Memorandum

To: ISO Board of Governors
From: Keith Casey, Vice President, Market & Infrastructure Development
Date: March 15, 2012
Re: **Decision on the ISO 2011/2012 Transmission Plan**

This memorandum requires Board action.

EXECUTIVE SUMMARY

Each year the California Independent System Operator Corporation undertakes a comprehensive assessment of the transmission needs of the system over a 10-year planning horizon and produces an annual transmission plan. The ISO 2011/2012 transmission plan provides a comprehensive evaluation of the ISO transmission grid to identify upgrades needed to successfully meet California's policy goals, in addition to examining conventional grid reliability requirements and transmission projects that can bring economic benefits to consumers. The ISO tariff requires Board approval of the transmission plan. Accordingly, Management is recommending the Board approve the ISO Transmission Plan for the 2011/2012 planning cycle.

In addition to approving the overall findings and conclusions documented in the transmission plan and summarized in this memorandum, Management requests that the Board approve the following transmission upgrades:

- A total of thirty reliability-driven transmission projects were identified as needed, representing an investment of approximately $691 million in infrastructure additions to the ISO-controlled grid. Three of these projects have costs greater than $50 million and a combined cost of $ 280 million. The remaining twenty-seven of these projects cost less than $50 million each and were approved by Management, consistent with the tariff. These thirty reliability projects are necessary to ensure compliance with NERC and ISO planning standards.

The ISO produced this transmission plan after engaging in an extensive stakeholder process. We communicated preliminary results through stakeholder presentations on September 28 and 29, and on December 8. The ISO released a draft plan on January

31 and presented it at a stakeholder session on February 7. Based on comments received from stakeholders, we made additional revisions, culminating in the final ISO 2011/2012 transmission plan. Management proposes the following motion:

> ***Moved, that the ISO Board of Governors approves the ISO 2011/2012 transmission attached to the memorandum dated March 15, 2012.***

THE REVISED TRANSMISSION PLANNING PROCESS

A core responsibility of the ISO is to plan and approve additions and upgrades to transmission infrastructure so that as conditions and requirements evolve over time, it can continue to provide a well-functioning wholesale power market through reliable, safe and efficient electric transmission service. Since it began operation in 1998, the ISO has fulfilled this responsibility through its annual transmission planning process.

Under the transmission planning process, Board approval of the transmission plan is required. Specifically, section 24.4.10 of the ISO tariff states:

> *The revised draft comprehensive Transmission Plan, along with the stakeholder comments, will be presented to the CAISO Governing Board for consideration and approval. Upon approval of the plan, all needed transmission addition and upgrade projects and elements, net of all transmission and non-transmission alternatives considered in developing the comprehensive Transmission Plan, will be deemed approved by the CAISO Governing Board. Transmission upgrade and addition projects with capital costs of $50 million or less can be approved by CAISO management and may proceed to permitting and construction prior to Governing Board approval of the plan. Following Governing Board approval, the CAISO will post the final comprehensive Transmission Plan to the CAISO website.*

COLLABORATIVE PLANNING EFFORTS

Responding to the need for coordinated action, the ISO, utilities, state agencies (the California Energy Commission and California Public Utilities Commission) and other stakeholders worked closely to assess how to meet the environmental goals established by state policy. The collaboration among these entities is evident in the following initiatives:

Renewable Energy Transmission Initiative

A joint initiative between the ISO, CPUC, CEC, investor-owned and publicly owned utilities and other stakeholders, the renewable energy transmission initiative (RETI) identified areas in California and neighboring states with concentrations of high-quality renewable resources that could be delivered to California loads. Much of the data used by the CPUC in developing its renewable generation development scenarios for use in the transmission plan was initially developed through RETI.

CPUC Long-Term Procurement Plan

The ISO and CPUC executed a Memorandum of Understanding in May 2010 to formalize coordination between the ISO revised transmission planning process and the CPUC transmission siting, permitting and long-term transmission planning processes. The MOU contemplated that the ISO will consider and incorporate the generation scenarios from the long term planning process into its planning process. The CPUC, in turn, will give substantial weight in its siting assessment to project applications that are consistent with the ISO transmission plan.

The ISO coordinated closely with CPUC staff in developing the renewable generation portfolios used in the transmission plan. The ISO further coordinated stakeholder consultation, which led to several modifications of the initially proposed portfolios.

