

# Memorandum

**To:** ISO Board of Governors  
**From:** Armie Perez, Vice President of Planning and Infrastructure Development  
**Date:** January 18, 2007  
**Re:** *Decision on Tehachapi Project*

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*This memorandum requires Board action.*

## EXECUTIVE SUMMARY

This memorandum requests Board's approval of the Tehachapi Transmission Project – the second of three transmission projects proposed for the Southern California Region to be brought forward for Board approval. The three projects are:

- **Tehachapi Transmission Project:** 500kV and 230kV transmission infrastructure to accommodate wind generation development in the Tehachapi area and is sponsored by Southern California Edison Company (SCE). This project is presented to the CAISO Board for a decision in this memo.
- **Sun Path Project:** Combination of Sunrise Powerlink Project sponsored by San Diego Gas and Electric Company (SDG&E) and Phase 2 of Green Path Project sponsored by Citizens Energy and Imperial Irrigation District (IID) connecting Imperial Valley to San Diego area. The CAISO Board approved this project on August 4, 2006.
- **LEAPS Project:** A 500kV transmission line project, sponsored by the Nevada Hydro Company and Elsinore Valley Municipal Water District (EVMWD) that would connect SCE's transmission system with that of SDG&E's and is accompanied by a 500MW pumped storage power plant built next to Lake Elsinore. Per FERC direction, this project is going through a stakeholder process to address the issues related to operational control and rate treatment of the pumped storage plant portion of the project.

CAISO's principal determinations and findings on the Tehachapi Transmission Project, as presented in this memo, are as follows:

1. The Tehachapi Transmission Project is the least-cost solution that reliably interconnects 4,350 MW of generating resources in Tehachapi Area Generation Queue (TGO);
2. The Tehachapi Transmission Project also addresses reliability needs of the ISO Controlled Grid due to projected load growth in Antelope Valley area as well as helping to address South of Lugo (SOL) transmission constraints – an ongoing source of reliability concern for the Los Angeles Basin;
3. The Tehachapi Transmission Project facilitates the ability of California utilities to comply with the state mandated Renewable Portfolio Standard (RPS) by providing access to planned renewable resources in the Tehachapi Wind Resource Area (TWRA) – also see point 6 below;

4. The Tehachapi Transmission Project is expected to provide economic benefits to the CAISO ratepayers mainly by providing access to wind and other efficient generating resources under development in TWRA;
5. The Tehachapi Transmission Project makes it possible to expand the transfer capability of Path 26 in the near future with a low cost upgrade of PG&E's portion of the Midway-Vincent Line No. 3 line; and
6. Although the detailed planning has not yet been performed, the Tehachapi Transmission Project lays the groundwork for the integration of large amounts of planned geothermal, solar, and wind generation in Inyo and northern San Bernardino counties with potential future 500 kV additions from the WindHub Substation (one of Tehachapi Transmission Project's substations) to the Kramer Substation.

Pursuant to CAISO's obligation to identify transmission solutions to interconnect generation projects, as delineated in the Large Generation Interconnection Procedures (LGIP), CAISO Management recommends that the CAISO Board approve the Tehachapi Transmission Project and direct SCE, as the Project Sponsor, to proceed with the necessary permitting and construction of the project.

FERC has granted the CAISO authority to study generation interconnection requests in a collective or "clustered" manner, rather than on-at-a-time as traditionally done, to ensure the efficient expansion of the transmission system to accommodate new generation that conforms to regional planning objectives. This is especially true where, as here, a significant number of interconnection requests are concentrated in a particular geographic region. The CAISO has therefore applied a clustered approach. However, as discussed further below, the CAISO has filed a petition before FERC for a one-time waiver of a certain limitations on clustering to better align with the present circumstances of the Tehachapi Transmission Project. Management, therefore, recognizes that the Board's approval may be affected by the outcome of the CAISO's pending petition before FERC. Hence, CAISO Management recommends that Board approval of the Tehachapi Transmission Project be contingent upon FERC consent to the CAISO's implementation of its clustering authority under the LGIP to this project.

