
System Impact Study

Study Plan

Cinergy Solutions, Inc

Bullard Energy Center

REVISION 1



*Pacific Gas and
Electric Company*

WE DELIVER ENERGY.

March 7, 2005

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[Attachment 1 - Generation Projects](#)

1. Introduction

Cinergy Solutions, Inc. (Cinergy) has submitted a completed Interconnection Application (IA) to the California Independent System Operator Corporation (CAISO) for the Bullard Energy Center (Bullard EC). The proposed project will consist of two gas turbine generators each rated for 102.6 MW (total 205.2 MW) with a total plant auxiliary load of 5.2 MW. The maximum net output to the grid will be 200 MW. The commercial operation date of the proposed project is June 2008. The proposed project will be interconnected by looping PG&E's Herndon-Kearney 230 kV line into the proposed project.

CAISO and PG&E have agreed that a System Impact Study (SIS) is required to determine the impact of the Bullard EC on PG&E's transmission grid. This study plan will form the basis for the System Impact Study Agreement (SISA) by defining the scope, content, assumptions, and terms of reference of this SIS. This SIS will:

- Identify transmission system impacts caused solely by the addition of the proposed project, and
- Identify the system reinforcements, if any, necessary to mitigate the adverse impact of the proposed project under various system conditions.

2. Study Fee

PG&E has estimated a study fee of \$60,000 for performing this SIS. The final cost to complete this SIS will be based on actual cost. PG&E will provide Cinergy a record of actual costs for performing this SIS roughly two months after the study is completed. PG&E will bill Cinergy the remaining balance if the actual cost is higher than the estimated \$60,000. If the actual cost is less than the estimated study fee, PG&E will refund the balance to Cinergy.

3. Schedule

The following Table 3-1 shows the milestones/schedules required for the study.

Task	Milestone Description	Target Date
1	Establish study commencement date based on receipt of study fee with the SISA	March 14, 2005
2	Issue SIS report	May 17, 2005

Table 3-1: Study Schedule

Per the CAISO Tariff, Cinergy must execute and return the attached SISA including the estimated study fee of \$60,000 by the tenth business day from the tendering of this study plan. If Cinergy fails to return an executed SISA, including the estimated study fee, within 10 business days, the Bullard EC will be removed from the interconnection queue.

4. Cost Estimates

No cost estimates will be provided in this SIS. Cost estimates will be provided when the proposed project progresses to the Facilities Study.

5. Project and Interconnection Information

Table 5-1 provides general information about the Bullard EC.

Project Location	5829 N Golden State Blvd, Fresno, California 93722
PG&E Planning Area	Valley Central Region
Number and Type of Generators	Two gas turbine generators, GE LMS 100
Maximum Generator Output	205.2 MW
Generator Auxiliary Load	5.2 MW
Maximum Net Output to Grid	200 MW
Power Factor	0.85
Step-up Transformer	One three-phase, three winding transformer, rated at 13.8/230 kV and 250 MVA
Description Of Interconnection Configuration	Connect to the new substation on project site and loop into the Herndon-Kearney 230 kV Line
Connection Voltage	230 kV

Table 5-1: The Bullard Energy Center General Information

Figure 5-1 provides the map for the Bullard EC and the transmission facilities in the vicinity.

