



System Impact Study

November 2, 2006

Sub Transmission System Analysis



SOUTHERN CALIFORNIA
EDISON


An EDISON INTERNATIONALSM Company

SOUTHERN CALIFORNIA EDISON COMPANY

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EXECUTIVE SUMMARY

Submitted an application to Southern California Edison ("SCE"), pursuant to SCE's Wholesale Distribution Access Tariff (WDAT) to interconnect a 49.9 MW Gas Turbine generating unit to the Vista-Colton Cement-Fibre 66 kV subtransmission line on SCE's Vista 66 kV System, in Colton Ca. The requested in-service date of the proposed generation project is June 1, 2007.

The consists of the addition of Gas Turbine Generator that has a maximum plant output of 49.9 MW. The generator will be tapped into the Vista-Colton Cement-Fibre 66 kV subtransmission line with 13.8 kV to 66 kV, 60 MVA step-up transformer. The net output from the project measured at the 66 kV bus is expected to be 49.9 MW. The tapped line will become the Vista-Colton Cement-Colton 66 kV line.

SCE provided a System Impact Study for the in accordance with SCE's WDAT process dated March 9, 2006. This is a re-study due to several factors that have changed since SCE performed the original study. The purpose of this study is to preliminarily assess the impact on SCE's transmission and subtransmission system to determine if the proposed project requires transmission or subtransmission system modifications and/or possible congestion management or mitigation. This study is required to maintain system reliability in accordance with SCE's Planning Criteria. The study includes assessments of power flow and short-circuit duties.

The results of the System Impact Study are in two sections.

- The impact of the proposed project on SCE's Vista 66 kV system.
- The impact of the proposed project on SCE's 220kV transmission system (see appendix).

Engineering evaluated circuit breakers at all transmission and sub-transmission buses where the contribution to the Short Circuit Duty resulted in an increase of 0.1kA or more.

Based on the new rules that indicate that a project will not be responsible for any replacements or upgrades required for any pre-project condition, the evaluation concluded that with the on-line:

- Thermal loadings on approximately 0.10 miles of existing SCE subtransmission facilities used to provide the requested WDAT service exceeded criteria limits.
- Review of circuit breaker interrupting capabilities on SCE's transmission and subtransmission system determine the following:

CASE A: Identifies the circuit breaker replacements and upgrades triggered by the . This case requires the replacement of 220 kV circuit breakers, and the replacement of 66 kV circuit breakers.

CASE B: Identify [REDACTED] the circuit breaker replacements and upgrades required, including those triggered by Applicants placed ahead of the [REDACTED] in the application queue. This case requires upgrading [REDACTED] 220 kV circuit breakers, replacing [REDACTED] 220 kV circuit breakers, and the replacement of [REDACTED] 66 kV circuit breakers.

In the event that any applicant presently placed ahead of the [REDACTED] in the application queue withdraws the application, the short circuit duties will be re-calculated and all circuit breakers will be re-evaluated. The new evaluation may conclude that the project would be responsible for some or all of the replacements and upgrades identified on CASE B.

SCE's System Impact Study did not assess the impact on customer owned 66 kV circuit breakers where the [REDACTED] contribution to short circuit Duty resulted in an increase of 0.1 kA or more. Additional system studies may need to be performed.

Non-binding order of magnitude cost estimate for the required interconnection facilities and system upgrades, which includes 35% ITCC Tax, are as follows:

[REDACTED] Interconnection facility	\$472,500
Protection Upgrades (Two Substations)	\$607,500
RTU (Installed by SCE at Generation Facility)	\$115,000
<u>66kV System Line Upgrades</u>	<u>\$330,750</u>
Total non-binding order of magnitude cost estimate	\$1,525,750

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[REDACTED]

SUBTRANSMISSION SYSTEM IMPACT STUDY

1. INTRODUCTION

The [REDACTED] submitted an application to Southern California Edison ("SCE"), pursuant to the Wholesale Distribution Access Tariff ("WDAT") to interconnect a [REDACTED] Gas Turbine generating unit to the Vista-Colton Cement-Fibre 66 kV subtransmission line on SCE's Vista 66 kV system, in Colton Ca. The [REDACTED] requested in-service date of the proposed generation project is June 1, 2007.