***MOVED,***

***That the ISO Board of Governors approve the Tehachapi Transmission Project as the Network Upgrades necessary to allow Generating Facilities in the Tehachapi Wind Resource Area to deliver their output and reliably interconnect to the ISO Controlled Grid in conformance with the ISO's Large Generator Interconnection Procedures (LGIP) and direct Southern California Edison Company (Project Sponsor) to proceed with the permitting and construction of the transmission project, as detailed in the memorandum to the ISO Governing Board dated January 18, 2007. This approval shall be contingent upon FERC approval of the waiver of the LGIP provision requested in California Independent System Operator Corporation, FERC Docket No. \_\_\_\_\_.***

## **BACKGROUND AND STUDY PROCESS**

Current law and policies require California utilities and other electricity retailers to purchase 20% of their electricity from renewable sources deliverable to the CAISO control area by 2010. Transmission

constraints have been identified as one of the obstacles to achieving this objective, and the CAISO has identified supporting state renewable policies as a corporate objective.

In line with this objective and the CAISO's role in facilitating compliance with the State RPS mandate, the CAISO needed to complete its assessment of the three proposed southern transmission projects -- Sun Path Project, Tehachapi Transmission Project and LEAPs Project -- in time to make it feasible for project sponsors to obtain regulatory approvals and complete construction as early as possible.

The CAISO began the study process by forming a technical project team. It included CAISO participating transmission owners or PTOs (PG&E, SCE and SDG&E), technical representatives from other project sponsors (Nevada Hydro Company, Citizens Energy, Imperial Irrigation District, Oak Creek Energy System/Tehachapi Holdings), and technical representatives from the California Energy Commission (CEC) and the California Electricity Oversight Board (EOB). The team became known as the CAISO South Regional Transmission Planning (CS RTP-2006) Team. This team was not a stakeholder forum but rather a technical group for providing the CAISO with the necessary technical data as well as the "real-time" technical advice it needed to conduct its analysis.

The origin of the Tehachapi Transmission Project is the Tehachapi Collaborative Study Group, coordinated by the California Public Utilities Commission (CPUC), which was formed in 2004 to develop a comprehensive transmission development plan for the phased expansion of transmission capabilities in the TWRA. The TCSG issued two study reports to the CPUC in March 2005 and in April 2006. The outcome of the collaborative study group process was the identification of a number of alternatives for the transmission infrastructure and a recommendation to further study of these alternative schemes by the CAISO. The CAISO studied the Tehachapi Transmission Project as part of its CAISO South Regional Transmission Plan for 2006 (CS RTP-2006) in full collaboration with SCE and other CS RTP-2006 participants<sup>1</sup> and developed a least-cost solution for the network component of the transmission infrastructure that will interconnect planned generation projects in TWRA to the ISO Controlled Grid.

## PROJECT DESCRIPTION

The Tehachapi Transmission Project consists of following major facilities:

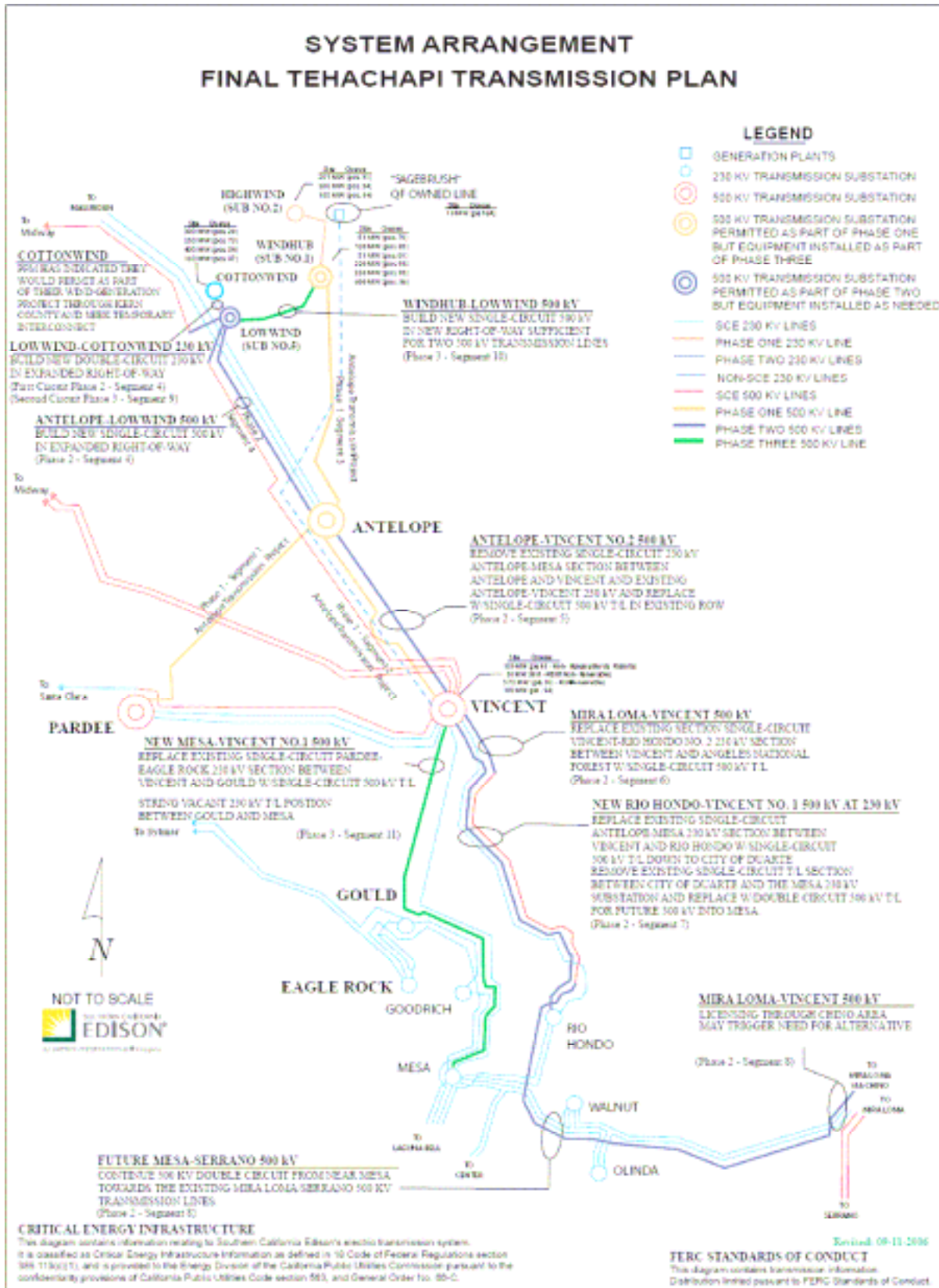
Major Transmission Facilities	Planned In-Service Date
Antelope – Pardee 230 kV Line (500 kV Specifications) & Antelope Substation Expansion	Dec 2008
Antelope – Vincent 230 kV Line #1 (500 kV Specifications)	Mar 2009
WindHub Substation	Mar 2009
Antelope – WindHub (also known as Substation 1) 230 kV Line ( 500 kV Specifications)	Mar 2009
Antelope – Vincent 230 kV Line #2 (500 kV Specifications)	Mar 2011
LowWind 500/230 kV Substation (also known as Substation 5) with Loop in of Midway – Vincent #3 500 kV line	Aug 2011
Antelope – LowWind 500kV line	Aug 2011
WindHub Substation 500 kV Upgrade	Mar 2011

<sup>1</sup> CS RTP-2006 was launched on April 11, 2006. The CS RTP-2006 team included the CAISO, impacted Participating Transmission Owners (Pacific Gas and Electric Company (PG&E), SCE and SDG&E), technical representatives from all Project Sponsors (TNHC, Citizens Energy, IID, Oak Creek Energy System/Tehachapi Holdings), and technical representatives from the California Energy Commission (CEC) and the California Electricity Oversight Board (EOB). This team has provided and will continue to provide the CAISO with necessary technical data and advice needed to conduct its analyses.

