
Appendix A – WDT1174



QUEUE CLUSTER 7 PHASE I REPORT

December 17, 2014

This study has been completed in coordination with the California Independent System Operator Corporation (CAISO) per CAISO Tariff Appendix DD Generator Interconnection and Deliverability Allocation Procedures (GIDAP)

Table of Contents

A. Introduction	1
B. Study Assumptions	3
C. Reliability Standards, Study Criteria and Methodology	5
D. Reliability Assessment Results	5
E. Short Circuit Duty Results	7
F. Transient Stability Evaluation.....	9
G. Reactive Power Deficiency Analysis	9
H. Deliverability Assessment Results	10
I. Interconnection Facilities, Network Upgrades, and Distribution Upgrades.....	11
J. Cost and Construction Duration Estimates	11
K. SCE Technical Requirements.....	11
L. Environmental Evaluation, Permitting, and Licensing	11
M. Affected Systems Coordination.....	12
N. Items not covered in this study	12

Attachments:

1. Interconnection Facilities, Network Upgrades and Distribution Upgrades
2. Escalated Cost and Time to Construct for Interconnection Facilities, Reliability Network Upgrades, Delivery Network Upgrades, and Distribution Upgrades
3. Allocation of Network Upgrades for Cost Estimates and Maximum Network Upgrade Cost Responsibility
4. Distribution Provider Interconnection Handbook
5. Short Circuit Calculation Study Results (see Appendix H of the Area Report)
6. Interconnection Customer Provided Project Dynamic Data
7. SCE Northern Hemisphere Import Nomogram

A. Introduction

██████████ the Interconnection Customer (IC), has submitted a completed Interconnection Request (IR) to Southern California Edison Company (SCE) for their proposed ██████████ (Project). The Project plans to have a ██████████ at the generating facility. The Project's requested Point of Interconnection (POI) is Southern California Edison Company's (SCE) ██████████ located in Lucerne Valley, California. ██████████

██████████ The IC requested Full Capacity Deliverability Status for the Project, and desires an In-Service Date (ISD) and Commercial Operation Date (COD) of October 1, 2017 and December 1, 2017 respectively. Such dates are specified in the Project Interconnection Request (IR). Actual ISD and COD will depend on design and construction requirements to interconnect the Project.

In accordance with Federal Energy Regulatory Commission (FERC) approved CAISO Tariff Appendix DD Generator Interconnection and Deliverability Allocation Procedures (GIDAP) of Attachment I of SCE's Wholesale Distribution Access Tariff (WDAT), the Project was grouped with Queue Cluster 7 (QC7) Phase I projects to determine the impacts of the group.

The Area Report has been prepared separately identifying the combined impacts of all projects in the group on the CAISO Controlled Grid. This report focuses only on the impacts or impact contributions of the Project, and it is not intended to supersede any contractual terms or conditions specified in an Interconnection Agreement.

The report provides the following:

1. Transmission and/or Sub-transmission system impacts caused by the Project;
2. System reinforcements necessary to mitigate the adverse impacts caused by the Project under various system conditions;
3. A list of required facilities and a good faith estimate of the Project's cost responsibility and time to construct¹ these facilities. Such information is provided in Attachment 1 and Attachment 2 as separate documents in the Appendix A Project report package.

All the equipment and facilities comprising the Project located in Lucerne Valley, California, as disclosed by the IC in its IR, as may have been amended during the Interconnection Study process, which consists of ██████████

██████████ (i) the associated infrastructure, (iii) meters and metering equipment, (iv) appurtenant equipment, and (v) auxiliary loads.

The Project shall consist of the Generating Facility and the IC's Interconnection Facilities as illustrated below in Figure A-1. Similarly, the Project information is summarized in Table A.1 below. The location of the Project was assumed as specified in the IR provided by the IC. The Project shall not exceed the total net output.

¹ It should be noted that construction is only part of the duration of months specified in the study, includes final engineering, licensing, etc., and other activities required to bring such facilities into service. These durations are from the execution of the Interconnection Agreement, receipt of: all required information, funding, and written authorization to proceed from the IC as will be specified in the Interconnection Agreement to commence the work.

