

# Memorandum

**To:** ISO Board of Governors

**From:** Dr. Keith Casey, Vice President of Market & Infrastructure Development

**Date:** December 9, 2009

**Re:** Decision on Alberhill Substation Project

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*This memorandum requires Board action.*

## EXECUTIVE SUMMARY

This memorandum requests ISO Board of Governors approval of the Alberhill Substation Project (Project), proposed by Southern California Edison Company (SCE). Based on the *ISO Business Practice Manual for the Transmission Planning Process*, transmission projects with capital cost greater than \$50 million require Board approval. The Project has an estimated total cost of \$315 million, which includes both the distribution retail cost as well as the transmission access charge (TAC) cost under the ISO. The TAC-related cost is \$171 million. Management's principal determinations and findings are:

- The Project is needed by summer 2014, based on SCE's 1-in-5 year<sup>1</sup> heat wave load forecast for the local area<sup>2</sup>, to provide additional transformer capacity to mitigate the Valley South 500/115 kV transformer overloading concerns. The Valley South transformers are located within the Valley Substation in Romoland, California.
- In the absence of a certain generation alternative, the proposed Project, with its ultimate build-out of three, 560 MVA, load-carrying transformers (and one spare transformer), will provide robust substation capacity to serve load growth in the southern Riverside County area, at least for the next fifteen years, based on the current load projection;

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<sup>1</sup> SCE plans for infrastructure upgrades under its own operational jurisdiction (i.e., Valley 115 kV system) based on 1-in-5 year heat wave load forecast. The Valley 115 kV system is not under ISO's operational control and is not subject to ISO planning standards that require 1-in-10 year heat wave load forecast.

<sup>2</sup> The California Energy Commission (CEC) provides the ISO with individual participating transmission owners system load forecast for planning studies. However, the owners provide the ISO with the sub-area load projections. These owners are responsible for ensuring that the aggregated coincidental sub-area forecasts match with the CEC load forecast for its aggregated larger area.

- The Project will enable SCE to improve its reliability in serving load in Riverside County by minimizing the loss of load exposure<sup>3</sup> in the event of a substation outage; and
- The Project is expected to cause minimum environmental impact in the area.

Management recommends that the Board approve the Project and directs SCE to proceed with its necessary permitting and engineering:<sup>4</sup>

***Moved, that the ISO Board of Governors finds that the Alberhill 500/115 kV Substation Project, as described in the memorandum dated December 9, 2009, is a necessary and cost-effective long-term transmission addition to the CAISO Controlled Grid.***

***Moved, that the ISO Board of Governors directs Southern California Edison to continue with the design, licensing, and construction of this project.***

## **BACKGROUND**

SCE's Valley Substation, located in Romoland, California, is the sole source serving customers' loads in the San Jacinto Region of southwestern Riverside County. This area encompasses about 1,260 square miles and serves approximately 325,000 customers. Valley Substation transforms voltage from 500 kV to 115 kV, with four load-carrying 560 MVA transformers. In 2004, the Valley 115 kV system was split into two separate 115 kV systems: Valley North and Valley South. Each of these systems is served by two 560 MVA transformers from the same 500 kV source. A stand-by spare transformer<sup>5</sup> is scheduled to be installed at Valley Substation in 2010. This spare transformer will provide back-up transformer capacity in the event of a transformer failure at Valley Substation. Since SCE has operational control on radial transmission facilities, the cost of the spare Valley transformer will be incurred by its Distribution Department and recovered through its retail rate.

The ISO transmission planning process requires participating transmission owner's sponsored projects to be submitted through the request window for evaluation and recommendation in the transmission plan for that study cycle. Accordingly, SCE submitted the Project during the 2008 request window, along with the supporting information required by the tariff and the *Business Practice Manual (BPM) for Transmission Planning*. The *2009 Transmission Plan* identified the Project as one of the various alternatives requiring further information for ISO evaluation prior to submitting for Board approval.<sup>6</sup>

<sup>3</sup> SCE 1-in-5 load forecast for the Valley Substation is 1,642 MW for 2010.

<sup>4</sup> Estimated cost for final engineering and design works is approximately 10% of the total project cost.

<sup>5</sup> The stand-by transformer is the fifth transformer to be installed at Valley Substation; the other four existing transformers are load-carrying transformers.

<sup>6</sup> See Table 1-4, page 20 of the *ISO 2009 Transmission Plan* (<http://www.aiso.com/2354/2354f34634870.pdf>).

