

# Memorandum

**To:** ISO Board of Governors  
**From:** Keith Casey, Vice President, Market & Infrastructure Development  
**Date:** March 17, 2016  
**Re:** **Decision on the 2015-2016 transmission plan**

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***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 2015-2016 transmission plan provides a comprehensive evaluation of the ISO's 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 tariff requires Board approval of the transmission plan. Accordingly, Management recommends the Board approve the ISO transmission plan for the 2015-2016 planning cycle, included as Attachment A.

Due to the considerable progress made in previous planning cycles in identifying and approving a wide array of transmission projects, the number and capital costs of recommended transmission projects in this 2015-2016 transmission plan is considerably reduced from previous years. Similarly, the focus in previous cycles on ensuring that the transmission system supports the state's 33% renewables portfolio standard has also led to an established path to achieving that goal without identification of additional reinforcements. While California Senate Bill 350, the Clean Energy and Pollution Reduction Act of 2015, was signed into law on October 7, 2015 and established, among other goals, a 50% renewables portfolio standard by 2030, the implementation details for achieving this goal will take time to develop and thus was not formally assessed in this planning cycle.

In addition to the approval of the overall findings and conclusions documented in the transmission plan, and summarized in this memorandum, Management requests that the

Board approve 13 reliability-driven transmission projects identified as needed to ensure compliance with NERC and ISO planning standards, representing an investment of approximately \$288 million in infrastructure additions to the ISO-controlled grid. All are estimated to cost less than \$50 million each and none are eligible for competitive solicitation<sup>1</sup>.

Other key findings and conclusions from the 2015-2016 transmission plan include:

- One additional project involving a transmission line jointly owned with a non-ISO participating transmission owner was found to be needed, and Management intends to seek approval in the next planning cycle after coordinating with the neighboring transmission owner.
- No policy-driven transmission projects were identified as needed for meeting state policy needs associated with 33% RPS objectives.
- No economically-driven transmission projects were identified as needed.
- A review of previously approved transmission projects, given materially changed circumstances underpinning the original need for the projects, resulted in the cancellation of 13 primarily local sub-transmission projects in the PG&E service area. As these projects were individually less than \$50 million, they have been cancelled by Management.

The ISO produced this transmission plan after engaging in an extensive stakeholder process. We communicated preliminary results through stakeholder presentations on September 21 and 22, and on November 16, 2015. The ISO released a draft plan on February 1, 2016 and presented it at a stakeholder session on February 18, 2016. Based on comments received from stakeholders, we conducted additional review and made further revisions, culminating in the revised draft ISO 2015-2016 transmission plan. Management proposes the following motion:

***Moved, that the ISO Board of Governors approves the ISO 2015-2016 transmission plan attached to this memorandum dated March 17, 2016.***

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<sup>1</sup> Five of the 13 projects, totaling \$41 million, were approved by Management consistent with the tariff.

## **BACKGROUND**

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 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.*

### **Advancing preferred resources**

Increased opportunity for non-transmission alternatives, particularly preferred resources and storage, continues to be a key focus of the transmission planning analysis. In this regard, the ISO's transmission planning efforts focus on not only meeting the state's policy objectives through advancing policy-driven transmission, but also to help transform the electric grid in an environmentally responsible way. The focus on a cleaner lower emission future governs not only policy-driven transmission, but our path on meeting other electric system needs as well.

Further, load modifying preferred resource assumptions are also incorporated into the load forecasts adopted through state energy agency activities that the ISO supports, and provide an additional opportunity for preferred resources to address transmission needs.

To increase awareness of the ISO's reliance on preferred resources, that reliance to address specific reliability needs has been summarized in a new separate section of the transmission plan (section 7.4) in addition to being discussed throughout the plan on an area-by-area study basis.

### ***Collaborative planning efforts***

The ISO, utilities, the California Energy Commission, the California Public Utilities Commission and other stakeholders worked closely to ensure alignment of key planning assumptions within the three core planning processes, in particular a single “managed” load forecast, and to assess how to meet the environmental goals established by state policy.

The three core processes are the:

- Long-term forecast of energy demand produced by the CEC as part of its biennial Integrated Energy Policy Report (IEPR),
- Biennial Long Term Procurement Plan proceeding (LTPP) conducted by the CPUC, and
- Annual Transmission Planning Process (TPP) performed by the ISO.

The results of the CPUC’s annual process feeding into this 2015-2016 transmission planning process were communicated via an assigned commissioner’s ruling in the 2014 LTPP<sup>2</sup>. These assumptions were further vetted by stakeholders through the stakeholder process in developing the 2015-2016 study plan.

### **KEY FINDINGS**

Our comprehensive evaluation of the areas listed above is discussed in the following sections.

#### ***Reliability-driven transmission projects***

A total of 13 reliability-driven transmission projects were identified as needed to be approved in this planning cycle to ensure compliance with NERC and ISO planning standards, representing an investment of approximately \$288 million in infrastructure additions to the ISO-controlled grid. All are estimated to cost less than \$50 million each. Five of the 13 projects, totaling \$41 million, were approved by Management consistent with the tariff.