California Transmission Planning Group

The California Transmission Planning Group (CTPG) was formed in 2009 to conduct joint transmission planning by transmission owners (investor owned utilities and publicly owned utilities) and the ISO. During their 2010 planning cycles, CTPG members completed a significant amount of technical analyses to develop a framework for preparing a statewide transmission plan. CTPG evaluated alternative renewable resource portfolios based on participant interest, which reflected input from RETI, other stakeholders, and state agencies. Their intent was to develop a conceptual, least regrets transmission plan that CTPG members that are planning entities for their balancing authority areas would assess in greater detail as part of their own respective planning processes. The CTPG statewide transmission plan was finalized in early January 2011 and it presented a list of high potential and medium potential transmission elements identified for further consideration by all CTPG members in developing their own 2020 RPS planning goals. The “high potential” transmission elements identified by CTPG for the ISO system were largely projects that had been previously approved through previous ISO transmission planning processes or generation interconnection studies, and these were incorporated into the final transmission plan.

The ISO relied heavily upon the CTPG process and the CTPG’s January 2011 report in the preparation of its February 1, 2011 Conceptual Statewide Transmission Plan.

That plan was relied upon in the ISO's 2010/2011 transmission planning cycle. After providing an opportunity for CTPG members to provide updates, the ISO released an update to the ISO's Conceptual Statewide Transmission Plan on August 31, 2011, which was considered in the 2011/2012 planning cycle.

FINDINGS AND TRANSMISSION PROJECTS

Our comprehensive evaluation of the areas listed above resulted in the following key findings:

- No new major transmission projects are required to be approved by the ISO at this time to support achievement of California's 33% renewable energy goal given the transmission projects listed in Table 1 that are already approved through the ISO planning process, are identified in large generator interconnection agreements or are progressing through the CPUC approval process. This conclusion is based on the following:
    - The major transmission projects already underway accommodate a diverse range of resource portfolios for meeting a 33% renewable energy goal, including in-state generation, distributed generation, and out of state scenarios;
    - Existing inter-state transmission will have capacity made available as renewable resources displace energy from traditional resources;
    - Approving more transmission under the circumstances and conditions that exist today would increase risk of stranded costs;
- The ISO identified 30 transmission projects with an estimated cost of $691 million, as needed to maintain the reliability of the ISO transmission system. A summary of these projects, aggregated by number and by service area, is provided in Table 2.

TRANSMISSION ELEMENTS SUPPORTING RENEWABLE ENERGY GOALS

Table 1 provides a summary of the various transmission elements of the 2011/12 transmission plan for supporting California's renewable energy goals. These elements are comprised of the following categories:

- The major transmission projects that have been previously approved by the ISO and are fully permitted by the CPUC for construction;
- Additional transmission projects that the ISO interconnection studies have shown are needed for access to new renewable resources have been

identified in large generator interconnection agreements or are still progressing through the approval process:

Table 1: Elements of the 2011/12 ISO Transmission Plan Supporting Renewable Energy Goals

Transmission Facility	Online
Transmission Facilities Approved and Permitted For Construction	
Sunrise Powerlink	2012
Tehachapi Transmission Project	2015
Colorado River - Valley 500 kV line	2013
Eldorado – Ivanpah 230 kV line	2013
Carrizo Midway Reconductoring	2012
Additional Network Transmission Identified as Needed in ISO Interconnection Agreements but not Permitted	
Borden Gregg Reconductoring	2015
South of Contra Costa Reconductoring	2014
Pisgah - Lugo	2017
West of Devers Reconductoring	2018
Coolwater - Lugo 230 kV line	2018
Policy-Driven Transmission Elements Approved but not Permitted	
Mirage-Devers 230 kV reconductoring (Path 42)	2014

The finding that no major new transmission projects are needed at this time to support the California RPS goals reflects years of effort by California state agencies, participants in the Renewable Energy Transmission Initiative, ISO market participants, and the ISO that resulted in the approval and ongoing construction of major transmission projects such as Tehachapi and the Sunrise Powerlink. The ISO recognizes, however, that uncertainty remains regarding how California will ultimately meet its 33% RPS goals in terms of the precise locations, resource mix and quantity of renewable energy resources. While this plan shows that the transmission approved to date can accommodate a diverse range of plausible renewable development scenarios, the ISO will continue to work with state agencies and all stakeholders to evaluate development trends and policy directives beginning with next year's planning cycle, and will reassess the transmission needs accordingly.

