California Independent
System Operator

Memorandum

To: ISO Board of Governors
From: Keith Casey, Vice President, Market & Infrastructure Development
Date: May 11, 2011
Re: **Decision on the ISO 2010/2011 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 2010/2011transmission plan is the first plan produced under the new revised transmission planning process.[1] The new planning process provides a more 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. Under the previous transmission planning process, Management was required only to brief the Board each year on its annual transmission plan. Under the new transmission planning process, Board approval of the transmission plan is required. Accordingly, Management is recommending the Board approve the ISO Transmission Plan for the 2010/2011 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-two reliability-driven transmission projects were identified as needed, representing an investment of approximately $1.2 billion in infrastructure additions to the ISO-controlled grid. Four of these projects have costs greater than $50 million and a

[1] The Revised Transmission Planning Process was filed on June 4, 2010 by the ISO at the Federal Energy Regulatory Commission following a lengthy stakeholder process and approval by the ISO Board of Governors. In an order issued on December 16, 2010, FERC approved the ISO filing subject to certain limited modifications to the tariff, to be effective December 20, 2010.

combined cost of $629 million. The remaining twenty-eight of these projects cost less than $50 million each and were approved by Management as contemplated by the tariff. These thirty-two reliability projects are necessary to ensure compliance with NERC and ISO planning standards.

- One policy driven transmission element to replace the 230 kV transmission lines on existing double-circuit towers from the Mirage to Devers substations (Path 42), located in the Southern California Edison transmission service territory, with new lines having higher electrical carrying capacity. This upgrade, estimated to cost $40 million, will complement planned upgrades on the adjacent transmission system of the Imperial Irrigation District and will better enable delivery of renewable energy from its system to the ISO transmission system.

The ISO produced this transmission plan after engaging in an extensive stakeholder process. We communicated preliminary results through stakeholder presentations on October 26 and 27, December 2 and December 16. A draft plan was released on March 24 and presented at a stakeholder session on April 6. Based on comments received from stakeholders, additional revisions have been made, culminating in the final ISO 2010/2011 transmission plan. Management proposes the following motion:

> ***Moved, that the ISO Board of Governors approves the ISO 2010/2011 transmission plan pursuant to tariff section 24.4.10, attached to the memorandum dated May 11, 2011.***

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. The State of California's adoption of new environmental policies and goals created a need for some important changes to the planning process. In 2009, the ISO initiated a stakeholder process to modify the transmission planning process, and in June 2010 filed tariff amendments with the Federal Energy Regulatory Commission to implement the needed changes. FERC approved the revised transmission planning process tariff amendments on December 16, 2010, and the amendments went into effect December 20, 2010.

The revised planning process improves upon the prior transmission planning process in several important ways including:

- Establishing a new "policy-driven" category of transmission additions and upgrades that are needed to meet state and federal public policy directives and goals;
- Managing the risk of stranded investment associated with policy-driven transmission additions by creating a distinction between category 1 (transmission elements that will be approved as part of the transmission plan) and category 2 (transmission elements that will be re-evaluated in future cycles);
- Providing for collaboration with other transmission planners in California in development of a statewide conceptual transmission plan that will serve as an input into the ISO planning process;
- Improving coordination between transmission planning and the generator interconnection procedures;
- Providing more opportunities for stakeholder participation and input to the process;
- Allowing all interested project sponsors, including independent developers and existing participating transmission owners, an equal opportunity to propose to construct and own policy-driven and economically-driven transmission facilities included in the plan; and
- Enabling the ISO to use its planning resources efficiently to develop a comprehensive annual plan that addresses all categories of identified transmission infrastructure needs.

Most of the planning activities and studies reported in this memo were performed in 2010, prior to December when FERC approved the revised transmission planning process, with the economic studies and evaluation of the prior request windows projects completed in 2011. During 2010, the ISO followed the requirements and provisions specified in its tariff for the then-current transmission planning process, but expanded the scope of its analyses to assess the capability of the grid, augmented by the upgrades already in progress or approved, to support the 33% renewable resource target. This proactive approach allowed an expedient transition from the previous transmission planning process to RTPP.

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

> ***24.4.10 Transmission Plan Approval Process***
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> *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.

Consistent with this provision, Management is presenting the ISO Transmission Plan for the 2010/2011 planning cycle and recommending the Board approve it.

COLLABORATIVE PLANNING EFFORTS

Responding to the need for coordinated action, the ISO, utilities, state agencies (CEC, CPUC) 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, 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 and by the ISO in further refining those scenarios for use in the transmission plan was initially developed through RETI.

CPUC Long Term Procurement Plan

A Memorandum of Understanding (MOU) was signed by the CPUC and ISO 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 LTPP 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, and the portfolios used in the plan are reasonably aligned with the final portfolios developed by the CPUC in its long term procurement proceeding. Due to timing of the development of the CPUC cases, which proceeded over the course of 2010, the four resource portfolios documented in this transmission plan are not identical to the CPUC portfolios. However, the ISO compared the portfolios actually studied to the CPUC portfolios and found that they were reasonably similar to ISO scenarios, as the data used to construct both sets of scenarios are almost identical and the scenarios share many common elements. Furthermore, to the extent there were differences between the resources contained in the CPUC and ISO scenarios, the ISO concluded that the transmission identified in each ISO scenario would accommodate the renewable resource development reflected in the CPUC scenarios.