Figure A.1: Project IC Facilities One-Line Diagram

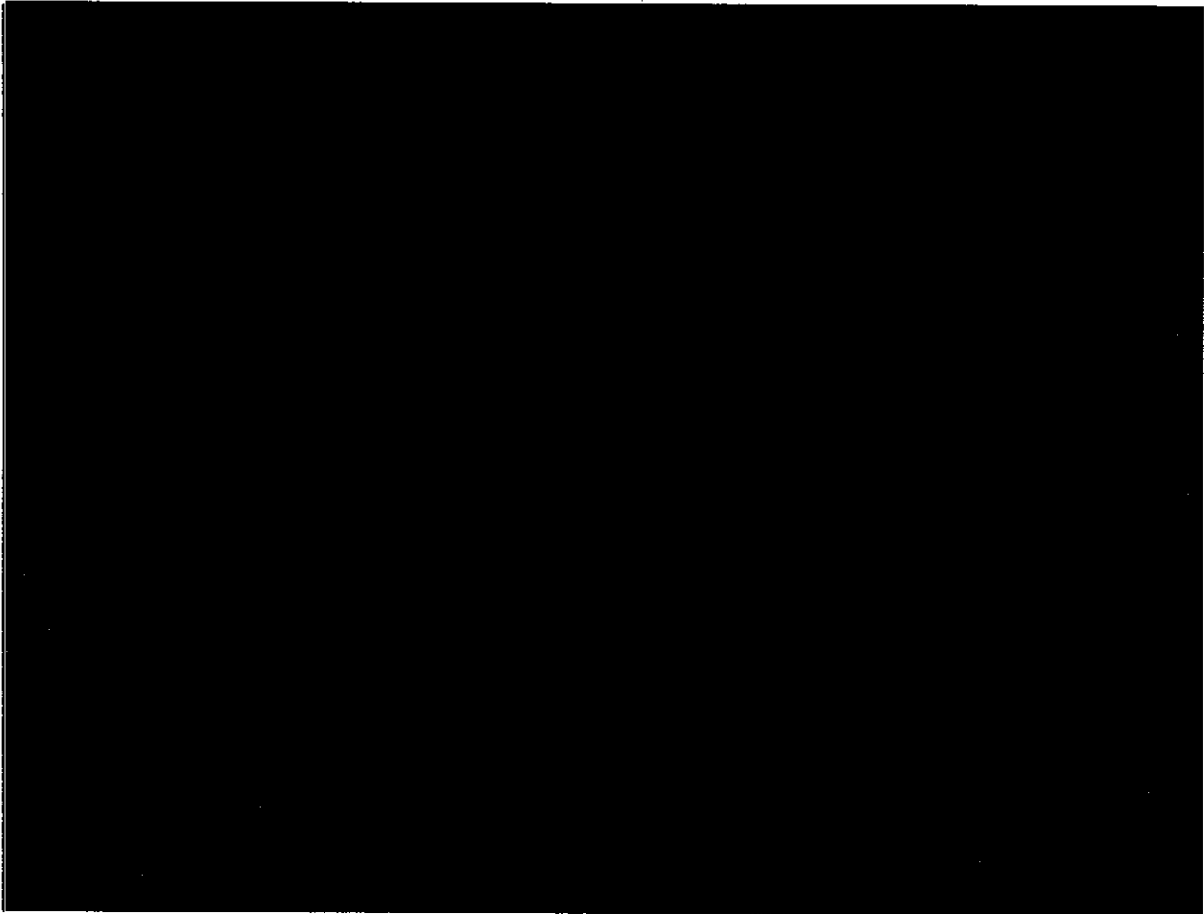


Table A.1: Project General Information

Project Location	[REDACTED]
Distribution Provider's Planning Area	SCE North of Lugo system
Number and Types of Generators	[REDACTED]
Interconnection Voltage	115kV
Maximum Generator Output	[REDACTED]
Generator Auxiliary Load	[REDACTED]
Maximum Net Output	[REDACTED]
Power Factor Range	[REDACTED] at POI per interconnection application
Step-up Transformer(s)	[REDACTED]
POI	[REDACTED]
IC Requested COD	December 1, 2017

B. Study Assumptions

For detailed assumptions regarding the group cluster analysis, please refer to the QC7 Phase I Area Report. Below are the assumptions specific to the Project.

1. The following is the Plan of Service (POS) assumed for the Project in the Phase I Study:

The project was modeled as interconnecting to the proposed WDT1174 [REDACTED]
[REDACTED]

2. The following Facilities will be installed by SCE and **are included** in this Phase I Study:

- [REDACTED]
- [REDACTED]
- [REDACTED]
[REDACTED]
- The required retail load meters.
- Lightwave, channel, and associated equipment at [REDACTED] and at the Generating Facility.

NOTE: SCE installation does not include metering voltage, current transformers and metering cabinet. The SCE meters will be connected to the generator – owned voltage and current transformers to be installed for their CAISO metering.

3. The following Facilities will be installed by the IC and **are not included** in this Phase I Study:

- The 115kV gen-tie line from the Generating Facility to the last structure outside the WDT1174 Substation property line.
- The 115kV gen-tie line Optical Ground Wire (OPGW) and an additional fiber optic line to provide two diversely routed telecommunication paths required for the line protection relays and the Special Protection System (SPS) from the Generating Facility to an SCE vault outside the WDT1174 Substation property line.
- The required CAISO metering equipment (voltage and current transformers and CAISO meters), and metering cabinet for SCE revenue meter.

NOTE: The metering voltage and current transformers installed for the CAISO metering will also be used for the SCE owned retail meters.

- The following line protection relays to be installed at the Generating Facility end of the 115kV gen-tie line:
 - [REDACTED]
[REDACTED]
 - [REDACTED]
[REDACTED]
- The following SPS Relays to be installed at the Generating Facility:
 - [REDACTED]
 - [REDACTED]

4. Additional QC7 Phase I Study and/or Assumption Notes:

- For the purposes of this study SCE assumed that the higher queued project WDT642 Substation has already tapped the existing Cottonwood – Savage 115kV transmission line and is already in service. [REDACTED]
- In the event that WDT642 withdraws, the Project may interconnect via a 115kV tapped substation on the Cottonwood-Savage 115kV line. However, additional telecommunications facilities will be required to interconnect the Project via a 115kV tapped substation. It is estimated that should the Project interconnect via a 115kV tapped substation, the Project IF and Plan of Service costs approximately is \$34,220,490 (2014 dollars).
- The Project will need to participate in the Victor SPS. It is important to note that if the prior queued projects that triggered the need for these SPSs do not materialize before the Project, the Project may choose to advance the costs of these SPSs or wait for the triggering project to move forward.
- It should be noted that any new/modifications to SPS will need to be presented to the WECC RASRS for approval. The WECC RASRS currently meets up to three (3) times a calendar year to review new and modified SPS systems. It should also be taken into account that engineering and design for any modification to the SPS on both the Distribution Provider and generator facilities must be finalized prior to presenting to the WECC RASRS for approval.
- In order to fully dispatch all QC7 Phase I projects in the North of Lugo Area additional transmission capability as well as added voltage support are required.

