

WDT 311

SYSTEM IMPACT STUDY

4/13/09

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**SOUTHERN CALIFORNIA
EDISON**

An EDISON INTERNATIONALSM Company

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EXECUTIVE SUMMARY

[REDACTED] applied to Southern California Edison ("SCE") for distribution service under the terms of SCE's Wholesale Distribution Access Tariff ("WDAT"). [REDACTED] owns and operates an existing 100 MW generating facility [REDACTED] and is adding an additional 100 MWs of generation [REDACTED] to be interconnected at the existing interconnection facility [REDACTED]. SCE provides power to seven of [REDACTED] 66 kV lines out of Vista substation from the Vista C bus. [REDACTED] Project is within [REDACTED] 66 kV system and is not directly connected to SCE system. Distribution service pursuant to the WDAT is proposed to be from [REDACTED] Project to the California Independent System Operator ("ISO") grid at SCE's 230 kV at Vista Substation. The proposed in-service date of [REDACTED] Project is [REDACTED].

The [REDACTED] is a generation system consisting of [REDACTED] gas turbines with a net generation export of 100 MW. As requested by [REDACTED], SCE performed a System Impact Study to identify the general electrical system impacts of the [REDACTED] possible mitigation measures to maintain conformance with SCE, ISO, or other applicable reliability planning criteria.

The System Impact Study consisted of a power flow analysis and a three-phase short circuit duty analysis to determine whether the energy associated with the [REDACTED] can be transmitted through SCE's distribution system to the ISO grid at [REDACTED], without creating the need for modifications to SCE's distribution system and/or the ISO grid. The study showed that, with the [REDACTED] Project on-line:

- For both peak load and light load conditions, the addition of the [REDACTED] caused no violation of SCE's thermal loading criteria under base case conditions.
- For both peak load and light load conditions, the addition of the [REDACTED] caused no violation of SCE's thermal loading criteria under N-1 conditions.
- There is one substation where the [REDACTED] increased three-phase short-circuit duties by 0.1 kA or more. The circuit breaker interrupting capabilities were reviewed at these substations and it was determined that nine circuit breakers were required to be upgraded as a result of the [REDACTED].

Results of the Interconnection System Impact Study (ISIS) will be used as the basis to determine appropriate project cost allocation for facility upgrades in the Facilities Study. The study accuracy and results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by [REDACTED]. Any changes from the data provided could void the study results. The ISIS report provides detailed study assumptions and conditions of the system in which the ISIS was conducted.

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[REDACTED]

SYSTEM IMPACT STUDY

June 1, 2009

1. INTRODUCTION

[REDACTED] applied to Southern California Edison ("SCE") for distribution service under the terms of SCE's Wholesale Distribution Access Tariff ("WDAT"). [REDACTED] owns and operates an existing 100 MW generating facility [REDACTED] and is adding an additional 100 MWs of generation [REDACTED] to be interconnected at the existing interconnection facility [REDACTED]. SCE provides power to [REDACTED] 66 kV lines out Vista substation from the Vista C bus [REDACTED] is within [REDACTED] 66 kV system and is not directly connected to SCE system. (see Figure 1 below).

Distribution service pursuant to the WDAT is proposed to be from [REDACTED] to the California Independent System Operator ("ISO") grid at SCE's 230 kV Vista Substation. The proposed in-service date of the [REDACTED] is June 1, 2009.

The [REDACTED] is a generation system consisting of [REDACTED] as turbines with a net generation export of 100 MW. As requested by [REDACTED], SCE performed a System Impact Study to identify the general electrical system impacts of the [REDACTED], possible mitigation measures to maintain conformance with SCE, ISO, or other applicable reliability planning criteria, and non-binding order of magnitude cost estimates for these mitigation measures.

The System Impact Study consisted of a power flow analysis and a three-phase short-circuit duty analysis to determine whether the energy associated with the [REDACTED] can be transmitted through SCE's distribution system to the ISO grid at Vista 230kV Substation, without creating the need for modifications to SCE's distribution system and/or the ISO grid. This report describes the study conditions and assumptions and presents the results of the power flow and short-circuit duty analysis on SCE's Vista 66 kV sub-transmission system.