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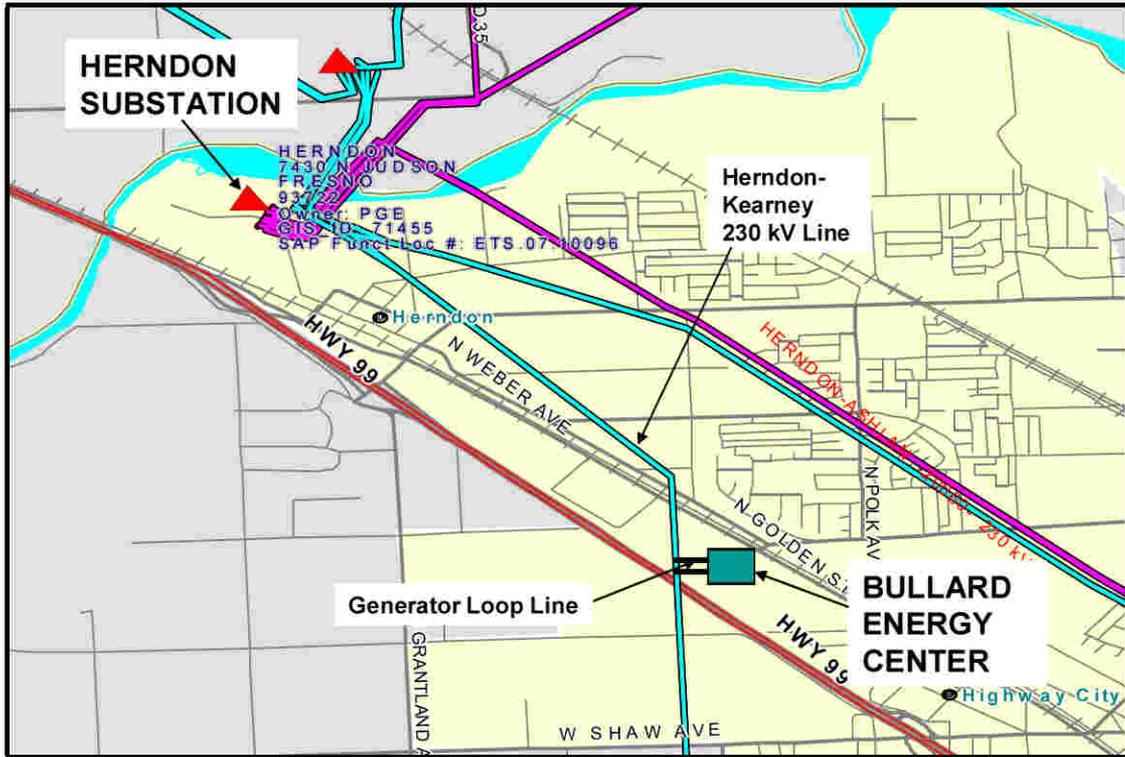


Figure 5-1: Map of the Bullard Energy Center

A conceptual one-line diagram of the proposed project is shown in Figure 5-2.

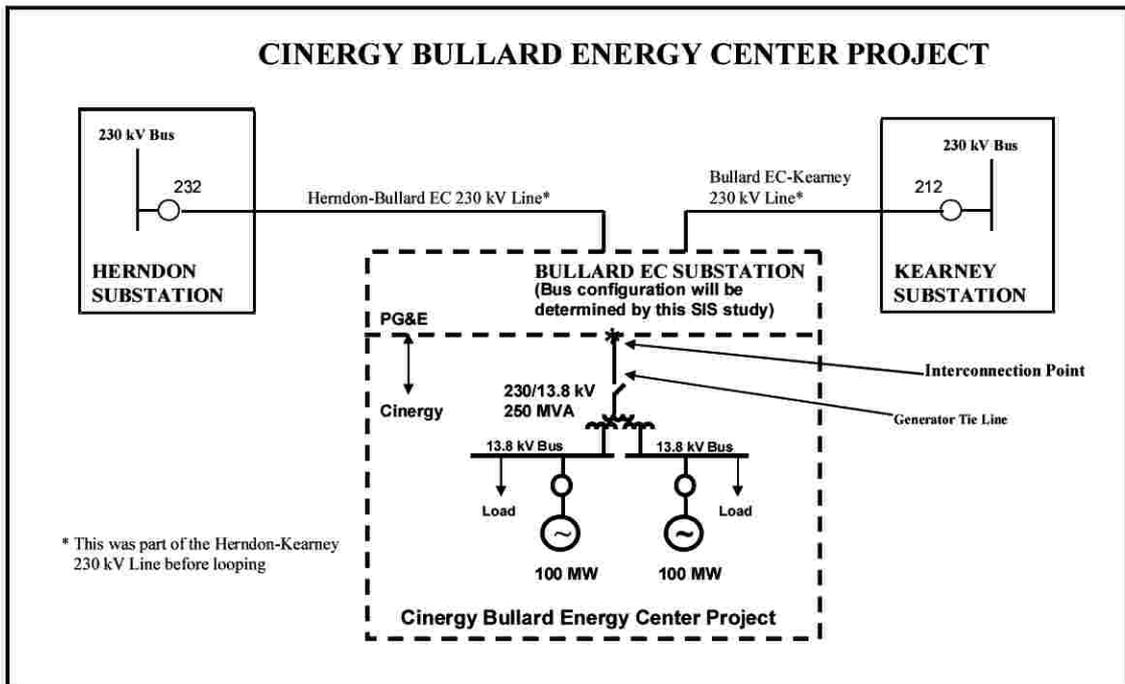


Figure 5-2: Conceptual One-Line Diagram

6. Study Assumptions

PG&E will conduct this SIS using the following assumptions:

1. Bullard EC will consist of two gas turbine generators, each rated for 102.6 MW. The total expected plant output is 205.2 MW. The total plant load is 5.2 MW. The maximum net output to the grid is 200 MW.
2. The expected commercial operation date is June 2008.
3. There is one three phase, three winding step-up transformer rated at 13.8/230 kV and 250 MVA with an impedance of 9% @ 150 MVA base.
4. Cinergy will engineer, procure, construct, own, and maintain its project facility.
5. This study will take into account the planned generating facilities in PG&E's service territory whose schedules are concurrent with or precede the Project's schedule.

7. Power Flow Study Base Cases

Three power flow base cases will be used to evaluate the transmission system impacts of the Bullard EC. While it is impossible to study all combinations of system load and generation levels during all seasons and at all times of the day, these three base cases represent extreme loading and generation conditions for the study area.

PG&E cannot guarantee that the Bullard EC can operate at maximum rated output 24 hours a day, year round, without system impacts, nor can PG&E guarantee that the Bullard EC will not cause system impacts during the times and seasons not studied in this SIS.

- **2008 Summer Peak Full Loop Base Case:**

Power flow analysis and dynamic stability analysis will be performed using PG&E's 2008 Summer Peak Area 6 Base Case (in General Electric Power Flow format). This base case was developed from PG&E's 2004 base case series and has a 1-in-10 year extreme weather load level for the Greater Fresno areas.

- **2009 Spring Peak Full Loop Base Case:**

Power flow analysis will also be performed using the 2008 Spring Base Case in order to evaluate the potential congestion on transmission facilities under reduced load and increased generation levels during a typical Spring season. Typical Spring season peak load will be applied in this Spring Base Case. Hydro generation will be modeled in a very high level as typical in the spring season.

- **2008 Summer Off Peak Full Loop Base Case:**

Power flow analysis will also be performed using the 2008 Summer Off-Peak base case in order to evaluate potential congestion on transmission facilities during the off-peak system condition. The Summer Off-Peak load will be modeled at 50 % of 2008 summer peak load level in the Greater Fresno areas. The Path 15 flows will be around 5,000 MW in a south-to-north direction. Two units at Helms PGP (620 MW total) will be assumed in pumping mode.

These three base cases will model all approved PG&E transmission reliability projects that will be operational by 2008. These three base cases will also model all proposed generation projects that will be operational by 2008. However, some generation projects that are electrically far from the proposed project will be either turned off or modeled with reduced generation to balance the loads and resources in the power flow model. The major generation projects included are shown in [Attachment 1](#).

8. Study Scope

This SIS will determine the impact of the Bullard EC on PG&E's transmission system. The specific studies conducted are outlined below:

8.1 Steady State Power Flow Analysis

Power Flow analysis will be performed using the three base cases described in [Section 7](#). The three base cases will be used to simulate the impact of the new facility during normal operating conditions, as well as, single (CAISO Categories "B") and selected multiple (CAISO Categories "C") outages. The study will cover the transmission facilities within PG&E's Greater Fresno areas.

The single (CAISO Category "B") and selected multiple (CAISO Category "C") contingencies include the following outages:

8.1.1 CAISO Category "B"

- All single generator outages within the study area.
- All single (60 - 230 kV) transmission circuit outages within the study area.
- All single transformer outages within the study area.
- Overlapping single generator and transmission circuit outages for the transmission lines and generators within the study area.

8.1.2 CAISO Category "C"

- Selected bus (60-230 kV) outages within the study area.