C. Reliability Standards, Study Criteria and Methodology

The generator interconnection studies will be conducted to ensure the CAISO-controlled grid is in compliance with the North American Electric Reliability Corporation (NERC) reliability standards, WECC regional criteria, and the CAISO planning standards. Refer to Section C of the Area Report for details of the applicable reliability standards, study criteria and methodology.

D. Reliability Assessment Results

I. Steady State Power Flow Analysis Results – 220kV and above

1. Thermal Overloads

The group study indicated that the Project contributes to the following facility overloads or non-convergence problems. The details of the analysis and overload levels are provided in the Area Report.

- Category “A” (All facilities in service, N-0)

- [REDACTED]
- [REDACTED]

- Category "B" (loss of a single element, N-1)

- [REDACTED]
- [REDACTED]

- Category "C" (loss of multiple elements, N-2)

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

2. Power Flow Non-Convergence

There were non-convergence issues under certain contingencies identified with the inclusion of the Project due to the limited system capacity, they are as follows:

- [REDACTED]

3. Voltage Performance

The Project is required to provide power factor regulation capability ([REDACTED] at POI) to alleviate power flow non-convergence and maintain the transmission transfer capability.

4. Required Mitigations

A combination of congestion management, the Project providing [REDACTED] power factor regulation capability at the POI, and SPS to trip the Project under identified contingency outage conditions is required to mitigate the power flow impacts of the Project described above. The Reliability Network Upgrades discussed in the Area Report and assigned to the Project are as follows:

- a. Add Project to previously Identified Victor SPS.

The Project will need to be added as a participant to the previously identified Victor SPS. Expand the existing (Pre-QC7) Victor SPS to include the Project to trip the generation under the following outages:

S [REDACTED]

- [REDACTED]
- [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Refer to the Scope of Network and Distribution Upgrades Section of the Area Report for associated costs and scope information.

II. Steady State Power Flow Analysis Results - 66kV or 115kV

1. Thermal Overloads

The group study indicated that the Project contributes to the following facility overloads or non-convergence problems. The details of the analysis and overload levels are provided in the Area Report.

- Category "A" (All facilities in service, N-0)
 - o None
- Category "B" (loss of a single element, N-1)
 - o None
- Category "C" (loss of multiple elements, N-2)
 - o None

2. Power Flow Non-Convergence

There were no non-convergence issues under certain contingencies identified with the inclusion of the Project due to the limited system capacity.

3. Voltage Performance

With the generators providing the required power factor regulation capability (██████████ at POI), no voltage performance issues were identified.

4. Required Mitigations

A combination of congestion management, the Project providing (██████████) power factor regulation capability at the POI is required to mitigate the power flow impacts of the Project described above. There were no Sub-transmission Upgrades assigned to the Project.

E. Short Circuit Duty Results

Short circuit studies were performed to determine the fault duty impact of adding the QC7 Phase I projects to the transmission system and to ensure system coordination. The fault duties were calculated with and without the projects to identify any equipment overstress conditions. Once overstressed circuit breakers are identified, the fault current contribution from each individual project in QC7 Phase I is determined. Each project in the cluster will be responsible for its share of the upgrade cost based on the rules set forth in CAISO Tariff Appendix DD.

1. Short Circuit Duty Study Input Data

The customer provided technical data for the identified inverter (specified in Section 2). If the technical data obtained from the inverter manufacturer by SCE illustrates differences in the Short Circuit Duty (SCD) parameters, then SCE utilized the manufacturer data of the inverter model specified by the IC in the application in the SCD study. SCE utilized the parameters provided by the IC.

"Inverter Based Generation" Data for Each generation unit:

Maximum Fault contribution: [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]

This generation tie-line impedance was based on Distribution Provider calculation of generation tie-line electrical parameters utilizing tower and line conductor characteristics provided by the IC.

2. Short Circuit Duty Study Results

All bus locations where the QC7 Phase I projects increase the short-circuit duty by 0.1 kA or more and where duty was found to be in excess of 60% of the minimum breaker nameplate rating are listed in the Area Report (Appendix H). These values have been used to determine if any equipment is overstressed as a result of the inclusion of QC7 Phase I interconnections and corresponding network upgrades, if any.

The responsibility to finance short circuit related Reliability Network Upgrades identified through a Group Study shall be assigned to all Interconnection Requests in that Group Study pro rata on the basis of short circuit duty contribution of each Generating Facility.

Please refer to the QC7 Phase I Area Report for the QC7 Phase I breaker evaluation identified overstressed circuit breakers at the SCE buses, and Attachment 2 for the pro-rata allocation with corresponding estimated costs (if any) for the Project, based on SCD contribution at each location.

3. Preliminary Protection Requirements

Protection requirements are designed and intended to protect the Distribution Provider's system only. The preliminary protection requirements were based upon the interconnection plan as shown in the one-line diagram depicted in line item #7 in Attachment 1.

The IC is responsible for the protection of its own system and equipment and must meet the requirements in the Distribution Provider Interconnection Handbook provided in Attachment 4.

F. Transient Stability Evaluation

Limited transient stability studies were conducted using full loop base cases to ensure that the transmission system remains in operating equilibrium, as well as operating in a coordinated fashion; through abnormal operating conditions after the QC7 Phase I projects begin operation. The generator dynamic data used in the study for the Project is shown in Attachment 6.