2. STUDY CONDITIONS AND METHODOLOGY

A. Planning Criteria

The study was conducted by applying SCE's planning criteria to the SCE facilities used to provide the requested WDAT service. Specifically, the main criteria applicable to this study are as follows:

Power Flow Criteria

Line loading should not exceed 100% of a conductor's thermal rating with all facilities in service (base case).

Line loading should not exceed 100% of a conductor's emergency rating with one line out of service (N-1).

Short-Circuit Duty Criteria

Short-circuit duty should not exceed a circuit breaker's interrupting capability with maximum area generation on-line.

B. System Load Conditions

The study considered two system load conditions: peak loads and light loads. The peak load forecast was based on SCE's 2006-2014 Distribution Substation Plan. The light load forecast was assumed to be 25 % of the peak load forecast.

C. Power Flow Study

SCE does not serve [REDACTED] through sub-transmission lines, so no power flow study was done on SCE's sub-transmission lines. Power flow study was done on the [REDACTED] that serve [REDACTED] at Vista substation on the Vista C bus. [REDACTED] 66 kV lines are then connected to the Vista C bus.

D. Short-Circuit Duty Study

This study evaluated the [REDACTED] impact on three-phase short-circuit duties seen by substation circuit breakers at the 66 kV level. Symmetrical three-phase fault currents and X/R ratios were calculated both with and without the [REDACTED] to determine if the addition of the [REDACTED] caused any violations of SCE's short-circuit duty criteria.

The dataset used for the short-circuit study represented all existing generation and all projects in the queue (up to and including the [REDACTED]) as on-line. Substations where the [REDACTED] increased three-phase short-circuit duties by 0.1 kA or more were flagged, and circuit breaker interrupting capabilities were reviewed at these substations to determine if any circuit breakers required replacement as a result of the [REDACTED]

3. DISCUSSION OF STUDY RESULTS

A. Power Flow Study

For both peak load and light load conditions, the addition of the [REDACTED] caused no violations of SCE's thermal loading criteria under base case conditions.

For both peak load and light load conditions, the addition of the [REDACTED] caused no violations of SCE's thermal loading criteria under N-1 conditions.

B. Short-Circuit Duty Study

Table 1 below summarizes the impact of the [REDACTED] on symmetrical three-phase short-circuit duties and X/R ratios at various 66 kV buses on the SCE system. [REDACTED] were flagged where the [REDACTED] increased three-phase short-circuit duties by 0.1 kA or more: [REDACTED] were verified and need to be replaced [REDACTED] on Vista A bus and [REDACTED] on Vista C 66 kV bus, along with [REDACTED] of disconnects on Vista A and a possible [REDACTED] more sets of disconnects on Vista C. A review of circuit breaker interrupting capabilities at these locations determined that the incremental contribution to increased SCD did trigger the need for circuit breaker upgrades.

SCE's planning criteria is for N-1. The system impact study showed that sixteen existing breakers are over duty at Vista substation before [REDACTED] comes on-line. These breakers need to be replaced along with the nine breakers [REDACTED] over-duties when it comes on line. To accommodate the connection of [REDACTED] there will need to be temporary operating restrictions until all upgrades are completed at Vista substation.

In an N-1 situation, the current operating procedure is to parallel the Vista A and Vista C bus sections through the Vista B bus. Restrictions will be in place for this Operating procedure until the sixteen breakers are replaced on the Vista A, Vista C, and Vista B bus at SCE's [REDACTED] cost, and nine breakers that need to be replaced due to [REDACTED] on the Vista A [REDACTED] and Vista B [REDACTED] bus a [REDACTED] cost.

For normal operating conditions at Vista substation, six of the sixteen breakers SCE is responsible for will need to be replaced. Also, [redacted] of the [redacted] breakers [redacted] is responsible for will need to be replaced. This will allow [redacted] to run their [redacted] 50 MW generators under normal operations (Vista A & C not paralleled).

SCE has separated the breaker replacement into [redacted] projects due to the amount of breakers that need to be replaced and resources needed to replace the breakers:

Project number one will be to replace [redacted] existing breakers that are SCE's responsibility on the Vista C bus, along with [redacted] [redacted] is responsible for due to [redacted] on the Vista C bus. This will allow [redacted] to run their generation under normal operation at Vista substation. Riverside is responsible for [redacted] of disconnects related to their [redacted] replacements.