California Transmission Planning Group

The CTPG was formed in 2009 to conduct joint transmission planning by transmission owners (investor owned utilities and publicly owned utilities) and the ISO. During the 2010/2011 planning cycle, the ISO worked closely with the CTPG to develop a statewide approach to the transmission needed to meet the 33% RPS target by 2020. 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.

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 evaluated all 41 transmission project proposals submitted in the 2008 and 2009 request windows to determine if they were needed as either policy-driven or

economically-driven transmission projects.[2] One of the projects, reconductoring the Devers-Mirage 230 kV double circuit line (Path 42), located in the Southern California Edison transmission service territory , was found to be needed as a policy-driven element to support California renewable energy goals.

- The ISO identified 32 transmission projects with an estimated cost of $1.2 billion, 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 2010/11 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;
- One policy-related transmission element ;
- Policy-related elements that are potentially needed and will be carried forward for evaluation in the next transmission planning cycle.

[2] Under the previous transmission planning process, transmission project sponsors could submit proposals for economic transmission projects through an open season process for the ISO to evaluate. Proposals submitted in the 2008 and 2009 process were evaluated in this year's planning cycle. It was not possible to effectively evaluate these projects prior to this timeframe given the uncertainty over the renewable resource portfolios that would be used to meet the state's RPS goals.

Table 1: Elements of the 2010/11 ISO Transmission Plan Supporting Renewable Energy Goals

Transmission Facility	Potential Renewable Energy Delivery	Renewable Deliverability potential with upgrade
	(TWh)	(MW)
Transmission Facilities Approved and Permitted For Construction		
Sunrise Powerlink	4.1	1,700
Tehachapi Transmission Project	18.2	5,500
Colorado River - Valley 500kV line	2.9	1,600
Eldorado – Ivanpah 230 kV line	3.6	1,400
Additional LGIP Network Transmission not Permitted		
Borden Gregg Reconductoring	2	800
South of Contra Costa Reconductoring	0.8	300
Pisgah - Lugo	4.1	1,750
West of Devers Reconductoring	5.7	3,100
Carrizo Midway Reconductoring	2.1	900
Coolwater - Lugo 230kV line	1.4	600
Needed Policy-Driven Transmission Elements		
Mirage-Devers 230 kV reconductoring (Path 42)	3.6	1,400
Potentially Needed Policy-Driven Transmission Elements		
Midway-Gregg 500 kV Line		
Gregg - Herndon 230 kV Line Reconductoring		
Warnerville - Wilson 230 kV Line Reconductoring		
Barton - Herndon 115 kV Line Reconductoring		
Manchester - Herndon 115 kV Line Reconductoring		
Upgrade El Dorado - Pisgah 500 kV series capacity to higher emergency rating (2700 Amps)		
400 MVAr reactive power support at Sycamore, Mission, and Talega 230 kV substations		
The third Miguel 500 kV transformer		
Total	48.5	19,050

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 be a top priority.

RELIABILITY-DRIVEN TRANSMISSION PROJECTS

This plan proposes thirty-two reliability driven transmission projects, representing an investment of approximately $1.2 billion in infrastructure additions to the ISO controlled grid. The majority of these projects (twenty-eight) cost less than $50 million each, has a combined cost of $569 million, and has been approved by Management earlier in the planning cycle. The remaining four projects with costs greater than $50 million each have a combined cost of $629 million. These reliability projects are necessary to ensure compliance with the NERC and ISO planning standards.

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

- **South Orange County Reliability Upgrade Project (SDG&E) –** This project involves the reconfiguration and upgrade of the Talega 138kV system, the re-build of the Capistrano substation and reinforcement of the area with two 230kV lines to create a new source in the area. Estimated cost: $365 million.

- **Cottonwood-Red Bluff Upgrade Project (PG&E)** – This project involves building a new span of 60 kV line from Red Bluff junction to the Red Bluff substation and building a new 230/60 kV substation near Red Bluff. Estimated cost: $43 million - $57 million.

- **South of Palermo 115 kV Reinforcement Project (PG&E) –** This project involves reconductoring various115 kV lines in the area. Estimated cost: $80 million - $100 million

- **Vaca-Davis Voltage Conversion Project (PG&E) –** This project involves converting 60 kV facilities between Vaca Dixon and Davis substations to 115 kV. Estimated cost: $70 million - $107 million.

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. Mitigation measures were then evaluated, and cost-effective solutions were recommended by ISO staff to Management and the Board of Governors for approval.