While there has been significant interest in additional transmission to support access to renewable resources located outside of California, the renewable energy procurement scenarios that could trigger such upgrades will need to be considered through the CPUC

long-term procurement process to determine the specific location, quantity, and type of renewable energy projects. In the meantime, obtaining CPUC approvals for the transmission identified in Table 1 should continue to be a top priority.

RELIABILITY-DRIVEN TRANSMISSION PROJECTS

This plan proposes thirty reliability driven transmission projects, representing an investment of approximately $691 million in infrastructure additions to the ISO controlled grid. The majority of these projects (twenty-seven) cost less than $50 million each, has a combined cost of $411 million, and has been approved by Management earlier in the planning cycle. The remaining three projects with costs greater than $50 million each have a combined cost of $280 million. These reliability projects are necessary to ensure compliance with the NERC and ISO planning standards.

The three reliability transmission projects with costs greater than $50 million consist of the following:

- **New Bridgeville-Garberville No. 2 115 kV Line Project (PG&E) –** A new 115 kV line in the PG&E system from Bridgeville to Garberville, to alleviate future potential overloading of the existing Bridgeville – Garberville 60 kV line and voltage issues under several single-contingency outage conditions.

- **Embarcadero-Potrero 230 kV Underground Cable Project (PG&E)–** A new 230 kV XLPE underground cable from the Potrero substation to the downtown San Francisco Embarcadero substation, providing a third line of supply to the critical downtown San Francisco load center. This circuit will provide redundancy to protect against the simultaneous loss of both existing Martin-Embarcadero 230 kV circuits.

- **Kern PP 115 kV Area Reinforcement Project (PG&E)-** A reinforcement and upgrade project of the 115 kV system within the Kern area of the PG&E system to address a number of potential overload conditions.

A summary of the number of reliability driven transmission projects and associated total costs in each of the three major transmission owners' service territories is listed below in Table 2. The ISO has operational control over PG&E and SDG&E lower voltage transmission facilities (i.e., 138kV and below) and therefore there were more reliability projects identified for those service territories in comparison to the SCE higher-voltage bulk system.

In arriving at these projects, the ISO and transmission owners performed power system studies to measure system performance against the NERC reliability standards and ISO planning standards as well as to identify reliability concerns that

included, among other things, facility overloads and voltage excursions. The ISO then evaluated mitigation measures and identified cost-effective solutions.

Table 2 – Summary of Approved Reliability Driven Transmission Projects in the ISO 2011/2012 Transmission Plan

Service Territory	Number of Projects	Cost
Pacific Gas & Electric	22	$610M
Southern California Edison Co.	3	$25M
San Diego Gas & Electric Co.	5	$56M
Total	30	$691M

COMPETITIVE SOLICITATION FOR NEW TRANSMISSION ELEMENTS

The ISO's revised transmission planning process includes a competitive solicitation process for policy-driven and economic-driven transmission elements, as well as for reliability-driven elements that provide additional policy and economic benefits. Upgrades to or additions on an existing participating transmission owner facility, the construction or ownership of facilities on a participating transmission owner's right-of-way, and the construction or ownership of facilities within an existing participating transmission owner's substation are excluded from competition. Reliability-driven projects eligible for competition will trigger the competitive solicitation process if they provide economic benefits that equal or exceed 10% of the project cost or eliminate the need for or reduce the size or scope of what would otherwise be a policy-driven transmission element.

In January when the ISO released its draft transmission plan, FERC had not yet ruled on the ISO's proposed criteria for assessing whether reliability-driven elements demonstrated sufficient economic or policy benefits to trigger the competitive solicitation process. The ISO committed to stakeholders that once FERC ruled, the ISO would apply the FERC criteria to assess whether any reliability-driven upgrades in the proposed 2011/2012 transmission plan triggered the competitive solicitation process.