1. Transient Stability Evaluation Results – 220kV and above

A number of selected line and generator outages within the North of Lugo system consistent with Category B and Category C requirements were simulated as part of the transient stability evaluation. The transient stability evaluation found that with all proposed system upgrades listed above, the QC7 Phase I projects in SCE's North of Lugo system would not cause the transmission system to go unstable under Category B and Category C outages.

2. Transient Stability Evaluation Results – 66kV or 115kV

A number of selected line and generator outages within the North of Lugo system consistent with Category B and Category C requirements were simulated as part of the transient stability evaluation. The transient stability evaluation found that with all proposed system upgrades listed above, the QC7 Phase I projects in SCE's North of Lugo system would not cause the transmission system to go unstable under Category B and Category C outages.

G. Reactive Power Deficiency Analysis

Reactive Power Deficiency Analysis was conducted using full loop base cases to ensure that there is enough reactive support such that the system (66kV and above) remains in operating equilibrium, as

well as operating in a coordinated fashion; through abnormal operating conditions after the QC7 Phase I projects begin operation.

1. Area Study Reactive Power Deficiency Results – 220kV and above

With the addition of all QC7 Phase I projects in the North of Lugo Area, there is voltage degradation to the system under base case conditions. As such, all QC7 Phase I projects in the North of Lugo are required to provide reactive capability consistent with Tariff requirements. They are also required to maintain [REDACTED] power factor while in operation.

The study concluded that the reactive power requirements for the North of Lugo system is acceptable with the combination of all network upgrades identified with all generating facilities in QC7 Phase I in the North of Lugo area required to be designed to provide [REDACTED] power factor at their Point of Interconnection.

2. Area Study Reactive Power Deficiency Results – 66kV or 115kV

With the addition of all QC7 Phase I projects in the North of Lugo area, there is voltage degradation to the system under base case conditions. As such, all QC7 Phase I projects in the North of Lugo area are required to provide reactive capability consistent with Tariff requirements. They are also required to maintain [REDACTED] power factor while in operation.

The study concluded that the reactive power requirements for the North of Lugo system is acceptable with the combination of all network upgrades identified with all generating facilities in QC7 Phase I in the North of Lugo area required to be designed to provide 0.95 leading/lagging power factor at their Point of Interconnection.

3. Individual Project Power Factor Requirements

Based on the results of the Study, the Project will need to be designed to maintain a composite power delivery at continuous rated power at the POI at a power factor within the [REDACTED]. Additionally, the generation system must be designed to accommodate a VAR schedule provided by SCE. SCE will determine if the VAR schedule is necessary based on future re-arrangements of SCE's Transmission system.

H. Deliverability Assessment Results

1. On Peak Deliverability Assessment

The Project contributes to the area constraints as shown in the Area Report Section E.1 Table E.1.2.

The project also contributes to the overloads listed in the Area Report Section E.1 Table E.1.1 for all the listed contingencies.

2. Off Peak Deliverability Assessment

For off-peak condition studies, see Section D.1.1 Table D-2 in the Area Report.

3. Required Mitigations

For area constraints, conceptual ADNU's are proposed to increase the generation deliverability for additional details, see the Area Report Section E.1.3.

For contingency concerns, the Project is required to participate in the proposed Victor SPS.

I. Interconnection Facilities, Network Upgrades, and Distribution Upgrades

Please see **Attachment 1** for the Interconnection Facilities (IF), Reliability Network Upgrades (RNU), Delivery Network Upgrades (DNU) and Distribution Upgrades (DU) allocated to the Project. Please note that SCE will not “reserve” the identified IF’s for the proposed POI. The identified scope/facilities will be allocated to the project upon the successful execution of the Generation Interconnection Agreement and SCE has completed the final design and engineering of the facilities according to tariff timelines.

J. Cost and Construction Duration Estimates

To determine the cost responsibility of each generation project in QC6 Phase II, the CAISO developed cost allocation factors (Attachment 3) for Reliability Network Upgrades, Local Delivery Network Upgrades, and Area Delivery Network Upgrades. Attachment 2 provides the 'constant' 2014 dollars and their escalation to the estimated COD year for Interconnection Facilities, Reliability Network Upgrades, Delivery Network Upgrades, and Distribution Upgrades which the Project was allocated cost.

For the QC7 Phase I Study, the estimated COD is derived by assuming the duration of the work element will begin in December 2016, which accounts for the CAISO tariff scheduled completion date of the QC7 Phase II study plus: the TP Deliverability (TPD)² allocation, Annual Reassessment effort, and the interconnection agreement signing period and submittal of required funds by the IC.

The IC should note that any Local Delivery Network Upgrades and Area Delivery Network Upgrades allocated to the Project may be assessed 35% Income Tax Component of Contribution (ITCC) pending the results of the TPD allocation Process several months after the QC Phase II Study Reports are released, in addition to the 35% ITCC assessed for the IFs, DUs, and RNUs above the \$60K/MW repayment cap allocated to the Project. For your information, Attachment 2 contains a potential ITCC estimate³ based on the Phase I cost in this study. It does not represent the “maximum ITCC exposure” of the Project. Attachment 3 provides an estimated non-reimbursable RNU cost that would be subject to ITCC, taking into account the Network Upgrade maximum cost responsibility. The maximum ITCC warranted by the Project will be addressed, calculated, and included during the Interconnection Agreement development phase once the IC submits the TPD Affidavit confirming the acceptance, waiver (parking), or denial of awarded deliverability assigned to the Project.