## ISO STAFF ASSESSMENT

### *Evaluation of need for Project*

ISO staff conducted a reliability assessment and determined that there was a need for the Project, based on the projections for the Valley South 115 kV system load. Specifically, the assessment found the Valley South system load will exceed its transformer capability by summer 2014 (i.e., 1122 vs. 1120 MVA). The Valley North and South systems are two separate electrical systems: Valley North is served from the 115 kV gas insulated switchgear and the Valley South is served from the 115 kV open air substation facilities. Due to high load growth (approximately 14% per year) between the 2000 and 2004 time frame, the Valley North and Valley South systems were split into two separate electrical systems in 2004. This allowed the Valley South system to be served from the expanded 115 kV open air switchgear, rather than being connected to the limited gas insulated switchgear. Based on the existing system design limitation, the Valley North switchgear cannot be expanded further.

### *Evaluated alternatives to the Project*

Management requested that SCE provide engineering feasibility and planning level cost estimates of five other alternatives in its evaluation of the Project. These alternatives are summarized in the following *Table 1*.

*Table 1. Summary of Rejected Alternatives*

<b>Alternative</b>	<b>Scope of Project</b>	<b>Evaluations</b>	<b>Amount<sup>7</sup></b>
<p><b><u>Alternative 1</u></b></p> <p>Transfer Load from Valley South to Valley North</p>	<ul style="list-style-type: none"> <li>• Transfers two 115kV Substations from the Valley South bus to the Valley North bus within the existing valley substation</li> <li>• Constructs new 115 kV transmission line</li> </ul>	<p><b><u>Pros:</u></b></p> <ul style="list-style-type: none"> <li>• Low costs</li> </ul> <p><b><u>Cons:</u></b></p> <ul style="list-style-type: none"> <li>• Requires rebuilding a substantial portion of the existing lines</li> <li>• Only shifts the problem without solving it</li> <li>• Is considered short-term mitigation that requires additional upgrades (i.e., new substation) within two years of its completion</li> </ul>	<p>Less than \$30 million</p>
<p><b><u>Alternative 2</u></b></p> <p>Expansion of 500/115 kV Valley Substation</p>	<ul style="list-style-type: none"> <li>• Installs a new 560 MVA 500/115 kV Transformer Bank at the existing Valley Substation</li> <li>• Replaces 16 existing 115 kV breakers on Valley South System with 63 kA rated units</li> </ul>	<p><b><u>Pros:</u></b></p> <ul style="list-style-type: none"> <li>• Low costs</li> </ul> <p><b><u>Cons:</u></b></p> <ul style="list-style-type: none"> <li>• Does not create any new 115 kV system ties for substation load transfers</li> <li>• Exceeds SCE’s substation design practice of limiting to 3 load-carrying banks and 1 spare within 500 kV substation</li> <li>• Increases further loss of load exposure</li> </ul>	<p>Less than \$50 million</p>

<sup>7</sup> Listed costs for alternatives are approximate costs due to proprietary information from SCE. However, ISO Staff has actual planning costs provided by SCE for evaluation of alternatives.

<p><b><u>Alternative 3</u></b></p> <p>Build New 230/115 kV Substation</p>	<ul style="list-style-type: none"> <li>• Constructs new 230/115 kV Substation</li> <li>• Constructs three new 30 mile 230 kV T/L</li> </ul>	<p><b><u>Pros:</u></b></p> <ul style="list-style-type: none"> <li>• Provides loading relief to Valley transformers for 10-year planning horizon</li> </ul> <p><b><u>Cons:</u></b></p> <ul style="list-style-type: none"> <li>• Is considered difficult to permit because this option requires CPCN permitting for at least 30 miles of rights-of-way through populated areas</li> <li>• Proposed location is far from major load areas</li> </ul>	<p>\$300 - \$350 million</p>
<p><b><u>Alternative 4</u></b></p> <p>Construction of new Auld Substation</p>	<ul style="list-style-type: none"> <li>• Constructs a new 500/115 kV substation south of the existing valley substation</li> <li>• Constructs two 14 mile 500 kV T/L</li> </ul>	<p><b><u>Pros:</u></b></p> <ul style="list-style-type: none"> <li>• Provides loading relief to Valley transformers for at least 10-year planning horizon</li> </ul> <p><b><u>Cons:</u></b></p> <ul style="list-style-type: none"> <li>• Is considered difficult to permit because it requires CPCN permitting and acquisition of a minimum of 28 miles of rights-of-way through heavily populated areas</li> <li>• Requires much longer construction time</li> </ul>	<p>\$300 - \$350 million</p>
<p><b><u>Alternative 5</u></b></p> <p>Generation Option (EME-proposed Sun Valley Energy Project)</p>	<ul style="list-style-type: none"> <li>• Edison Mission Energy proposed to construct 5x101.5 MW peakers (507.5 MW total capacity)</li> <li>• Currently is at the permitting stage at the California Energy</li> </ul>	<p><b><u>Pros:</u></b></p> <ul style="list-style-type: none"> <li>• If this project receives appropriate environmental permits from the CEC and the South Coast Air Quality Management District, receives power purchase agreement, and is able to complete by June</li> </ul>	<p>Less than \$40 million<sup>8</sup> for connection of this generation to Valley Substation</p>