In arriving at these projects, the ISO and transmission owners performed power system studies to measure system performance against the NERC reliability

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<sup>2</sup> Rulemaking 13-12-010 “Assigned Commissioner’s Ruling on updates to the Planning Assumptions and Scenarios for use in the 2014 Long-Term Procurement Plan and the California Independent System Operator’s 2015-2016 Transmission Planning Process” on March 4, 2015 with an update adopted on October 28, 2015.

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.

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 1.

Table 1 – Summary of Needed Reliability-Driven Transmission Projects in the ISO 2015-2016 Transmission Plan

Service Territory	Number of Projects	Cost (in millions)
Pacific Gas & Electric (PG&E)	7	\$202
Southern California Edison Co. (SCE)	1	\$10
San Diego Gas & Electric Co. (SDG&E)	5	\$76
Valley Electric Association (VEA)	0	0
Total	13	\$288

While a number of identified reliability concerns continue to be related to facility overloads or low voltage, a number of reliability issues and resulting voltage control reactive power projects in the PG&E service area are related to emerging overvoltage concerns. These are tied to a combination of factors, including declining load forecasts, increased penetration of distributed renewable energy resources and their associated production profiles, and tightening requirements on transmission equipment voltage ratings. This is not unexpected as the transmission system transitions to new and more diverse renewable generation sources, although the need to manage these issues may be emerging somewhat earlier than initially anticipated.

One additional project, upgrading the existing Lugo-Victorville transmission line, was found to be needed for reliability reasons to alleviate potential thermal overloads but involves a transmission line jointly owned with a non-ISO participating transmission owner. Given this, Management intends to seek approval in the next planning cycle after coordinating with the neighboring transmission owner.

### **Southern California reliability assessment (LA Basin and San Diego)**

The reliability needs in southern California and the complex interrelationship with deliverability of generation from the Imperial Valley and Riverside areas have received considerable emphasis in past planning cycles. As in the 2014-2015 transmission planning cycle, efforts were made in this 2015-2016 planning cycle to monitor the progress of the basket of forecast procurement of conventional and preferred resources and ISO-approved transmission upgrades, and test the collective effectiveness of those solutions to meet the area's reliability needs.

The ISO's analysis indicated in this planning cycle that the authorized resources, forecast load, and previously-approved transmission projects working together meet the overall reliability needs in the LA Basin and San Diego areas mitigating potential loss of 500 kV circuits supplying the combined areas.

The analysis did, however, identify some potential contingency loading concerns on the south of Mesa 230 kV lines for the loss of 230 kV circuits within the LA Basin area. These are expected to require some level of mitigation in the future but do not impact the overall adequacy into the areas.

### ***Transmission elements supporting renewable energy goals***

On March 11, 2015, the CEC and CPUC recommended two 33 percent renewable resource portfolios be studied in the 2015-2016 transmission planning process,<sup>3</sup> with the same base portfolio as the previous year. As stated in the March 11 transmittal letter, the intent was to not re-run the renewables portfolio standard calculator relied upon in the previous planning cycle (RPS Calculator v.5) because the anticipated changes were not envisioned to materially impact the RPS portfolios. After further review, specific and limited changes were made, after which the RPS Calculator (v.5) was re-run and the updated base portfolio was received by the ISO on April 29, 2015.<sup>4</sup>

The reduced number of scenarios from previous transmission planning cycles and the consistency with the previous year's portfolios are indicative of the greater certainty around the portfolios, as utilities have largely completed their contracting for renewable resources to meet the 2020 goals.

The ISO's assessment in this planning cycle did not identify a need for new transmission projects to support achievement of California's 33 percent renewables portfolio standard, given the transmission projects already approved or progressing through the California Public Utilities Commission approval process.

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<sup>3</sup> <https://www.aiso.com/Documents/2015-2016RenewablePortfoliosTransmittalLetter.pdf>

<sup>4</sup> <https://www.aiso.com/Documents/Revised2015-2016RenewablePortfoliosTransmittalLetter.pdf>

Table 2: Elements of 2015-2016 ISO Transmission Plan Supporting Renewable Energy Goals

Transmission Facility	Online
Transmission Facilities Approved, Permitted and Under Construction	
Tehachapi Transmission Project	2016
Path 42 and Devers-Mirage 230 kV Upgrades	2016
Additional Network Transmission Identified as Needed in ISO Interconnection Agreements but not Permitted	
Borden Gregg Reconductoring	2018
South of Contra Costa Reconductoring	2016
West of Devers Reconductoring	2021
Coolwater-Lugo 230 kV line <sup>5</sup>	cancelled
Policy-Driven Transmission Elements Approved but not Permitted	
Sycamore – Penasquitos 230kV Line	2017
Imperial Valley Area Collector Station <sup>6</sup>	cancelled
Eldorado-Mohave and Eldorado-Moenkopi 500 kV Line Swap	2017
Lugo – Eldorado series cap and terminal equipment upgrade	2019
Warnerville-Bellota 230 kV line reconductoring	2017
Wilson-Le Grand 115 kV line reconductoring	2020
Suncrest 300 Mvar SVC	2017
Lugo-Mohave series capacitors	2019
Additional Policy-Driven Transmission Elements Recommend for Approval	
None identified in 2015-2016 transmission plan	

