
WDT402

[REDACTED]

[REDACTED]

Facilities Study Report

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SOUTHERN CALIFORNIA
EDISON
An EDISON INTERNATIONALSM Company

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Attachments:

1. Attachment A – System Impact Study
2. Attachment B – Transmission Technical Assessment

1. Executive Summary

On November 25, 2009, the Southern California Edison Company ("SCE") received an Interconnection Request from [REDACTED] for its proposed [REDACTED] ("Project") under the terms of SCE's Wholesale Distribution Access Tariff ("WDAT"). The project is an energy only solar PV generator that would receive interconnection service from an existing SCE 12 kV distribution circuit ("Discovery 12 kV") out of SCE's [REDACTED] 66/12 kV Substation. The generated power would be delivered to the California Independent System Operator ("CAISO") grid at the 66 kV bus of SCE's [REDACTED] 66 kV Substation. The Interconnection Customer's (IC) targeted Commercial Operation Date of the Project is [REDACTED].

The report provides the following:

1. Summary of the Transmission and Distribution System impacts which were identified during the System Impact Study.
2. Summary of the Transmission and Distribution System upgrades necessary to mitigate those impacts identified in the System Impact.
3. The Interconnection Facilities required to interconnect the proposed project to the Distribution System.
4. A non-binding, good faith cost estimate for the identified Distribution System Upgrades and Interconnection Facilities.
5. A non-binding time to design, procure and construct the identified Distribution Upgrades System Upgrades and Interconnection Facilities.

The System Impact Study was performed to determine the impacts on the Transmission and Distribution system for which mitigation plans may have been proposed for the Project. Mitigation plans for the Project are detailed in the System Impact Study report (Attachment A).

The non-binding SCE cost estimates² to interconnect the Project are:

Interconnection Facilities ³	\$0.665 M
Interconnection Facilities ITCC ⁴	\$0.233 M
Distribution Upgrades	\$0.165 M
Distribution Upgrades ITCC ⁴	\$0.058 M

The estimated costs have been provided in 2012 constant dollars. Section 6 of this report provides the estimated costs.

¹ Date as requested in the application. Actual operating date depends on design, procurement, and construction requirements. Interconnection Studies will ultimately determine in-service date.

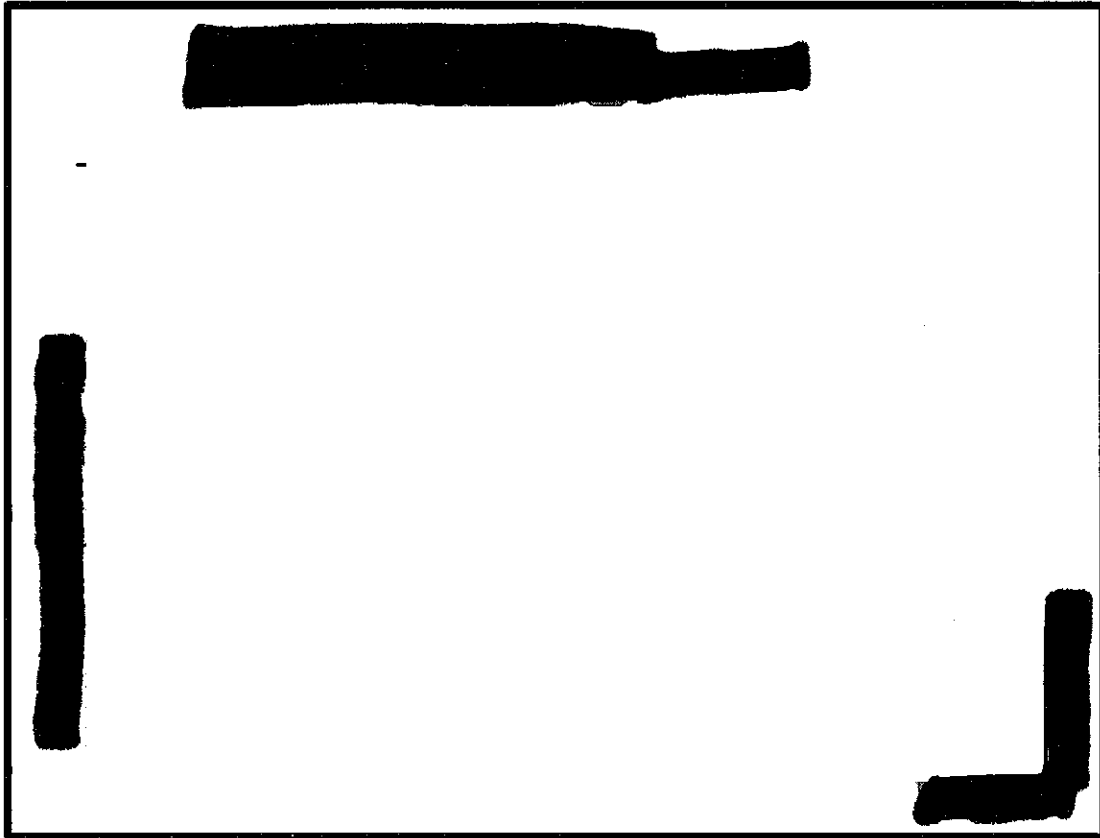
² These upgrades are not reimbursable.