- Selected outages caused by selected breaker failures (excluding bus tie and sectionalizing breakers) at the same above bus section.
- Selected combination of any two-generator/transmission line/transformer outages (except ones included above in Category "B") within the study area.
- Selected outages of double circuit tower lines (60-230 kV) within the study area.

8.2 System Protection Analysis

Short circuit studies will be performed to determine the maximum fault currents on various buses in the vicinity of the Bullard EC. This SIS will assess the impact of increased fault duty resulting from the added generation. Equipment that may become overstressed as a result of the added generation will be identified.

Preliminary system protection requirements will be provided.

8.3 Reactive Power Deficiency Analysis

With the generation project included in the system model, CAISO Category "B" and "C" contingencies will be analyzed to identify any reactive power deficiency:

- If they result in voltage drops of 5% or more from the pre-project levels, or
- If they fail to meet applicable voltage criteria.

A post-transient power flow analysis will be performed, if deemed necessary, after considering the network topology or power transfer paths involved when a significant amount of power transfer occurs.

8.4 Dynamic Stability Analysis

Dynamic stability studies will be conducted using the 2008 Summer Peak Full Loop Base Case to ensure that the transmission system remains in operating equilibrium through abnormal operating conditions after the new facility begins operation.

Disturbance simulations will be performed for a study period of up to 20 seconds to determine whether the new facility will create any system instability during the following line and generator outages:

8.4.1 CAISO Category "B"

- Full load rejection 200 MW of the proposed Bullard EC.

- A three-phase close-in fault on the Herndon-Bullard EC 230 kV line at Herndon Substation 230 kV bus with normal clearing time followed by loss of the Herndon-Bullard EC 230 kV line.
- A three-phase close-in fault on the Bullard EC-Kearney 230 kV line at Kearney Substation 230 kV bus with normal clearing time followed by loss of the Bullard EC-Kearney 230 kV line.

8.4.2 CAISO Category "C"

- A three-phase fault on Herndon Substation 230 kV bus with normal clearing time.
- A three-phase fault on Kearney Substation 230 kV bus with normal clearing time.
- A three-phase fault on Herndon Substation 230 kV bus with normal clearing time followed by loss of the Herndon-Bullard EC and Gates-Gregg 230 kV lines.
- A three-phase fault on Kearney Substation 230 kV bus with normal clearing time followed by loss of the Bullard EC-Kearney and Gates-Gregg 230 kV lines.

8.5 Transmission Line Evaluation

PG&E's transmission line evaluation will identify any existing equipment requiring upgrades to mitigate overload or overstress due to the new generation, if any. However, the work scope and costs for these potential system impact upgrades are not included in the transmission line evaluation for this SIS.

8.6 Substation Evaluation

PG&E's substation evaluation will identify any existing equipment requiring upgrades, if any, to mitigate problems caused by overstress or overload due to the Bullard EC.

The substation evaluation for this SIS will not include the work scope and cost estimates of the new equipment at existing PG&E substations needed to accommodate the Bullard EC.

Cost estimates and work scope for the substation evaluation will be provided when the proposed project progresses to the Facilities Study.

8.7 Interconnection Feasibility Evaluation

The following PG&E Transmission Departments will review the feasibility of the proposed interconnection for the Bullard EC:

- System Protection

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- Operations Engineering
- Asset Management

If the interconnection is determined to be infeasible, a new interconnection point must be selected before the study can proceed.

8.8 Land Evaluation

For the SIS, PG&E's Corporate Real Estate Department will not perform an evaluation to determine if any new land rights are necessary to upgrade PG&E facilities that may be impacted by the Bullard EC, such as constructing the new generator tie line and re-conductoring of existing PG&E transmission lines, if required.

A land right evaluation will be provided when the proposed project progresses to the Facilities Study.