Antelope Substation 500 kV Upgrade	Mar 2011
Vincent Substation 500 kV & 220 kV Upgrade	Sep 2011
LowWind – WindHub 500 kV line	Oct 2011
Replacement of Vincent – Rio Hondo No. 2 230kV line	Nov 2011
Vincent – Mira Loma 500 kV line	Apr 2012
Vincent – Mesa 500/220 kV Line and Mesa Substation Work	Nov 2013

The proposed Tehachapi Project will increase California's ability to import additional energy mainly from renewable resources from Tehachapi Wind Resource Area (TWRA). Figure 1 shows the general configuration of the Tehachapi Transmission Project.

**Figure 1: Tehachapi Transmission Project**  
(Routes shown on this diagram are for illustration purposes only)



The total cost of the Tehachapi Transmission Project is estimated at \$1.8 billion dollars in nominal terms. This cost includes the cost of the Antelope-Pardee line segment (\$90 million) previously approved by the CAISO Board, but excludes the cost of Interconnection Facilities, i.e., radial wind collector transmission systems that interconnect the individual generation projects to the grid and are the responsibility of generation developers. The full cost and ownership of the Network Upgrades associated with this project will be assigned to SCE.<sup>2</sup> SCE will recover such costs, including the commensurate rate-of-return, directly through the CAISO transmission Access Charge (TAC) upon approval from FERC.<sup>3</sup>

## PUBLIC PROCESS IN DEVELOPING RECOMMENDATION

In addition to several outreach programs intended to familiarize the public with the CSRTP-2006 process and studies assumptions that the CAISO held as part of the Sun Path project, the CAISO held two days of open houses on the CSRTP-2006 planning process and the Tehachapi Transmission Project in the Tehachapi area. The CAISO conducted additional outreach programs to local agencies and local community organizations and provided several presentations about the CSRTP-2006 process and the CAISO's findings at workshops sponsored by the California Public Utilities Commission (CPUC) and the Southwest Transmission Expansion Plan (STEP). As a result of these public outreach programs, the CAISO received several valuable comments and suggestions from stakeholders that triggered modifications of study assumptions and approach and, eventually, the CAISO's findings and conclusions. The following table lists the outreach activities related to the CSRTP-2006 process and the Tehachapi Transmission Project.

Outreach Activity	Date
Open house in San Diego on CSRTP-2006 process	- May 19-20, 2006
Created tailored distribution lists to reach affected parties, including those wishing not to be on master communications lists.	- May 2006 through present

<sup>2</sup> Network Upgrades are defined in the ISO Tariff as "[t]he additions, modifications, and upgrades to the ISO Controlled Grid required at or beyond the Point of Interconnection to accommodate the interconnection of the Large Generating Facility to the ISO Controlled Grid. Network Upgrades shall consist of Delivery Network Upgrades and Reliability Network Upgrades." (ISO Tariff, Appendix A, at 515.) Delivery Network Upgrades are "[t]ransmission facilities at or beyond the Point of Interconnection, other than Reliability Network Upgrades, identified in the Interconnection Studies to relieve constraints on the ISO Controlled Grid." (*Id.* at 489.) Reliability Network Upgrades are "[t]he transmission facilities at or beyond the Point of Interconnection necessary to interconnect a Large Generating Facility safely and reliably to the ISO Controlled Grid, which would not have been necessary but for the interconnection of the Large Generating Facility, including Network Upgrades necessary to remedy short circuit or stability problems resulting from the interconnection... [or] to mitigate any adverse impact that Large Generating Facility's interconnection may have on a path's WECC rating." Interconnection Facilities, on the other hand, are "all facilities and equipment between the Generating Facility and the Point of Interconnection, including any modification, additions, or upgrades that are necessary to physically and electrically interconnect the Generating Facility to the ISO Controlled Grid."

<sup>3</sup> The present Tehachapi plan of service contemplates that the network upgrades will be constructed over a number of years. One or more of the transmission line segments may be characterized as bulk-transfer gen-tie lines for an interim period of time until additional lines and transmission interconnections are built. If some of the line segments are temporarily or permanently characterized as bulk-transfer gen-tie lines, generators would be charged a pro-rata rate for transmission service over the gen-tie line. The residual revenue requirement for any unsubscribed portion of the gen-tie line would be recovered either from retail ratepayers under CPUC-approved rates [PUC Section 399.25(b)(4)] or from all transmission customers in FERC-jurisdictional TAC rates if a future proposal by the CAISO is approved by FERC. In this manner, generators will be charged for generation tie lines consistent with FERC's policy that gen-tie costs are usually assessed to generators. If any such bulk-transfer gen-tie later converts into a network facility, generators would be relieved of their pro-rata share of the transmission service charge prospectively.