<sup>5</sup> [The project was cancelled after conventional generation in the area retired and the project was no longer required in order to provide the requested generation interconnection service.](#)

<sup>6</sup> [The ISO received notice from the Imperial Irrigation District on November 24, 2015 exercising its right to terminate the Approved Project Sponsor Agreement. As the project was dependent on IID's participation, the project has been cancelled.](#)

## **Economically driven transmission projects**

The objective of the ISO's economic studies is to identify transmission congestion and analyze if the congestion can be cost effectively mitigated by network upgrades. Generally speaking, transmission congestion increases consumer costs because it prevents lower priced electricity from serving load. Resolving congestion bottlenecks is cost effective when projected ratepayer savings are greater than the cost of the project. In such cases, the transmission upgrade can be justified as an economic project.

Through its own analysis and the input of stakeholders, the ISO identified the five highest priority studies in the 2015-2016 planning cycle. The analyses compared the cost of the mitigation plans to the expected reduction in production costs, congestion costs, transmission losses, capacity or other electric supply costs resulting from improved access to cost-efficient resources.

Considering the five high priority studies, the ISO determined that there were no economic upgrade recommendations needed in this plan.

## **Competitive solicitation for new transmission elements**

The ISO's transmission planning process includes a competitive solicitation process for reliability-driven, policy-driven and economically-driven transmission facilities over 200 kV. Upgrades to or additions on an existing participating transmission owner facility and the construction or ownership of facilities within an existing participating transmission owner's substation are excluded from competition.

None of the transmission projects in this transmission plan include facilities eligible for competitive solicitation.

## **Special studies conducted in the planning process**

Special studies focusing on emerging grid transition and renewable integration issues expanded in the 2015-2016 transmission plan from previous years, including:

- a preliminary effort studying gas pipeline and electricity coordination given the evolving role of gas-fired generation in southern California;
- a preliminary study of the capabilities of the ISO grid to accommodate renewable generation resources on an energy-only basis in moving beyond 33 percent renewables to a 50 percent renewables goal. Note that this is informational only to assist industry in considering options in moving beyond 33 percent; and



- a preliminary study of the benefits of large energy storage in managing oversupply periods in moving beyond 33 percent; this study explored a 40 percent renewables condition.

A number of interregional projects were raised by stakeholders during the planning cycle. The ISO conducted some analysis of several of these projects reflecting a more limited ISO view of those projects. The ISO is participating in the interregional Federal Energy Regulatory Commission Order No. 1000 interregional planning process with the neighboring western planning regions as that process commences for the first time in the first quarter of 2016, which will allow for a broader consideration of the potential benefits of these projects.

## **STAKEHOLDER FEEDBACK**

Stakeholders have provided feedback on the draft ISO 2015-2016 transmission plan that was released on February 1, 2016 and presented at a stakeholder meeting on February 18, 2016. The more significant stakeholder concerns, and our response to those concerns, are summarized below.

- ***Mixed support for individual projects*** – Stakeholder support for a number of projects evaluated in the plan was mixed, ranging from strong support to concern with certain projects proceeding. Both SDG&E and SCE also encouraged approvals of specific projects within their respective service areas that are not being recommended for approval at this time, as more analysis and consideration of other alternatives is required.

**ISO response:** The ISO has reviewed all of the stakeholder comments carefully, and has concluded that the recommendations made in the transmission plan are appropriate. The ISO will continue to review the potential needs referred to by SDG&E and SCE in the 2016-2017 planning cycle.

- ***Reliance on renewable generation portfolios provided by state agencies*** – Several stakeholders have reiterated their past comments that the ISO should set aside the CPUC’s direction to provide deliverability for the 33% RPS portfolios relied upon for policy-driven transmission planning. The comments further request the cancellation of previously approved policy-driven transmission projects.

**ISO response:** The ISO continues to rely on the coordination achieved with the state agencies, and in particular, the reliance on the portfolio development process led by the CPUC to provide direction on policy-driven needs to

achieve state renewables goals. The ISO acknowledges that additional procurement of resources on an energy-only basis is being explored in moving beyond 33% in 2020 to 50% by 2030, and that no decisions have been made in that regard. However, there has been no change in direction in achieving the 2020 goals.

- **Special Studies** – There was strong interest in the special studies conducted in the transmission planning cycle, and numerous comments requesting the analysis be continued in future planning cycles.

**ISO response:** The ISO's 2016-2017 draft study plan sets out continuation of a number of the special studies conducted in this cycle.

## **CONCLUSION**

The 2015-2016 ISO transmission plan provides a comprehensive evaluation of the ISO transmission grid to identify upgrades needed to adequately meet California's policy goals, address grid reliability requirements and bring economic benefits to consumers. This year's plan identified 13 transmission projects, estimated to cost a total of approximately \$288 million, as needed to maintain the reliability of the ISO transmission system.

Based on the findings that the transmission solutions listed above are the most cost-effective, feasible solutions for meeting the identified transmission needs in the ISO system, Management recommends that the Board approve the attached ISO 2015-2016 transmission plan.