

Ella Foley Gannon  
Direct Phone: +1.415.393.2572  
Direct Fax: +1.415.262.9251  
ella.gannon@bingham.com

January 11, 2013

Siting Committee  
Raoul Renaud, Hearing Officer  
Eric Solorio, Project Manager  
California Energy Commission  
Docket No. 11-AFC-03  
1516 9th Street  
Sacramento, CA 95814

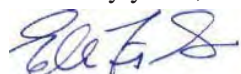
**Re: Cogentrix Quail Brush Generation Project - Docket Number 11-AFC-03,  
Further Response to HomeFed Fanita Rancho Data Requests 85 through 105**

Docket Clerk:

Pursuant to the provisions of Title 20, California Code of Regulations, and on behalf of Quail Brush Genco, LLC, a wholly owned subsidiary of Carlyle Infrastructure Partners, L.P., Bingham McCutchen LLP hereby submits its *Further Response to HomeFed Fanita Rancho Data Requests 85 through 105*. The Quail Brush Generation Project is a 100 megawatt natural gas fired electric generation peaking facility to be located in the City of San Diego, California.

If you have any questions regarding this submittal, please contact Rick Neff at (704) 525-3800 or me at (415) 393-2572.

Sincerely yours,



Ella Foley Gannon

cc: Lori Ziebart, Cogentrix  
John Collins, Cogentrix  
Rick Neff, Cogentrix  
Proof of Service List

California Energy Commission

**DOCKETED**  
**11-AFC-03**

TN # 69105

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Bingham McCutchen LLP  
Three Embarcadero Center  
San Francisco, CA  
94111-4067

T +1.415.393.2000  
F +1.415.393.2286  
bingham.com

A/75347685.1



## Quail Brush Genco, LLC

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A Project Company of Cogentrix Power Holdings, LLC

9405 Arrowpoint Boulevard  
Charlotte, North Carolina 28273-8110  
(704) 525-3800  
(704) 525-9934 – Fax

January 11, 2013

Siting Committee  
Raoul Renaud, Hearing Officer  
Eric Solorio, Project Manager  
California Energy Commission  
1516 Ninth Street, MS-15  
Sacramento, CA 95814

Re: **Quail Brush Generation Project (11-AFC-03)  
Further Response to HomeFed Fanita Rancho Data Requests 85 through 105**

Dear Members of the Siting Committee, Hearing Officer Renaud, and Mr. Solorio:

In response to HomeFed Fanita Rancho (Intervenor) Data Requests, 85 through 105, dated December 14, 2012, Quail Brush Generation Project (Quail Brush) responds to the following requests: 85.a, 85.b, 86.a, 87, 88, 89, 94.a, 97.a, 97.c, 97.d, 98, 101, 102, 103, 104, 105, and 106.b. On January 3, 2012, Quail Brush docketed initial responses to 85.c, 85.d, 86.b, 90, 91, 92, 93, 94.b, 94.c, 95, 96, 97.b, 99, 100, 106.

### **I. Data Requests regarding Quail Brush Genco, LLC's ("QB") 10/30/12 letter to the CEC regarding need for the project.**

85. QB's item I.h.ii, on pp. 4-5 of the 10/30/12 letter, cites SDG&E witness Jan Strack as having testified that "[i]f the Encina sub-area is eliminated, then, for purposes of satisfying San Diego area local capacity requirements, generation anywhere within the San Diego area would exhibit 'electrical equivalence' with generation at Encina."

a. Please explain why QB does or does not agree with this portion of Mr. Strack's testimony. Quail Brush agrees with this portion of Mr. Strack's testimony, as supported by his testimony in the same California Public Utilities Commission (CPUC) proceeding explaining that SDG&E has proposed minor transmission upgrades which will eliminate the Encina LCR sub-area, which would allow dependable capacity added anywhere within the San Diego area to satisfy San Diego area LCRs. See Prepared Supplemental Testimony of Jan Strack on Behalf of SDG&E, A.11-05-023, at JS-2 (April 27, 2012), included as Exhibit I(f)(iii) to the Letter entitled "Public Record Documents Supporting the Need for the Project", docketed with the Commission on October 30, 2012 (hereinafter

the “Letter Supporting Need”. This testimony is also supported by the CAISO’s conclusion that one way to mitigate a potential overload resulting from the retirement of Encina is to reconductor the TL13820 Sycamore-Chicarita 138 kV line. See CAISO 2011-2012 Transmission Plan, Section 4.9 – Policy Driven Assessment Results and Mitigations in SDG&E Area, pg. 338.(March 23, 2010) (available at <http://www.aiso.com/Documents/Board-approvedISO2011-2012-TransmissionPlan.pdf>).

b. Please explain why QB does or does not agree that generation anywhere in the SDG&E area can meet the same needs that QB is intended to meet. Quail Brush agrees, as explained by Mr. Strack in his testimony, that under certain scenarios, generation anywhere within the San Diego area would exhibit “electric equivalence” with generation at Encina. Accordingly, a power plant located in another location in San Diego could help fill some of the need that the proposed Project is intended to meet. However, as analyzed fully in Quail Brush’s Alternatives Analysis, docketed with the Commission on October 31, 2012, Quail Brush has not identified any other project location which is commercially available to Quail Brush and which meets most or all of the project objectives.

86. QB’s item I.d.i, on p. 2 of the 10/30/12 letter, cites CAISO witness Rothleder as having testified that “there will be substantial needs for new, or repowered, generation resources in ... the San Diego area, in as early as 2018 when the existing OTC units must comply with the OTC requirements.”

a. Please explain why QB does or does not agree with this portion of Mr. Rothleder’s testimony. Quail Brush agrees with this testimony, as informed by Mr. Rothleder’s testimony that the substantial needs for new generation resources in the San Diego area supports the procurement of flexible thermal resources “as soon as possible.” See Testimony of Mark Rothleder on Behalf of CAISO, A.11-05-023, at 4, 5 (March 9, 2012) (“load serving entities should be authorized to procure flexible thermal resources or repowered resources that will meet the SWRCB regulations in the local capacity areas as soon as possible in the timeframe set forth in the [Long Term Procure Proceeding or ] LTPP settlement agreement. . . . If these resources are not procured and online [by 2018], it is likely that the system will not be able to operate reliably unless the Encina units are allowed to stay online.”), included as Exhibit I(d)(i) to the Letter Supporting Need, docketed with the Commission on October 30, 2012. .

## **II. Data Requests regarding the analyses of alternatives to meet SDG&E reliability at the CPUC in A.11-05-023 and A.06-08-010**

87. Please explain why QB does or does not consider capacity from each of the following projects or proposed projects as a potential alternative to the full 100 Mw proposed to be built at QB:

a. The proposed CEC project at Encina, after accounting for the retirement of existing Encina units 1-3 as part of that project (as approved by the CEC). This proposed project was bid into the same 2009 SDG&E Request for Offers (RFO) as Quail Brush and did not make SDG&E’s short-list. The CEC project does not have a PPTA, and thus is not commercially viable at this time. Further, it lacks the flexibility to follow renewables integration that Quail Brush provides. The CPUC expressly required SDG&E to procure

such flexible resources in the 2006 LTPP. See CPUC D.07-12-052 at 115 (“we require SDG&E to procure dispatchable ramping resources that can be used to adjust for the morning and evening ramps created by the intermittent types of renewable resources.”).

b. The proposed Pio Pico project included in CPUC A.11-05-023. The Pio Pico project is not a potential alternative to Quail Brush because both projects are needed to ensure reliability within the SDG&E service area. See SDG&E Prepared Direct Testimony, A.11-05-023 at 3-5 (May 19, 2011) (establishing need for 530 MW of new, local generation by 2015 to meet local and system resource adequacy requirements), included as Exhibit I(b) to the Letter Supporting Need, docketed with the Commission on October 30, 2012.

c. Retention in service of the existing Cabrillo gas turbines. SDG&E expects the Cabrillo II combustion turbines, with a total capacity of 188 MW, to be retired on December 31, 2013, and thus are not expected to be operational when Quail Brush goes online. See SDG&E Prepared Direct Testimony, A.11-05-023, at 9 (May 19, 2011) (“SDG&E has assumed that the Cabrillo II combustion turbines, with a total capacity of 188 MW, will be retired when their current land leases expire on December 31, 2013”), included as Exhibit I(b) to the Letter Supporting Need, docketed with the Commission on October 30, 2012.

d. Post-2010 uncommitted energy efficiency on the SDG&E system, as quantified by the CEC in 2012 (7/18/12, “Energy Efficiency Adjustments for a Managed Forecast: Estimates of Incremental Uncommitted Energy Savings Relative to the California Energy Demand Forecast 2012-2022.” showing Mid Savings Scenario peak demand savings for SDG&E in Table 25 of 117 Mw by 2016 and 318 Mw by 2022), and/or as included by SDG&E in Exs. 11 and 29 in CPUC A.11-05-023. Quail Brush defers to SDG&E and the CAISO’s analysis regarding uncommitted energy efficiency, and accordingly finds that SDG&E and the CAISO’s consideration of uncommitted energy efficiency results in the determination that there is a need for Quail Brush’s generation. SDG&E testimony indicates that conservative values must be used for the purpose of reliability planning, that the low savings scenario comes closest to meeting California Public Utilities Code § 454.5 requirements that energy efficiency must be “cost-effective, reliable and feasible,” and explaining SDG&E’s updated load forecast resulting in decreased uncommitted energy efficiency savings. See Prepared Supplemental Rebuttal Testimony of Athena Beas on Behalf of SDG&E, A.11-05-023, at AB-2 - AB-3 (June 6, 2012) (citing Prepared Supplemental Testimony of Robert Anderson on Behalf of SDG&E, A.11-05-023, at RA-3 (June 6, 2012), included as Exhibit I(h)(i) to the Letter Supporting Need, docketed with the Commission on October 30, 2012. CAISO testimony further indicates that it “does not believe it is prudent to rely on uncommitted resources for assessing future local system needs and ensuring the reliability of the bulk power system.” Rebuttal Testimony of Robert Sparks on Behalf of the California Independent System Operator, A.11-05-023, at RS-2 (June 6, 2012), included as Exhibit I(g) to the Letter Supporting Need, docketed with the Commission on October 30, 2012.

e. Demand response on the SDG&E system, as quantified by SDG&E in Exhibit 11 in CPUC A.11-05-023. Quail Brush defers to the CAISO’s analysis regarding demand response, and accordingly finds that the proper consideration of demand response results in the determination that there is a need for Quail Brush’s generation. The CAISO is “not willing to accept the uncommitted demand response megawatt amount as

a substitute local capacity resource” because available demand response programs cannot offset new dispatchable generation resources in the local area. See Comments of the CAISO on the Proposed and Alternate Decisions, A.11-05-023, 6-8 (Dec. 10, 2012)

f. Retention in service of the existing Encina units 4 and 5 by switching them to a new cooling technology. Quail Brush defers to SDG&E, which has prudently procured resources assuming the retirement of Encina units 1, 2, & 3 by 2013, and units 4 & 5 by the end of 2017 in order to comply with the State’s Once-Through Cooling (OTC) policy mandates. See SDG&E Prepared Direct Testimony, A.11-05-023 (May 19, 2011), included as Exhibit I(b) to the Letter Supporting Need, docketed with the Commission on October 30, 2012. Accordingly, Quail Brush does not believe it is prudent or commercially reasonable to assume that Encina Units 4 and 5 will be repowered.

g. Phase shifter(s) to control flows between SDG&E and CFE and thereby increase firm import capacity into the SDG&E system. Quail Brush does not consider it prudent to rely upon additional import capacity into the SDG&E system due to the use of phase shifters. As suggested by the CAISO on page 206 in its most recent comprehensive Transmission Plan (docketed with the Commission on October 30, 2012 as Exhibit II(A)(i) to the Letter Supporting Need), there are no current plans to install phase shifters between the SDG&E and CFE systems. Indeed, with regard to installation of such phase shifters, the CAISO merely “recommende[d] further evaluation in a future planning cycle.” As further explained by CAISO witness Mr. Sparks during oral testimony at the CPUC with regard to such an installation, “it’s very uncertain how long that would take and whether or not it would ever amount to anything.” See June 19, 2012 Hearing Transcript Pages 543-543, docketed with the Commission on October 30, 2012 as Exhibit I(i) to the Letter Supporting Need.

h. Upgrades to the SCE transmission system to increase firm import capacity over Path 44 into the SDG&E system, such as those identified in UCAN testimony in CPUC A.06-08-010. Quail Brush does not consider it prudent to rely upon additional import capacity into the SDG&E system due to an increase in firm import capacity over Path 44. Quail Brush is not aware of any intention or plan by SCE, SDG&E or the CAISO to undertake projects that would increase the firm import capacity over Path 44, and none are identified in the CAISO’s most recent Transmission Plan (docketed with the Commission on October 30, 2012 as Exhibit II(A)(i) to the Letter Supporting Need).

88. Please explain why QB does or does not consider capacity from each of the following projects or proposed projects as a potential partial alternative to the capacity proposed to be built at QB:

a. Incremental combined heat and power (CHP) projects, as quantified by SDG&E in Ex. 11 in CPUC A.11-05-023. Quail Brush defers to SDG&E’s analysis regarding CHP process, and accordingly does not consider incremental CHP projects as a potential partial alternative to the proposed Project. As explained by SDG&E witness Robert Anderson in his Prepared Supplemental Rebuttal Testimony in CPUC proceeding A.11-05-23:

SDG&E’s need analysis did not include any incremental supply-side CHP, for several reasons. First, SDG&E has not seen any new CHP built to

supply the wholesale market in its service area in over 10 years. Second, SDG&E has just completed its first RFO under the CHP settlement which has provide recent market information as to what might be expected as far as new local CHP. Thus, both historical and forward-looking market data supports SDG&E's assumption that no new local (San Diego load pocket area) supply-side CHP should be assumed for reliability planning.

See Exhibit I(h)(i) to the Letter Supporting Need at pp. RA-11 and RA-12, docketed with the Commission on October 30, 2012.

b. Load shedding under N-2 conditions. Quail Brush defers to CAISO's analysis regarding the impact of load shedding under contingency events, and accordingly does not consider load shedding under N-2 conditions as potential partial alternative to the proposed Project. The CAISO analyzed various planning scenarios assuming a G-2/N-2 contingency event *with* load shedding, and nevertheless found a local capacity requirement need which can be met in part by the proposed project. Please refer to Prepared Supplemental Testimony of Robert Sparks on behalf of CAISO, A.11-05-023, at 2-5 (April 6, 2012), included as Exhibit I(e) to the Letter Supporting Need, docketed with the Commission on October 30, 2012.

c. Energy storage. Quail Brush does not believe that energy storage for this size project is a commercially reasonable alternative. Energy storage was considered and analyzed in Section 1.6.1.2 of the Alternative Analysis, docketed with the Commission on October 30, 2012.

d. Solar energy projects within the SDG&E area with tracking to allow generation during peak load hours. Solar energy projects within the SDG&E area are a factor that is considered. Even with tracking features, the intermittent nature of this generation is one of the needs for the flexibility of Quail Brush, and SDG&E has been required to procure flexible resources to support intermittent generation by the CPUC. See CPUC D.07-12-052 at 115 ("we require SDG&E to procure dispatchable ramping resources that can be used to adjust for the morning and evening ramps created by the intermittent types of renewable resources.").

e. Solar energy projects within the SDG&E area with storage to allow generation during peak load hours. Applicant does not believe that energy storage for this size project is a commercially reasonable alternative. Quail Brush recognizes that such projects may be commercially viable in certain locations and situations, they tend to be extremely land intensive - requiring on the order of 1,000 acres for a 100-MW project. Quail Brush is not aware of any suitable locations within the San Diego load pocket that could support such a project.

f. Biomass energy projects within the SDG&E area. Quail Brush does not believe biomass energy projects create a viable partial alternative to the proposed Project. Such projects were identified in Section 3.5.1.9 of Quail Brush's original alternatives analysis in the AFC, docketed with the Commission on August 25, 2011.

g. Other renewable energy projects. Other renewable energy projects are a factor that is considered in determining the need for the proposed Project. The intermittent nature of much of this generation (wind, etc.) as well as the fact that much of this generation at

utility scale must be sited outside of the San Diego load pocket are supporting reasons for Quail Brush. See CPUC D.07-12-052 at 115 (“we require SDG&E to procure dispatchable ramping resources that can be used to adjust for the morning and evening ramps created by the intermittent types of renewable resources.”).

h. The 45 Mw Wellhead project included in CPUC A.11-05-023. The Wellhead project (which is a conversion of an existing project and provides a net gain of only 10-15 MWs) is not a potential alternative to Quail Brush because both projects are needed to ensure reliability within the SDG&E service area. See SDG&E Prepared Direct Testimony, A.11-05-023 at 3-5 (May 19, 2011) (establishing need for 530 MW of new, local generation by 2015 to meet local and system resource adequacy requirements), included as Exhibit I(b) to the Letter Supporting Need, docketed with the Commission on October 30, 2012.