³ The electrical facilities installed and maintained by SCE necessary to physically and electrically interconnect the Project to the SCE Distribution System from the Point of Change in Ownership to the Point of Interconnection.

⁴ Income Tax Component of Contribution. The ITCC included in this cost estimate was computed using a 35% rate.

The non-binding schedule to license, engineer, and construct the Interconnection Facilities, Distribution Upgrades, is approximately six to nine (6-9) months from the execution of the Small Generator Interconnection Agreement (SGIA) and from SCE specified milestones associated with applicant responsibilities.

Figure 1: Proposed Single Line Diagram



See Attachment A – System Impact Study for project information.

2. System Impact Study Executive Summaries

For additional details on system impacts and proposed mitigation, please refer to Attachment A.

A. Transmission Planning:

- With all queued ahead generation projects and all corresponding facility upgrades modeled, and with the system reconfigurations proposed as part of EKWRA, the power flow study identified base case and contingency overloads on the Windhub 220/66 kV transformer banks with the addition of the [REDACTED]. For the Windhub 220/66 kV overloads the study found that the addition of a new 220/66 kV transformer will be required. Additionally, the study found contingency overloads on the Windhub 500/220 kV transformer banks. These overloads are triggered by higher queued projects and are aggravated by the [REDACTED]. For the Windhub 500/220 kV T-1 overloads the study found that the proposed SPS for the higher queued projects will be sufficient to mitigate the incremental impacts of the Projects without any additional upgrades.
- The study found that the Project did not trigger any new Post Transient or Transient Stability voltage criteria violations.
- The results showed that the addition of the Project does not increase SCD and contributes no SCD impact on the SCE transmission system.

B. Distribution Engineering:

- The addition of the 10 MW [REDACTED] resulted in SCE's protective relays on the Discovery 12 kV line and the 12 kV bus tie at [REDACTED] Substation to be adjusted due to the added load flow on the circuit.
- For both peak load and light load conditions, the addition of the 10 MW [REDACTED] resulted in no violations of SCE's thermal loading criteria under base case. However, the addition of the 10 MW [REDACTED] resulted in a violation of the SCE's thermal loading criteria under N-1 conditions for the SCE distribution system.
- The addition of the 10 MW [REDACTED] resulted in voltage rise exceeding allowable Rule 2 limits under base case and N-1 conditions operating at unity power factor.
- The addition of the 10 MW [REDACTED] resulted in increases of three-phase short-circuit duties by 0.1 kA or more at [REDACTED] distribution substations. The circuit breaker interrupting capabilities were reviewed at these substations and it was determined that [REDACTED] circuit breakers will be required to be upgraded under this project.

3. Facilities Study Assumptions

The following assumptions are only specific to the Project.

