alt Case	
1	Sunrise + South Bay Repower (ED7)	166	236	410	70	245	(Part V Errata, Table 34)
2	<b>Sunrise</b>	<b>157</b>	<b>209</b>	<b>383</b>	<b>52</b>	<b>226</b>	(Rebuttal, Table 6)
3	<b>TE/VS + LEAPS + Green Path</b>	<b>97</b>	<b>142</b>	<b>271</b>	<b>45</b>	<b>174</b>	(Rebuttal, Table 6)
4	Sunrise + South Bay Repower + Green Path (ED8)	196	230	404	34	208	(Part V Errata, Table 38)
5	<b>South Bay Repower</b>	<b>9</b>	<b>37</b>	<b>37</b>	<b>29</b>	<b>29</b>	(Rebuttal, Table 6)
6	TE/VS + Green Path (ED2)	97	125	255	28	158	(Part V Errata, Table 9)
7	Sunrise + Green Path (ED9)	188	206	380	18	193	(Part V Errata, Table 42)
8	Sunrise + TE/VS + LEAPS (ED5)	224	226	401	2	177	(Part V Errata, Table 24)
9	Sunrise + TE/VS (ED3)	224	207	382	(16)	158	(Part V Errata, Table 14)
10	TE/VS + LEAPS	67	43	43	(23)	(23)	(Part V Errata, Table 46)
11	Sunrise + TE/VS + LEAPS + Green Path (ED6)	254	221	396	(33)	142	(Part V Errata, Table 29)
12	TE/VS (ED1)	67	24	24	(42)	(42)	(Part V Errata, Table 4)
13	Sunrise + TE/VS + Green Path (ED4)	254	203	377	(51)	123	(Part V Errata, Table 19)

Note the RPS high case was not included in the ED runs. The RPS alt cost benefits can be derived based on the Rebuttal Table 6 results.  
The Sunrise scenario has an additional \$174.6M in RPS benefits in the Alt case. These benefits are assigned to ED cases 3 through 9.  
The Green Path scenario from Rebuttal Table 6 has \$129.3M in additional RPS benefits in the Alt case. This value is assigned to ED case 2.  
Differences may exist due to rounding

These above provide the composite results of the CAISO's analysis for the original four scenarios and the alternative scenarios requested by Energy Division.

## **B. Risk and uncertainty**

DRA witness Palmerton stated that the Commission should adopt a more systematic approach to analyzing Sunrise rather than using Gridview model runs to study the western electric system with and without Sunrise. Mr. Palmerton suggests a hybrid approach consisting of classic decision tree models, deterministic zonal production cost models and stochastic simulation models to address the uncertainties associated with forecasting the need for large infrastructure additions far into the future.<sup>238</sup>

The CAISO analysis has addressed uncertainty without the use of decision tree and stochastic simulation. As explained in the Rebuttal Testimony, the CAISO's TEAM methodology estimates the benefits of Sunrise for each given scenario defined by numerous variables, each with varying degrees of uncertainty. To avoid overstating Sunrise's cost effectiveness, the CAISO has used conservative assumptions that are likely to result in some under-assumptions of net benefits. The following examples of conservative assumptions, set forth on pages 73-74 of the Rebuttal Testimony, include:

- Reliability benefit is driven by reasonably known impact of Sunrise on San Diego's local reliability compliance cost.
- The energy benefit is estimated using a low natural gas price forecast (\$7/MMBTU) and relatively low locational differences in the costs of fuel between the desert southwest and CA (\$.20 /MMBTU and reasonable load growth forecasts adjusted for DSM/EE/DR/rooftop solar and AMI induced price response programs.
- Sunrise's completion does not create a learning curve effect that can reduce renewable energy's per MWH cost in Imperial Valley.
- There is no tightening of the GHG legislation either at the State or Federal level that can increase the value of renewable energy from the Salton Sea area.