Project number [redacted] will be to replace [redacted] SCE is responsible for on the Vista A and Vista B bus, and [redacted] will be responsible for due to [redacted] Project on the Vista A bus. Until these breakers are replaced Vista A and Vista C bus at Vista substation can not be operated in parallel. SCE will meet with [redacted] to discuss the operating issues and possible mitigation measures for an N-1 condition at Vista substation. [redacted] of disconnects were identified as needing possible replacement due to Riverside's project and will need to be verified by a job walk.

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4. NON-BINDING ORDER OF MAGNITUDE COST ESTIMATES

Scope: Replace [REDACTED] breakers and [REDACTED] disconnect switches at Vista Substation.

Element	Interconnection Facilities	System Upgrades	Income Tax Component of Contribution	TOTAL COST
Substations				
Vista - Remove and replace nine 66kV Circuit Breakers with Foundation	\$2,430,000	\$0	\$851,000	\$3,281,000
Vista - Remove and replace eighteen 66kV disconnect switches	\$1,930,000	\$0	\$676,000	\$2,606,000
TOTAL	\$4,360,000	\$0	\$1,527,000	\$5,887,000

Results of the Interconnection System Impact Study (ISIS) will be used as the basis to determine appropriate project cost allocation for facility upgrades in the Facilities Study. The study accuracy and results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by [REDACTED]. Any changes from the data provided could void the study results. The ISIS report provides detailed study assumptions and conditions of the system in which the ISIS was conducted.

5. CONCLUSIONS

The results of this System Impact Study showed that, with the [REDACTED] on-line:

- For both peak load and light load conditions, the addition of the [REDACTED] caused no violation of SCE's thermal loading criteria under base case conditions.
- For both peak load and light load conditions, the addition of the [REDACTED] caused no violation of SCE's thermal loading criteria under N-1 conditions.
- There is one substation where the [REDACTED] increased three-phase short-circuit duties by 0.1 kA or more. The circuit breaker interrupting capabilities were reviewed at these substations and it was determined that nine circuit breakers need replacement.

Project [REDACTED] will be to replace [REDACTED] existing breakers that are SCE's responsibility on the Vista C bus, along with [REDACTED] is responsible for due to [REDACTED] on the Vista C bus. This will allow [REDACTED] to run their generation under normal operation at Vista substation. Riverside is responsible for [REDACTED] of disconnects related to their [REDACTED] breaker replacements.

Project [REDACTED] will be to replace the [REDACTED] breakers SCE is responsible for on the Vista A and Vista B bus, and three breakers RPU will be responsible for due to [REDACTED] Project on the Vista A bus. Until these breakers are replaced Vista A and Vista C bus at Vista substation can not be operated in parallel. SCE will meet with [REDACTED] to discuss the operating issues and possible mitigation measures at Vista substation. [REDACTED] of disconnects were identified as needing possible replacement due to Riverside's project and will need to be verified by a job walk.

Non-binding order of magnitude cost estimates for the required interconnection facilities and 66 kV system upgrades are as follows:

Scope: Replace [REDACTED] breakers and [REDACTED] disconnect switches at Vista Substation.

Element	Interconnection Facilities	System Upgrades	Income Tax Component of Contribution	TOTAL COST
Substations				
Vista - Remove and replace nine 66kV Circuit Breakers with Foundation	\$2,430,000	\$0	\$851,000	\$3,281,000
Vista - Remove and replace eighteen 66kV disconnect switches	\$1,930,000	\$0	\$676,000	\$2,606,000
TOTAL	\$4,360,000	\$0	\$1,527,000	\$5,887,000

Results of the Interconnection System Impact Study (ISIS) will be used as the basis to determine appropriate project cost allocation for facility upgrades in the Facilities Study. The study accuracy and results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by [REDACTED]. Any changes from the data provided could void the study results. The ISIS report provides detailed study assumptions and conditions of the system in which the ISIS was conducted.

APPENDIX A

Project Schedule

Phase 1 Schedule	Date
Drawings Release to CDM	06/15/08
Material arrival date	11/1/09
Construction completion	3/31/10