A. The following assumptions and SCE Distribution System Design Criteria were included in the Facility Study:

- [REDACTED] requested a change in the project site location to reduce the distance between the Project's switchgear and Point of Interconnection.
- The Point of interconnection did not change.
- The Project must be designed to accommodate a VAR schedule provided by SCE. SCE will determine if the VAR schedule and/or changes to it are necessary based on future re-arrangements of SCE's distribution system.
- As part of the voltage rise mitigations proposed in the System Impact Study, the Project is responsible for supplementing the VARs consumed by the Project.
- The design and construction of the electrical facilities will take approximately six to nine (6-9) months. The Interconnection Customer is responsible to perform the underground civil work per SCE's design.
- SCE will approve and release the applicant installed underground infrastructure prior to SCE initiating the construction of the electrical facilities.
- The underground civil work includes but it is not limited to excavation (all necessary trenching, backfilling, and other digging as required), and installation of conduits and vaults for the required interconnection facilities
- Where formal rights of way, easements, land leases, or permits are required by SCE for installation of facilities, on or over Applicant's property, or the property of others, the Applicant shall grant SCE the rights of way and easements for the electrical facilities.
- Current distribution standards are being updated to address generation interconnection systems. The proposed method of service in this report may change according on final design to comply with the updated distribution design standards.

B. The following facilities are to be installed by the Interconnection Customer and are not included in this Facilities Study:

- Ducts
- Underground Structures
- Point of Interconnection Breaker
- CAISO metering as required
- Protection Systems required to comply with SCE Interconnection requirements
- Transformation as required

4. Facilities Study Scope

Case A: The facilities that are triggered by the addition of the Project and are required exclusively by the Project for interconnection and distribution service.

And

Case B: The facilities that are triggered by projects queued ahead of the Project but may be required by the Project as a result of a change in the interconnection queue, or may need to be advanced by the Project based on results of operating studies.

Case A:

SCE'S INTERCONNECTION FACILITIES

1. Distribution:

- Approximately 150 feet of 1000 JCN new underground cable
- 12 kV pad-mounted 3-way gas switch
- 12 kV Metering, CTs, PTs, and associated wiring
- Remote Terminal Unit (RTU)
- Telecommunication System for RTU

2. Telecommunications

The applicant is responsible for requesting from the local phone company a T1 service from the project location to the appropriate SCE facility location. SCE is to be part of the contract for the T1 line such that it allows SCE to call for trouble on the T1 line service.

3. Metering Services Organization

Install the SCE revenue metering required to meter the retail load at the generating facility. The SCE meter can be installed in tandem with the ISO meter circuit if requested by the applicant.

4. Power System Control

It will be required to install one RTU at the generating facility to monitor Watts and VAR flow from the generation facility to SCEs distribution system as well as other customer status including breaker status and bus voltage.⁵

5. Real Properties

It is assumed that applicant will provide all rights of way, and easements satisfactory for installation of SCE facilities without cost to SCE, based on SCE's design. SCE will provide oversight for documents related to customer's easements and/or acquire land, as necessary, for the construction of Interconnection Facilities.

6. Corporate Environmental Health & Safety Organization

Oversight for documents related to customer's licensing, permitting, and all required environmental activities, as necessary, for the construction of Interconnection Facilities.

⁵ Reference the Interconnection Handbook for all requirements for telemetry installation. The Interconnection Handbook can be downloaded at: <http://www.sce.com/AboutSCE/Regulatory/openaccess/>.

DISTRIBUTION UPGRADES

1. Distribution

- Install [REDACTED] capacitor banks on new distribution poles.

2. Sub-Transmission

- Replace a Subtransmission Pole

3. Substation

- Install Bi-directional 3-phase Watt transducers on the Discovery 12 kV line

4. Corporate Environmental Health & Safety Organization

Obtain licensing, permits, and all required environmental activities, as necessary, for the installation of the Distribution Provider's Interconnection Facilities.

Case B:

None

5. Facility Study Cost Estimates

The total estimated cost of all elements of the interconnection as identified above in the Interconnection Facilities Study Scope is as follows:

Case A:	<u>\$0.830 M</u>
ITCC:	<u>\$0.291 M</u>
TOTAL:	<u>\$1.121 M</u>

6. Facility Study Summary

6.1 Cost Estimates

Non-binding order of magnitude cost estimates for the required interconnection facilities and system upgrades are as follows, these costs do not include the cost for the civil construction which is required to install the interconnection facilities.