89. Please provide all analyses relied upon by QB in reaching the opinions and conclusions expressed in your responses to the preceding two questions and their sub-parts. Quail Brush relies mainly on the CAISO and SDG&E for this information. Quail Brush also relies on testimony presented before the CPUC and this Commission, as well as information provided by consultants in this area for this information. Quail Brush refers HomeFed to the answers provided to the previous two questions, which include citations providing support for Quail Brush’s opinions on these matters.

### **III. Data Requests regarding the Proposed Decisions in CPUC A.11-05-023**

94. The PDs in A.11-05-023 find that the CPUC “has yet to determine the particular operational characteristics of resources that are needed to support renewable resources integration or to set procurement targets for them.” Please identify any analyses or other documents in this proceeding (at the CEC) which:

a. identify the “particular operational characteristics of resources that are needed to support renewable resources”. Quail Brush developed the proposed Project in response to SDG&E’s 2009 Request for Offers (RFO), which specifically requested “flexible resources”. As explained in Section 2.2 of the AFC, docketed with the Commission on August 25, 2011, the Project will support renewable resources in the following manner:

When the output of the renewable resources decreases, the Project can be dispatched quickly. Conversely, when the output of renewable resources increases, the Project can be ramped down quickly and still operate efficiently with the lower load. The design of the project as consisting of multiple reciprocating engines, as opposed to one or two combustion turbines, provides unique flexibility, while still achieving higher efficiencies across the entire load range. The Project can thus support further integration of renewable resources into SDG&E’s generation portfolio, and assist statewide goals calling for increased reliance on renewable energy.

Quail Brush is not in a position to opine on characteristics of resources that are needed to support renewable resources in the abstract, and will leave it to the CPUC’s discretion to do so. However, Quail Brush further notes that the CAISO has proposed “maximum ramping,” “load following,” and “regulation” as flexible requirement categories, and Quail Brush has these characteristics. See Prepared Supplemental Testimony of Jan Strack

on Behalf of SDG&E, A.11-05-023, JS-13 (April 27, 2012) (“the CAISO has proposed to define the following three flexible requirement categories: ‘maximum ramping,’ ‘load following,’ and ‘regulation.’ SDG&E’s Product 2 generators [including Quail Brush] can be started very quickly and are dispatchable at any level of output between the units’ minimum output level and full capacity. They would therefore meet the requirements for ‘maximum ramping’ and ‘load following.’ In addition the Pio Pico and Quail Brush generators will be configured to respond to Automatic Generation Control (AGC) signals and on that basis meet the ‘regulation’ requirement. The Product 2 generators are ideally suited for the integration of intermittent renewable resources.” (citing the CAISO’s January 27, 2012 “*Flexible Capacity Procurement, Market and Infrastructure Policy Issue Paper*”), included as Exhibit I(f)(iii) to the Letter Supporting Need, docketed with the Commission on October 30, 2012.

#### **IV. Data Requests regarding other topics**

97. Assuming CEC approval of QB in July 2013, how long would it take from that date to:

a. Obtain a PPA for sale of QB generation? The project already has a PPA for sale of power generation from the proposed Project. No additional time would be needed.

c. Begin construction of QB? Quail Brush anticipates that construction of the Project could begin within a few months of achieving regulatory approvals. If future events cause Quail Brush to determine that a revised construction schedule is appropriate, it will so notify the Commission.

d. Begin commercial operation of QB? Quail Brush anticipates that commercial operation will begin within 17 months of commencing construction, as explained in Section 2.3.13.2 of the Application for Certification, docketed with the Commission on August 25, 2011. If future events cause Quail Brush to determine that a revised construction schedule and anticipated commercial operation date are appropriate, it will so notify the Commission.

98. To the extent the answer to the preceding question regarding commercial operation is after the summer of 2014, please explain how that is consistent with the project purposes as described to the CEC. Quail Brush developed and proposed the Project as a response to SDG&E’s 2009 RFO which was approved by the CPUC. In the RFO, SDG&E specifically sought “flexible resources.” As explained by SDG&E to the CPUC, such resources are necessary to provide “greater operational flexibility that will be needed to integrate increasing levels of renewable energy into the grid.” See SDG&E Prepared Direct Testimony, A.11-05-023 at 16 (May 19, 2011), included as Exhibit I(b) to the Letter Supporting Need, docketed with the Commission on October 30, 2012. Nothing has changed to reduce the need for this type generation. Subsequent to the RFO’s issuance, the additional concern and expectation that part or all of the San Onofre Nuclear Generating Facility will never come online again, creating an even greater need for new capacity in the San Diego area. The time to develop a project to meet such needs, such as the proposed Project, is in the range of seven years. For these reasons, among others, Quail Brush believes it prudent to move this project forward as quickly as possible.

101. What network upgrades will be required on the SDG&E system as part of the CAISO’s interconnection process for QB? The proposed Project will not be responsible for any Delivery



Network Upgrades on the SDG&E system and will be responsible for approximately \$14.3 million for Reliability Network Upgrades on the SDG&E system in order to complete the physical interconnection. Please refer to Section 4.1 of the *Re-Study of C1C2 Phase II Appendix A - C565 Individual Project Report* provided by the CAISO on June 4, 2012 and attached hereto, and the *Addendum to Re-Study of C1C2 Phase II Appendix A - C565 Individual Project Report* (the "*Appendix A Addendum*") provided by the CAISO on October 22, 2012 and docketed with the Commission on November 5, 2012.

102. Please provide the cost estimate, and any underlying CAISO or other documents which form the basis for that estimate, for the current expected transmission interconnection cost for QB, including any network upgrades whose costs QB will have to initially pay. The CAISO conducted a Re-Study in the first half of 2012, issuing a *Re-Study of C1C2 Phase II Interconnection Study Report on June 4, 2012* (the "*Re-Study Report*"). Attached to this data request response is the "Group Report" (the main body of the report) and Appendix A, which is specific to the proposed Project. The *Appendix A Addendum* was provided by the CAISO on October 22, 2012 and docketed with the Commission on November 5, 2012. Please refer to Table 11.1 in the *Appendix A Addendum*, which provides the cost estimate for interconnection costs. Supporting documentation for the cost estimates is found in the *Re-Study Report*, as modified by the *Appendix A Addendum*. Please refer especially to Section 4.1 of Appendix A of the *Re-Study Report*, attached hereto.

103. Please provide any powerflow studies or other CAISO documents which support any claim that interconnecting QB to the SDG&E system at the 138 kV level will not trigger any need for network upgrades on the SDG&E system, contrary to Table 11.1 of Appendix A – C565, as amended 2/14/12 by the CAISO to reflect the change to a 138 kV point of interconnection. Please see the complete *Re-Study Report*, attached hereto and docketed in part on October 13, 2011, and the *Appendix A Addendum*, docketed on November 5, 2012. The complete report provides the basis for replacing the original Table 11.1 with the revised Table 11.1, as provided in the *Appendix A Addendum*. The revised Table 11.1 identifies Reliability Network Upgrades necessary to interconnect the proposed Project, but indicates that no Deliverability Network Upgrades are required.

104. Please explain why QB does or does not agree with the CEC that rooftop solar is a potentially viable alternative to an SDG&E-area peaking plant, at a comparable cost to the peaking plant (CEC publication 800-2009-001-CMF, the CEC permit denial in the Chula Vista Energy Upgrade Project case, pp. 29-30). Quail Brush does not believe that rooftop solar is a potentially viable alternative to an SDG&E-area peaking plant. A full explanation for this belief is provided in Section 1.6.1.1 of the Alternatives Analysis, docketed with the Commission on October 31, 2012. Quail Brush further notes that HomeFed has mischaracterized the Commission's statements in the Chula Vista Energy Upgrade Project Final Decision, in which it merely determined that the analysis of the solar photovoltaic alternative in record was insufficient. (CEC publication 800-2009-001-CMF, p. 30.)

105. Please explain why QB does or does not agree that the CEC load forecast adopted in 2012 (the California Energy Demand 2012-2022 Final Forecast) is the correct starting point for determining the need for capacity in the SDG&E area. Quail Brush defers to SDG&E's calculation of its forecasted load. As described by SDG&E witness Robert Anderson:

SDG&E believes the need analysis should be based on the most recent CEC load forecast developed as part of the 2011 IEPR Process [i.e. the California

Energy Demand 2012-2022 Final Forecast]. The [CPUC's] use of the latest CEC load forecast is consistent with past Commission practice of adopting the most recent CEC load forecast for resource planning. . . . The demand forecast shows an expected peak for San Diego in 2020 of 5,359 MW. This figure is 36 MW greater than the Staff's Preliminary Forecast that SDG&E previously used. The 1-in-10 peak also increased to 5,863 MW, up from 5,824 MW.

See Rebuttal Testimony of Robert Anderson on behalf of SDG&E, A.11-05-023, RA-9 through RA-10, included as Exhibit I(h)(i) to the Letter Supporting Need, docketed with the Commission on October 30, 2012.

106. Please provide copies of the following documents:

b. The unredacted Phase 2 interconnection studies (early versions are referenced in the AFC at pp. 2-24, 2-25) which form the basis for removing Table 11.1 from the 8/24/11 Appendix A to the QB Individual Project Report from the CAISO. Note that this question applies only to Table 11.1. It does not apply to the removal of Table 11.2, pursuant to p. 3 of the 2/14/2012 CAISO "Revised Second Addendum to the Cluster 1 and 2 Phase II Final Report. Please note that Quail Brush misunderstood this question when responding to it in its Initial Response, filed on January 3, 2012, and is hereby amending its answer.

The Phase 2 interconnection studies referenced in the AFC are no longer accurate, due to a subsequent change in the Point of Interconnection for the proposed Project and other anticipated changes to the CAISO grid. The CAISO conducted a Re-Study in the first half of 2012. Please see the complete *Re-Study Report*, attached hereto and docketed in part on October 13, 2011, and the *Appendix A Addendum*, docketed on November 5, 2012. The complete report provides the basis for replacing the original Table 11.1 with the revised Table 11.1, as provided in the *Appendix A Addendum*.

I certify under penalty of perjury that the foregoing is true, correct, and complete to the best of my knowledge.

Regards,



C. Richard Neff  
Vice President

cc: Docket (11-AFC-03)

January 11, 2013

Page 10 -- Quail Brush Generation Project (Docket No. 11-AFC-03)

**ATTACHMENT**

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# **Re-Study of C1C2 Phase II Interconnection Study Report**

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**Group Report for SDG&E Area**

**Final Report**



**California ISO**  
Shaping a Renewed Future

**June 4, 2012**

This study has been completed in coordination with San Diego Gas & Electric Company per CAISO Tariff Appendix Y Generator Interconnection Procedures (GIP) for Interconnection Requests in a Queue Cluster Window

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## **Appendices**

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Appendix B for Re-Study – CAISO Controlled Grid Generation Queue

Appendix C for Re-Study – Load, Resource, and Dispatch Summary Table

Appendix D for Re-Study – Steady-State Power Flow Results: Thermal and Voltage

## Definitions

APS	Arizona Public Service
C1C2 Projects	Cluster 1, Cluster 2, and SGIP Transition Cluster generation projects listed in the CAISO Queue being evaluated in this Phase II Re-Study
CAISO	California Independent System Operator Corporation
CFE	Comisión Federal de Electricidad
CPUC	California Public Utilities Commission
COD	Commercial Operation Date
CT	Combustion Turbine
Cut Plane	SDG&E Cut Plane is the aggregate flow of: South of SONGS (5-230 kV lines), 2-500/230 kV transformer banks at Suncrest Substation, all 500/230 kV transformer banks at Miguel Substation, 1-230 kV Otoy Mesa-Tijuana line, and the flow across the Q72 transmission system
Deliverability Assessment	CAISO's Deliverability Assessment
EO	Energy Only Deliverability Status
ECO	SDG&E's proposed East County Substation located between the Imperial Valley and Miguel substations
FC	Full Capacity Deliverability Status
FERC	Federal Energy Regulatory Commission
GIP	Generator Interconnection Procedures
IC	Interconnection Customer
IID	Imperial Irrigation District
IV	Imperial Valley
LFB	Local Furnishing Bond
LGIA	Large Generator Interconnection Agreement
LGIP	Large Generator Interconnection Procedures
Max	Maximum generation output
NERC	North American Electric Reliability Corporation
NG	Natural Gas
PEN	Palomar Energy Switchyard
Phase I Study	Cluster 1 and Cluster 2 Phase I Study
PTO	Participating Transmission Owner
RAS	Remedial Action Scheme (also known as SPS)
POI	Point of Interconnection
POS	Plan of Service
PV	Photovoltaic
RASRS	Remedial Action Schemes Reliability Subcommittee
S	Solar
SCE	Southern California Edison Company
SCIT	Southern California Import Transmission
SDG&E	San Diego Gas & Electric Company
SGIP	Small Generator Interconnection Procedures
SPS	Special Protection System (also known as RAS)
SRPL	Sunrise Powerlink
ST	Steam Turbine
SWPL	Southwest Powerlink
TCA	Transmission Control Agreement
TJI	Tijuana Substation
W	Wind
WECC	Western Electricity Coordinating Council
WT	Wind Turbine



## 1. Executive Summary

In accordance with the Federal Energy Regulatory Commission (FERC) approved Generator Interconnection Procedures (GIP) for Interconnection Requests in a Queue Cluster Window (CAISO FERC Electric Tariff Appendix Y), a Phase II Study was performed to determine the combined impact of all the Cluster 1, Cluster 2, and Small Generator Interconnection Procedures Transition Cluster projects (C1C2 Projects) on the CAISO Controlled Grid. The Phase II Study report was sent to the Interconnection Customers (ICs) on August 24, 2011.

Subsequent to issuing the original Phase II Study report, the CAISO performed studies (C1C2 Phase II Re-assessment) to re-assess specific upgrades using the criteria in the Technical Bulletin issued January 31, 2012 (and revised February 2, 2012) entitled "Generation Interconnection Procedures: Deliverability Requirements for Clusters 1-4."<sup>1</sup> Applicable C1C2 Projects received addendums detailing the results of the C1C2 Phase II Re-assessment on February 10, 2011. The addendums specified that the SCE Upgrades identified in the original Phase II Study do not apply to the SDG&E area C1C2 Projects. In addition, the C1C2 Phase II Re-assessment identified deliverability constraints and generation dispatch limitations.

The purpose of this C1C2 Phase II Re-Study (Re-Study) is to incorporate the results from the C1C2 Phase II Re-assessment and determine which Network Upgrades that were identified in the original Phase II Study are still needed due to the following:

- A. Applying the criteria defined in the CAISO issued Technical Bulletin (January and February 2012) that resulted in dispatch limitations to observe the Path 43 flow limit,
- B. Project withdrawals from the queue since the original C1C2 Phase II Study was performed,
- C. Current status of earlier queued generation projects with executed Generation Interconnection Agreements with respect to required milestones, and
- D. Transmission additions and upgrades approved in the most recent Transmission Planning Process (TPP) cycle.

The Re-Study also identified an additional Network Upgrade to mitigate impacts on a neighboring system identified as an Affected System in the original Phase II Study. This mitigation plan is subject to review and concurrence by the Affected System Operator and must be coordinated with the Affected System Operator and the Interconnection Customers.

In situations where the Re-Study identifies updates to required Network Upgrades and/or Interconnection Facilities, the CAISO will use the results to amend the Generation Interconnection Agreements.

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<sup>1</sup> The Technical Bulletin can be accessed on the CAISO website at [http://www.caiso.com/Documents/TechnicalBulletin-GeneratorInterconnectionProcedures-DeliverabilityRequirements-Clusters1-4Jan31\\_2012.pdf](http://www.caiso.com/Documents/TechnicalBulletin-GeneratorInterconnectionProcedures-DeliverabilityRequirements-Clusters1-4Jan31_2012.pdf)

Eleven generation projects totaling a maximum net-output-to-grid of 1,624.5 MW are included in SDG&E's grouping of C1C2 Projects. (This is a 92 MW reduction from the original Phase II Study due to the withdrawal of a project.) The projects consist of two Cluster 1 projects, six Cluster 2 projects, and three Small Generator Interconnection Procedures Transition Cluster (SGIP TC) projects. The Commercial Operation Dates proposed by these projects range from year 2012 to 2016. The study year was revised to reflect SDG&E's 2015 system load and transmission system topology. This study report provides the following:

- A. Transmission system impacts caused by the addition of the C1C2 Projects,
- B. System reinforcements necessary to mitigate the adverse impacts of the C1C2 Projects under various system conditions studied, and
- C. A list of required facilities, a cost responsibility for Network Upgrades assigned to each Interconnection Request, and a non-binding, good faith estimate of the cost and time to construct the upgrades for each Interconnection Request.