K. SCE Technical Requirements

The IC is responsible for the protection of its own system and equipment and must meet the requirements in the Distribution Provider Interconnection Handbook provided in Attachment 4.

L. Environmental Evaluation, Permitting, and Licensing

Please see Appendix K of the QC7 Phase I Area Report.

² Transmission Plan Deliverability: Deliverability supported by the CAISO’s Transmission Plan

³ The maximum ITCC exposure applies ITCC (35%) to assigned IF and DU facilities, Network Upgrades that are not subject to transmission credits incremental to a repayment \$/MW cap or an award of 0 MW TPD Allocation, and that SCE will own the facilities in question. The maximum ITCC exposure was calculated by applying the following formula: $(IF*35\%)+((RNU\ Costs - (Project\ MW * (\$60k/MW)))*35\%)+(LDNU*35\%)+(ADNU*35\%)+(DU*35\%)$

M. Affected Systems Coordination

Please see Section H of the QC7 Phase I Area Report.

N. Items not covered in this study

1. Conceptual Plan 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 as part of final engineering and design.

2. IC's Technical Data

The study accuracy and results for the QC7 Phase I Study are contingent upon the accuracy of the technical data provided by the IC. Any changes from the data provided could void the study results.

3. Study Impacts on Neighboring Utilities

Results or consequences of this QC7 Phase I 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 CAISO Controlled Grid, and sub-synchronous resonance (SSR).

Refer to Affected Systems Coordination Section of the Area Report.

4. Use of Distribution Provider Facilities

The IC is responsible for acquiring all property rights necessary for the IC's Interconnection Facilities, including those required to cross Distribution Provider facilities and property. This Interconnection Study does not include the method or estimated cost to the IC of Distribution Provider mitigation measures that may be required to accommodate any proposed crossing of Distribution Provider facilities. The crossing of Distribution Provider property rights shall only be permitted upon written agreement between Distribution Provider and the IC at Distribution Provider's sole determination. Any proposed crossing of Distribution Provider property rights will require a separate study and/or evaluation, at the IC's expense, to determine whether such use may be accommodated.

5. Distribution Provider Interconnection Handbook

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

6. Western Electricity Coordinating Council (WECC) Policies

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

7. System Protection Coordination

Adequate Protection coordination will be required between Distribution Provider-owned protection and generator-owned protection. If adequate protection coordination cannot be

achieved, then modifications to the generator-owned facilities (i.e., Generation-tie or Substation modifications) may be required to allow for ample protection coordination.

8. Standby Power and Temporary Construction Power

The QC7 Phase I Study does not address any requirements for standby power or temporary construction power that the Project may require prior to the In-Service Date of the Interconnection Facilities. Should the Project require standby power or temporary construction power from Distribution Provider prior to the In-Service Date of the Interconnection Facilities, the IC is responsible to make appropriate arrangements with Distribution Provider to receive and pay for such retail service.

9. Licensing Cost and Estimated Time to Construct Estimate (Duration)

The estimated licensing cost and durations applied to this Project are based on the Project scope details presented in this study. These estimates are subject to change as Project environmental and real estate elements are further defined. Upon execution of the Interconnection Agreement, additional evaluation including but not limited to preliminary engineering, environmental surveys, and property right checks may enable licensing cost and/or duration updates to be provided.

10. Network/Non-Network Classification of Telecommunication Facilities

The cost for telecommunication facilities that were identified as part of the IC's Interconnection Facilities was based on an assumption that these facilities would be sited, licensed, and constructed by the IC. The IC will own, operate, maintain, and construct diverse telecommunication paths associated with the IC's generation tie line, excluding terminal equipment at both ends. In addition, the telecommunication requirements for SPS were assumed based on tripping of the generator breaker as opposed to tripping the circuit breakers at the Distribution Provider substation. Due to uncertainties related to telecommunication upgrades for the numerous projects in queue ahead of QC7 Phase I, telecommunication upgrades for higher queued projects were not considered in this study. Depending on the outcome of interconnection studies for higher queued projects, the telecommunication upgrades identified for QC7 Phase I may be reduced. Any changes in these assumptions may affect the cost and schedule for the identified telecommunication facilities.

11. Applicability

This document has been prepared to identify the impact(s) contributions of the Project on the SCE electrical system; as well as establish the technical requirements to interconnect the Project to the POI that was evaluated in the QC7 Phase I Study for the Project. Nothing in this report is intended to supersede or establish terms/conditions specified in interconnection agreements agreed to by SCE, CAISO and the IC.

12. Process for synchronization/trial operations and commercial operations of the Project

The IC is reminded that the CAISO has implemented a New Resource Implementation (NRI) process that ensures that a generation resource meets all requirements before synchronization/trial operations and commercial operations. The NRI uses a bucket system for deliverables from the IC that are required to be approved by the CAISO. The first step of this process is to submit an "ISO Initial Contact Information Request form" at least 7 months in advance of the planned initial synchronization. Subsequently an NRI project number will be assigned to the project for all future communications with the CAISO. The Distribution Providers

have no involvement in this NRI process except to inform the IC of this process requirement. Further information on the NRI process can be obtained from the CAISO Website using the following links:

New Resource Implementation webpage:

<http://www.caiso.com/participate/Pages/NewResourceImplementation/Default.aspx>

NRI Checklist:

<http://www.caiso.com/Documents/NewResourceImplementationChecklist.xls>

NRI Guide:

<http://www.caiso.com/Documents/NewResourceImplementationGuide.doc>

13. Potential Changes in Cost Responsibility

The IC is hereby placed on notice that interconnection of its proposed generating facility may be dependent upon certain Network Upgrades which are currently the cost responsibility of projects ahead of the proposed generating facility in the interconnection application queue. Section 14.2.2 of the GIDAP provides that should Network Upgrades required for queued-ahead projects be included in an executed GIA (or unexecuted GIA filed at FERC) at the time of withdrawal of the earlier queued generating facility, and the upgrades are determined to still be needed by later queued generating facilities, the financial responsibility for such upgrades falls to the Distribution Provider. However, if the Network Upgrades required by earlier queued generating facilities are not subject to an executed GIA (or unexecuted GIA filed at FERC) the financial responsibility for such upgrades may fall to the IC. Section 14.2.2 also discusses how Network Upgrades required by interconnection customers selecting Option (B) might be required to be reapportioned among interconnection customers selecting Option (B) in the case of withdrawals of earlier queued generating facilities. Changes in costs allocated to the IC could also arise as the result of the CAISO's reassessment process described in Section 7.4 of the GIDAP. SCE encourages the IC to review Sections 7.4 and 14.2.2 of the GIDAP for the rules and processes under which the financial responsibility might be reapportioned to the IC. Potential changes in the IC's cost responsibility resulting from application of the provisions of these Sections of GIDAP are not included in this Phase I study, nor are the potential impacts to the IC's maximum cost responsibility outlined.

Attachment 1

Interconnection Facilities, Network Upgrades, and Distribution Upgrades

Please refer to separate document.

Attachment 2

Escalated Cost and Time to Construct for Interconnection Facilities, Reliability Network Upgrades, Delivery Network Upgrades, and Distribution Upgrades

Please refer to separate document.

Attachment 3

Allocation of Network Upgrades for Cost Estimates and Maximum Network Upgrade Cost Responsibility

Queue # WDT1174 [X]

	NU Total Cost (2014 \$k)	Project Allocation(%)	Allocated Cost (2014 \$k)	Allocated Cost (Escalated \$k)
RNU				
██████████ upgrade	\$8,253	1.44%	\$119	\$151
██████████ reprogram, SPS modify & test	\$35	100.00%	\$35	\$45
██████████ ██████████: Add the project to HDPP SPS	\$523	100.00%	\$523	\$664
Ground grid study to support SCD mitigation	\$35	100.00%	\$35	\$45
RNU Total			\$712	\$905
Grand Total			\$712	\$905

Queue # WDT1174 [X]

	Total NU Cost (2014 \$k)	Incremental MW	Cost Rate (2014 \$/MW)	Project MW	Allocated Cost (2014 \$k)
3rd ██████████ 500/230kV bank	\$129,974	189.95	\$684	80	\$54,741

Attachment 4

Distribution Provider Interconnection Handbook

Preliminary Protection Requirements for Interconnection Facilities are outlined in the Distribution Provider Interconnection Handbook.

Please refer to separate document.

Attachment 5

Short Circuit Calculation Study Results

Please refer to the Appendix H of the Area Report.

Attachment 6

Customer Provided Project Dynamic Data

The following data was submitted by the IC for Dynamic simulation:

[Redacted text block containing multiple paragraphs of information, all obscured by black bars]

Attachment 7

SCE Northern Hemisphere Import Nomogram

Please refer to separate document.

Queue Cluster 7 Phase I - Attachment 1



Interconnection Facilities, Network Upgrades, and Distribution Upgrades

Interconnection Facilities, Network Upgrades, and Distribution Upgrades

To determine the cost responsibility of each project in QC7, the California Independent System Operator Corporation (CAISO) developed cost allocation factors (Attachment 3) for Reliability Network Upgrades and Local Delivery Network Upgrades. The CAISO developed the \$/MW cost rate for incremental Area Delivery Network Upgrades. The cost rate multiplied by the requested deliverable MW capacity provides the cost estimate for the Area Delivery Network Upgrades. The Interconnection Facilities are the sole cost responsibility of the Project. The Interconnection Facilities, Network Upgrades, and Distribution Upgrades allocated to the project are listed below¹.

1. Interconnection Facilities.

- (a) **Interconnection Customer's Interconnection Facilities.** The Interconnection Customer shall:
- (i) [REDACTED]
 - (ii) [REDACTED] from the Generating Facility to a position designated by the Distribution Provider, outside of the Distribution Provider's WDT1174 Substation, where Interconnection Customer shall install a structure designed and engineered in accordance with the Distribution Provider's specifications ("Last Structure"). [REDACTED] WDT1174 [REDACTED] shall extend up to the edge of the WDT1174 Substation property line.

[REDACTED] WDT1174 [REDACTED] name is subject to change by the Distribution Provider based upon its transmission line naming criteria. [REDACTED] WDT1174 [REDACTED] name be changed, this LGIA may be amended to reflect such change.)
 - (iii) Install fiber [REDACTED] WDT1174 [REDACTED] to a point designated by the Distribution Provider near the Distribution Provider's WDT1174 Substation to provide one of two telecommunication paths required for the line protection scheme, the Remote Terminal Units ("RTU"), and one of the two required telecommunication paths required for the SPS. A minimum of eight (8) strands within the fiber optic cable shall be provided for the Distribution Provider's exclusive use into WDT1174 Substation.
 - (iv) Install appropriate fiber optic cable from the Generating Facility to a point designated by the Distribution Provider near the Distribution Provider's WDT1174 Substation to provide the second telecommunication path required for the line protection scheme and the SPS. A minimum of eight (8) strands within the fiber optic cable shall be provided for the Distribution Provider's

¹ Such descriptions are subject to modification to reflect the actual facilities that are constructed and installed following the Distribution Provider's final engineering and design, identification of field conditions, and compliance with applicable environmental and permitting requirements.