The [REDACTED] consists of [REDACTED] Gas Turbine Generator that has a maximum plant output of 49.9 MW. The net output from the project measured at the 66 kV bus at [REDACTED] is expected to be 49.9 MW. [REDACTED] has requested that the new generating facility be located at Agua Mansa Road in Colton, CA. The generator will be connected to the [REDACTED] 66 kV bus through one 13.8 kV to 66 kV, 60 MVA step-up transformer. This station will be tap fed from the existing Vista-Colton Cement-Fibre 66 kV line. The new [REDACTED] station would form one new 66kV line: the Vista-Colton Cement-Colton [REDACTED] 66kV line.

SCE performed a System Impact Study in accordance with SCE's WDAT process. The purpose of this study is to assess the project's impact on SCE's transmission and subtransmission system, and to conduct other analyses to determine if the proposed project requires transmission and/or subtransmission system modifications and/or possible congestion management or mitigation. The study is required to maintain system reliability in accordance with SCE's Planning Criteria. The study includes assessments of power flow and short-circuit duties.

2. STUDY CONDITIONS AND METHODOLOGY

A. Planning Criteria

The study was conducted by applying SCE Transmission and Subtransmission Planning Criteria and Guidelines. Specifically, the main criteria applicable to this study are as follows:

Load Flow Criteria

For this system impact study, the base case and N-1 subtransmission loading criterion were considered for subtransmission lines and 220/66 kV transformer banks ("A Banks").

For this contingency, the following loading criteria were used:

Subtransmission lines (66 kV):

Base Case 100%

N-1 130%

A Banks:

Base Case 100% of Planned Loading Limit (PLL)

N-1 130% of Planned Loading Limit (LTELL)

Short-Circuit Duty Criteria

The calculated Maximum Expected short-circuit duties shall not exceed the short-circuit duty rating of the 12 kV and 66 kV circuit breakers for system conditions that model maximum area generation on-line.

The calculated short-circuit duties shall not exceed the short-circuit duty rating of the 220 kV and 66 kV circuit breakers for system conditions that model maximum area generation on-line.

Engineering evaluated circuit breakers at all transmission and sub-transmission buses where the [redacted] contribution to the Short Circuit Duty resulted in an increase of 0.1kA or more.

B. System Conditions - Methodology

SCE performed studies to evaluate the impact of the [redacted]

- Base case and N-1 load flow and short-circuit duty studies were run on the Vista 66 kV System to establish base line conditions so that the impact of the [redacted] on the SCE system could be determined.
- Load flow and short-circuit duty studies were run on the Vista 66 kV System to evaluate the system impact associated with the addition of the [redacted]. Two scenarios were studied:
 - 1) the Vista 66 kV system as it is normally operated without the [redacted]
 - 2) the Vista 66 kV system as it is normally operated with the [redacted]

C. Load Flow Study

This study evaluated the impact of the [redacted] on 66 kV facilities for Base Case and N-1 conditions.

D. Short-Circuit Duty Study

This study evaluated the [redacted] impact on three-phase, symmetrical short-circuit duties seen by substation circuit breakers at the 66 kV, and 220 kV levels. [redacted] three – phase fault currents were calculated both with and without the [redacted] to determine if the addition of the [redacted] causes any violations of SCE's short circuit duty criteria.

3. DISCUSSION OF STUDY RESULTS

A. Load Flow Study

Base case (N-0):

For system conditions that model maximum area generation on-line, the addition of the [redacted] caused the following violations:

Approximately 0.10 miles of existing overhead conductor on the Bloomington-Colton-Colton Cement 66kV line will be loaded to 106% of its normal loading criteria under base case conditions due in part to the [REDACTED]

Contingency (N-1):

There were no N-1 system connection problems on the Vista 66 kV system before or after the addition of the [REDACTED]

B. Short Circuit Duty Study

The results of short circuit duty studies are provided in Table 1. Following is a summary of the results:

- During normal operation the [REDACTED] increases three-phase short circuit duties by 0.1 kA or more on [REDACTED] buses within the Vista 66 kV system. Based on the new rules that indicate that a project will not be responsible for any replacements or upgrades required for any pre-project condition, a review of circuit breaker interrupting capabilities on SCE's transmission and subtransmission system indicate the following:

CASE A: Identifies [REDACTED] the circuit breaker replacements and upgrades triggered by the [REDACTED] project. This case requires the replacement of [REDACTED] 220 kV circuit breakers, and the replacement of [REDACTED] 66 kV circuit breakers.

