

SCE WDAT CLGIP Transition Cluster Window
Phase I - Interconnection Study Report

July 31, 2009



SOUTHERN CALIFORNIA

EDISON

An *EDISON INTERNATIONAL*SM Company

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Executive Summary

██████████ applied to Southern California Edison (SCE) for interconnection of a new 100 MW solar generation project deemed ██████████ (Project). ██████████ application was in accordance with SCE Wholesale Distribution Access Tariff Clustering Large Generation Interconnection Procedures (WDAT CLGIP). ██████████ requested and paid for Interconnection Studies in compliance with Appendix H, Section 3.4.1 of the WDAT CLGIP.

Southern California Edison (SCE) assessed ██████████ original Point of Interconnection (POI) to connect the Project to SCE's existing Oasis-Tortoise 66 kV Transmission Line; part of the Antelope-Bailey 66 kV system. The POI proved viable. SCE performed additional assessments for potential alternatives to the POI; no alternatives were found to be superior. The POI from the Project to SCE's portion of the CAISO Controlled Grid is located within the ██████████.

The ██████████ constitutes a portion of the SCE's portion of the CAISO Controlled Grid whereby generation located within this area electrically affects other interconnection projects and SCE's transmission system. Consequently, while independent analysis was conducted on the Project, group network analysis was performed in relation to other interconnection projects located within the ██████████. Details related specifically to the network analysis are provided in Appendix A.

Section 6.4 of Appendix H of the WDAT CLGIP, requires SCE provide a *good faith* estimate on costs pertaining to the Project. Additionally, the Tariff states Network Upgrades are to be estimated as a maximum cost exposure for any network enhancements listed in the Phase I Study. Based on ██████████ requirements, SCE estimated the Project costs as follows:

| Component | Estimated Costs |
|--------------------------------|---------------------|
| SCE Interconnection Facilities | \$18,600,000 |
| Reliability Network Upgrades | \$408,000 |
| Delivery Network Upgrades | \$130,000 |
| Distribution System Upgrades | \$20,000 |
| TOTAL ESTIMATED COST | \$19,158,000 |

1. Introduction

_____ applied to the Southern California Edison (SCE) for interconnection of a new 100 MW solar generation project (_____. The _____ total of 100 MW.

1.1 Grouping Interconnection Requests

SCE's electrical system can be described as having _____ network system and _____ electrical radial systems. The one network system is comprised of the Metro Area or sometimes referred to as the LA Basin area. The three electrical radial systems consist of the _____ and the _____. Generation interconnection applications requesting interconnections to facilities within the Metro Area are to be studied on a group basis if they electrically affect one another; otherwise, they are to be studied on an individual basis (i.e. group of one). Generation interconnection applications requesting interconnections to facilities within one of the _____ electrical radial systems are to be studied on a group basis.

1.2 Group Study Designation

In mutual agreement with _____ and SCE; _____ indicated that _____ Project is to tap the existing Oasis-Tortoise 66 kV transmission line within the _____. Since its POI is located on the _____, the _____ Generation Project will be studied on a group basis along with other similarly situated projects connecting within the _____. Details related specifically to the Group Network Analysis for the _____ are provided in Appendix A.

2. Project Description

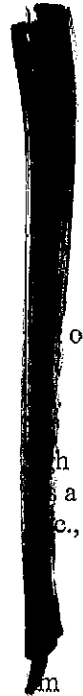
2.1 Point of Interconnection

The _____ is to be connected via a radial generation tie (constructed, owned maintained, and operated by the project developer) to the existing SCE Oasis-Tortoise 66 kV transmission line which is part of the Antelope-Bailey 66 kV system. The project developer proposes to _____ making the rated and net output of the facility a total of 100 MW.

The _____ generating facility arrangement consists of four separate blocks of _____ solar units. Each block contains _____ and there is _____ MVA pad-mount transformer per _____ inverter units that step-up the voltage from 0.48 kV to 35 kV. The solar blocks are then connected to one _____ customer owned transformer, which is ultimately connected to the Oasis-Tortoise 66 kV transmission line. The _____ one line diagram is shown below in Figure 2.1 and illustrates the proposed facility arrangement and POI into SCE existing Oasis-Tortoise 66 kV transmission line. Figure 2.2 provides the geographical point of connection.

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Figure 2.1



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3. Point of Interconnection Assessment

The assessment to identify the most viable POI was done by mutual agreement among the Interconnection Customer and SCE. Conclusions drawn from the assessment typically considered multiple disciplines

including technical, permitting and licensing, and land use realities based on information at hand and engineering judgment.

It should be acknowledged that any conclusions drawn in this Phase I Report related to a preferred POI should not be taken as the final recommendation. Many factors will likely influence the final selection of the POI as the Interconnection Request moves through planning and development processes.