To determine the system impacts caused by the C1C2 Projects, the following studies were revised. (The results from all other studies originally performed are considered valid and are not repeated in this report):

- A. Deliverability Assessment
- B. Steady-State Power Flow

The results of the above studies indicated that the C1C2 Projects are responsible for:

- A. Overloading several transmission facilities in the CAISO Controlled Grid, and
- B. Increasing the available fault current at the Comisión Federal de Electricidad (CFE) 230 kV bus at Tijuana Substation (connects to Otay Mesa Switchyard).

Network Upgrades<sup>2</sup> within the CAISO Controlled Grid to mitigate identified problems have been proposed in this report. The following tables show a summary of the proposed Network Upgrades in the CAISO Controlled Grid and the estimated costs for these upgrades.

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<sup>2</sup> The transmission facilities, beyond the Point of interconnection (POI), necessary to interconnect the Project, which would not have been necessary but for the interconnection of the Project.

**Table 1.1: Reliability Network Upgrades**

Description of Upgrade		Cost (x 1,000)
1	Participate in existing Otay Mesa Energy Center Generator SPS for N-1 and N-2 contingencies (included in Mission-Old Town SPS cost)	\$200
2	Participate in existing Imperial Valley SPS for multiple N-1 and N-2 contingencies	\$2,100
3	Participate in proposed ECO 500/230 kV transformer bank outage SPS (included in IV SPS cost)	\$0
4	Implement an SPS to protect ECO 230/138 kV transformer bank for overload or outage	\$300
5	Install current limiting series reactor on Otay Mesa-Tijuana 230 kV line	\$2,355
<b>TOTAL</b>		<b>\$4,955</b>

**Table 1.2: Delivery Network Upgrades on SDG&E Transmission System**

Description of Upgrade		Cost (x 1,000)
1	Reconfigure TL23041 and TL23042 at Miguel Substation to create two Otay Mesa-Miguel 230 kV lines	\$4,285
<b>TOTAL</b>		<b>\$4,285</b>

The upgrades in Tables 1.1 and 1.2 do not include Interconnection Facilities. The Interconnection Facilities relating to each individual project are discussed in the corresponding Appendix A for Re-Study, Individual Project Report.

In the original study, CFE was identified as an Affected System Operator in the short circuit analysis due to the reconfiguration of TL23041 and TL23042 at the Miguel Substation. This upgrade was identified as a Delivery Network Upgrade. The short circuit study results showed a 27% increase in available fault current at the Tijuana 230 kV bus. Without the details of CFE's system, it is unknown if any circuit breakers are overstressed. Coordination with CFE is required so CFE can perform studies with its detailed system model to determine mitigation to maintain its existing fault duty margin for CFE's future expansion. This Re-Study introduces a current limiting series reactor installed on the Otay Mesa-Tijuana 230 kV line as a mitigation plan to retain CFE's fault duty margin at the Tijuana 230 kV bus.

The CAISO analyses primarily focus on the CAISO system. The definitive analyses of the impacts on Affected Systems are the responsibility of the Affected System Operator to perform. It is the obligation of each Interconnection Customer to work with potentially Affected System Operators, to identify impacts on their systems and mitigate those impacts.

Project-specific confidential information for each project is not included in this Group Report. Each generation project will have its own Individual Project Report in Appendix A. Appendix A will include project information, Point of Interconnection (POI), dynamic models, Reliability Study results, and costs to interconnect and mitigate impacts on the

transmission system. This Group Report includes only general results based on the cumulative impact of the projects evaluated in this Phase II Re-Study.

Given the magnitude of the identified Network Upgrades, a good faith estimate to license/permit, design, procure material, and construct the SDG&E facilities could be 18 months from the submittal of written authorization to proceed after the execution of all required Generator Interconnection Agreements (GIAs).

## 2. Cluster Interconnection Information

Eleven (11) generation projects totaling a maximum net-output-to-grid of 1,624.5 MW are included in SDG&E's C1C2 Projects Phase II Re-Study. Table 2.1 lists SDG&E's C1C2 Projects with essential data obtained from the CAISO Controlled Grid Generation Queue (see Appendix B for Re-Study). C1C2 Projects in SDG&E's Phase II Re-Study utilize various fuel resources. Two (2) generation projects utilize wind turbines, seven (7) generation projects utilize solar photovoltaic systems, and two (2) generation projects utilize natural gas-fired generation.

**Table 2.1: SDG&E C1C2 Projects**

CAISO Queue Position	Point of Interconnection	Max MW	FC/EO	Fuel/Type	Commercial Operation Date (Note 1)
493	Sunrise Powerlink 500 kV Line	299	FC	Wind / Wind Turbine	12/15/2012
510	Imperial Valley Substation 230 kV Bus	200	FC	Solar / PV	1/1/2016
561	Imperial Valley Substation 230 kV Bus	200	FC	Solar / PV	12/1/2014
565	Carlton Hills Substation 138 kV Bus	100	FC	Natural Gas / Reciprocating Engine	5/15/2014
574	Otay Mesa Substation 230 kV Bus	308	FC	Natural Gas / Combustion Turbine	5/1/2014
583	Boulevard Substation 138 kV Bus	57.5	EO	Wind / Wind Turbine	7/14/2014
590	Imperial Valley Substation 230 kV Bus	150	FC	Solar / PV	9/30/2013
608	Imperial Valley Substation 230 kV Bus	250	FC	Solar / PV	1/1/2016
621	Imperial Valley Substation 12 kV Bus	20	EO	Solar / PV	10/1/2012
644A	ECO Substation 138 kV Bus	20	EO	Solar / PV	2/1/2016
653ED	Boulevard Substation 69 kV Bus	20	EO	Solar / PV	10/31/2014
<b>Total Generation</b>		<b>1,624.5</b>			

Note 1: Some dates differ from the CAISO Queue due to revisions provided by the ICs.

SDG&E performed the Reliability Study under the direction of the CAISO. For the Reliability Study, all Cluster 1, Cluster 2, and SGIP Transition Cluster generator projects were dispatched and studied simultaneously. Figure 2.1 shows the proposed generator interconnections at Boulevard East Substation, East County (ECO) Substation, Imperial Valley Substation, and Sunrise Powerlink. Figure 2.2 shows the two projects in the internal SDG&E transmission service territory.

Figure 2.1: C1C2 Project Interconnections in East

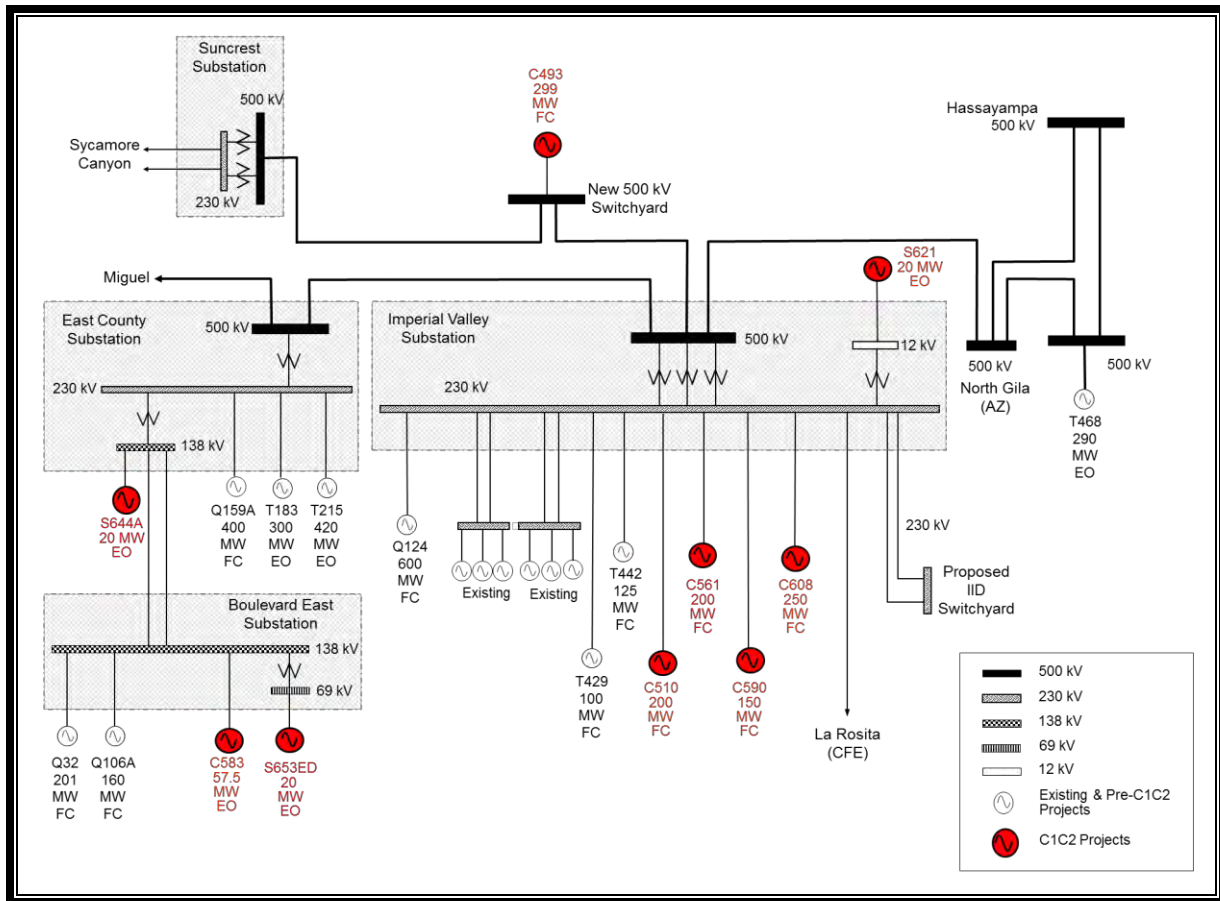
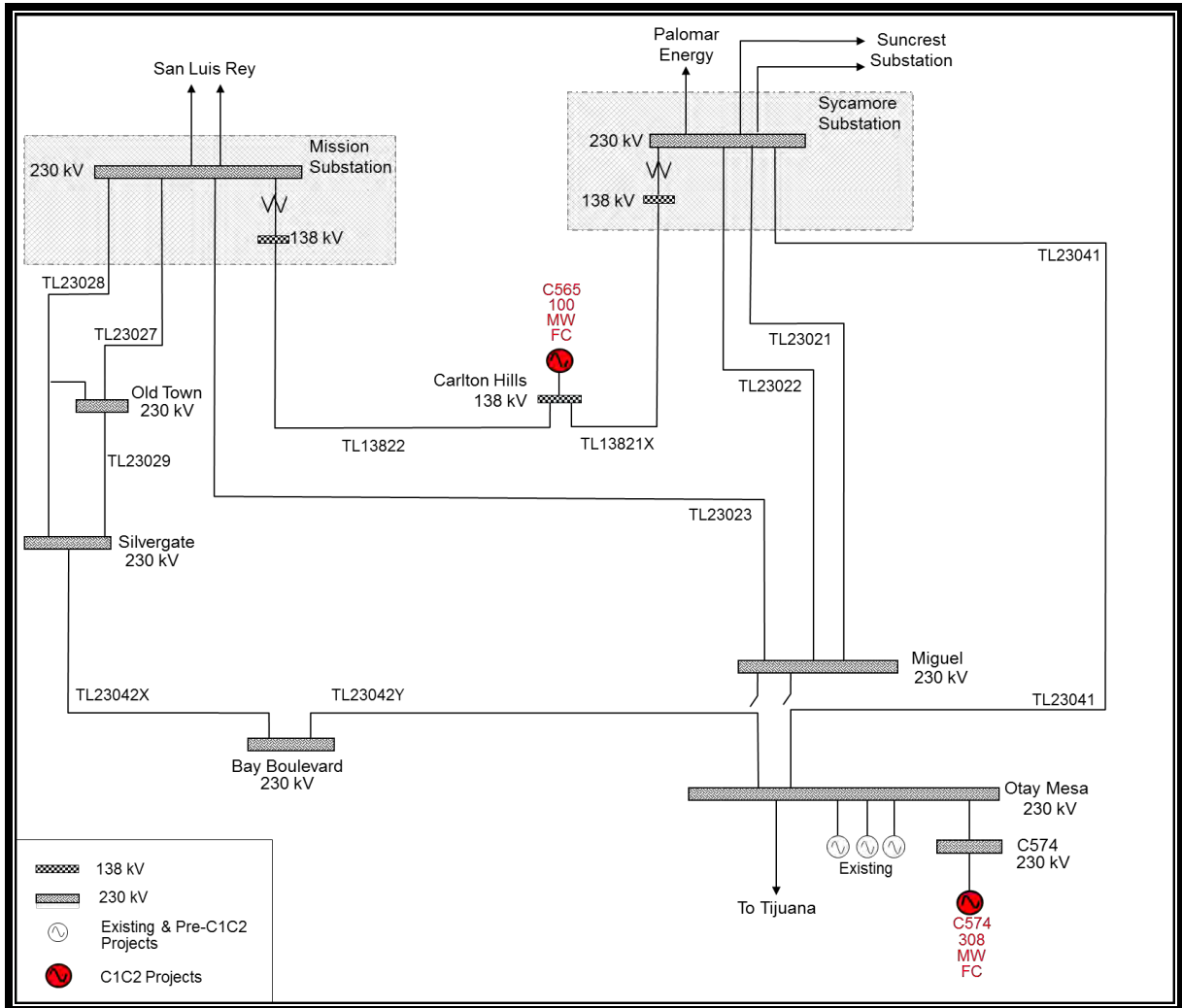


Figure 2.2: C1C2 Project Interconnections for Internal Area



### **3. Study Objectives**

The purpose of this C1C2 Phase II Re-Study (Re-Study) is to incorporate the results from the C1C2 Phase II Re-assessment and determine which Network Upgrades that were identified in the original Phase II Study are still needed due to the following:

- A. Applying the criteria defined in the CAISO issued Technical Bulletin (January and February 2012) that resulted in dispatch limitations to observe the Path 43 flow limit,
- B. Project withdrawals from the queue since the original C1C2 Phase II Study was performed,
- C. Current status of earlier queued generation projects with executed Generation Interconnection Agreements with respect to required milestones, and
- D. Transmission additions and upgrades approved in the most recent Transmission Planning Process (TPP) cycle.

The Re-Study also identified an additional Network Upgrade to mitigate impacts on a neighboring system identified as an Affected System in the original Phase II Study. This mitigation plan is subject to review and concurrence by the Affected System Operator and must be coordinated with the Affected System Operator and the Interconnection Customers.

In situations where the Re-Study identifies updates to required Network Upgrades and/or Interconnection Facilities, the CAISO will use the results to amend the Generation Interconnection Agreements.



## 4. Study Assumptions

### 4.1 Power Flow Base Cases

#### 4.1.1 Deliverability Assessment

The Deliverability Assessment was performed by the CAISO to identify which of the Network Upgrades that were identified in the original C1C2 Phase II Study are still needed. The base cases studied reflect a 2015 SDG&E system configuration with all CAISO-approved transmission projects through 2015. In addition, pre-C1C2 Projects that are currently active were modeled. A second Hassayampa-North Gila 500 kV transmission line planned for 2014 in the Arizona Public Service (APS) service territory was included in the base cases.

#### 4.1.2 Reliability Study

The Reliability Study re-evaluated the C1C2 Projects under the Heavy Summer and Light Load system conditions. The SDG&E transmission system topology used for the Reliability Study base cases was the same as for the Deliverability Assessment. In an attempt to capture the most adverse condition, the Reliability Study modeled simultaneous maximum dispatch for both pre-C1C2 Projects (higher-queued), with In-Service Dates within the 2015 timeframe, and C1C2 Projects in the electrical vicinity of the projects being studied. 230 kV and 500 kV facilities in the APS and CFE transmission systems and the 92 kV, 161 kV, and 230 kV facilities in the Imperial Irrigation District (IID) transmission system were monitored for adverse impacts caused by the addition of the C1C2 Projects.

The cases used for evaluating the steady-state thermal loading and SDG&E operating voltages are listed in Table 4.1.

**Table 4.1: Reliability Study Cases**

Case Name
C1c2_hs_restudy_base.sav
C1c2_ll_restudy_base.sav

### 4.2 Load and Import

#### 4.2.1 Deliverability Assessment

The Deliverability Assessment On-Peak case modeled 5,176 MW load + losses (the latest 1-in-5 load forecast received from the California Energy Commission (CEC) in February 2012) in the SDG&E system with an import target as shown in Table 4.2.

An Off-Peak Deliverability Assessment was not performed because the C1C2 Projects that triggered Delivery Network Upgrades during the Off-Peak condition in the original Phase II Study have been withdrawn or converted to EO Deliverability Status, therefore, those Delivery Network Upgrades are no longer needed.