9. Environmental Evaluation/ Permitting

9.1 CPUC General Order 131-D

Pacific Gas and Electric Company (PG&E) is subject to the jurisdiction of the California Public Utilities Commission (CPUC); and must comply with CPUC General Order 131-D (Order) on the construction, modification, alteration, or addition of all electric transmission facilities (i.e., lines, substations, etc.). This includes facilities to be constructed by others and deeded to PG&E. The Order exempts PG&E from obtaining a formal permit from the CPUC on facilities over 200 kV provided the planned facilities involve the replacement of existing facilities or supporting structures with equivalent facilities or structures, the minor relocation of existing facilities, the conversion of existing facilities to underground or the placing of new or additional conductors, insulators, or their accessories on or replacement of structures already built. These exemptions do not apply under certain circumstances when significant environmental impacts may be caused by the work. If the project does not qualify for an exemption, PG&E will need to seek formal approval from the CPUC (i.e., Certificate of Public Convenience and Necessity) taking as much as 18 months or more since the CPUC may decide to conduct its own environmental evaluation (i.e., Negative Declaration or Environmental Impact Report).

For cases where PG&E can claim a valid exemption, PG&E would file an Advice Letter with the CPUC and publish public notice of the proposed construction of the facilities. The noticing process takes about 90 days if no protests are filed, but should be done as early as possible so that a protest does not delay construction. PG&E has no control over the time it takes the CPUC to respond when issues arise. If the protest is granted, PG&E will then need to apply for a formal permit to construct the project (i.e., Certificate of Public Convenience and Necessity).

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Facilities built or modified under this procedure must also be designed to include electric and magnetic field (EMF) mitigation measures pursuant to PG&E “EMF Design Guidelines of New Electrical Facilities: Transmission, Substation and Distribution”.

Please see Section III, B.1(f) in General Order 131-D. This document can be found in the CPUC’s web page at:

http://www.cpuc.ca.gov/PUBLISHED/GENERAL_ORDER/589.htm

9.2 CPUC Section 851

Pacific Gas and Electric Company (PG&E) is subject to the jurisdiction of the California Public Utilities Commission (CPUC) and must comply with Public Utilities Code Section 851, which among other things requires CPUC approval of leases and licenses to use PG&E property. This includes rights-of-way granted to third parties for interconnection facilities. Obtaining CPUC approval for a Section 851 application can take several months, and requires compliance with the California Environmental Quality Act (CEQA). PG&E recommends that Section 851 issues be identified as early as possible so that the necessary application can be prepared and processed.

10. Stand-by Power

This SIS will not address any requirements for stand-by power that the Bullard EC may require. Cinergy should contact their Generation Interconnection Services Representative regarding this service.

Note: Cinergy is urged to contact their Generation Interconnection Services Representative promptly regarding stand-by service in order to ensure its availability for the Bullard EC start-up date.

11. Study Updates

This SIS is performed in according to the assumptions shown in the Sections titled “[Study Assumptions](#)” and “[Power Flow Study Base Cases](#)”. In the event that these assumptions are changed, an updating study may be required to re-evaluate the project’s impact on PG&E’s transmission grid. Cinergy would be responsible for paying for any such updating study. Examples of changes that might prompt such a study are:

- Change in interconnection date.
- Change in Interconnection Queue position.
- Change in project’s MW size.
- Change in interconnection plan.

ATTACHMENT 1 – GENERATION PROJECTS

PG&E Generation Projects						
PG&E Queue Position	Applicant Name	Project Name	Nearest Substation	Capacity (MW)	Latest Expected On-Line Date	Modeled In Study Cases
1	Calpine	Metcalf Energy Center	Metcalf	600	2005	Yes
2	Mirant	Contra Costa Power Plant Unit 8 Power Project	Contra Costa	590	2006	Yes
3	Midway Power, LLC	Tesla Power Project	Tesla	1156	2008	Yes
4	Duke Energy Morro Bay LLC	Morro Bay Modernization Project	Morro Bay	1200	2008	Yes
5	Mirant Potrero LLC	Potrero Power Plant Unit 7	Potrero	640	2008	Yes
6	Federal Power Avenal, LLC	Avenal Energy Project	Gates	620	2009	No
7	Calpine	Los Esteros Critical Energy Facility Phase II	Los Esteros	140	2008	Yes
8	Sacramento Municipal Utility District	Solano Wind Project	Russell	77	2006	Yes
9	Calpine	Los Esteros Critical Energy Facility Phase II	Los Esteros	335	2008	Yes
10	Sacramento Municipal Utility District	Solano Wind Project	Russell	15	2007	Yes