In addition, the study also includes prior queued projects in the study base case, and shall only study the impact on Distribution provider's electrical system, including that portion that is part of the CASCE portion of the CAISO Controlled Grid.

3.1 Original Point of Interconnection Request

SCE performed an assessment to identify Interconnection Facilities required to connect the [REDACTED] Project to SCE existing Oasis-Tortoise 66 kV transmission line which is part of the Antelope-Bailey 66 kV system. Based on information provided by [REDACTED] in their Interconnection Request and known information about the geographic area surrounding the POI, SCE assessed the viability of the original POI request. Based on this assessment, the original POI request has been found to be viable. Therefore, Phase I analysis for the [REDACTED] was performed with the POI, as requested by [REDACTED] to the Oasis-Tortoise 66 kV transmission line. The plan of service analyzed in Phase 1 for the [REDACTED] is the plan of service that is illustrated in Figure 2.1 above.

3.2 Potential Alternatives to the Original Point of Interconnection Request

Based on information provided by [REDACTED] in their Interconnection Request and known information about the geographic area surrounding the POI, SCE assessed potential alternatives to the original POI request. Based on the information at hand during this assessment, no alternatives were found to be superior to the original POI request.

4. Study Related to Interconnection Facilities

4.1 Distribution Provider Interconnection Facilities

SCE performed an assessment to identify Distribution Provider Interconnection Facilities required to connect the [REDACTED] to the existing SCE Oasis-Tortoise 66 kV transmission line. Based on information provided by [REDACTED] in their Interconnection Request and known information about the geographic area surrounding the POI, SCE has identified Interconnection Facilities that need to be installed between the Point of Change of Ownership and SCE system.

4.2 Study Results Related to Distribution Upgrades

4.2.A Assumptions Included in Phase I Study

1. The additional telecommunications path from the generating facility to the [REDACTED] will be installed by SCE.
2. Point of delivery to be at SCE's [REDACTED]
3. It is assumed that the last structure of the [REDACTED] 66 kV generation tie line outside the [REDACTED] Substation property line would be at a distance from the substation switchyard that it would require SCE to install one additional tubular steel pole (TSP) and a total of two spans of line to reach the proposed 66 kV line position. The additional structures and conductors between the last [REDACTED] Structure and the substation switchyard will be installed by SCE.
4. The required revenue metering cabinet and retail load meters to be installed at the generating facility will be installed by SCE.

5. The required Remote Terminal Unit (RTU's) to be installed at the generating facility will be installed by SCE.

4.2.B Assumptions NOT Included in Phase I Study

1. The [REDACTED] 66 kV generation tie line from the generating facility to the last structure outside the [REDACTED] Substation property line will be installed by [REDACTED].
2. The [REDACTED] 66 kV generation tie line must be equipped with fiber optics to provide [REDACTED] telecommunication paths required for the line protection scheme and the SPS. The cost of the fiber optics will be included in the cost of the line.
3. All required CAISO metering equipment at the generating facility will be provided by [REDACTED].
4. All required revenue metering equipment to meter the generating facility retail load will be specified by SCE and installed by [REDACTED] at their end of the [REDACTED] 66 kV generation tie line.
5. The following 66 kV generation tie line protection to be installed at the generating facility will be specified by SCE and provided by [REDACTED].
 - a. [REDACTED] current differential relays with dual dedicated digital communication channels to [REDACTED].
 - b. [REDACTED] current differential relays with dual dedicated digital communication channels to [REDACTED].
 - c. [REDACTED] relays (One each for SPS A and B) to trip the main generator breaker.
 - d. [REDACTED] satellite synchronized clock.

4.3 Phase I Study Facilities to be installed by SCE

A. Transmission:

[REDACTED] 66 kV generation tie line

Install [REDACTED] 66 kV TSP, [REDACTED] spans of conductors and 12 dead end insulator / hardware assemblies between the last [REDACTED] Structure and the Substation dead – end rack at the 66 kV Switchyard. Install approximately 500 circuit feet of 954 SAC for a total of 1,500 feet of 954 SAC.

Oasis – Tortoise – [REDACTED] 66 kV Tap Line

Install approximately 3.5 miles of new 66 kV line connecting to the existing Oasis – Tortoise 66 kV line. Install [REDACTED] 75 foot tall light weight steel poles designed for single circuit construction on each pole. Install [REDACTED] TSPs. Install [REDACTED] automated switches. Install [REDACTED] circuit feet of 653 ACSR for a total of [REDACTED] feet of 653 ACSR conductor. Install [REDACTED] feet of 4/0 ACSR fault return conductor to be tied into the new PV-6 Substation ground grid.