SCE's Distribution Upgrades

Distribution Upgrades \$0.165 M⁶

- Install [REDACTED] capacitor banks on new distribution poles
- Install [REDACTED] 3-phase Watt transducers on the Discovery 12 kV line

⁶ Cost estimates does not include 35% ITCC. Cost estimates are in 2012 dollars.

- Replace a Subtransmission Pole

Environmental Health and Safety

Distribution Upgrades	\$0.239 M ⁶
<ul style="list-style-type: none"> • Obtain licensing, permits, and all required environmental activities, as necessary, for the installation of the Distribution Provider’s Interconnection Facilities. 	

SCE’s Interconnection Facilities

Interconnection Facilities	\$0.117 M ⁶
<ul style="list-style-type: none"> • Approximately 150 feet of 1000 JCN new underground cable • 12 kV pad-mounted 3-way gas switch • 12 kV Metering, CTs, PTs, and associated wiring 	
Telemetry	\$0.157 M ⁶
<ul style="list-style-type: none"> • Power System Controls – Install RTU and program data points • Telecommunications – Install telecom facilities to support RTU 	

Real Properties

Interconnection Facilities	\$0.078 M ⁶
<ul style="list-style-type: none"> • Oversight for documents related to customer’s easements and/or acquire land, as necessary, for the construction of the Distribution Provider’s Interconnection Facilities. 	

Environmental Health and Safety

Interconnection Facilities	\$0.074 M ⁶
<ul style="list-style-type: none"> • Oversight for documents related to customer’s licensing, permitting, and all required environmental activities, as necessary, for the construction of the Distribution Provider’s Interconnection Facilities. 	

35% ITCC	\$0.291 M
Total non-binding order of magnitude cost estimate	\$1.121 M

6.2 Design Schedule Estimates

Once the SGIA is executed, the design of the Interconnection Facilities will take approximately sixty (60) business days from the time the Interconnection Customer has provided the following to SCE:

- *Customer information sheet.*
- *Street improvement plans (if available)*
- *Unique address for point of interconnection*
- *Site plot plan on a 30:1 scale or digital file required*
 - *Easements/Lease Agreement*
 - *Grading plans – if project area is not graded*

- *Sewer and storm plot plans – if facilities are existing at the project location*
- *Landscape, sprinkler, pedestal locations – if facilities are existing at the project location.*

6.3 Construction Schedule Estimates

The construction of the Interconnection Facilities will take approximately six to nine (6-9) months from the time the design is complete and from the time the underground civil construction has been completed by Interconnection customer and released by SCE inspectors. This assumes all transmission network, subtransmission, and distribution upgrades triggered by higher queued projects that required for the Project to interconnect has been constructed and are in place.

6.4 Conceptual Method of Service

The results provided in this 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 during the actual design and construction of the project

6.5 Relocations and Other Use of SCE Facilities

The Interconnection Customer is responsible for all costs associated with necessary relocation of any SCE facilities as a result of this project and acquiring all property rights necessary for the Interconnection Customer's Interconnection Facilities, including those required to cross SCE facilities and property. The relocation of SCE facilities or use of SCE property rights shall only be permitted upon written agreement between SCE and the Interconnection Customer. Any proposed relocation of SCE facilities or use of SCE property rights may require a separate study and/or evaluation to determine whether such use may be accommodated, and any associated cost would be non-refundable.

6.6 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.

6.7 System Protection Coordination

The Interconnection Customer will be required to install a relay with adequate elements into the applicant's relay protection scheme per the Interconnection Handbook.

6.8 Construction Schedule

The estimated time to construct (ETC) is for a typical project; schedules duration may change due to number of projects approved and release dates. Stacked projects impact resources, system outage availability, and environmental windows of construction.

6.9 Var Schedule

Prior to allowing the project to interconnect, the Project is required to demonstrate the ability to follow the developed Var Schedule. Inability to follow the Var Schedule requirements will prevent the project from interconnecting to the SCE distribution system. The Var Schedule will be monitored via the telemetry systems. If the Project is not able to maintain the required Var schedule, then it will be disconnected from the SCE distribution system until such conditions are rectified.

ATTACHMENT A

System Impact Study

ATTACHMENT B

Transmission Technical Assessment