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<sup>238</sup> DRA/Palmerton, Ex. D-69 at 9.

- There is no large LMP differential across the WECC as a result of market power abuse and/or significant transmission congestion.<sup>239</sup>
- There is no consideration for Sunrise's option value in the benefit estimation.<sup>240</sup>

The CAISO could have substantially increased the Sunrise benefits by altering these assumptions, but chose not to do so. Furthermore, the CAISO is experienced in transmission and resource planning under uncertainty, and chose to bypass the decision tree modeling and stochastic simulation because a decision tree cannot be reasonably represented if there are too many uncertain variables with unknown probabilities of realization. In addition, even if a tree can be represented, its solution may only be driven by a few likely key events.<sup>241</sup> The CAISO's conservative approach to uncertainty is reasonable for the complicated and data-intensive modeling required by the Sunrise analysis. DRA has presented no sound basis upon which the Commission could reject the CAISO Gridview modeling and start the evaluation process from scratch, and the CAISO's conservative evaluation should be adopted.

## **VIII. CONSIDERATIONS UNDER PUB. UTIL. CODE § 1002 AND G.O. 131-D**

### **A. Community Values**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

### **B. Recreational and Park Areas**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

### **C. Historical and Aesthetic Values**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

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<sup>239</sup> The PV Devers II project was partially justified based on its ability to mitigate market power at Ex. D-69.

<sup>240</sup> This is notwithstanding of the DRA witness' suggestion to include the value, *see* Palmerton, .11.

<sup>241</sup> CAISO Ex. I-6, at 74: 10-75: 2.

**D. Influence on the Environment**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

**E. EMF Measures**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

**F. Other Factors Relating to the Safety, Health, Comfort and Convenience of the Public**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

**G. Pub. Util Code § 625 Concerning Eminent Domain.**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

**IX. OTHER ISSUES**

The CAISO is not addressing this issue in its opening brief but reserves the right to reply to arguments raised by other parties.

**X. CONCLUSION**

The CAISO's analysis demonstrates that Sunrise is needed to meet SDG&E's reliability need, will provide significant net economic benefits, and is a critical component to SDG&E meeting RPS requirements. For these and other reasons discussed herein, the CAISO strongly supports the granting of the requested CPCN for Sunrise.

Respectfully submitted,

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CORPORATION

Dated: November 9, 2007

**CERTIFICATE OF SERVICE**

I, Judy Pau, certify:

I am employed in the City and County of San Francisco, California, am over eighteen years of age and am not a party to the within entitled cause. My business address is 505 Montgomery Street, Suite 800, San Francisco, California 94111.

On November 9, 2007, I caused the following to be served:

**PHASE 1 OPENING BRIEF OF THE CALIFORNIA  
INDEPENDENT SYSTEM OPERATOR CORPORATION**

enclosed in a sealed envelope, by first class mail on the parties listed as “Appearance” and “State Service” on the attached service list who have not provided an electronic mail address, and via electronic mail to all parties on the service list who have provided the Commission with an electronic mail address.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed on the date above at San Francisco, California.

/s/ Judy Pau  
Judy Pau

- cc: Commissioner Dian M. Grueneich (via US Mail and email)
- Commissioner Michael R. Peevey (via US Mail and email)
- Commissioner John A. Bohn (via US Mail and email)
- Commissioner Timothy Alan Simon (via US Mail and email)
- Commissioner Rachelle Chong (via US Mail and email)
- ALJ Steven A. Weissman (via US Mail and email)
- Service List A. 06-08-010 (via US Mail or email)



# CALIFORNIA PUBLIC UTILITIES COMMISSION

## Service Lists

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**PROCEEDING: A0608010 - SDG&E - CPCN FOR THE  
FILER: SAN DIEGO GAS & ELECTRIC COMPANY (U902E)  
LIST NAME: LIST  
LAST CHANGED: NOVEMBER 2, 2007**

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