**Table 4.2: On-Peak Deliverability Assessment Import Target**

Branch Group (BG) Name	BG Import Direction	Net Import MW	Import Unused ETC MW
LUGO-VICTORVILLE-BG	N-S	1306	171
COI_BG	N-S	3770	548
BLYTHE_BG	E-W	90	0
CASCADE_BG	N-S	17	0
CFE_BG	S-N	-95	0
ELDORADO_MSL	E-W	1011	0
IID-SCE_BG	E-W	315	0
IID-SDGE_BG	E-W	-159	0
LAUGHLIN_BG	E-W	-41	0
MCCULLGH_MSL	E-W	14	316
MEAD_MSL	E-W	350	585
NGILABK4_BG	E-W	-105	168
NOB_BG	N-S	1283	0
PALOVRDE_MSL	E-W	2899	124
PARKER_BG	E-W	123	22
SILVERPK_BG	E-W	0	0
SUMMIT_BG	E-W	-8	0
SYLMAR-AC_MSL	E-W	-72	459

#### 4.2.2 Reliability Study

The Reliability Study re-evaluated the impact of the proposed C1C2 Projects for the 2015 Heavy Summer and Light Load system conditions.

The Heavy Summer case represents SDG&E system modeled with a 5,342 MW (load + losses) target (this 1-in-10 CEC load forecast differed from the 1-in-5 load used in the Deliverability Assessment) and a moderate Cut Plane import target.

The Light Load case represents SDG&E system modeled with a 2,938 MW (load + losses) target (55% of the 1-in-10 CEC load forecast) and a moderate Cut Plane import target.

While it is impractical to study all combinations of system load and generation levels during all seasons and at all times of the day, the base cases were developed to represent a stressed scenario of loading and generation conditions for the C1C2 Projects. The load, resource, and dispatch summary table is included in Appendix C.

#### 4.3 Generation Dispatch

The generation dispatch differed for the Deliverability Assessment and the Reliability Study as follows:

#### **4.3.1 Deliverability Assessment**

The generation dispatch in the Re-Study followed the same guidelines as the original Phase II Study. More details about the dispatch used in the Deliverability Assessment can be found in the Deliverability Assessment Methodologies.

#### **4.3.2 Reliability Study**

In the Reliability Study, an attempt was made to dispatch all generation in the study area, including SDG&E's pre-C1C2 Projects, at maximum generation output. Pre-C1C2 Projects with an In-Service Date later than 2015 were modeled, but not dispatched. Curtailment of existing or higher-queued generation was required for certain scenarios as discussed in Section 7. The base case assumptions are listed in Table 4.3.

SDG&E's Out-of-Basin generation includes existing and proposed generation interconnected at the ECO Substation, Boulevard East Substation, Imperial Valley Substation, Imperial Valley-Suncrest 500 kV transmission line (Sunrise Powerlink), and North Gila-Hassayampa 500 kV transmission line.

**Table 4.3: Reliability Study Base Case Assumptions, MW**

		Heavy Summer	Light Load
		Post-C1C2 Projects case	Post-C1C2 Projects case
CAISO Load +Losses			
SDG&E			
	Load+Losses	5397	2872
	Area Generation	5866	3721
	Exports	469	849
SDG&E Cut Plane		2523	1766
In-Basin Generation		2744	1029
Out-of-Basin Generation		3093	2693
PG&E			
	Load+Losses	29773	15136
	Area Generation	24815	13283
	Exports	-4959	-1853
SCE			
	Load+Losses	26213	15354
	Area Generation	19681	8180
	Exports	-6532	-7174
IID			
	Load+Losses	1051	528
	Area Generation	1264	991
	Exports	213	463
CFE			
	Load+Losses	2493	1157
	Area Generation	2393	1507
	Exports	-100	350
Arizona (Area 14)			
	Load+Losses	22644	10679
	Area Generation	29541	17579
	Exports	6897	6900
Path 43 (North of SONGS) “+” flow is exiting SDG&E		2250	2380
Path 44 (South of SONGS) “-“ flow is exiting SDG&E and “+” flow is entering SDG&E		-100	-230
Path 45 (CFE-SDG&E) “+” flow is entering SDG&E		-100	350
Path 66 (COI)		2080	2206
SCIT (Southern CA Import Transmission)		11973	6278

#### **4.4 New Transmission Projects**

All CAISO-approved projects with a proposed In-Service Date before or in 2015 were modeled in the base cases. In addition, some CAISO-approved projects that are expected to be operational after that time or SDG&E-approved projects were included if the CAISO and SDG&E agreed to the reasons for including those projects. Table 4.4 lists the planned SDG&E system additions and upgrades modeled in the cases.

**Table 4.4: Planned SDG&E System Additions and Upgrades**

Project
Proposed East County (ECO) 500/230/138 kV Substation (Note 1)
Proposed Boulevard East 138/69/12 kV Substation (Note 1)
Proposed Boulevard East-ECO 138 kV Transmission Line (Note 1)
Sunrise Powerlink 500 kV Transmission Project
Bay Boulevard Substation - South Bay Substation Relocation Project (Note 2)
Reconfigure Carlton Hills-Sycamore-Santee and Carlton Hills-Mission to Carlton Hills-Sycamore and Sycamore-Santee 138 kV Transmission Lines
Reconductor Talega-Pico 138 kV Transmission Line
New San Mateo-Laguna Niguel 138 kV Tap
New Escondido- Ash 69 kV Transmission Line # 2
Reconductor Poway-Pomerado 69 kV Transmission Line
Upgrade terminal line equipment on TL642B Sweetwater – Montgomery Tap 69 kV (Note 3)
Upgrade TL644 South Bay – Sweetwater 69 kV
New Sycamore-Bernardo 69 kV Transmission Line
New and/or Upgrade of 69 kV Capacitors Banks
TL626 Santa Ysabel – Descanso mitigation (Loop Loveland – Barrett Tap (TL625B) into Loveland substation and eliminate Barrett tap)
Reconductor TL663, Mission-Kearny 69 kV Transmission Line
Reconductor TL670, Mission-Clairemont 69 kV Transmission Line
Reconductor TL676, Mission-Mesa Heights 69 kV Transmission Line
Loop TL694A 69 kV Transmission Line into Melrose substation
Replacement of Los Coches 138/69 kV Bank 50 and Bank 51
Modified - South Orange County Reliability Enhancement Project
Reconductor TL631, El Cajon – Los Coches 69kV Transmission Line
Reconductor TL633, Bernardo – Rancho Carmel 69kV Transmission Line
Reconductor TL695B, Japanese Mesa – Talega Tap 69kV Transmission Line
Replacement of Talega Bank 50

*Note 1: The Administrative Law Judge issued the Proposed Decision approving the Permit to Construct for the ECO Substation which will go to the California Public Utilities Commission for approval at the June 21, 2012 meeting. Boulevard East is the new name for the Boulevard Substation Rebuild project, representing the 138 kV upgrade of the existing Boulevard 69 kV Substation. Boulevard East was modeled in the base cases. With this new substation, the existing Boulevard-Crestwood 69 kV transmission line was also opened (normal open), establishing a radial connection between Boulevard East and the proposed ECO 500/230/138 kV Substation.*

*Note 2: The Permit to Construct for the South Bay Relocation Project is currently under review by the CPUC and a draft environmental impact report (EIR) is expected in June 2012. The final environmental impact report (FEIR) should be approved before the end of 2012. The review of the coastal permit by the California Coastal Commission is awaiting the CPUC decision. The relocated substation will be named Bay Boulevard*

*Note 3: This project does not require CAISO approval. SDG&E intends to increase the rating of the line. The proposed rating was modeled to ensure that it is adequate for this cluster study.*

#### 4.5 Pre-C1C2 Projects

All pre-C1C2 Projects, as listed in Table 4.5, were modeled in the base cases. However, some generation projects were either turned off or modeled with reduced output to create a more stressed case for the Reliability Study, to observe generation dispatch limitations as discussed in Section 7.2, or to balance the loads and resources in the power flow model.

**Table 4.5: Pre-C1C2 Projects**

Queue Position	Point of Interconnection
13	Olivenhain-Bernardo-Rancho Santa Fe 69 kV Line
32	Boulevard Substation 138 kV
72	Proposed Lee Lake Substation <i>(Note 1)</i>
103	Border Substation 69 kV
106A	Boulevard Substation 138 kV
124	Imperial Valley Substation 230 kV Bus
137	Encina Substation 230kV Bus
150	Border Substation 69 kV
159A	Imperial Valley-Miguel via proposed ECO 500/230 kV Sub 230 kV Bus
183	Imperial Valley-Miguel via proposed ECO 500/230 kV Sub 230 kV Bus
189	Encina 138 kV Substation
215	Imperial Valley-Miguel via proposed 230/500 kV Sub 230 kV Bus
337	Borrego Substation 69 kV
429	Imperial Valley Substation 230 kV
442	Imperial Valley Substation 230 kV
468	Hassayampa-North Gila 500 kV Line
480	Borrego Substation 69 kV
WDAT #2	Borrego 12 kV

*Note 1: This project and its Network Upgrades are not being modeled per the CAISO issued Technical Bulletin - Generator Interconnection Procedures: Deliverability Requirements for Cluster 1-4, Revised February 2, 2012.*

Reliability Network Upgrades and Delivery Network Upgrades associated with the projects listed in Table 4.5 were evaluated to see if they were still needed. If the Network Upgrades were still needed, they were modeled in the base cases if they were identified in the cluster process or if there is an executed Generator Interconnection Agreement (GIA) with the Interconnection Customer and the mitigation is listed in the GIA. Network Upgrades for pre-C1C2 Projects that were still needed are listed in Table 4.6.

**Table 4.6: Network Upgrades and SPSs for Pre-C1C2 Projects**

Project
Participate in existing Imperial Valley SPS for multiple N-1 and N-2 contingencies for Imperial Valley, Boulevard East, ECO substations and/or the C493 switchyard
Imperial Valley 500/230 kV Transformer Bank #3
Reconductor Border-Border Tap 69 kV, Otay-Otay Lakes Tap 69 kV, and Otay Lakes Tap-San Ysidro 69 kV Transmission Lines
SPS for generators connected to Border 69 kV Substation
SPS to trip generators connected to Encina to protect San Luis Rey 138/69 kV transformer and Cannon-San Luis Rey 138 kV line
Dispatch limitation and accompanying SPS for generation connected to ECO or Boulevard East to a maximum of 1,150 MW
Implement an SPS to trip generation for the overload or outage of the Borrego-Narrows 69 kV line or the outage of the Narrows-Warmers 69 kV line

## 4.6 Other SPSs and Operator Actions

### 4.6.1 Imperial Valley SPS

The output from the existing and queued generation connected to the Imperial Valley Substation must comply with the CAISO generation tripping limitation of 1,150 MW for a Category B contingency and 1,400 MW tripping limitation of net generation, for a Category C contingency. New generation in the area (a project connecting to Imperial Valley and/or Boulevard East and/or ECO substations and/or the C493 switchyard) will also be required to participate in the existing Imperial Valley generation SPS, which mitigates adverse impacts to the SDG&E, CFE, and IID transmission systems by tripping generation following various N-1 and N-2 contingencies. (CFE has an internal SPS that monitors the CFE 230 kV lines, La Rosita–Rumorosa and La Rosita–Herradura. During non-summer operation, if loading is above 388 MVA on either line and TL23050 (Imperial Valley–La Rosita 230 kV line) flow is from Imperial Valley to La Rosita, a trip signal will be sent in two seconds to open TL23050. During summer operation, TL23040 (Otay Mesa–Tijuana) is tripped instead of TL23050).

The following 500 kV contingencies will result in tripping of generation projects connecting to the Imperial Valley and/or Boulevard East and/or ECO substations and/or the C493 switchyard:

- A. Category B contingencies with up to 1,150 MW of generation tripping
  1. Imperial Valley-ECO 500 kV line (eastern segment of Southwest Powerlink (SWPL) after looping into ECO)
  2. ECO-Miguel 500 kV line (western segment of SWPL after looping into ECO)
  3. Imperial Valley-C493 500 kV line (segment of Sunrise Powerlink (SRPL) after looping into C493)



4. C493-Suncrest 500 kV line (segment of Sunrise Powerlink after looping into C493)
  - B. Category C contingencies with up to 1,400 MW of generation tripping
    1. Imperial Valley-ECO 500 kV line (segment of SWPL after looping into ECO) and Imperial Valley-C493 500 kV line (segment of Sunrise Powerlink after looping into C493).
    2. North of Miguel N-2
      - A. Miguel-Mission 230 kV lines #1 and #2
      - B. Miguel-Sycamore 230 kV lines #1 and #2
    3. Imperial Valley Stuck Breaker
      - A. Imperial Valley-North Gila 500 kV line and Imperial Valley 500/230 kV transformer bank
      - B. Imperial Valley-C493 500 kV line and Imperial Valley 500/230 kV transformer bank

The existing IV SPS is based on the two 500 kV (one to North Gila and one to Miguel) and the two 230 kV transmission lines (one to IID and one to CFE) as outlets at the IV Substation. After the Sunrise Powerlink is in-service, the IV SPS with its current modules/logic would no longer be needed until more generation connects to the IV Substation and substantiates the need for the SPS again. CAISO and SDG&E Grid Operations are planning to remove the IV SPS from service in the near future. However, the equipment will remain in place and as more generation develops, and if the need for the IV SPS is identified in studies, the IV SPS will be returned to service.

All new SPSs and modifications to existing SPSs are subject to review by Affected System Operators, members of the Imperial Valley RAS Technical Committee, and review and approval by WECC RASRS.

#### **4.6.2 Operating Procedures**

Additional provisions and operating procedures (which may include curtailing the output of C1C2 Projects during planned or extended forced outages) may be required for reliable operation of the transmission system. These procedures, if needed, will be developed before the projects' Commercial Operation Dates in coordination with CAISO Grid Operations and SDG&E Grid Operations.

## **5. Study Criteria and Methodology**

The information in this section did not change from the original study. See original Group Report dated August 24, 2011.

## 6. Deliverability Assessment

The Deliverability Assessment was performed by the CAISO according to the On-Peak and Off-Peak Deliverability Assessment Methodologies posted on the CAISO website at: <http://www.caiso.com/1c44/1c44b5c31cce0.html>. See original Group Report dated August 24, 2011 for more details on the process and assumptions used to perform the Re-Study.

Due to the updated study assumptions, the following Network Upgrades that were identified in the Deliverability Assessment in the original C1C2 Phase II Study are no longer needed:

- A. Implement an SPS to protect Mission-Old Town 230 kV line for N-2 contingencies
- B. Implement an SPS to trip the San Luis Rey 138/69 kV transformer bank to prevent overload of Cannon-San Luis Rey 138 kV line for an N-2 (Some C1C2 projects contributed to an overload on the Cannon-San Luis Rey 138 kV line and San Luis Rey 138/69 kV transformer following the N-2 outage of Encina-San Luis Rey 230 kV and Encina-San Luis Rey-Palomar 230 kV lines. The Re-Study identified the preferred mitigation to be implementation of an SPS to trip generation. Because tripping the C1C2 Projects is marginally effective in eliminating the overload, other more effective generators will be participating in the SPS and the C1C2 Projects are not expected to be included in this SPS)
- C. Install 2nd ECO 230/138 kV transformer bank
- D. Reconductor Escondido-Palomar Energy 230 kV lines #1 and #2
- E. Reconductor Friars-Doublet Tap 138 kV line

The following Network Upgrades that were identified in the Deliverability Assessment in the original Phase II Study are still needed:

- A. Participate in existing Otay Mesa Energy Center Generator SPS for N-1 and N-2 contingencies
- B. Reconfigure TL23041 and TL23042 at Miguel Substation to create two Otay Mesa-Miguel 230 kV lines

Prior to the distribution of this Phase II Re-Study, some C1C2 Projects received addendums that documented studies performed by the CAISO (C1C2 Phase II Re-assessment) to re-assess specific upgrades by applying the criteria in the Technical Bulletin issued January 31, 2012 (and revised February 2, 2012) entitled "Generation Interconnection Procedures: Deliverability Requirements for Clusters 1-4." Those addendums to the Appendix As of the C1C2 Phase II report contained a revised identification of Network Upgrades resulting from the Re-assessment. Applicable C1C2 Projects received addendums detailing the results of the C1C2 Phase II Re-assessment on February 10, 2011. The addendums specified that the SCE Upgrades identified in the original Phase II Study do not apply to the SDG&E area C1C2 Projects. The C1C2 Phase II Re-assessment also identified deliverability constraints and generation dispatch limitations. In addition, two C1C2 projects received addendums unrelated to the Re-assessment. This Phase II Re-Study incorporates the results from all prior addendums and the results are presented below.

The C1C2 Phase II Re-Study removed the upgrades that met the criteria specified in the Technical Bulletin. The following project and its associated upgrades that affect the SDG&E area study met the criteria for removal:

Q72 and associated upgrades

Table 6.1 lists the deliverability constraint identified in the Re-Study as a result of the removal of the Q72 project and its associated upgrades.

