



# Memorandum

**To:** ISO Board of Governors

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

**Date:** February 3, 2010

**Re:** **Decision on the Bayfront Substation Transmission Project**

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*This memorandum requires Board action*

## EXECUTIVE SUMMARY

This memorandum seeks approval of the Bayfront substation transmission project. San Diego Gas & Electric Company proposed the project to meet a reliability need. Specifically, this project is needed to mitigate reliability concerns on the sub-transmission network facilities in the event that the remaining South Bay power plant (South Bay) Units 1, 2 and the 15 MW gas turbine are retired. The planned operational date for the proposed project is December 2012.

The California Independent System Operator identifies projects needed to meet reliability needs, including projects needed to meet standards established by the North American Electric Reliability Corporation (NERC), and the system must be planned and built in anticipation of circumstances that would lead to reliability impacts. In this instance, Dynegy has stated publicly that it intends to retire the South Bay plant if the ISO determines that the plant is no longer needed for reliability must run (RMR) purposes. Additionally, the existing South Bay power plant utilizes once-through cooling, which has been identified by the State Water Resources Control Board as one of nineteen plants that would be phased out due to its cooling technology.

The Bayfront project has an estimated total cost of \$129.2 million, of which \$57.2 million includes the cost for the 230 kV upgrades, \$60.8 million for 69 kV and 138 kV related construction and \$11.2 million is for the cost of borrowing funds until the project is placed into operation. In reviewing the project, ISO staff also evaluated one other alternative, which was found to be less cost effective than the Bayfront substation transmission project.

*Moved, that the ISO Board of Governors finds that the Bayfront Substation Transmission Project, as detailed in the memorandum dated February 3, 2010, is a necessary and cost-effective long-term transmission addition to the ISO controlled grid; and*

*Moved, that the ISO Board of Governors directs San Diego Gas and Electric Company to continue with the design, licensing and construction of this project.*

## **DISCUSSION AND ANALYSIS**

### ***Background***

Downtown San Diego is presently served from the 500/230/138/69 kV Miguel substation by the Miguel-Silvergate-Old Town 230 kV line, two Miguel-Sycamore Canyon 230 kV and two Miguel-Mission 230 kV transmission lines, as well as by underlying 138 and 69 kV systems. The 138 kV lines connect Miguel substation with South Bay and Main Street substations in the north and Los Coches substation in the northeast. South Bay power plant is connected to the 138 kV and 69 kV systems, and at this time South Bay, or a portion of it, is essential in meeting local capacity requirement in the San Diego area.

The proposed project is needed to address transmission overloads that would occur when the South Bay power plant is retired. The project involves relocating and upgrading the South Bay substation from 138/69 kV to 230/69 kV and other system modifications described in the body of the memo. In addition to mitigating identified overloading concerns, there are two other issues that SDG&E cited as factors supporting the Bayfront project. First, the existing South Bay substation is over forty years old. The substation has aging infrastructure concerns, including undersized circuit breakers and 138 kV bus, outdated seismic standards, and an unreliable 69 kV configuration during bus outages. Secondly, per a Memorandum of Understanding between SDG&E and the City of Chula Vista regarding franchise agreements, SDG&E agreed to relocate the existing South Bay substation to a new location on Chula Vista's Bayfront in coordination with the retirement of the South Bay power plant. This relocation may be the only opportunity to bring the needed 230 kV source into the area.

South Bay has been included as RMR generation unit since 1998 to meet local reliability needs in the San Diego area. With the addition of new generation located within San Diego County, the need for maintaining South Bay as an RMR unit has been decreasing. For 2010 RMR requirements for South Bay, the ISO has determined that 296 MW (or two units) are needed, provided that the Otay Mesa power plant (573 MW) is proven to be a reliable generating station prior to summer 2010.