<sup>8</sup> Non-TAC costs due to proposed connection of generation project to SCE-Controlled 115 kV sub-transmission radial system

	<p>Commission</p> <ul style="list-style-type: none"> <li>Connects to Valley South 115 kV bus at Valley Substation</li> </ul>	<p>2014, it will negate the need for the transmission option.</p> <p><b><u>Cons:</u></b></p> <ul style="list-style-type: none"> <li>Project is located in South Coast Air Quality Management District (SCAQMD), which currently has priority reserve issues</li> <li>Uncertain in obtaining air credits from SCAQMD for construction</li> <li>Project is still under environmental review by the CEC and has not yet been granted permit to construct</li> <li>Has no signed power purchase agreement with Utility Distribution Company</li> <li>Is considered uncertain generation project due to above environmental issues that need to be resolved</li> </ul>	
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***Description of proposed Project***

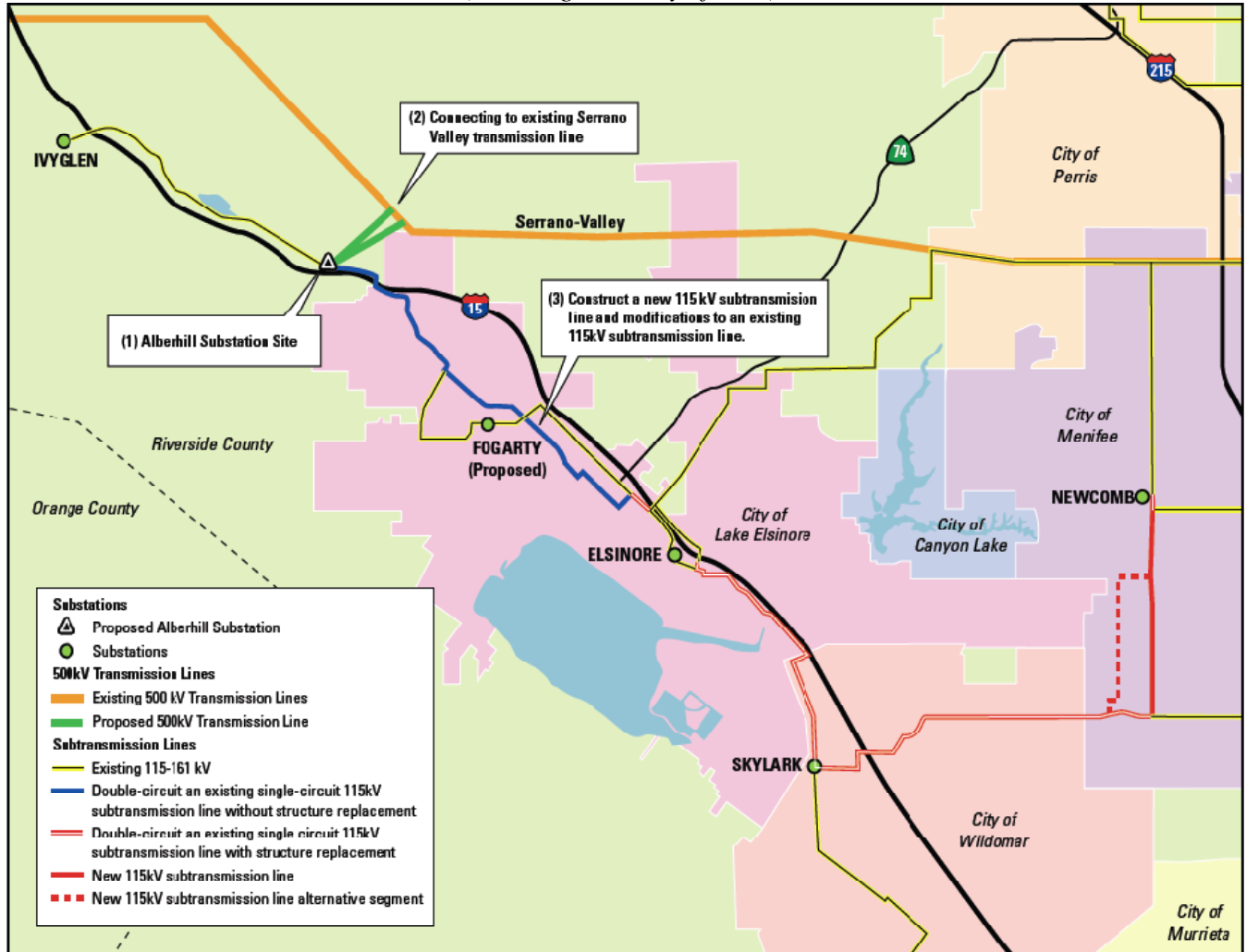
SCE proposes to construct the Project to serve current and projected demand for electricity in the southwestern Riverside County, including the cities of Lake Elsinore, Canyon Lake, Perris, Menifee, Murrieta, Murrieta Hot Springs, Temecula, Wildomar, and the surrounding unincorporated portions of Riverside County. The following is the scope of the project:

1. Construction of a new 500/115 kV substation to provide additional substation capacity to the area currently served by Valley Substation; the project will have two 560 MVA 500/115 kV AA-transformer banks initially. The ultimate substation arrangement will have a total of four 560 MVA transformer banks, with three banks carrying load and

one serving as a stand-by spare unit in the event of a bank failure. The 500/115 kV substation will be constructed using a hybrid (500 kV gas insulated switchgear/115 kV open air) configuration.

2. Construction of two, 1.5-mile lengths of new, 500 kV single-circuit transmission lines to connect the new substation by loop-in of the existing Serrano – Valley 500 kV transmission line;
3. Construction of a new 115 kV sub-transmission line (approximately three miles in length) and modifications to four existing 115 kV sub-transmission lines to transfer loads from Valley South system to the new Alberhill substation. The cost for performing these works is recovered through retail rate and is not under the ISO TAC cost, since SCE's 115 kV radial facilities are not under ISO operational control.
4. Installation of telecommunication improvements to connect the new facilities to SCE's telecommunication network. The cost for most of this work is not included in the ISO TAC costs.

**Figure 1. Alberhill Substation Project**  
*(Drawing Courtesy of SCE)*



***Costs of Alberhill Substation Project***

The total cost of this project is \$315 million, which includes both the TAC and non-TAC portions. The TAC-related cost is \$171 million and covers the cost of the transmission facilities under ISO’s operational control. The retail rate cost is \$144 million and covers the cost of the 115 kV sub-transmission facilities that are under SCE’s operational control. The estimated annual levelized revenue requirement for the TAC cost portion is estimated to be \$22 million, if the annual carrying charge is 13 percent. This estimate is for illustration only because SCE has yet to bring this project to the Federal Energy Regulatory Commission for cost recovery approval. An updated transmission revenue requirement will be available upon their review and approval.



## **POSITIONS OF THE PARTIES**

Management presented this proposed project to stakeholders as part of the 2009 transmission planning process. In *Table 1-4*, page 20 of the *Final ISO 2009 Transmission Plan Report*<sup>9</sup>, posted on the ISO website, the Management indicated that this proposed Project would be evaluated further with other alternatives before recommending to the Board for approval. On September 30, 2009, SCE submitted to the CPUC its CPCN permit filing. The CPUC has initiated a proceeding to conduct the environmental permit review of this project. Currently, SCE anticipates receiving the final decision from the CPUC regarding this project in the Fall of 2011. The planned completion date for this project is June 2014.

## **MANAGEMENT RECOMMENDATION**

Based on Management's findings that the project is the most robust transmission alternative with expected minimum environmental impact in meeting reliability needs and providing long-term transformer capacity for serving load growth in the southwestern Riverside County, Management recommends the Board approve this project as a new addition to the ISO controlled grid. In addition, SCE should be directed to proceed with necessary permitting, engineering and construction of the project, with a planned operational date of June 2014.

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<sup>9</sup> The ISO Transmission Plan is posted at <http://www.caiso.com/2354/2354f34634870.pdf>.