**Table 6.1: Deliverability Constraint**

Contingency	Limiting Facility
Normal condition	Path 43 (North of SONGS) path rating

Due to the above constraint, between 600 and 1400 MW of generation in the SDG&E area cannot be dispatched. The lower value is based on the assumption that Encina units 4, 5, and the gas turbine (GT) (644 MW total) and Cabrillo II generation (188 MW) will not be repowered. If these units are repowered, their deliverability may need to be preserved, and more generation will have to be limited.

In the scenario where Encina units 4, 5, and the GT are not repowered, the Re-Study identified an N-0 overload on the Miguel-Bay Boulevard 230 kV line. Since this overload is caused by the removal of existing generation, its mitigation is not being assigned to C1C2 generators. An overload on this line was identified in the CAISO's 2011/2012 Transmission Planning Process and it is expected to be mitigated through that process<sup>3</sup>. There is a possibility that when Bay Boulevard Substation is constructed, the rating of the Miguel-Bay Boulevard 230 kV line could be greater than what was modeled, and this higher rating may be sufficient to eliminate the identified overload.

Table 6.2 provides the approximate number of MWs that are deliverable if Q72 and its associated transmission upgrades are not in-service. Given that there is approximately 3,800 MW of generation in the CAISO queue that significantly flow across the deliverability constraint shown in Table 6.1, approximately 2,400 MW to 3,200 MW can be accommodated as fully deliverable without the need for major upgrades similar to Q72 upgrades. As a comparison, the renewable portfolios under study in the 2011/2012 CAISO Transmission Planning Process have no more than approximately 1,000 MW to 2,000 MW of generation that significantly flow across the constraint.

**Table 6.2: Summary of Results – SDG&E Area**

Contingency	Low End of Range	High End of Range
Deliverable MW in SDG&E area	2400	3200

<sup>3</sup> The final 2011/2012 Transmission Plan report is available at <http://www.aiso.com/Documents/Board-approvedISO2011-2012-TransmissionPlan.pdf>

Table 6.3 lists the set of proposed generation projects for the deliverability constraint and Table 6.4 lists the shift factors on the constraint. The proposed generation dispatch by CREZ in the lower level of withdrawal case is also shown in Table 6.4.

**Table 6.3: Generation Projects Contributing to the North of SONGS Deliverability Constraint**

<b>Generation Projects Contributing to the North of SONGS Deliverability Constraint</b>			
<b>Project Q#</b>	<b>POI</b>	<b>Pmax</b>	<b>CREZ</b>
13	Olivehain-Bernardo-Rancho Santa Fe 69 kV line	40	Non-CREZ
32	Boulevard Station 138 kV Bus	201	San Diego South
103	Border Sub 69 kV Bus	27	Non-CREZ
106A	Boulevard Sub 138 kV Bus	160	San Diego South
124	Imperial Valley Substation 230 kV bus	600	Imperial – SDG&E
137	Encina Substation 230 kV bus	260	Non-CREZ
150	Border Substation	47.4	Non-CREZ
159A	Imperial Valley-Miguel new 230/500 kV Sub 230 kV bus	400	San Diego South
189	Encina 138kV Substation	260	Non-CREZ
337	Borrego Substation 69 kV	25.75	Non-CREZ
429	Imperial Valley Substation	100	Imperial - SDG&E
442	Imperial Valley 230 kV	125	Imperial - SDG&E
493	Sunrise Powerlink 500 kV line	299	Imperial - SDG&E
510	Imperial Valley Substation 230 kV bus	200	Imperial - SDG&E
561	Imperial Valley Sub 230 kV bus	200	Imperial - SDG&E
565	Carlton Hills 138 kV	100	Non-CREZ
574	Otay Mesa Sub 230 kV Bus	308	Non-CREZ
590	Imperial Valley Sub 230 kV bus	150	Imperial - SDG&E
608	Imperial Valley Sub 230 kV bus	250	Imperial - SDG&E
<b>Total MW</b>		<b>3753</b>	

**Table 6.4: Shift Factors by CREZ**

Shift Factors and Dispatch by CREZ			
Limiting Facility	Path 43 (North of SONGS)		
Contingency	Normal		
	PMAX	Shift Factors	PGEN
Imperial - SDG&E	1924	0.26	868.6
San Diego South	761	0.33	275.5
Non-CREZ	1068	0.59 - 0.42	1037.2

## 6.1 Required Network Upgrades

### 6.1.1 Participate in Existing Otay Mesa Energy Center Generator SPS

This upgrade is still needed and the original scope of work is unchanged:

Modify existing SPS that trips generation at Otay Mesa for outages of Otay Mesa-Miguel 230 kV lines

### 6.1.2 Reconfigure TL23041 and TL23042 at Miguel to create two Otay Mesa-Miguel 230 kV lines

This upgrade is still needed and the original scope of work is unchanged:

Reconfigure TL23041 and TL23042 at Miguel to create two Otay Mesa-Miguel 230 kV lines

## **7. Reliability Study Steady-State Analysis**

### **7.1 Detailed Base Case Assumptions**

The Reliability Study re-evaluated SDG&E's transmission system under stressed conditions. The steady-state studies identified thermal overloads due to the simultaneous dispatch of all C1C2 Projects. C1C2 Projects were dispatched as one cluster.

The steady-state power flow analysis in the Reliability Study was performed to ensure that with the proposed interconnections SDG&E's transmission system remains in compliance with North American Electric Reliability Corporation (NERC) reliability standards TPL-001, 002, 003 and 004. The results of this power flow analysis will serve as documentation that the reliability impacts of new facilities and their connections on interconnected transmission systems are evaluated.

The CAISO and SDG&E cannot guarantee that C1C2 Projects can operate at maximum rated output at all times without adverse system impacts, especially during the times and seasons not studied in the Phase II Re-Study.

A 2015 Heavy Summer power flow base case was used for the analysis in the Phase II Re-Study. The Phase II Re-Study Reliability Study Heavy Summer case modeled all CAISO approved projects in the SDG&E area. The SDG&E system was modeled with a 5,342 MW (load + losses) target (1-in-10 CEC 2015 load forecast), a moderate Cut Plane import target, and moderate In-Basin generation. The Heavy Summer case includes transmission system topology updates provided by CFE and IID. IID's area export matched the WECC Heavy Summer approved base case (14hs3sa.sav). CFE requested an import (SDGE to CFE) of 100 MW for the 2015 Heavy Summer due to CFE generation retiring or not developed as planned. The loads and topology of other WECC areas replicated the 14hs3sa.sav case.

A 2015 Light Load power flow base case was used for the analysis in the Phase II Re-Study. The Light Load case modeled all CAISO approved projects in the SDG&E area. The SDG&E system was modeled with a 2,938 MW (load + losses) target (55% of the 1-in-10 CEC 2015 load forecast), a moderate Cut Plane import target, and moderate In-Basin generation. IID's area export matched the WECC 2014 Light Autumn approved base case (14la1sa.sav). The Light Load case includes transmission system topology updates provided by CFE and IID. CFE is modeled exporting 350 MW from CFE to SDG&E to create a stressed scenario. The loads and topology of other WECC areas replicated the 14la1sa.sav.

All C1C2 Projects were modeled at Pmax simultaneously. While it is impractical to study all combinations of system load and generation levels during all seasons and at all times of the day, the base case represents extreme loading and generation conditions for the study area.

CAISO approved transmission projects and proposed generation projects and associated Network Upgrades were modeled as noted in Section 4. See Appendix C for Re-Study for additional details regarding SDG&E generation dispatch.

The Deliverability Assessment identified one Reliability Network Upgrade (RNU) and one Delivery Network Upgrade (DNU). All upgrades identified in the Deliverability Assessment were modeled in the Reliability Study Post-C1C2 cases, as listed in Tables 7.1 and 7.2.

**Table 7.1: Deliverability Assessment Identified RNUs Modeled in the Reliability Study**

Description of Upgrade	
1	Participate in existing Otay Mesa Energy Center Generator SPS for N-1 and N-2 contingencies

**Table 7.2: Deliverability Assessment Identified DNUs Modeled in the Reliability Study**

Description of Upgrade	
1	Reconfigure TL23041 and TL23042 at Miguel Substation to create two Otay Mesa-Miguel 230 kV lines

**7.2 Reliability Study Steady-State Results**

SDG&E’s Reliability Study dispatched all C1C2 Projects regardless of Deliverability Status. Dispatched generation includes existing and queued generation. The results of the Reliability Study’s steady-state power flow analysis for the C1C2 Projects are shown in Appendix D for Re-Study.

Not all pre-C1C2 Projects may be simultaneously dispatched at rated output due to the constraints summarized below:

- A. Generation projects interconnecting to ECO and Boulevard East substations are limited to 1,150 MW due to the CAISO N-1 generation tripping limit (for N-1 of a single ECO 500/230 kV transformer bank). The output of higher-queued projects connecting to Boulevard East or ECO substations was reduced<sup>4</sup>. Generators connecting at Boulevard East or ECO substations will be required to participate in the proposed ECO/Boulevard East SPS which trips all dispatched generation connected at ECO 230 and/or 138 kV and Boulevard East substations in the event of an N-1 of the ECO 500/230 kV transformer.
- B. Generation projects interconnecting to Boulevard East Substation and ECO 138 kV bus are limited due to the continuous loading limit of 392 MVA on the single ECO 230/138 kV transformer bank. An accompanying SPS will be implemented to trip this generation to prevent the ECO 230/138 kV transformer bank from overloading under N-0 conditions. This limitation is not needed for pre-C1C2 Projects but dispatching generation from C1C2 Projects connected to the Boulevard East Substation or ECO 138 kV bus may overload the ECO 230/138 kV transformer bank. C1C2 Projects connecting at Boulevard East Substation and the ECO 138 kV bus will be required to participate in the N-0 dispatch limitation to maintain loading less than the 392 MVA continuous limit of the single ECO 230/138 kV transformer bank. Also, generation will be tripped with the outage of the ECO 230/138 kV transformer bank.

<sup>4</sup>Higher-queued Projects, Q189 and Q215, have In-Service Dates beyond 2016. The In-Service Dates are 2018 and 2020, respectively. Q189 and Q215 were modeled in the case and not dispatched to represent the dispatch for the 2015 year of study.



- C. Constraints also included observing the Path 43 (North of SONGS) maximum flow limit of 2,440 MW. The maximum output of the generation at Imperial Valley Substation and C493 combined, 1,944 MW Heavy Summer or 1,544 MW Light Load, is the limit to adhere to the Path 43 flow limit.

**7.2.1 Steady-State Thermal Results for C1C2 Projects in SDG&E System**

The scenarios studied include Network Upgrades identified in the Deliverability Assessment, as noted in Tables 7.1 and 7.2, and dispatch constraints, as noted in Section 7.2. C1C2 Projects injecting into the 138 kV side of the ECO 138/230 kV transformer, at Boulevard Substation and the ECO 138 kV bus, overload the 230/138 kV ECO bank N-0 for both the Heavy Summer scenario and the Light Load sensitivity. However, since some of the projects have requested Energy Only Deliverability Status, the need for an additional transformer is not identified by the Deliverability Assessment studies. No other thermal overloads are due to C1C2 Projects for the Heavy Summer scenario or the Light Load sensitivity. Mitigation, in addition to the Network Upgrades identified by the Deliverability Assessment, is listed in Table 7.3.

**Table 7.3: Reliability Study Identified RNU**

Description of Upgrade	
1	Implement an SPS to protect ECO 230/138 kV transformer bank for overload or outage

**7.2.2 Steady-State Voltage Results in SDG&E System**

No steady-state voltage violations were observed in the SDG&E transmission system due to the addition of the C1C2 Projects.

**7.2.3 Steady-State Reactive Power Deficiency Analysis Results**

The results from the original study are still valid. See original Group Report dated August 24, 2011.

**7.2.4 Affected Systems**

Due to the IV SPS and the Otay Mesa SPS, no thermal overloads were identified in the IID or CFE transmissions as a result of the addition of the C1C2 Projects. However, the CAISO analyses primarily focus on the CAISO system, and the definitive analyses of the impacts on Affected Systems are the responsibility of the Affected System Operator to perform.

## **8. Short Circuit Duty Analysis**

The results from the original study are still valid. See details in the original Group Report dated August 24, 2011.

CFE's transmission system was identified as an Affected System in the short circuit analysis due to the reconfiguration of TL23041 and TL23042 at the Miguel Substation. The short circuit study results showed a 27% increase in fault current at the Tijuana 230 kV bus. The CAISO analyses primarily focus on the CAISO system, and the definitive analyses of the impacts on Affected Systems are the responsibility of the Affected System Operator to perform.

## **9. Transient Stability Analysis**

The results from the original study are still valid. See original Group Report dated August 24, 2011.

## **10. Post-Transient Voltage Stability Analysis**

The results from the original study are still valid. See original Group Report dated August 24, 2011.

## **11. Post-Transient Reactive Power Deficiency Analysis**

The results from the original study are still valid. See original Group Report dated August 24, 2011.

## **12. Mitigation**

The mitigation requirements triggered by the C1C2 Projects, based on the results described in Sections 6-11, are as follows.

### **12.1 Facilities for Project Interconnections**

The plan of service for the Reliability Network Upgrades required for the physical interconnection of the C1C2 Projects is discussed in detail in each Individual Project Report (Appendix A).

### **12.2 Delivery Network Upgrades**

The scope for the Delivery Network Upgrade for C1C2 Projects in the SDG&E System is discussed below.

#### **Reconfigure TL23041 and TL23042 at Miguel Substation to create two Otay Mesa-Miguel 230 kV lines**

- A. Install 1-230 kV breaker, 2-230 kV disconnects, relaying, new steel pole, and 600 feet of bundled 900 ACSS/AW for TL23041, Otay Mesa-Miguel-Sycamore 230 kV line
- B. Install 1-230 kV breaker and relaying for TL23042, Miguel-Otay Mesa-Bay Boulevard 230 kV line

### **12.3 Reliability Network Upgrades**

#### **12.3.1 Special Protection Systems**

Per the CAISO guidelines, all SPSs are classified as Reliability Network Upgrades because their cost is less than \$1 million. This is to prevent overburdening of CAISO's congestion management system which can increase processing time to a point that could create reliability concerns.

##### **12.3.1.1 Participate in Existing Otay Mesa Energy Center Generator SPS**

Currently, there is an SPS to trip existing generation at Otay Mesa Energy Center to protect CFE's transmission system in the event of an N-2 contingency of the Otay Mesa-Miguel/Bay Blvd Tap-Bay Blvd 230 kV and Otay Mesa-Miguel/Sycamore Tap-Sycamore 230 kV transmission lines. Some of the C1C2 Projects will be added to this existing SPS. The details are provided in Appendix A.

In addition, the SPS will be modified to monitor the parallel Miguel-Otay Mesa 230 kV lines #1 and #2. An SPS is proposed to trip some C1C2 Projects after detecting an emergency rating overload of one line following the N-1 contingency of the parallel line. The C1C2 Project connecting to the Otay Mesa Switchyard will be subject to this modification of the SPS. The details are provided in Appendix A.

### **12.3.1.2 Imperial Valley SPS**

Currently, there is an Imperial Valley Special Protection System in place which limits the impact of generation plants connected to the Imperial Valley Substation for various N-1 and N-2 contingencies and mitigates adverse impacts to the SDG&E, CFE, and IID's transmission systems. Participation in this existing IV SPS is proposed as a Reliability Network Upgrade.

The Imperial Valley area generation output is currently limited by the CAISO criteria of 1,150 MW of generation tripping for a Category B contingency and 1,400 MW of generation tripping for a Category C contingency. Study results for the C1C2 Projects showed that tripping 1,400 MW of generation for N-2 and 1,150 MW of generation for N-1 contingencies mitigated any adverse impacts on neighboring systems. No additional generation tripping was required beyond the 1,400 MW limit for N-2 or 1,150 MW for N-1.

Currently, there are 1,070 MW of generation connected at Imperial Valley Substation which is subject to the Imperial Valley generation tripping SPS. It should be assumed that any generation which would impact the facilities protected by the Imperial Valley SPS would be included in the generation tripping scheme covered by this SPS. C1C2 Projects injecting power into the Sunrise Powerlink, Southwest Powerlink, and the Imperial Valley Substation will be subject to this SPS. The details are provided in Appendix A.

All new SPSs and modifications to the existing ones are subject to review by Affected System Operators, members of the Imperial Valley RAS Technical Committee, and review and approval by the WECC RASRS.

### **12.3.1.3 Participate in Proposed ECO 500/230 kV transformer bank outage SPS**

In the event of the N-1 contingency of the 500/230 kV transformer bank at ECO Substation, all generation interconnected at Boulevard East and ECO substations must be tripped by this SPS. In addition, as described in Section 7.2, the combined generation dispatch at these two substations is limited to 1,150 MW. It is assumed that any generation interconnected at Boulevard East and ECO substations will participate in generation reduction and this SPS. The details are provided in Appendix A.