Non-PG&E Generation Projects to Be Modeled in Base Case per On-line Year						
	Applicant Name	Project Name	Nearest Substation	Capacity (MW)	Latest Expected On-Line Date	Modeled In Study Cases
SMUD	Sacramento Municipal Utility District	Consumes Power Plant	Rancho Seco (SMUD)	500	2005	Yes
SVP	Silicon Valley Power	Pico Power Project	Kifer Receiving Station (SVP)	147	2005	Yes
TID	Turlock Irrigation District	Walnut Energy Center	Walnut (TID)	250	2006	Yes
SVP	Silicon Valley Power	Los Esteros Critical Energy Facility	SSS (SVP)	320	2008	Yes

ATTACHMENT 1 – GENERATION PROJECTS

PG&E Generation Projects - ISO Generation Interconnection Queue						
Project ID #	Applicant Name	Project Name	Nearest Facility	Capacity (MW)	Latest Expected On-Line Date	Modeled In Study Cases
P0301	Confidential	Confidential	Birds' Landing Switchyard	150	2006	Yes
P0302	Gaviota Energy / Global Renewable	Lompoc Wind Power Project	Cabrillo	120	2006	Yes
P0303	Kings River Conservation District	KRCD Peaking Project	Malaga	97	2005	Yes
P0304	FPL Energy, LLC	High Winds III	Birds' Landing Switchyard	38	2007	Yes
P0401	Confidential	Confidential	Birds' Landing Switchyard	150	2006	Yes
P0402	City and County of San Francisco	San Francisco Electric Reliability Power Project	Potrero	145.1	2007	Yes
P0403	Confidential	Confidential	Collector Station at Geysers #17 & Fulton Line	201	2007	Yes
P0404	City and County of San Francisco	San Francisco Airport Electric Reliability Project	San Francisco Airport	48.7	2007	Yes
P0405	NRG Energy Center San Francisco, LLC	San Francisco Cogeneration	Mission	14.26	2006	Yes
P0406	Confidential	Confidential	Panoche	99.9	2006	Yes
P0408	Confidential	Confidential	Tesla-Stockton 115 kV Line	99.9	2006	Yes
P0409	D. Milne Associated, LLC	Ripon Generation	Tesla	96.9	2007	Yes
P0410	Duke Energy North America, LLC	Duke Energy Oakland	Oakland C	320	2009	No
P0411	Confidential	Confidential	Humboldt Power Plant Substation	166	2008	Yes
P0412	Confidential	Confidential	Birds' Landing Switchyard	200	2008	Yes
P0413	Confidential	Confidential	East Shore	118	2007	Yes
P0414	Confidential	Confidential	Pease	99.9	2007	Yes
P0418	Confidential	Confidential	McCall	300	2007	Yes

ATTACHMENT 1 – GENERATION PROJECTS

PG&E Generation Projects - ISO Generation Interconnection Queue						
Project ID #	Applicant Name	Project Name	Nearest Facility	Capacity (MW)	Latest Expected On-Line Date	Modeled In Study Cases
P0419	Confidential	Confidential	Borden	126.5	2008	Yes
P0420	Confidential	Confidential	Tesla-Bellota 230 kV Line	168.7	2008	Yes
P0421	Three Mountain Power, LLC	Three Mountain Power Project	Pit 1-Pit 3 & Pit 1-Cottonwood 230 kV Line	295	2007	Yes
P0424	Calpine	Russell City Energy Center	East Shore	361	2006	Yes
P0426	Calpine	Wolfskill II	Vaca Dixon-Suisun 115 kV Line	50	2007	Yes
P0427	Calpine	East Altamont Energy Center	Tracy Substation	806	2009	No
P0428	Confidential	Confidential	Evergreen-San Jose "B" 115 kV Line	94.5	2008	Yes



System Impact Study Agreement

Cinergy Solutions, Inc (Applicant) has reviewed the study plan for the interconnection of Applicant's electric generating plant with PG&E's system at City of Fresno, Fresno County¹, State of California and agrees with the proposed plan.

Applicant agrees to pay the proposed study fee.

Dated this _____ day of _____, 2005

APPLICANT:

BY: _____
(Signature)

(Type or Print Name)

MAILING ADDRESS:

¹ Enter city and county location of proposed facility.