Interconnection Facilities, Network Upgrades, and Distribution Upgrades

exclusive use. The telecommunication path shall meet the Applicable Reliability Standards criteria for diversity.

- (v) Own, operate and maintain both telecommunication paths (including any fiber optic cables and appurtenant facilities), with the exception of the terminal equipment at both WDT1174 Substation and at the Generating Facility, which terminal equipment will be installed, owned, operated and maintained by the Distribution Provider.
- (vi) Allow the Distribution Provider to review the Interconnection Customer's telecommunication equipment design and perform inspections to ensure compatibility with the Distribution Provider's terminal equipment and protection engineering requirements; allow the Distribution Provider to perform acceptance testing of the telecommunication equipment and the right to request and/or to perform correction of installation deficiencies.
- (vii) Provide required data signals, make available adequate space, facilities, and associated dedicated electrical circuits within a secure building having suitable environmental controls for the installation of the Distribution Provider's RTU in accordance with the Interconnection Handbook.
- (viii) Make available adequate space, facilities, and associated dedicated electrical circuits within a secure building having suitable environmental controls for the installation of the Distribution Provider's telecommunications terminal equipment in accordance with the Interconnection Handbook.
- (ix) Extend the fiber optic cable for the two telecommunication paths to an Interconnection Customer provided and installed patch panel located adjacent to the Distribution Provider's telecommunications terminal equipment specified above.
- (x) Install all required CAISO-approved compliant metering equipment at the Generating Facility, in accordance with Section 10 of the CAISO Tariff.
- (xi) Install a revenue metering cabinet and revenue metering equipment (typically, voltage and current transformers) at the Generating Facility to meter the Generating Facility retail load, as specified by the Distribution Provider. The metering cabinet must be placed at a location that would allow twenty-four hour access for the Distribution Provider's metering personnel.
- (xii) Allow the Distribution Provider to install, in the revenue metering cabinet provided by the Interconnection Customer, revenue meters and appurtenant equipment required to meter the retail load at the Generating Facility.
- (xiii) Install relay protection to be specified by the Distribution Provider to match the relay protection used by the Distribution Provider at WDT1174 Substation, in order to [REDACTED] WDT1174 [REDACTED] as follows:
 1. Two (2) current differential relays connected via diversely routed dedicated digital communication channels to WDT1174 Substation. The make and type of current differential relays will be specified by the Distribution Provider during final engineering of the Distribution Provider's Interconnection Facilities.

Interconnection Facilities, Network Upgrades, and Distribution Upgrades

- (xiv) Install necessary relays and satellite clock to support the SPS requirements for the Generating Facility. The make and type of SPS relays and satellite clock will be specified by the Distribution Provider during final engineering of the Distribution Provider's Interconnection Facilities.
- (xv) Install disconnect facilities in accordance with the Distribution Provider's Interconnection Handbook to comply with the Distribution Provider's switching and tagging procedures.

(b) **Distribution Provider's Interconnection Facilities.** The Distribution Provider shall:

(i) **WDT1174 Substation.**

- 1. [REDACTED] This work includes the following:
[REDACTED]
- 2. [REDACTED]

(ii) **Saturn Solar- WDT1174** [REDACTED]

Install an appropriate number of [REDACTED] including insulator/hardware assemblies, and appropriate number of spans of conductor and fiber optic cable between the Last Structure and the dead-end substation structure at WDT1174 Substation. The actual number and location of the transmission tower structures and spans of conductor and fiber optic cable will be determined by the Distribution Provider following completion of final engineering of the Distribution Provider's Interconnection Facilities. The Phase I Interconnection Study assumed one (1) transmission tower structures and two (2) spans of conductor and fiber optic cable.

(iii) **Telecommunications.**

- 1. Install all required lightwave, channel, and associated equipment (including terminal equipment), supporting protection and SCADA requirements at the Generating Facility and WDT1174 Substation for the interconnection of the Generating Facility. Notwithstanding that certain telecommunication equipment, including the telecommunications terminal equipment, will be located on the Interconnection Customer's side of the Point of Change of Ownership, the Distribution Provider shall own, operate and maintain such telecommunication equipment as part of the Distribution Provider's Interconnection Facilities.