CASE B: Identifies [REDACTED] the circuit breaker replacements and upgrades required, including those triggered by Applicants placed ahead of the [REDACTED] in the application queue. This case requires upgrading [REDACTED] 220 kV circuit breakers, replacing [REDACTED] 220 kV circuit breakers, and the replacement of [REDACTED] 66 kV circuit breakers.

In the event that any applicant presently placed ahead of the [REDACTED] in the application queue withdraws the application, the short circuit duties will be re-calculated and all circuit breakers will be re-evaluated. The new evaluation may conclude that the project would be responsible for some or all of the replacements and upgrades identified on CASE B.

- The impact of the [REDACTED] on other 220 and 500 kV circuit breakers on the SCE system is in the appendix to this study.

The evaluation of the single line-to-ground duty increases for SCE's subtransmission system buses will be conducted as part of the Facilities Study. SCE does not anticipate the results of the single line-to-ground duty analysis to cause any violations of SCE's short circuit duty criteria.

C. Interconnection Facility – Preliminary Cost

Non-binding Order-of-Magnitude cost for a Single-Line 66 kV Interconnection Facility to serve one customer owned transformer is estimated to be \$1,525,750. Following is a summary of the estimate:

- One 66 kV Interconnection Facility (to build substation to SCE's standards) estimate includes review of engineering & design, inspection of construction, and facility testing. - \$350,000 + ITCC Tax @ \$122,500 = \$472,500
- Upgrade line protection relays at two substations - \$150,000 + ITCC Tax @ \$52,500 = \$202,500
- Relay Communications - \$300,000 + ITCC Tax @ \$105,000 = \$405,000
- RTU (Installed by SCE at the) - \$85,000 + ITCC Tax @ \$30,000 = \$115,000
- 66kV line upgrades (New source line and reconductor of 0.10 miles of overhead conductor) – \$245,000 + ITCC Tax @ \$85,750 = \$330,750

4. CONCLUSIONS AND RECOMMENDATIONS

SCE determines that a Facilities Study is required to determine the required facilities and associated costs of any interconnection facilities and system upgrades for the 66 kV, 220 kV and 500 kV.

Engineering evaluated circuit breakers at all transmission and sub-transmission buses where the contribution to the Short Circuit Duty resulted in an increase of 0.1kA or more.

Based on the new rules that indicate that a project will not be responsible for any replacements or upgrades required for any pre-project condition, the evaluation concluded that with the on-line:

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**TABLE 1
THREE-PHASE SHORT-CIRCUIT DUTY SUMMARY**

Substation Bus
Vista 66 kV
Crestmore 66 kV
Glen Avon 66 kV
Bloomington 66 kV
Colton 66 kV
Colton Cement 66 kV

SCHEDULE

ELEMENT	START	END	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
PROJECT APPROVAL	Initiate Work Orders								
ENERGY SUB. DESIGNED & INSTALLED BY WELLHEAD									
Design Review	New Switching Station	Start of Mo.5							
Site Inspection during Construction	Start of Mo.2	Start of Mo.7							
Testing	Start of Mo.4	End of Mo.7							
OTHER RELATED SUBSTATIONS									
Engineering & Design	PROTECTION UPGRAGE	Start of Mo.5							
Relays & Panels	Start of Mo.2	Mid of Mo.6							
Construction	Start of Mo.4	Mid of Mo.7							
Testing	Start of Mo.5	End of Mo.7							
	Start of Mo.7								

* This Schedule is for substation interconnection only and does not include the replacement of any 66kV or 220kV circuit breakers.