### ***Reliability criteria violations***

The proposed project will eliminate the following reliability criteria violations that occur for the following contingencies under a complete South Bay retirement scenario:

- 1) Overloading of the Miguel 230/138 kV bank # 2 based on a normal rating starting in 2012. If emergency rating<sup>1</sup> can be utilized on an extended basis, the ISO staff expects that there will be no overloads. However, SDG&E planning staff expressed concerns on the length of time it takes to bring in and install the spare transformer at Miguel substation, which can take up to two weeks or more. The emergency rating limit for the transformer is intended not for use more than 24 hours for five days (occurrences) in a year. The overloading occurs under T-1 contingencies.
- 2) Overloading of the Kettner-Station B 69kV transmission line starting in 2019 under an N-1-1 contingency condition.
- 3) Overloading of the Old Town-Kettner 69 kV transmission line starting in 2019 under an N-1-1 contingency condition.
- 4) Overloading of the Old Town 230/69 kV transformer banks under an N-1/T-1 contingency condition starting in 2010, if normal rating is utilized. However, if the emergency rating is utilized, the ISO staff does not expect the transformer to be overloaded. Similar to item # 1 above, SDG&E staff expressed concerns on the extended use of the emergency rating of the transformer while the spare bank is being relocated to Old Town.

### ***Project description***

The Bayfront substation transmission project includes the following scope of work:

1. Construct a new 230/69 kV substation that will replace the existing 138/69 kV substation;
2. Install two 224 MVA 230/69 kV transformers;
3. Loop in the Miguel-Silvergate 230 kV transmission line into the new substation;
4. Transfer all 69 kV lines presently connected to the South Bay 138/69 kV substation to the new substation;
5. Re-configure existing 138 kV lines to eliminate the need for the South Bay 138 kV bus.

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<sup>1</sup> An emergency rating, which generally should not be exceeded, is a higher rating on a transmission line or transformer to allow higher flow than normal rating for a short duration of time (i.e., typically 15 minutes to 24 hours, depending on the equipment) to address contingency overloads.

***Project cost***

The proposed project has an estimated total cost of \$129.2 million, in which \$57.2 million includes the cost for the 230 kV upgrades; \$60.8 million for the 69 kV, 138 kV and distribution upgrades and \$11.2 million is for the cost of borrowing funds until the project is placed into operation.

***Other alternatives considered***

In addition to the proposed project, ISO staff also evaluated another option (alternative 2) under the assumptions that the South Bay power plant is retired.

***Alternative 1 (preferred): Proposed project of rebuilding South Bay substation in a different location with 230 kV upgrades*** – This alternative has an estimated cost of \$129.2 million. With this project, identified facility loading concerns under contingency conditions will be mitigated. This alternative also allow connection of 230 kV transmission facilities to serve downtown load, thus enable for more robust option of serving future load growth.

***Alternative 2: Rebuild South Bay 138/69 kV substation in a different location and upgrade identified individual overloaded transmission facilities*** – This alternative is expected to have substantially higher cost than the proposed project. The alternative includes additional upgrades and estimated costs, shown in Table 1, in addition to \$112.9 million for constructing a new South Bay substation with the same voltage (138/69 kV) at a nearby location. With this alternative, load curtailment in the order of about 50 MW would be required to mitigate loading concerns under N-1-1 contingency conditions and the facility upgrades, shown in Table 1, are proposed for mitigating loading concerns under an N-1 contingency.

**TABLE 1**

<b>Overloaded Equipment</b>	<b>Mitigation</b>	<b>Cost</b>
Miguel Bank 230/138 kV transformer #2	Upgrade 230/138 kV bank	\$27.4 M
Old Town 230/69 kV transformers #1 & #2	Install System Protection System for load curtailment under contingency conditions	\$0.1 M
Old Town-Kettner 69 kV line	Install System Protection System for contingency load curtailment	\$0.1 M
Kettner-B 69 kV line	Install System Protection System for contingency load curtailment	\$0.1 M
South Bay Substation Rebuild (In-kind Replacement)	N/A	\$112.9 M
<b>Total Cost of Alternative # 2</b>		<b>\$140.6 M</b>

## **MANAGEMENT RECOMMENDATION**

Based on the ISO staff findings that the proposed project is the most cost effective transmission alternative to address overloading concerns associated with South Bay's retirement, Management recommends that the Board approve the project and that SDG&E be directed to proceed with necessary permitting, engineering and construction of the project. To allow for continued delivery of the South Bay generation until the ISO removes reliability must run designation for South Bay Units 1 and 2, the construction and energization of the new Bayfront substation should be coordinated such that there is no loading impact to the sub-transmission facilities.