Hosted conference call to discuss assumptions and comments	- June 22, 2006
Collected written stakeholder comments on assumptions.	- Through June 29, 2006
Initiated 1:1 outreach to individuals and interested groups.	- May through present
Published and re-posted updated study assumptions	- July 17, 2006
Held joint Tehachapi Transmission Workshop with CPUC	- August 23, 2006
Presented the CSRTP-2006 process and interim findings on all projects, including the Tehachapi Transmission Project, at multiple Southwest Transmission Expansion Plan (STEP) meetings.	- May 5, 2006 - July 24, 2006 - September 21, 2006 - November 17, 2006
Hosted an Open House in Tehachapi to display CAISO's role in transmission planning and the Tehachapi Transmission Project final plan of service.	- September 25, 2006 - September 26, 2006
Presentation at CPUC Workshop on the Tehachapi Transmission	- August 23, 2006 - November 21, 2006

## COMPLIANCE WITH THE LGIP REQUIREMENTS

CAISO Management's recommendations on the Tehachapi Transmission Project are primarily based on the CAISO's obligation to identify least-cost transmission solutions to reliably interconnect generation projects in accordance with provisions of the CAISO's LGIP. The CAISO worked with the project sponsor (SCE) and other participants in the CSRTP-2006 process to plan the Tehachapi Transmission Project in a manner that reliably interconnects all generating projects in the TGQ (4,350 MW) as of the commencement date of the CSRTP-2006 process (April of 2006).<sup>4</sup> Accordingly, the CAISO has utilized the efforts of the CSRTP-2006 as a foundation to efficiently comply with its obligations under the LGIP. It has done so by accounting for all LGIP provisions related to "clustered" Interconnection System Impact Studies (SIS) in the CSRTP-2006 study process.

"Clustering" permits the CAISO to collectively study the system impacts of a group of Interconnection Requests, rather than evaluate each potential Generation Facility one-at-a-time. The principal benefit of studying Interconnection Requests in clusters is that it allows the CAISO to better coordinate Interconnection Requests with its overall transmission planning process, and, as a result, achieves greater efficiency in the design of needed Network Upgrades.<sup>5</sup> Indeed, the reasoning that resulted in adoption of a Clustering study process option in the LGIP is strongly applicable to the situation faced by the CAISO with respect to the TWRA involving the interconnection of multiple projects in a proximate geographic location such that incremental study and transmission expansion would be inefficient in the design of the necessary Network Upgrades. By pursuing an integrated solution, the Clustering approach will result in substantial capital cost savings for Network Upgrades when compared to the probable outcome of any piecemeal solution associated with the traditional, sequential SIS approach.

However, the CAISO has deviated in several respects from a typical clustered Interconnection Study. First, unlike the product of a typical Interconnection Study, this report identifies only the network components or Network Upgrades of the transmission infrastructure necessary to interconnect the planned generation projects in TWRA to the ISO Controlled Grid. It excludes Interconnection Facilities, including radial wind collector transmission systems that interconnect the individual generation projects to the grid and are the

<sup>4</sup> Around 1460 MW of TGQ projects queued beyond April 2006 will be studied individually or in additional clusters according to their Queue Position in accordance with the LGIP.

<sup>5</sup> Order No. 2003-A, *Standardization of Generator Interconnection Agreements and Procedures*, 106 FERC ¶ 61,220 (2004) at P 120.

responsibility of generation developers. Needed Interconnection Facilities, and their cost responsibilities, will be identified through a separate more narrow Interconnection Study for each particular Generating Facility in the TGO. Second, an element of Clustering is the selection of a time window for determining which generation projects in the queue will be included in the clustered SIS, i.e., the "Queue Cluster Window." For the Tehachapi Transmission Project the Queue Cluster Window was defined to encompass the first project in the TGO up through the start date of the CSRTP-2006 process or from August 19, 2003 through April 11, 2006.<sup>6</sup> The Tehachapi Transmission Project will also provide low cost integration into the ISO Controlled Grid for additional TGO projects queued beyond April 11, 2006 (around 1,260 MW).