FERC issued its ruling on February 1, and the ISO applied the competitive solicitation criteria approved in that order to the two reliability-driven elements (the Embarcadero-Potrero 230 kV underground cable project and the Cressey-North Merced 115 kV transmission line) that met the criteria for potential competitive solicitation. The ISO's review concluded that neither project provided policy benefits or economic congestion benefits that met or exceeded the criteria set by FERC. The Embarcadero-Potrero project provided no transmission line loss benefits, and while the Cressey-North Merced

115 kV transmission line provided some incremental transmission line loss savings, these fell significantly short of the threshold established in the FERC-approved criteria. Therefore, neither project triggered the competitive solicitation process under the new provisions of the tariff. The ISO shared this determination with stakeholders on February 28.

Following the February 28 stakeholder session, the ISO received comments that three voltage support projects should also be evaluated as potential competitive solicitation candidates. While the ISO does not believe that it is feasible to conclude that the three voltage support projects could reasonably and efficiently be built outside of existing substation facilities (in which case the projects would be excluded from competition), the ISO proceeded to apply the competitive solicitation criteria nonetheless.

In reviewing the system topology, the ISO determined that the projects provided no policy benefits, and no economic benefits associated with reducing congestion on the transmission system. The projects also produced minimal transmission line loss savings, falling short of the criteria established to support a finding of additional economic benefits. Therefore, the ISO has concluded that the projects are not eligible for the competitive solicitation process.

STAKEHOLDER FEEDBACK

Stakeholders have provided feedback on the draft ISO 2011/2012 transmission plan that was released on January 31 and presented at a stakeholder meeting on February 7, as well as the competitive solicitation analysis discussed at the stakeholder session on February 28. The more significant stakeholder concerns, and our response to those concerns, are summarized below. A detailed stakeholder matrix of comments and ISO responses is available on the ISO's website at: http://www.caiso.com/planning/Pages/TransmissionPlanning/2011-2012TransmissionPlanningProcess.aspx

- ***The load forecasts and assumptions. -*** Some stakeholders expressed concern for the consistency of the load forecasts used in the transmission plan and in other ISO studies as well as in other regulatory proceedings such as the CPUC's long term planning process.

  ISO response: The ISO agrees that consistency in principle is important, and works to ensure consistent study assumptions are used. However, depending on the analysis and the use for the analysis, consistency does not mean using the same forecast in all circumstances. For example, as is indicated in the 10 year plan, more conservative (higher) forecasts are used to test the reliability of the system than the less conservative forecasts used to assess economic benefits.

- ***Large generator interconnection-driven network upgrades included in the ISO's renewable scenarios.*** Some stakeholders continue to question the ISO including network upgrades identified in the generator interconnection process in its plan that had not been approved yet by the CPUC nor reviewed in the ISO transmission planning process. Stakeholders have also questioned the implications of including those upgrades in the transmission plan.

  ISO response: Interconnection process identified network upgrades are included in the transmission plan analysis if they are contained in a generator interconnection agreement that is in effect, and the resources could reasonably be considered a necessary part of the generation resource portfolios identified to achieve the state's policy goals, However, the projects are not approved by the ISO Board by virtue of being modeled in the transmission plan, because the Board's approval of the plan does not include approval of the interconnection-driven network upgrades. Each year's planning cycle needs to consider if those projects are moving forward or not, and the transmission plan is then modified as necessary. Similarly, not modeling an interconnection-process identified upgrade in the transmission plan does not change the ISO's obligation to advance the network upgrade if the generator requiring the upgrade continues to move forward.

  Incorporated into the ISO's annual process are provisions to review major interconnection-driven network upgrades as part of the transmission planning process. To the extent new policy-driven transmission elements are identified in the transmission planning process either as superior alternatives to major interconnection-driven network upgrades or otherwise determined needed, they will be subject to the competitive mechanism our tariff describes. However, the transmission planning process does not provide a mechanism to cancel a network upgrade identified in the interconnection process and to refuse service to the generator on that basis.

  While the ISO is advancing an initiative to further integrate the transmission planning process with the generator interconnection process, those changes are not yet in effect.

- ***The absence of independent transmission company-proposed transmission projects in the 2011/2012 transmission plan (and the eligibility of certain types of projects for future competitive solicitation.)*** Some stakeholders disagreed with the ISO's criteria for assessing whether reliability projects demonstrated sufficient economic or policy benefits such that the competitive solicitation process should be implemented. Further, interest was expressed in specifically considering future reactive support

devices in the competitive solicitation process. The level of detailed analysis presented to stakeholders has also been questioned.