### **12.3.1.4 Implement an SPS to protect ECO 230/138 kV transformer bank for overload or outage of bank**

The amount of generation dispatched at the Boulevard East Substation and the ECO 138 kV bus will be limited to prevent the overload of the ECO 230/138 kV transformer bank. The SPS will be implemented to trip this generation for the overload or outage of the ECO 230/138 kV transformer bank. C1C2 Projects connecting at Boulevard East Substation and the ECO 138 kV bus will be subject to this SPS. The details are provided in Appendix A.

### **12.3.2 Mitigation for Steady-State Voltage Violation**

There were no steady-state voltage violations identified to mitigate.

### **12.3.3 Mitigation for Short Circuit Duty**

There were no overstressed circuit breakers in SDG&E's transmission system due to the C1C2 Projects.

However, the short circuit study results showed a 27% increase in fault current at CFE's Tijuana 230 kV bus. The reconfiguration of TL23041 and TL23042 at the Miguel Substation was the primary reason for the significant increase in fault current. This Re-Study introduces one option for mitigation, a current limiting series reactor to be installed on the Otay Mesa-Tijuana 230 kV line. Coordination with CFE is needed to confirm this option will mitigate the increased fault current at Tijuana 230 kV and will maintain the existing fault duty margin for CFE's future expansion.

#### **Install current limiting series reactor on Otay Mesa-Tijuana 230 kV line**

- A. Install 3-single phase 230 kV series reactors (2.9-3.0 ohm) in Bay 4 in the Otay Mesa Switchyard
- B. Connect series reactors to the Otay Mesa-Tijuana 230 kV line (TL23040)
- C. Re-arrange termination of TL23040 in Otay Mesa Switchyard to accommodate the connection of the series reactor
- D. Install associated structures
- E. Relay protection

### **12.3.4 Mitigation for Transient Stability**

See original Group Report dated August 24, 2011. There were no transient stability issues identified to mitigate.

### **12.3.5 Mitigation for Post-Transient Voltage Stability**

See original Group Report dated August 24, 2011. There were no post-transient stability issues identified to mitigate.

### **12.3.6 Mitigation for Post-Transient Reactive Power Deficiency**

See original Group Report dated August 24, 2011. There were no reactive power deficiency issues identified to mitigate.

### **12.3.7 Mitigation for Steady-State Reactive Power Deficiency**

See original Group Report dated August 24, 2011. There were no reactive power deficiency violations identified to mitigate. Since it is impractical to study all system conditions SDG&E Grid Operations may face in real time, asynchronous generator



projects are urged to construct generators with 0.95 lagging to 0.95 leading power factor range capability in order to meet SDG&E's specified voltage schedule. Synchronous generators will be required to provide 0.90 lagging to 0.95 leading power factor per LGIA 9.6.1.

### **13. Environmental Evaluation/Permitting**

The information in this section did not change from the original study. See original Group Report dated August 24, 2011.

## 14. Upgrades, Cost Estimates, and Time to Construct Estimates

The cost estimates are good faith estimates and are based on the published unit costs, when applicable. Customized costs were developed when the unit costs did not reflect the unique circumstances of a project. The customized costs include: anticipated land acquisition costs, environmental mitigation, licensing/permitting, looping lines into substations, new switchyards, substation upgrades not included in unit costs, and PTO's Interconnection Facilities.

The Commercial Operation Dates of the C1C2 Projects are dependent on the completed construction and energizing of the identified Network Upgrades. Based on the estimated time to construct for the Network Upgrades listed in Table 14.1, it appears feasible to complete all the Network Upgrades required for mitigation before the requested Commercial Operation Dates of the projects in the cluster.

Some of the projects also require Reliability Network Upgrades to accommodate their physical interconnections. Based on the time needed to license/permit, design, procure material, and construct, it may not be feasible to complete all Reliability Network Upgrades to physically interconnect all the C1C2 Projects before the requested In-Service Dates. Projects cannot connect until all Reliability Network Upgrades are in-service. Specific details are presented in the Individual Project Reports for applicable projects.

Costs for each generation project are confidential and are not published in this Group Report. Each IC is also receiving an Individual Project Report (Appendix A), specific only to their generation project, containing the details of the IC's cost responsibilities.

The estimated cost of **Reliability Network Upgrades** identified in this Group Study is assigned to all Interconnection Requests in that Group Study according to the following rules: (a) short circuit related Reliability Network Upgrades will be assigned pro rata on the basis of the total short circuit duty contribution of each Generating Facility and its associated Network Upgrades, (b) for all other Reliability Network Upgrades, the cost will be assigned pro rata on the basis of the maximum megawatt electrical output of each proposed new Large Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request. The Reliability Network Upgrades required for a project to "physically" interconnect (i.e. bus extension, new switchyard, etc.) are presented only in the Individual Project Reports. Some mitigation measures are related to the telecommunications needed for each individual SPS. SPS costs may have two components. The cost for the SDG&E protection and communication equipment for the monitored facilities is assigned pro rata on the basis of the maximum megawatt electrical output of each project. The cost for the protection and communication equipment to interface between SDG&E and each project is assigned directly to the participating project.

The estimated cost of all **Delivery Network Upgrades** identified in the Deliverability Assessment are assigned to all Interconnection Requests selecting Full Capacity Deliverability Status based on the flow impact of each such Large Generating Facility on the Delivery Network Upgrades as determined by the generation distribution factor methodology.

The estimated cost of all **PTO's Interconnection Facilities** is assigned to each Interconnection Request individually. The cost estimates for the PTO's Interconnection Facilities are all site specific and details are provided in each Individual Project Report.

The cost of the mitigation plan for overloads of SDG&E facilities attributed to the C1C2 Projects evaluated as a cluster is **\$9,240,000**, as shown in Table 14.1.

PTO's Interconnection Facilities and Reliability Network Upgrades required to physically interconnect specific projects are identified (as appropriate) in each project's Appendix A. The non-binding, good faith estimate of time to construct (license/permit, design, procure material, and construct) the facilities identified in the report will be project-specific and will be based upon the assumption that the environmental permitting obtained by the IC is adequate for permitting all SDG&E activities.

It is assumed that the Interconnection Customers will include the PTO's Interconnection Facilities and Network Upgrades work scope in their environmental impact study/report to the regulatory agency having jurisdiction over the permitting of their project. In the time to construct estimates, SDG&E included the time required for a PTC or CPCN, if it was anticipated. If the CPUC requires licensing when it was not anticipated by SDG&E, timing for the upgrade could be extended by two to three years.

**Table 14.1: SDG&E Network Upgrades, Estimated Costs, Estimated Time to Construct**

Type of Upgrade	Upgrade		Estimated Cost x 1,000 (Note 1)	Estimated Time to Construct (Note 2)
Reliability Network Upgrades	Participate in existing Imperial Valley SPS for multiple N-1 and N-2 contingencies (Notes 3 & 4)	SDG&E protection and communication equipment for Imperial Valley Substation, ECO Substation, and C493 switchyard (Note 5)	\$300	12 Months
		Protection and communication equipment to interface between SDG&E and projects (Note 6)	\$1,800	12 Months
	Participate in proposed ECO 500/230 kV transformer bank outage SPS (Note 3)	SDG&E protection and communication equipment for ECO Substation (assumed installed with higher-queued projects) (Note 5)	\$0	-
		Protection and communication equipment to interface between SDG&E and projects (included in IV SPS cost) (Note 6)	\$0	-
	Implement an SPS to protect ECO 230/138 kV transformer bank for overload or outage (Note 3)	SDG&E protection and communication equipment for ECO Substation and Boulevard East Substation (Note 5)	\$300	12 Months
		Protection and communication equipment to interface between SDG&E and projects (included in IV SPS cost) (Note 6)	\$0	-
	Participate in existing Otay Mesa Energy Center Generator SPS for N-1 and N-2 contingencies (Note 3)	SDG&E protection and communication equipment for Miguel Substation and Otay Mesa (already installed) (Note 5)	\$0	-
		Protection and communication equipment to interface between SDG&E and projects (Note 6)	\$200	-
	Install current limiting series reactor on Otay Mesa-Tijuana 230 kV line	<ul style="list-style-type: none"> <li>Install 3-single phase 230 kV series reactors (2.9-3.0 ohm) in Bay 4 in the Otay Mesa Switchyard</li> <li>Connect series reactors to the Otay Mesa-Tijuana 230 kV line (TL23040)</li> <li>Re-arrange termination of TL23040 in Otay Mesa Switchyard to accommodate the connection of the series reactor</li> <li>Install associated structures</li> <li>Relay protection</li> </ul>	\$2,355	12 Months
	Delivery Network Upgrades	Reconfigure TL23041 and TL23042 at Miguel Substation to create two Otay Mesa-Miguel 230 kV lines	For TL23041, Otay Mesa-Miguel-Sycamore 230 kV line: <ul style="list-style-type: none"> <li>Install 1-230 kV breaker, 2-230 kV disconnects, and relaying</li> <li>Install a new anchor-bolted deadend steel pole</li> <li>Install approximately 600 feet of bundled 900 ACSS/AW</li> </ul>	\$4,285
For TL23042, Miguel-Otay Mesa-Bay Boulevard 230 kV line: <ul style="list-style-type: none"> <li>Install 1-230 kV breaker and relaying</li> </ul>				
<b>Total</b>			<b>\$9,240</b>	<b>18 Months</b>

Notes for Table 14.1:

- Note 1: *Estimated costs in "as year spent" dollars and in thousands of \$ dollars, excluding Allowance for Funds Used During Construction (AFUDC). Estimated costs include land purchases and licensing/permitting costs, when appropriate.*
- Note 2: *Time to construct estimates include time for licensing/permitting, when appropriate. The estimated time to construct is for a typical project; construction duration may change due to the number of projects simultaneously in construction. Multiple projects impact resources, system outage availability, and environmental windows of construction. A key assumption is SDG&E will need to obtain CPUC licensing and regulatory approvals prior to design, procurement, and construction of the proposed facilities. The time to construct is not cumulative.*
- Note 3: *Per CAISO guidelines, all Special Protection Systems are classified as Reliability Network Upgrades because their cost is less than \$1 million per project. This is to prevent overburdening of CAISO's congestion management system which can increase processing time to a point that could create reliability concerns.*
- Note 4: *The existing Imperial Valley SPS protects SDG&E, CFE, and IID following various N-1 and N-2 contingencies. All new SPSs and modifications to existing SPSs are subject to review by Affected System Operators, members of the Imperial Valley RAS Technical Committee, and review and approval by the WECC RASRS.*
- Note 5: *The SPS cost includes the equipment on the PTO's system. This is a one-time setup and equipment cost. The SPS cost does not include any control, protection, and/or fiber-optic communication costs at the projects' facility.*
- Note 6: *The SPS cost includes project-specific equipment required on the PTO's system for interface with the projects, as well as equipment provided to the projects for installation at the projects' facility. Additional SPSs would require updated logic, but minimal/no cost.*

## **15. Coordination with Affected Systems**

CAISO Appendix Y GIP Tariff, Section 3.7 requires the CAISO to notify the Affected System Operators that are potentially affected by the C1C2 Projects. The CAISO will also coordinate the studies, performed by or under the direction of the Affected System Operators and at the cost to the Interconnection Customer, required to determine the impact on any Affected Systems, to the extent possible.

Due to the participation of the C1C2 Projects, as necessary, in the IV SPS, no thermal overloads were identified in the CFE or IID transmission systems as a result of the addition of C1C2 Projects. However, the CAISO analyses primarily focus on the CAISO system, and the definitive analyses of the impacts on Affected Systems are the responsibility of the Affected System Operator to perform.

CFE was identified as an Affected System in the short circuit analysis due to the Delivery Network Upgrade reconfiguring TL23041 and TL23042 at the Miguel Substation. The short circuit study results showed a 27% increase in fault current at the Tijuana 230 kV bus. The proposed current limiting series reactor will mitigate the increased fault current at Tijuana 230 kV and will maintain the existing fault duty margin for CFE's future expansion.

The CAISO will coordinate, to the extent possible, further communications and study efforts between CFE, IID, and the appropriate project developers.

## **16. Local Furnishing Bonds**

The results from the original study are still valid. See original Group Report dated August 24, 2011.



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# **Re-Study of C1C2 Phase II Appendix A – C565 Individual Project Report**

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**Cogentrix Energy, LLC**

**Quail Brush Power Project**

**Final Report**



**California ISO**  
Shaping a Renewed Future

**June 4, 2012**

This study has been completed in coordination with San Diego Gas & Electric Company per CAISO Tariff Appendix Y Generator Interconnection Procedures (GIP) for Interconnection Requests in a Queue Cluster Window

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## 1. Executive Summary

Cogentrix Energy LLC, an Interconnection Customer (IC), has submitted a completed Interconnection Request (IR) to the California Independent System Operator (CAISO) for their proposed Quail Brush Power Project (Project) interconnecting to the CAISO Controlled Grid. (Subsequent to the Phase I Study, the ownership of the Project was transferred from ENPEX Corporation and the project name was changed from San Diego Community Power Project 2.) The revised Project is a natural gas reciprocating engine generation facility with a net output of 100 MW to the Point of Interconnection (POI), which is in San Diego, California. Subsequent to the original Phase II Study, the IC revised the Point of Interconnection (POI) to be at San Diego Gas & Electric's (SDG&E) existing 138 kV bus at the Carlton Hills Substation. The revised proposed Commercial Operation Date (COD) of the Project is May 15, 2014. The Project occupies Queue Position 565 in the CAISO Queue.

The IC elected Full Capacity Deliverability Status.

In accordance with Federal Energy Regulatory Commission (FERC) approved Generator Interconnection Procedures (GIP) for Interconnection Requests in a Queue Cluster Window (CAISO Appendix Y), this project was studied in the Cluster 2 Phase I Study and in the Cluster 1, Cluster 2, and the Small Generator Interconnection Procedures Transition Cluster projects (C1C2 Projects) Phase II Study (Phase II Study). The IC received the Phase II Study on August 24, 2011.

Prior to the distribution of this Phase II Re-Study report, the IC received an addendum issued on January 17, 2011 that reflected the change of POI. The IC also received a Revised Second Addendum on February 14, 2012 that documented studies performed by the CAISO (C1C2 Phase II Re-assessment) to re-assess certain upgrades by applying the criteria in the Technical Bulletin issued January 31, 2012 (and revised February 2, 2012) entitled "Generation Interconnection Procedures: Deliverability Requirements for Clusters 1-4."<sup>1</sup> The Revised Second Addendum to Appendix A of the C1C2 Phase II report contained a revised identification of Network Upgrades resulting from the Re-assessment. The addendum specified that the SCE Upgrades identified in the original Phase II Study do not apply to the Project. In addition, the C1C2 Phase II Re-assessment identified deliverability constraints and generation dispatch limitations. The results from the Re-assessment are still applicable and are reflected in this Phase II Re-Study.

The purpose of this C1C2 Phase II Re-Study (Re-Study) is to incorporate the results from the C1C2 Phase II Re-assessment and determine which Network Upgrades that were identified in the original Phase II Study are still needed, as described in the C1C2 Phase II Re-Study Group Report. This Individual C1C2 Project Re-Study Report focuses only on the impacts of this project.

The report provides updated results for the following:

- A. Transmission system impacts caused by this project,

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<sup>1</sup> The Technical Bulletin can be accessed on the ISO website at [http://www.caiso.com/Documents/TechnicalBulletin-GeneratorInterconnectionProcedures-DeliverabilityRequirements-Clusters1-4Jan31\\_2012.pdf](http://www.caiso.com/Documents/TechnicalBulletin-GeneratorInterconnectionProcedures-DeliverabilityRequirements-Clusters1-4Jan31_2012.pdf)

- B. System reinforcements necessary to mitigate the adverse impacts caused by this project under various system conditions, and
- C. Required facilities and a non-binding, good faith estimate of this project's cost responsibility and time to construct these facilities.

The Phase II Re-Study concluded the following:

- A. Transmission system impacts caused by this project
  - 1. The Project does not cause impacts to the transmission system as identified in the Deliverability Assessment, subject to the dispatch constraints identified in the C1C2 Phase II Re-assessment and described in detail in the Re-Study Group Report.
  - 2. The Reliability Study steady-state results indicate that the Project, evaluated with the C1C2 Projects, does not cause adverse impacts to the transmission system with the associated C1C2 Projects' Delivery Network Upgrades modeled.
    - a. The results of the steady-state thermal analysis did not identify any overloaded facilities in the SDG&E transmission system.
    - b. The Project did not cause any adverse impacts to the steady-state voltage performance of the SDG&E transmission system.
    - c. Per LGIA 9.6.1, synchronous generators are required to provide reactive power capability range of 0.90 lagging to 0.95 leading, measured at the generator terminals. As such, the steady-state reactive power capability test for these types of generators is not necessary since this capability is an inherent attribute.
  - 3. The short circuit analysis results indicate that no existing or planned (if planned rating is known) SDG&E transmission circuit breakers were overstressed due to the addition of the Project. Also, no Affected Systems were identified in the short circuit analysis as a result of the interconnection of the Project.
  - 4. Transient stability results concluded that the addition of the Project would not cause the transmission system to become unstable following the select disturbances studied.
  - 5. Post-transient voltage stability analysis indicated that, under studied conditions and system configuration (including the C1C2 Projects' Delivery Network Upgrades), cases including the Project did not result in any post-transient voltage deviations of 5% or more for Category B contingencies and 10% or more for Category C contingencies from the pre-project levels or cause the SDG&E transmission system to fail to meet applicable voltage criteria.