Interconnection Facilities, Network Upgrades, and Distribution Upgrades

2. Install appropriate length of fiber optic cable, including conduit and vaults, from the point designated by the Distribution Provider near the Distribution Provider's WDT1174 Substation to extend the fiber optic cable into the communication room at WDT1174 Substation. The actual location and length of fiber optic cable and conduit, and location and number of vaults, will be determined during final engineering of the Distribution Provider's Interconnection Facilities.
 3. Install appropriate length of fiber optic cable, including conduit and vaults, to extend the Interconnection Customer's diverse telecommunications from the point designated by the Distribution Provider near the Distribution Provider's WDT1174 Substation into the communication room at WDT1174 Substation. The actual location and length of fiber optic cable and conduit, and location and number of vaults, will be determined during final engineering of the Distribution Provider's Interconnection Facilities.
 4. Install all additional required lightwave, channel, fiber optic cable, and associated equipment (including terminal equipment), supporting the SPS requirements. Notwithstanding that certain telecommunication equipment, including the telecommunications terminal equipment, will be located on the Interconnection Customer's side of the Point of Change of Ownership, the Distribution Provider shall own, operate and maintain such telecommunication equipment as part of the Distribution Provider's Interconnection Facilities.
- (iv) **Real Properties, Transmission Project Licensing, and Corporate Environmental Health and Safety.**
Obtain easements and/or acquire land, obtain licensing and permits, and perform all required environmental activities for the installation of the Distribution Provider's Interconnection Facilities, including any associated telecommunication equipment for the [REDACTED] WDT1174 [REDACTED]
[REDACTED]
- (v) **Metering.**
Install revenue meters and appurtenant equipment required to meter the retail load at the Generating Facility. Notwithstanding that the meters and appurtenant equipment will be located on the Interconnection Customer's side of the Point of Change of Ownership, the Distribution Provider shall own, operate and maintain such facilities as part of the Distribution Provider's Interconnection Facilities.
- (vi) **Power System Control.**
Install one (1) RTU at the Generating Facility to monitor typical generation elements such as MW, MVAR, terminal voltage and circuit breaker status for the Generating Facility and plant auxiliary load, and transmit the information received thereby to the Distribution Provider's grid control center.

Interconnection Facilities, Network Upgrades, and Distribution Upgrades

Notwithstanding that the RTU will be located on the Interconnection Customer's side of the Point of Change of Ownership, the Distribution Provider shall own, operate and maintain the RTU as part of the Distribution Provider's Interconnection Facilities.

2. Network Upgrades.

(a) **Stand Alone Network Upgrades.**
None identified in this Phase I Study.

(b) **Other Network Upgrades.**

(i) **Distribution Provider's Reliability Network Upgrades.**

The Distribution Provider shall:

1. WDT1174 Substation.

a. Engineer and construct the WDT1174 [REDACTED] which will include the following elements:

[REDACTED]

b. [REDACTED]

[REDACTED]

d. Install all necessary equipment, including one (1) RTU to monitor: the typical bulk power elements such as MW, MVAR and phase amps at each line; kV at lines and buses; and circuit breaker status/control, protection relays status and alarms.

e. Other Station Elements to be Installed:

i. [REDACTED]

Interconnection Facilities, Network Upgrades, and Distribution Upgrades

- ii. [REDACTED]

2. [REDACTED]

a. Replace Transmission Line Protection Relays to the following:

- i. [REDACTED]

3. [REDACTED]

a. Replace Transmission Line Protection Relays to the following:

- i. [REDACTED]

4. **WDT642 Substation.**

a. Replace Transmission Line Protection Relays to the following:

- [REDACTED]

5. [REDACTED] - WDT642 [REDACTED]

- [REDACTED]

6. **Telecommunications.**

- [REDACTED]

7. **Real Properties, Transmission Project Licensing, and Corporate Environmental Health and Safety.**

Obtain easements and/or acquire land, obtain licensing and permits, and perform all required environmental activities for the installation of the

Interconnection Facilities, Network Upgrades, and Distribution Upgrades

Distribution Provider's Reliability Network Upgrades, including any associated telecommunication equipment.

8. [REDACTED]
Refer to Area Report for scope information and Attachment 2 for associated costs assigned to the Project.
9. **Short Circuit Duty (SCD) Mitigation – RNU.**
Refer to Area Report for scope information and Attachment 2 for associated costs assigned to the Project.

(ii) **Distribution Provider's Delivery Network Upgrades.**

1. **Area Delivery Network Upgrades.**

a. [REDACTED]

Refer to Area Report for scope information and Attachment 2 for associated costs assigned to the Project.

2. **Local Delivery Network Upgrades.**

None identified in this Phase I Study. .

3. **Distribution Upgrades.**

(a) **Short Circuit Duty (SCD) Mitigation – DU.**

Refer to Area Report for scope information and Attachment 2 for associated costs assigned to the Project.

4. **Affected System Upgrades.**

Not Used.

5. **Point of Change of Ownership.**

- (a) [REDACTED] WDT1174 [REDACTED] The Point of Change of Ownership shall be the point where the [REDACTED] – WDT1174 [REDACTED] [REDACTED] are attached to the Last Structure, which will be connected on the side of the Last Structure facing WDT1174 Substation. The Interconnection Customer shall own and maintain the Last Structure, the conductors, insulators and jumper loops from such Last Structure to the Interconnection Customer's Generating Facility. The Distribution Provider will own and maintain the WDT1174 Substation, as well as all circuit breakers, disconnects, relay facilities and metering within the WDT1174 Substation, together with the line drop, in their entirety, from the Last Structure to WDT1174 Substation. The Distribution Provider will own the insulators that are used to attach the Distribution Provider-owned conductors to the Last Structure.
- (b) **Telecommunication fiber optic cable:** The Point of Change of Ownership shall be the point where the fiber optic cable for the [REDACTED] – WDT1174 115kV Transmission Line is attached to the Last Structure or a Distribution Provider owned vault.

Interconnection Facilities, Network Upgrades, and Distribution Upgrades

- (c) **Telecommunication diverse fiber optic cable:** The Point of Change of Ownership shall be the point at an Interconnection Customer installed and owned pole located at a position designated by the Distribution Provider outside the Distribution Provider's substation, or a Distribution Provider owned vault, where the Interconnection Customer's fiber optic cable is connected to the Distribution Provider's fiber optic cable.

6. **Point of Interconnection.** The Distribution Provider's WDT1174 [REDACTED] at the [REDACTED]

7. **One-Line Diagram of Interconnection to WDT1174** [REDACTED]