B. Substations:

[REDACTED] Substation

Install a new 66 kV customer dedicated substation equipped with [REDACTED] 66 kV circuit breakers and three sets of 66 kV disconnect switches. Install the following protection relays:

- [REDACTED] line current differential (digital communication channel)
- [REDACTED] line current differential relay (digital communication channel)
- [REDACTED] relays

Oasis Substation

Upgrade the line protection for the new [REDACTED] – Tortoise 66 kV line.

Tortoise Substation

Upgrade the line protection for the new Oasis – [REDACTED] 66 kV line.

C. Telecommunications:

Provide lightwave, channel, and ancillary equipment to support 66 kV line protection, SCADA, and SPS requirements for the project. In addition to the existing fiber optic cable provided by the customer on the generation tie line, 11.5 miles of fiber optic cable will be constructed to meet the diverse routing requirements for applicable regulatory agencies.

D. Metering Services Organization

Install a revenue metering cabinet and revenue meters required to meter the retail load at the Generating Facility. [REDACTED] will provide the required metering equipment (voltage and current transformers).

E. Power System Control

Install one RTU at the generating facility to monitor the typical generation elements such as MW, MVAR, terminal voltage and circuit breaker status at each generating unit and the plant auxiliary load and transmit this information to the SCE grid control Center.

F. Corporate Real Estate

Perform all required activities to secure permits and land acquisition as required for the construction of PV-6 Substation and the [REDACTED] of the Oasis – PV-6 – Tortoise 66 kV line.

G. Environmental Permitting and Licensing

Perform all required activities to permit and license as required for the construction of [REDACTED] and the PV-6 tap of the Oasis – [REDACTED] – Tortoise 66 kV line.

5. Study Related to Network Upgrades

Given that PV-6 Generation Project is part of the Northern Bulk System, then all Network Upgrade requirements were identified within that Group Study. SCE has assessed the need for Network Upgrades to mitigate potential impacts on the CAISO Controlled Grid caused by the [REDACTED]. Details of these results are provided in Appendix A.

6. Study Related to Distribution Upgrades

SCE performed an assessment to identify Distribution Upgrades required to mitigate impacts on SCE's Distribution System caused by the connection of and power deliveries from the [REDACTED].

7. Facilities Requirements and Cost Responsibility

The following facilities requirements and associated costs have been determined to be the responsibility of the [REDACTED].

7.1 Distribution Provider Interconnection Facilities

This Phase I Study has identified the following Interconnection Facilities that are located between the Point of Change of Ownership and the POA. For a description of the facilities, refer to Section 4, *Study Related to Interconnection Facilities*. For cost information please refer to Table 7.1, *Summary of Cost Estimates*.

**Table 7.1
Summary of Cost Estimates**

WDT300

Interconnection Facilities Cost Estimate Summary (2009 Dollars)

Scope: Install all Interconnection Facilities to Interconnect 100MW of Generation to the CAISO Grid at the Oasis-Tortoise 66kV Transmission Line via a new [REDACTED]

| No. | ELEMENT | INTERCONNECTION FACILITIES (Subject to ITCC) | ITCC ** (35%) | ONE-TIME PAYMENT |
|-----|---|--|---------------------|----------------------|
| 1 | Sub-Transmission | | | |
| | PV6 66kV Tap line of the Oasis-Tortoise 66kV Line | \$ 2,147,000 | \$ 751,000 | \$ 2,898,000 |
| | Gen Tie segment into PV6 Sub Station | \$ 407,000 | \$ 142,000 | \$ 649,000 |
| 2 | Substations | | | |
| | [REDACTED] Line drop Incl. support structure and line protection elements | \$ 294,000 | \$ 103,000 | \$ 397,000 |
| | [REDACTED] - less line drop | \$ 1,212,000 | \$ 424,000 | \$ 1,636,000 |
| | Oasis Substation | \$ 234,000 | \$ 82,000 | \$ 316,000 |
| | Tortoise Substation | \$ 234,000 | \$ 82,000 | \$ 316,000 |
| 3 | Telecommunications | | | |
| | Telecom line | \$ 4,088,000 | \$ 1,423,000 | \$ 5,489,000 |
| | Environmental | \$ 384,000 | \$ 134,000 | \$ 518,000 |
| 4 | Metering Services | | | |
| | Retail Metering Equipment at the Generation Facility | \$ 12,000 | \$ 4,000 | \$ 16,000 |
| 5 | Power System Control | | | |
| | RTU at Generation Facility | \$ 91,000 | \$ 32,000 | \$ 123,000 |
| 6 | Corporate Real Estate | | | |
| | Line tap | \$ 94,000 | \$ 33,000 | \$ 127,000 |
| | PV6 Tapped Sub | \$ 1,000 | \$ - | \$ 1,000 |
| 7 | Environmental | | | |
| | PV6 Tapped Sub | \$ 1,919,000 | \$ 672,000 | \$ 2,591,000 |
| 8 | Licensing | | | |
| | PV6 Tapped Sub | \$ 1,274,000 | \$ 446,000 | \$ 1,720,000 |
| | General Contractor | | | |
| | Project management | \$ 1,399,000 | \$ 490,000 | \$ 1,889,000 |
| | Totals | \$ 13,768,000 | \$ 4,818,000 | \$ 18,586,000 |
| | | | | \$ 18,600,000 |

This document includes confidential trade secrets and proprietary information of Southern California Edison, to be used only by the Interconnection Customer in connection with its evaluation of this Facility Study Proposal. Southern California Edison retains all rights to maintain the confidentiality of this information and requests the Interconnection Customer preserve its confidentiality.