6. The post-transient reactive power deficiency analysis indicated that, under the studied conditions and system configuration (including the C1C2 Projects' Delivery Network Upgrades), cases including the Project did not cause post-transient reactive power deficiency on the SDG&E transmission system.
  7. It appears that the energy produced by this Project will not cause an Impairment to the tax-exempt status of the Local Furnishing Bonds (LFBs) involving the Amended Annual Net Importer Test. However, if the energy from the Project is not sold exclusively to SDG&E, then an Impairment involving the Character Test may occur and if so, the IC is required to meet either of the two following requirements:
    - a. Pay any costs SDG&E incurs in mitigating the Impairment, and
    - b. Obtain a FERC order under Sections 211/213 of the Federal Power Act compelling SDG&E to provide transmission service, including interconnection service.
- B. The Project will be subject to the dispatch constraints identified in the Deliverability Assessment in the C1C2 Phase II Re-assessment and described in detail in the Re-Study Group Report.
- C. Specification of required facilities, a non-binding, good faith estimate of the Project's cost responsibility and approximate time to construct the required facilities:
1. The non-binding, good faith cost estimate of the PTO's Interconnection Facilities<sup>2</sup> to interconnect the Project is approximately **\$1,382,000**, exclusive of ITCC<sup>3</sup>. The non-binding, good faith cost estimate for the Network Upgrades<sup>4</sup> to interconnect the Project and be fully deliverable is approximately **\$180,000** on the SDG&E transmission system.
  2. The non-binding, good faith estimate of time to construct (license/permit, design, procure material, and construct) the facilities in the SDG&E system that are needed to interconnect the Project is approximately 12 months from the submittal of written authorization to proceed after the execution of the Large Generator Interconnection Agreement (LGIA).

---

<sup>2</sup> The transmission facilities owned, controlled, or operated by the PTO from the Point of Change of Ownership to the Point of Interconnection necessary to physically and electrically interconnect the Project to the CAISO Controlled Grid.

<sup>3</sup> Income Tax Component of Contribution

<sup>4</sup> The transmission facilities, other than Interconnection Facilities, beyond the Point of Interconnection necessary to accommodate the interconnection of the Project to the CAISO Controlled Grid.

## 2. Project and Interconnection Information

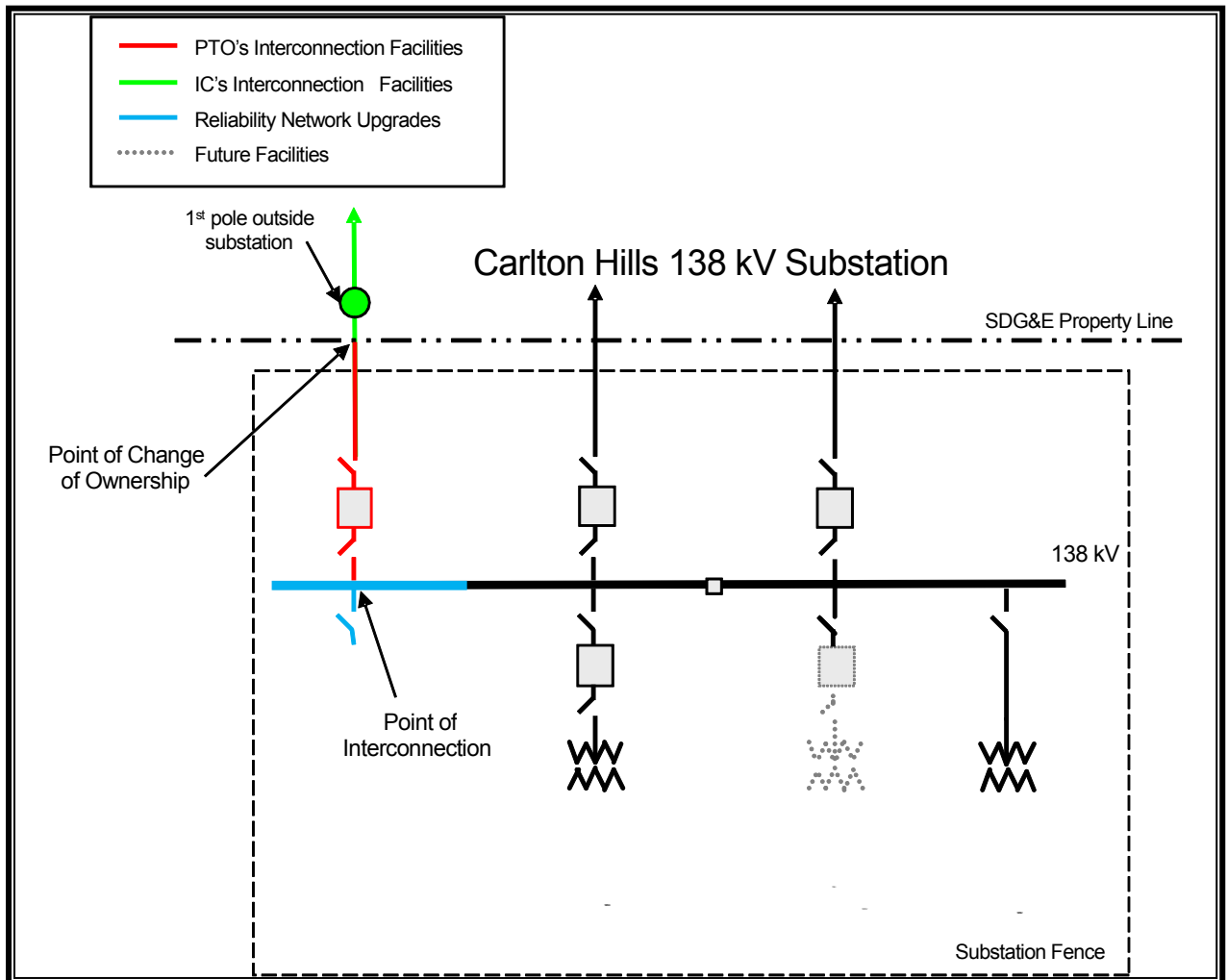
Table 2.1 provides general information about the Project.

**Table 2.1: Project General Information**

Project Location	San Diego, California
Number and Type of Generators	11 – 9.341 MW Reciprocating Engines
Interconnection Voltage	138 kV
Maximum Generator Output	102.749 MW
Generator Auxiliary Load	2.749 MW
Maximum Net Output to Grid	100 MW
Step-up Transformer	One (1) - 138/13.8 kV transformer, three phase, rated for 125 MVA with 10% impedance on 75 MVA base
Point of Interconnection	138 kV bus at Carlton Hills Substation
Alternative Point of Interconnection	Loop-in Carlton Hills-Mission 138 kV line (TL13822)

Figure 2.1 shows the Interconnection Facilities and the Reliability Network Upgrades associated with the Project's revised POI.

**Figure 2.1: Interconnection Facilities and Reliability Network Upgrades for Revised POI**



### 3. Study Assumptions

For detailed assumptions, please refer to the Group Report. The following assumptions are only specific to this project:

- The requested In-Service Date of the Project is December 15, 2013.
- The expected Commercial Operation Date of the Project is May 15, 2014.
- The IC will engineer, procure, construct, own, and maintain its project facility.

## **4. Deliverability Assessment**

### **4.1 On-Peak Deliverability Assessment**

CAISO updated the results of the On-Peak Deliverability Assessment performed in the original C1C2 Phase II Study.

The Project is not responsible for any Delivery Network Upgrades as identified in the Re-Study. However, the Project will be subject to the dispatch constraints identified in the C1C2 Phase II Re-assessment and described in detail in the Re-Study Group Report.

### **4.2 Off-Peak Deliverability Assessment**

An Off-Peak Deliverability Assessment was not performed because the C1C2 projects that triggered Delivery Network Upgrades during the Off-Peak condition in the original Phase II Study have been withdrawn or converted to EO Deliverability Status, therefore, those Delivery Network Upgrades are no longer needed.

## **5. Reliability Study Steady-State Analysis**

The steady-state thermal and voltage analyses of the Reliability Study were revised for the C1C2 Phase II Re-Study. The Project was modeled connecting to the 138 kV bus at the Carlton Hills Substation. Even though the Project was modeled at a different POI in the original Phase II Study, the original results for the remaining analyses of the Reliability Study are still valid for this conventional generator. The results of the Re-Study are reported in the applicable sub-sections.

The Project was studied as part of the C1C2 Projects, the results of which can be found in the Group Report, Section 7.2, Reliability Study Results. The Project was modeled with the Network Upgrades identified in the Deliverability Assessment.

### **5.1 Steady-State Thermal Overloads in SDG&E System**

Based on the results of the Re-Study, no steady-state thermal overloads were attributed to the Project.

### **5.2 Steady-State Voltage Results in SDG&E System**

Based on the results of the Re-Study, no steady-state voltage violations were attributed to the Project.

### **5.3 Steady-State Reactive Power Deficiency Results**

The results from the original study are still valid and are repeated in this section.

Per LGIA 9.6.1, synchronous generators are required to provide reactive power capability range of 0.90 lagging to 0.95 leading, measured at the generator terminals. As such, the



steady-state reactive power capability test for these types of generators is not necessary since this capability is an inherent attribute.

#### **5.4 Affected Systems**

No Affected Systems were identified as a result of the steady-state analysis.

## **6. Short Circuit Analysis**

The results from the original study are still valid and are repeated in this section.

Short circuit studies were performed to determine the maximum available fault current at all buses in the SDG&E service territory. This study determined the impact of increased fault current resulting from C1C2 Projects plus the associated Delivery Network Upgrades.

### **6.1 Short Circuit Study Input Data**

The following short circuit model input data was used to determine fault duty impacts of the Project:

Equivalent Reciprocating Engine Generator Unit @ 13.8 kV and 128.4 MVA Base:

- |  |              |
|--|--------------|
| A. Positive Sequence subtransient reactance ( $X''1$ ) | = 0.186 p.u. |
| B. Negative Sequence reactance ( $X2$ )                | = 0.214 p.u. |
| C. Zero Sequence reactance ( $X0$ )                    | = 0.061 p.u. |

### **6.2 Results**

#### **6.2.1 SDG&E Transmission System**

Short circuit analysis results indicate that the addition of the C1C2 Projects plus the associated Delivery Network Upgrades will not cause any SDG&E circuit breakers to become overstressed.

The IC is not responsible for mitigating any pre-existing overstressed circuit breakers.

#### **6.2.2 Affected System**

No Affected Systems were identified in the short circuit analysis as a result of the interconnection of the Project.

### **6.3 Preliminary Protection Requirements**

The IC is responsible for the protection of its own system and equipment and must meet the requirements per the SDG&E Interconnection Handbook. The SDG&E Interconnection Handbook can be found at <http://sdge.com/generation-interconnection-handbook>.

## 7. Transient Stability Analysis

The results from the original study are still valid and are repeated in this section.

Transient stability studies were conducted using the Heavy Summer and Light Load cases to ensure that the addition of the Project will not adversely impact the stability of the interconnected system following disturbances and abnormal operating conditions. The parameters for the generator dynamic model, as provided by the IC, were used in the evaluation of the Project and are as follows:

```
#
models
gensal 23157 "C565_G1 " 13.80 "1" : #9 mva=11.6760 "tpdo" 3.2000 "tppdo" 0.0280 "tppqo"
0.1280 "h" 1.1300 "d" 0.0200 "ld" 1.3100 /
"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000
"xcomp" 0.0000
gensal 23157 "C565_G1 " 13.80 "10" : #9 mva=11.6760 "tpdo" 3.2000 "tppdo" 0.0280 "tppqo"
0.1280 "h" 1.1300 "d" 0.0200 "ld" 1.3100 /
"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000
"xcomp" 0.0000
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"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000
"xcomp" 0.0000
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"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000
"xcomp" 0.0000
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"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000
"xcomp" 0.0000
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"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000
"xcomp" 0.0000
gensal 23157 "C565_G1 " 13.80 "5" : #9 mva=11.6760 "tpdo" 3.2000 "tppdo" 0.0280 "tppqo"
0.1280 "h" 1.1300 "d" 0.0200 "ld" 1.3100 /
"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000
"xcomp" 0.0000
gensal 23157 "C565_G1 " 13.80 "6" : #9 mva=11.6760 "tpdo" 3.2000 "tppdo" 0.0280 "tppqo"
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"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000
"xcomp" 0.0000
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0.1280 "h" 1.1300 "d" 0.0200 "ld" 1.3100 /
"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000
"xcomp" 0.0000
```

gensal 23157 "C565\_G1 " 13.80 "9" : #9 mva=11.6760 "tpdo" 3.2000 "tppdo" 0.0280 "tppqo"  
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"lq" 0.6550 "lpd" 0.2570 "lppd" 0.1860 "ll" 0.1110 "s1" 0.0770 "s12" 0.3240 "ra" 0.0037 "rcomp" 0.0000  
"xcomp" 0.0000  
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"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
esac5a 23157 "C565\_G1 " 13.80 "10" : #9 "tr" 0.020000 "ka" 10.0000 "ta" 0.100000 "vrmax"  
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"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
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"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
esac5a 23157 "C565\_G1 " 13.80 "2" : #9 "tr" 0.020000 "ka" 10.0000 "ta" 0.100000 "vrmax"  
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"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
esac5a 23157 "C565\_G1 " 13.80 "3" : #9 "tr" 0.020000 "ka" 10.0000 "ta" 0.100000 "vrmax"  
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"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
esac5a 23157 "C565\_G1 " 13.80 "4" : #9 "tr" 0.020000 "ka" 10.0000 "ta" 0.100000 "vrmax"  
4.5700 "vrmin" 0.0 "ke" 1.000000 "te" 0.200000 "kf" 0.010000 "tf1" 0.100000 "tf2" 0.0 /  
"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
esac5a 23157 "C565\_G1 " 13.80 "5" : #9 "tr" 0.020000 "ka" 10.0000 "ta" 0.100000 "vrmax"  
4.5700 "vrmin" 0.0 "ke" 1.000000 "te" 0.200000 "kf" 0.010000 "tf1" 0.100000 "tf2" 0.0 /  
"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
esac5a 23157 "C565\_G1 " 13.80 "6" : #9 "tr" 0.020000 "ka" 10.0000 "ta" 0.100000 "vrmax"  
4.5700 "vrmin" 0.0 "ke" 1.000000 "te" 0.200000 "kf" 0.010000 "tf1" 0.100000 "tf2" 0.0 /  
"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
esac5a 23157 "C565\_G1 " 13.80 "7" : #9 "tr" 0.020000 "ka" 10.0000 "ta" 0.100000 "vrmax"  
4.5700 "vrmin" 0.0 "ke" 1.000000 "te" 0.200000 "kf" 0.010000 "tf1" 0.100000 "tf2" 0.0 /  
"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
esac5a 23157 "C565\_G1 " 13.80 "8" : #9 "tr" 0.020000 "ka" 10.0000 "ta" 0.100000 "vrmax"  
4.5700 "vrmin" 0.0 "ke" 1.000000 "te" 0.200000 "kf" 0.010000 "tf1" 0.100000 "tf2" 0.0 /  
"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
esac5a 23157 "C565\_G1 " 13.80 "9" : #9 "tr" 0.020000 "ka" 10.0000 "ta" 0.100000 "vrmax"  
4.5700 "vrmin" 0.0 "ke" 1.000000 "te" 0.200000 "kf" 0.010000 "tf1" 0.100000 "tf2" 0.0 /  
"tf3" 0.0 "e1" 4.5700 "se1" 0.250000 "e2" 5.4800 "se2" 0.074000 "spdmit" 0.0  
ggov1 23157 "C565\_G1 " 13.80 "1" : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tfload" 1.000000 "kpload" 1.000000 /  
"kiloa" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
ggov1 23157 "C565\_G1 " 13.80 "10" : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tfload" 1.000000 "kpload" 1.000000 /  
"kiloa" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000

ggov1 23157 "C565\_G1 " 13.80 "11" : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tfload" 1.000000 "kpload" 1.000000 /  
"kiloa" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
ggov1 23157 "C565\_G1 " 13.80 "2" : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tfload" 1.000000 "kpload" 1.000000 /  
"kiloa" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
ggov1 23157 "C565\_G1 " 13.80 "3" : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tfload" 1.000000 "kpload" 1.000000 /  
"kiloa" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
ggov1 23157 "C565\_G1 " 13.80 "4" : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tfload" 1.000000 "kpload" 1.000000 /  
"kiloa" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
ggov1 23157 "C565\_G1 " 13.80 "5" : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tfload" 1.000000 "kpload" 1.000000 /  
"kiloa" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
ggov1 23157 "C565\_G1 " 13.80 "6" : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tfload" 1.000000 "kpload" 1.000000 /  
"kiloa" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
ggov1 23157 "C565\_G1 " 13.80 "7" : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tfload" 1.000000 "kpload" 1.000000 /  
"kiloa" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /

"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
ggov1 23157 "C565\_G1 " 13.80 "8 " : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tload" 1.000000 "kpload" 1.000000 /  
"kload" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
ggov1 23157 "C565\_G1 " 13.80 "9 " : #9 mwcap=9.3410 "r" 0.040000 "rselect" 1.000000 "tpelec"  
0.160000 "maxerr" 10.0000 "minerr" -10.0000 "kpgov" 5.9600 "kigov" 5.9600 "kdgov" 0.001000  
"tdgov" 0.010000 "vmax" 1.1400 /  
"vmin" 0.0 "tact" 0.025000 "kturb" 1.0800 "wfnl" 0.071000 "tb" 0.014600 "tc" -0.014600 "flag"  
1.000000 "teng" 0.029200 "tload" 1.000000 "kpload" 1.000000 /  
"kload" 1.000000 "ldref" 10.0000 "dm" 0.0 "ropen" 0.100000 "rclose" -0.100000 "kimw" 0.007000  
"pmwset" 8.4400 "aset" 0.0 "ka" 0.0 "ta" 0.010000 /  
"db" 0.0 "tsa" 1.000000 "tsb" 1.000000 "rup" 99.0000 "rdown" -99.0000  
pss2a 23157 "C565\_G1 " 13.80 "1 " : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565\_G1 " 13.80 "10" : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565\_G1 " 13.80 "11" : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565\_G1 " 13.80 "2 " : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565\_G1 " 13.80 "3 " : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565\_G1 " 13.80 "4 " : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565\_G1 " 13.80 "5 " : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565\_G1 " 13.80 "6 " : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /

```
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565_G1 " 13.80 "7 " : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565_G1 " 13.80 "8 " : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
pss2a 23157 "C565_G1 " 13.80 "9 " : #9 "j1" 1.000000 "k1" 0.0 "j2" 3.0000 "k2" 0.0 "tw1"  
2.0000 "tw2" 2.0000 "tw3" 2.0000 "tw4" 0.0 "t6" 0.0 "t7" 2.0000 /  
"ks2" 0.237000 "ks3" 1.000000 "ks4" 1.000000 "t8" 0.500000 "t9" 0.100000 "n" 1.000000 "m" 5.0000  
"ks1" 15.0000 "t1" 0.150000 "t2" 0.030000 /  
"t3" 0.150000 "t4" 0.030000 "vstmax" 0.100000 "vstmin" -0.100000 "a" 1.000000 "ta" 0.0 "tb" 0.0  
#
```

## 7.1 Transient Stability Study Scenarios

Disturbance simulations were performed for a study period of 10 seconds for pre-Project cases and 20 seconds for post-Project cases to determine whether the Project would create any system instability or cause criteria violations during a variety of line and generator outages. For the Project, line and generator outages were evaluated for disturbances simulated by the switch files outlined in Table 9.3 of the Group Report.

Descriptions of the switching sequences can be found in Appendix H.

## 7.2 Results

The study concluded that the addition of the Project would not cause the transmission system to become unstable following the select disturbances studied.

Detailed results for the Project can be found in Attachment 2.

# 8. Post-Transient Voltage Stability Analysis

The results from the original study are still valid and are repeated in this section.

Using the Heavy Summer and Light Load cases described in Section 7.1 of the Group Report, the post-transient voltage stability analysis indicated that, under the studied conditions and system configuration (including all C1C2 Projects' Delivery Network Upgrades), the addition of the Project did not result in any post-transient voltage deviations of 5% or more for Category B contingencies and 10% or more for Category C contingencies from the pre-Project levels or cause the SDG&E transmission system to fail to meet applicable voltage criteria.

The Project will not be responsible for pre-existing post-transient voltage deviations.

Detailed results of the analysis are provided in Appendix K.

## **9. Post-Transient Reactive Power Deficiency Analysis**

The results from the original study are still valid and are repeated in this section.

Using the Heavy Summer and Light Load cases described in Section 7.1 of the Group Report, post-transient reactive power deficiency analysis indicated that, under the studied conditions and system configuration (including all C1C2 Projects' Delivery Network Upgrades), cases including the Project converged for a 5% SDG&E area load increase followed by Category B contingencies and a 2.5% SDG&E area load increase followed by Category C contingencies.

This convergence indicates that the addition of the Project and the associated C1C2 Projects' Delivery Network Upgrades do not cause post-transient reactive power deficiency on the SDG&E transmission system.

Detailed results of the post-transient reactive power deficiency analysis are provided in Appendix K.

## **10. Environmental Evaluation/Permitting**

Due to the anticipated revised scope of work associated with the upgrades for the Project, no considerations for licensing and permitting are included in the estimates for cost and time to construct for the upgrades to the SDG&E transmission system.

## **11. Upgrades, Cost Estimates, and Time to Construct Estimates**

There are no Delivery Network Upgrades assigned to the Project. The estimated costs, Cost Allocation Factors, and estimated time to construct for the PTO's Interconnection Facilities and Reliability Network Upgrades for which the Project is solely responsible for on the SDG&E system are shown in Table 11.1.

### **11.1 SDG&E Upgrades**

The non-binding, good faith estimate of time to construct (license/permit, design, procure material, and construct) the facilities is based on the assumptions outlined in Section 3 of this report, and is applicable from the submittal of written authorization to proceed after the execution of the Large Generator Interconnection Agreement (LGIA). This is also based upon the assumption that the environmental permitting obtained by the IC is adequate for permitting all SDG&E activities.

It is assumed that the Interconnection Customers will include the PTO's Interconnection Facilities and Network Upgrades work scope in their environmental impact assessment and report. In the time to construct estimates, SDG&E included the time required for a Permit to Construct (PTC) or Certificate of Public Convenience and Necessity (CPCN), if it was

anticipated. If the CPUC requires licensing when it was not anticipated by SDG&E, timing for the upgrade could be extended by two to three years.

**Table 11.1: SDG&E Upgrades, Estimated Costs, and Estimated Time to Construct Summary**

Type of Upgrade	Upgrade		Cost Allocation Factor	Estimated Cost x 1,000 (Note 1)	Estimated Time to Construct (Note 2)
<b>PTO's Interconnection Facilities</b> (Note 3)	Extend gen-tie from the POI at the 138 kV bus at Carlton Hills Substation to the PTO property line	<ul style="list-style-type: none"> <li>• Install 500' of 1-636 ACSS/AW per phase with one deadend attachment at the rack</li> <li>• Install two (2) 500' spans of overhead ground wire with one deadend attachment per span at the rack</li> <li>• Install 500' of fiber optic communication cable</li> <li>• Install one (1) 138 kV deadend structure</li> <li>• Install two (2) 138 kV disconnect switches</li> <li>• Install one (1) 138 kV circuit breaker</li> <li>• Install associated relaying</li> </ul>	100%	\$1,382	12 Months
<b>Reliability Network Upgrades to Physically Interconnect</b>	Construct 138 kV bus extension at Carlton Hills Substation	<ul style="list-style-type: none"> <li>• Construct 138 kV bus extension at Carlton Hills Substation</li> <li>• Install one (1) disconnect switch</li> </ul>	100%	\$180	12 Months
<b>Total</b>				<b>\$1,562</b>	<b>12 Months</b>

Notes for Table 11.1:

Note 1: Estimated costs in "as year spent" dollars and in thousands of \$ dollars, excluding Allowance for Funds Used During Construction (AFUDC). Estimated costs include land purchases and licensing/permitting costs, when appropriate.

Note 2: Time to construct estimates include time for licensing/permitting, when appropriate. The estimated time to construct is for a typical project; construction duration may change due to the number of projects simultaneously in construction. Multiple projects impact resources, system outage availability, and environmental windows of construction. A key assumption is SDG&E will need to obtain CPUC licensing and regulatory approvals prior to design, procurement, and construction of the proposed facilities. The time to construct is not cumulative.

Note 3: The Interconnection Customer is obligated to fund these upgrades and will not be reimbursed.

## 12. Local Furnishing Bonds

The results from the original study are still valid and are repeated in this section.

Section 16 of the C1C2 Projects Phase II Interconnection Study Group Report identifies additional requirements for generators that connect to the SDG&E wholly-owned transmission system.

It appears that the energy produced by this Project will not cause an Impairment to the tax-exempt status of the Local Furnishing Bonds (LFBs) involving the Amended Annual Net Importer Test.



The Project is proposing to connect to SDG&E's Local Transmission System, which is used to transmit electricity at high voltages from SDG&E's and Imperial Irrigation District's Imperial Valley Substation located in Imperial County through SDG&E's distribution service area consisting of San Diego County and a contiguous portion of Orange County. If the output of this project is fully contracted to SDG&E, an Impairment will not occur from the construction and energization of new Interconnection Facilities and Network Upgrades that are required for this project located within the Local Transmission System. However, in the event output from this project is not fully contracted to SDG&E, then an Impairment involving the Character Test may occur and the means by which such Impairment, if any, is resolved is set forth in SDG&E's Appendix B (SDG&E Encumbrances) to the CAISO's Transmission Control Agreement. This procedure requires SDG&E, in good faith, to promptly seek an opinion from a nationally recognized bond counsel selected by SDG&E that the requested action or inaction will not adversely affect the tax-exempt status of the LFBs. This procedure further requires that such opinion be of the type generally considered by the municipal bond market as unqualified. If SDG&E is unable to obtain such unqualified opinion, then pursuant to a written request by an Eligible Entity (as defined in the SDG&E Encumbrances), SDG&E, in good faith, will promptly seek a ruling from the IRS that the requested action or inaction will not adversely affect the tax-exempt status of interest on the LFBs. In addition, pursuant to certain provisions of the Code, SDG&E may also be required to redeem a portion of the LFBs in order to mitigate an Impairment.

The Project proposes to connect to SDG&E's Local Transmission System and therefore is required to meet either of the two following requirements:

- A. The energy from the Project must be fully contracted to SDG&E, or
- B. The Project must:
  1. Pay any costs SDG&E incurs in mitigating the Impairment, and
  2. Obtain a FERC order under Sections 211/213 of the Federal Power Act compelling SDG&E to provide transmission service, including interconnection service.

### **13. Items Not Covered in this Study**

The information in this section did not change from the original study and is repeated in this section.

The Phase II Study does not address any requirements for standby power that the Project may require. If interested, the IC should make proper arrangements with the appropriate parties regarding this service.



BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT  
COMMISSION OF THE STATE OF CALIFORNIA  
1516 NINTH STREET, SACRAMENTO, CA 95814  
1-800-822-6228 – WWW.ENERGY.CA.GOV

**APPLICATION FOR CERTIFICATION FOR THE  
QUAIL BRUSH GENERATION PROJECT**

DOCKET NO. 11-AFC-03  
PROOF OF SERVICE  
(Revised 12/28/2012)

SERVICE LIST:

APPLICANT

Cogentrix Energy, LLC  
C. Richard "Rick" Neff, Vice President  
Environmental, Health & Safety  
John Collins, VP Development  
Lori Ziebart, Project Manager  
Quail Brush Generation Project  
9405 Arrowpoint Boulevard  
Charlotte, NC 28273  
rickneff@cogentrix.com  
johncollins@cogentrix.com  
loriziebart@cogentrix.com

CONSULTANTS FOR APPLICANT

Tetra Tech EC, Inc.  
Connie Farmer  
Sr. Environmental Project Manager  
Sarah McCall  
Sr. Environmental Planner  
143 Union Boulevard, Suite 1010  
Lakewood, CO 80228  
connie.farmer@tetrattech.com  
sarah.mccall@tetrattech.com

Tetra Tech EC, Inc.  
Barry McDonald  
VP Solar Energy Development  
17885 Von Karman Avenue, Ste. 500  
Irvine, CA 92614-6213  
barry.mcdonald@tetrattech.com

COUNSEL FOR APPLICANT

Bingham McCutchen LLP  
Ella Foley Gannon  
Camarin Madigan  
Three Embarcadero Center  
San Francisco, CA 94111-4067  
ella.gannon@bingham.com  
camarin.madigan@bingham.com

INTERVENORS

Roslind Varghese  
9360 Leticia Drive  
Santee, CA 92071  
roslindv@gmail.com

Rudy Reyes  
8655 Graves Avenue, #117  
Santee, CA 92071  
rreyes2777@hotmail.com

Dorian S. Houser  
7951 Shantung Drive  
Santee, CA 92071  
dhouser@cox.net

Kevin Brewster  
8502 Mesa Heights Road  
Santee, CA 92071  
lzpup@yahoo.com

Mr. Rob Simpson, CEO  
Helping Hand Tools  
1901 First Avenue, Suite 219  
San Diego, CA 92101  
rob@redwoodrob.com

Sierra Club, San Diego Chapter  
c/o Law Office of Robert W. Wright  
Robert W. Wright  
716 Castro Street  
Solana Beach, CA 92075  
bob.wright@mac.com

Sunset Greens  
Homeowners Association  
c/o Briggs Law Corporation  
Cory J. Briggs  
Isabel E. O'Donnell  
99 East "C" Street, Suite 111  
Upland, CA 91786  
cory@briggslawcorp.com  
isabel@briggslawcorp.com

INTERVENORS (cont'd.)

HomeFed Fanita Rancho, LLC  
c/o Allen Matkins Leck Gamble  
Mallory & Natsis LLP  
Jeffrey A. Chine  
Heather S. Riley  
501 West Broadway, 15<sup>th</sup> Floor  
San Diego, CA 92101  
jchine@allenmatkins.com  
hriley@allenmatkins.com  
jkaup@allenmatkins.com  
vhoy@allenmatkins.com

Preserve Wild Santee  
Van Collinsworth  
9222 Lake Canyon Road  
Santee, CA 92071  
savefanita@cox.net

Center for Biological Diversity  
John Buse  
Aruna Prabhala  
351 California Street, Suite 600  
San Francisco, CA 94104  
jbuse@biologicaldiversity.org  
aprabhala@biologicaldiversity.org

\*California Pilots Association  
Andy Wilson  
31438 Greenbrier Lane  
Hayward, CA 94544  
andy.wilson@calpilots.org

INTERESTED AGENCIES

California ISO  
e-recipient@caiso.com

City of Santee  
Department of Development Services  
Melanie Kush  
Director of Planning  
10601 Magnolia Avenue, Bldg. 4  
Santee, CA 92071  
mkush@ci.santee.ca.us

City of San Diego  
Morris E. Dye  
Development Services Dept.  
1222 First Avenue, MS 501  
San Diego, CA 92101  
mdye@sandiego.gov

County of San Diego  
Mindy Fogg  
Land Use Environmental Planner  
Advance Planning  
Department of Planning & Land Use  
5510 Overland Avenue, Suite 310  
San Diego, CA 92123  
mindy.fogg@sdcounty.ca.gov

ENERGY COMMISSION –  
PUBLIC ADVISER

Jennifer Jennings  
Public Adviser's Office  
publicadviser@energy.ca.gov

COMMISSION DOCKET UNIT

California Energy Commission –  
Docket Unit  
Attn: Docket No. 11-AFC-03  
1516 Ninth Street, MS-4  
Sacramento, CA 95814-5512  
docket@energy.ca.gov

OTHER ENERGY COMMISSION  
PARTICIPANTS (LISTED FOR  
CONVENIENCE ONLY):

*After docketing, the Docket Unit  
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Eileen Allen  
Commissioners' Technical  
Adviser for Facility Siting

Galen Lemei  
Adviser to Commissioner Douglas

Jennifer Nelson  
Adviser to Commissioner Douglas

David Hungerford  
Adviser to Commissioner McAllister

Patrick Saxton  
Adviser to Commissioner McAllister

Eric Solorio  
Project Manager

Stephen Adams  
Staff Counsel

DECLARATION OF  
SERVICE

I, Margaret Pavao, declare that on January 11, 2013, I served and filed copies of the attached Applicant's Further Response to HomeFed Fanita Rancho Data Requests, 85 through 105, dated January 11, 2013. This document is accompanied by the most recent Proof of Service list, which I copied from the web page for this project at: <http://www.energy.ca.gov/sitingcases/quailbrush/index.html>.

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, as appropriate, in the following manner:


(Check one)

For service to all other parties and filing with the Docket Unit at the Energy Commission:

- I e-mailed the document to all e-mail addresses on the Service List above and personally delivered it or deposited it in the US mail with first class postage to those parties noted above as "hard copy required"; OR
- Instead of e-mailing the document, I personally delivered it or deposited it in the US mail with first class postage to all of the persons on the Service List for whom a mailing address is given.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that I am over the age of 18 years.

Dated: January 11, 2013

  
\_\_\_\_\_  
Margaret Pavao