Table 2 – Summary of Approved Reliability Driven Transmission Projects in the ISO 2010/2011 Transmission Plan

Service Territory	Number of Projects	Cost
Pacific Gas & Electric	23	$683M
Southern California Edison Co.	0	$0M
San Diego Gas & Electric Co.	9	$515M
Total	32	$1,198M

STAKEHOLDER FEEDBACK

Stakeholders have provided feedback on the draft ISO 2010/2011 transmission plan that was released on March 24 and presented at a stakeholder meeting on April 6. The more significant stakeholder concerns, and our response to those concerns, are summarized below. A detailed stakeholder matrix of comments is available on the ISO's website at http://caiso.com/2861/2861c6ed34110.html.

- ***The generation portfolio scenarios used in the ISO transmission plan.*** - Some stakeholders expressed concerns over how well the ISO generation portfolios aligned with the renewable generation portfolios developed by the CPUC in its long term procurement proceeding. Others felt the ISO should have developed a broader range of generation portfolios and scenarios to capture the full scope of renewable generation development potential.

  ISO Response: The ISO relied on CPUC information available at the time as the basis for developing the four generation portfolios (scenarios) used for study purposes. However, because updates to the CPUC portfolios were not completed at the time in the planning process that the ISO conducted its renewable transmission studies, the ISO needed to complete the development of generation portfolios using the best

information available from the CPUC at that time. These four portfolios align significantly, but not completely, with the CPUC portfolios released in the long-term procurement proceeding at the end of 2010.

While the ISO recognizes there is significant commercial interest and competition for generation and transmission development, it is not prudent or economic to plan and advance transmission facilities capable of meeting the requirements of all of the generation seeking to connect to the transmission system given that the total generation development interest far exceeds what is needed to meet the 33% RPS goal and not all of these proposed generation projects will materialize. Therefore, it was important to identify specific portfolios that represent a reasonable range of highly viable development scenarios – all of which could meet the 33% RPS objective. In developing these portfolios, the ISO coordinated with the CPUC and invited stakeholder comments on the proposed portfolios.

- ***Large generator interconnection-driven network upgrades included in the ISO's renewable scenarios.*** Some stakeholders argued that the ISO should not have included 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.

  ISO Response: Beginning with the 2011/2012 planning cycle currently underway, the ISO will 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, in the transition to the new annual planning process, the ISO made an explicit policy decision, which was vetted with stakeholders and approved by FERC, not to further review the identified LGIP network upgrades in the 2010/2011 transmission planning process. This approach was taken to give projects in the current interconnection queue that were competing for federal stimulus funds and loan guarantees a chance to meet federal government deadlines. The issue was discussed on several occasions in the stakeholder process and the tariff makes it clear that this policy decision was a one-time exception. A decision to the contrary would have jeopardized numerous renewable projects, including those associated with the Eldorado-Ivanpah transmission project recently approved by the CPUC.

- ***The absence of independent transmission company-proposed transmission projects in the 2010/2011 transmission plan (and the impact of the LGIP-related projects on***

the viability of at least one of the ITC-proposed transmission projects.) – Some stakeholders disagreed with the outcome of the ISO's evaluation of transmission projects submitted into the 2008/2009 request window, particularly independent transmission companies some of whom disagreed with the inclusion in system models of network upgrades identified and advancing in the generator interconnection process prior to testing the benefits of the ITC-proposed projects.

ISO Response: The new revised transmission planning process explicitly calls for evaluating the independent transmission developer projects submitted in prior request windows after incorporating LGIP-related projects and reliability-driven projects. This approach was thoroughly vetted with stakeholders in developing the new transmission planning process and documented in tariff amendments that were approved by FERC.

Furthermore, the ISO has thoroughly evaluated each of the transmission projects proposed by independent transmission companies in the course of preparing the 2010/2011 transmission plan. In none of those cases were the benefits from a policy or economic basis sufficient to warrant the cost to ratepayers, as documented in the transmission plan.

These results were reviewed in a public stakeholder meeting and well documented in the 2011 transmission plan. Specifically, half of the projects would deliver less than ten cents on the dollar for ratepayers, including the value of emission reductions. Applying the same analysis to two utility projects caused their proposals to be omitted from the plan as well.

Going forward, our revised transmission planning process will provide greater opportunities for independent transmission developers through the creation of a new "policy-driven" category of transmission that independent transmission developers and utilities can compete to build.

- ***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. 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. The ISO has considered consistent

parameters in evaluating proposed projects and attempted to consistently apply that judgment in reviewing these circumstances taking into account the information available to the ISO. To address stakeholder concerns that consistency was not visible in the draft transmission plan, the ISO has provided additional discussion in the final transmission plan where it has exceeded the minimum transmission planning criteria. Also, where stakeholders indicated that there may be additional extenuating circumstances warranting additional reinforcement, the ISO changed the categorization of those proposed projects to "further study required" to allow proponents further opportunity to identify those circumstances.

CONCLUSIONS

The ISO 2010/2011 transmission plan presents comprehensive results from the first cycle of the ISO revised transmission planning process. This ISO transmission plan, which will be updated annually, 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-two transmission projects, estimated to cost a total of approximately $1.2 billion, as needed to maintain the reliability of the ISO transmission system. In addition, one policy-driven transmission element is also recommended to provide access to renewable generation (i.e., solar and geothermal generation) in Imperial County. 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 this comprehensive transmission plan.