Finally, due to the specific circumstances presented by this project, CAISO has filed a petition with FERC for approval to proceed with the proposed study approach on a one-time basis.

### **EFFICIENCY, RELIABILITY AND ENVIRONMENTAL BENEFITS**

In addition to interconnecting the TGO generation projects, the Tehachapi Transmission Project offers System Reliability and efficiency benefits and facilitates compliance with the California's mandated RPS requirements. The CAISO is not relying on such reliability or economic benefits or RPS compliance to justify approval of the Tehachapi Transmission Project. Therefore, while significant, the CAISO does not attempt to quantify these or the following benefits of the Tehachapi Transmission Project for purposes of this study:

- Provision for the future low cost expansion capability for Path 26;
- Provision for the future expansion of transmission capability to integrate planned renewable resources in Inyo and northern San Bernardino counties area;
- Reduction in nitrogen oxides (NOx) and sulfur oxides (SOx) and other pollutant emissions from displaced fossil fuel generation;
- Potential reduction in natural gas prices stemming from lower fuel consumption by the natural gas generators that are displaced by the wind generation in TWRA - the benefits here would be both due to lower generation cost as well as other societal benefits stemming from lower natural gas costs;
- Augmentation of competitive wholesale Energy markets for California; and
- Further diversification of Energy resources.

### **PROJECT COST**

The total cost of the Tehachapi Transmission Project is \$1.8 billion dollars in nominal terms. This cost includes the cost of the Antelope-Pardee line segment (\$90 million) previously approved by the CAISO Board, but excludes the cost of Interconnection Facilities, i.e., radial wind collector transmission systems that interconnect the individual generation projects to the grid and are the responsibility of generation developers. The full cost and ownership of the Network Upgrades associated with this project will be assigned to SCE. SCE will recover such costs, including the commensurate rate-of-return, directly through the CAISO transmission Access Charge (TAC).

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6. It should be noted that the duration of the Queue Cluster Window is generally intended to extend for only 180 days. This 180-day limit was adopted by FERC, in large part, to protect Interconnection Customers from undue delay in processing their study requests by transmission owners. This risk is not present in the context where the CAISO conducts the study. Nevertheless, in an abundance of caution, the CAISO will file with FERC a petition requesting an explicit one-time waiver of the 180-day Queue Cluster Window to ensure expansion of the transmission grid in the TWRA can be accomplished in the most efficient manner reasonably achievable.



## RECOMMENDATION

Pursuant to CAISO's obligation to plan for least-cost transmission solutions to interconnect generation projects, as delineated in the LGIP, the CAISO Management recommends that CAISO Board approve the project and direct SCE, as the Project Sponsor, to proceed with the necessary permitting and construction of the project. Furthermore, given the CAISO's pending petition before FERC for a one-time waiver of the 180-day Queue Cluster Window, Management recognizes that the Board's approval may be affected by the outcome of the CAISO's pending petition before FERC. Hence, CAISO Management recommends that the Board consider the "substance" of the report and approve the Tehachapi Transmission Project contingent upon FERC consent to the CAISO's implementation its Clustering authority in the present circumstances.

## RECOMMENDATION

As a result of the analysis that has been completed for the Tehachapi Transmission Project, the CAISO Management recommends the approval of the project and the following motion:

***MOVED,***

***That the ISO Board of Governors approve the Tehachapi Transmission Project as the Network Upgrades necessary to allow Generating Facilities in the Tehachapi Wind Resource Area to deliver their output and reliably interconnect to the ISO Controlled Grid in conformance with the ISO's Large Generator Interconnection Procedures (LGIP) and direct Southern California Edison Company (Project Sponsor) to proceed with the permitting and construction of the transmission project, as detailed in the memorandum to the ISO Governing Board dated January 18, 2007. This approval shall be contingent upon FERC approval of the waiver of the LGIP provision requested in California Independent System Operator Corporation, FERC Docket No. \_\_\_\_\_.***