ISO response: The applicable criteria for assessing whether reliability projects provide additional policy or economic benefits sufficient to apply the ISO's competitive solicitation process applicable to policy-driven or economic-driven projects were approved by FERC on February 1. Regarding dynamic reactive power devices, the ISO has evaluated the three reliability-driven voltage support projects referenced in the stakeholder comments, and that analysis has been discussed earlier in this memo.

Additional detail about the analysis has also been provided in the transmission plan.

- ***Level of detail and range of alternatives studied in developing recommendations –*** Some stakeholders expressed the view somewhat generically, as well as in specific examples, that broader ranges of alternatives should be examined, and that the ISO should provide more detail in the transmission plan regarding each recommendation.

  ISO response: The ISO considers that the level of analysis and detail in the transmission plan is generally reasonable. Stakeholder consultation takes place throughout the development of the transmission plan to enable suggestions regarding possible alternatives, and the ISO responds to that feedback. The geography and electrical system topology can at times limit the number of viable alternatives, however.

  In response to more specific feedback, the ISO has augmented in the transmission plan the discussion of several projects (the Embarcadero-Potrero 230 kV underground cable project and the Bridgeville-Garberville transmission project in particular).

- ***Projects that did not have finalized recommendations in the January 31 draft transmission plan –*** One stakeholder raised the concern that three projects were still under evaluation at the time of the release of the January 31 draft, due to further information being needed from the participating transmission owners, and that the ISO should delay any approvals until the next planning cycle so that stakeholders have further opportunity to review the final recommendation.

  ISO response: The ISO has advanced in the final plan only a component of one of the three projects (the Kern bus reconfiguration), and as that modified project is less than $50 million, it has been approved by Management and does not require further Board approval. The one project was required to

address a critical contingency, for which the ISO determined there was no interim mitigation available and immediate action was necessary.

- ***Consistent treatment of load shedding for extreme contingency events. –*** Some stakeholders disagreed with our rationale for finding transmission projects to be needed to avoid load shedding in the event of multiple contingencies; as such load shedding is permitted by NERC planning criteria. This is particularly highlighted in the 2011/2012 transmission plan due to the identified need for the Embarcadero-Potrero 230 kV underground cable project to mitigate the risk of loss of both existing cables. Other stakeholders have suggested that additional projects should be approved in other areas of the transmission system to eliminate load shedding in the event of multiple contingencies in those areas as well.

  ISO response: The ISO acknowledges that judgment is called for as part of the criteria and is to be applied in determining when load shedding should not be accepted as a consequence for extreme contingency events. Consistency is also important in applying that judgment. Based on previous feedback ISO has considered consistent parameters in evaluating proposed projects, and has enhanced its planning standards to provide additional guidance and direction regarding consistency. Those revisions were approved by the Board on July 13, 2011. The ISO does consider that the specific details of the Embarcadero-Potrero project support the need for reinforcement. Also, the ISO acknowledges the concern expressed by some stakeholders that special projection systems have perhaps been over-utilized; the ISO has also committed, in its 2012/2013 transmission plan study plan to perform a review of existing special protection systems.

CONCLUSIONS

The ISO 2011/2012 transmission plan presents comprehensive results from the ISO transmission planning process. This transmission plan, which will be updated annually and submitted to the Board for approval, provides a comprehensive evaluation of the ISO transmission grid to identify upgrades needed to successfully meet California's policy goals, in addition to examining conventional grid reliability requirements and projects that can bring economic benefits to consumers. This year's plan identified thirty transmission projects, estimated to cost a total of approximately $691 million, as needed to maintain the reliability of the ISO transmission system. While this plan shows that the transmission approved to date can accommodate a diverse range of plausible renewable development scenarios, the ISO will continue to work with state agencies and all stakeholders to evaluate development trends and policy directives beginning with next year's planning cycle and will reassess the transmission needs accordingly.

MANAGEMENT RECOMMENDATION

Based on the findings that the transmission projects and the element listed above are the most cost-effective, feasible solutions for meeting the identified reliability and policy-driven transmission needs in the ISO system, Management recommends that the Board approve the attached ISO 2011/2012Transmission Plan.