* Pursuant to FERC Order 2003A, ITCC is not collected on Reliability Upgrades.

** ITCC cost (calculated at 35% based on Customer Operating Date after 2009) may be satisfied with a letter of credit in accordance with the tax provisions of the LGIA.

7.2 Distribution Upgrades

This Phase I Study has identified the following Distribution Upgrades required to mitigate impacts on SCE's Distribution System caused by the connection of and power deliveries from the [REDACTED]. Details of these results are provided in Appendix A.

7.3 Reliability Network Upgrades

This Phase I Study has identified the following Reliability Network Upgrades required to mitigate impacts on the SCE portion of the CAISO Controlled Grid caused by the connection of and power deliveries from the [REDACTED]. Details of these results are provided in Appendix.

7.4 Delivery Network Upgrades

This Phase I Study has identified the following Delivery Network Upgrades required to mitigate impacts on SCE portion of the CAISO Controlled Grid caused by the connection of and power deliveries from the [REDACTED]. The ISO has applied distribution factors to those transmission elements that were identified in Appendix A as Delivery Network Upgrades to determine [REDACTED] share of the total cost responsibility. Details of these results are provided in Appendix A.

8. Estimated Construction Schedule

The estimated time to construct the required SCE's Interconnection Facilities, any Distribution Upgrades, Reliability Network Upgrades, and Delivery Network Upgrades will be provided in the Phase II Study. Given the magnitude of the Network Upgrades required to interconnect the generation, as requested in the Transition Cluster, the non-binding estimated date the SCE's interconnection facilities, network upgrades, and distribution upgrades will be completed as identified in the Phase I Study could take up to 96 months from execution of an LGIA to engineer, license, permit, and construct.

9. Other Study Assumptions and Responsibilities

9.1 Conceptual Plan of Service

The results provided in this Phase I study are based on conceptual engineering and a preliminary plan of service and are not sufficient for permitting of facilities. The Plan of Service is subject to change as part of the Phase II Interconnection Study.

9.2 Customer's Technical Data

Additional technical data related to the Interconnection Customer's project may be required as part of the Phase II study. The study accuracy and results for the Phase I Study are contingent upon the accuracy of the technical data provided by the Interconnection Customer. Any changes from the data provided could void the study results.

9.3 Study Impacts on Neighboring Utilities

Results or consequences of this Phase I Study and/or to-be-performed Phase II Interconnection Study may require additional studies, facility additions, and/or operating procedures to address impacts to neighboring utilities and/or regional forums. For example, impacts may include but are not limited to WECC Path Ratings, short circuit duties outside of the SCE portion of the CAISO Controlled Grid, and sub-synchronous resonance (SSR).

9.4 Use of SCE Facilities

The Interconnection Customer is responsible for acquiring all property rights necessary for the Interconnection Customer's Interconnection Facilities, including those required to cross SCE facilities and property. This Interconnection Study does not include the method or estimated cost to the Interconnection Customer of SCE mitigation measures that may be required to accommodate any proposed crossing of SCE facilities with Interconnection Customer's Interconnection Facilities. The use of SCE property rights shall

only be permitted upon written agreement between SCE and the Interconnection Customer. Any proposed use of SCE property rights may require a separate study and/or evaluation, at the Interconnection Customer's expense, to determine whether such use may be accommodated.

9.5 SCE Interconnection Handbook

The Interconnection Customer shall be required to adhere to all applicable requirements in the SCE Interconnection Handbook. These include, but are not limited to, all applicable protection, voltage regulation, VAR correction, harmonics, switching and tagging, and metering requirements.

9.6 Western Electricity Coordinating Council (WECC) Policies

The Interconnection Customer shall be required to adhere to all applicable WECC policies including, but not limited to, the WECC Generating Unit Model Validation Policy.

9.7 System Protection Coordination

Adequate Protection coordination will be required between SCE-owned protection and Interconnection Customer-owned protection. If adequate protection coordination cannot be achieved, then modifications to the Interconnection Customer-owned facilities (i.e., Generation-tie or Substation modifications) may be required to allow for ample protection coordination.

Appendix A
Group Network Analysis

SCE WDAT CLGIP Transition Cluster Window
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