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# **Facilities Study Report**

Generation Interconnection

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**Cinergy Solutions, Inc.**

**Bullard Energy Center Project**



*Pacific Gas and  
Electric Company*

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***WE DELIVER ENERGY.***

February 7, 2006

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## 1. Executive Summary

Cinergy Solutions, Inc. (Cinergy) proposes to interconnect a new 200 MW generating facility to Pacific Gas & Electric's (PG&E's) Herndon-Kearney 230 kV line in Fresno, California. The project is called the Bullard Energy Center Project (Project). The commercial operational date of the Project is June 1, 2008. PG&E issued a System Impact Study (SIS) for the Project on May 17, 2005 that provided an analysis of the system impacts.

Per California Independent System Operator Corporation (CAISO) Amendment 39 Process and based on the issued SIS, the Facilities Study (FS) provides:

1. Cost estimates and work scope for the Direct Assignment necessary to interconnect the Project to PG&E's grid.
2. Cost estimates and work scope for the Network Upgrades necessary to mitigate the impact of the Project under various system conditions.

The Direct Assignment for PG&E work scope consists of the following:

- Engineering, construction, project management, testing, maintenance and operations support required by PG&E personnel
- Pre-parallel inspection, testing, SCADA, EMS setup, engineering support and any other activities required to commission the Project

The cost of Direct Assignment to interconnect the project is approximately **\$220,000** exclusive of ITCC<sup>1</sup>.

The Network Upgrades for PG&E work scope consist of the following:

- Provide loop interconnection from the Herndon-Kearney 230 kV line to the new Bullard Switching Station
- Re-conductor the Herndon-Bullard EC 230 kV Line
- Provide protection scheme
- Upgrade substation relays
- Replace four 115 kV breakers at Herndon Substation
- Provide two special protection schemes (SPS)
- Land engineering, survey and permitting activities associated with Network Upgrade transmission line work scope

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<sup>1</sup> Income Tax Component of Contribution

The cost of Network Upgrades to interconnect the Project is approximately **\$5.27 million** for work to be done by PG&E.

Cinergy will construct the new Bullard Switching Station. The cost of this Network Upgrades is estimated approximately **\$7 million** if the work to be done by PG&E.

Therefore, the total cost to interconnect the Project is approximately **\$12.5 million**.

## 2. Project Information and Interconnection Plan

The Project consists of two gas turbine generators (GTG). Each GTG is rated 102.6 MW or 205.2 MW total. The plant auxiliary load is 5.2 MW. The maximum net output to the grid will be 200 MW. The generators will be connected to one three-phase, three winding, and 13.8/230 kV rated step-up transformer. The Project will loop into PG&E's Herndon-Kearney 230 kV line via a new Bullard Switching Station. A conceptual one-line diagram of the Project is shown in Figure 2-1.

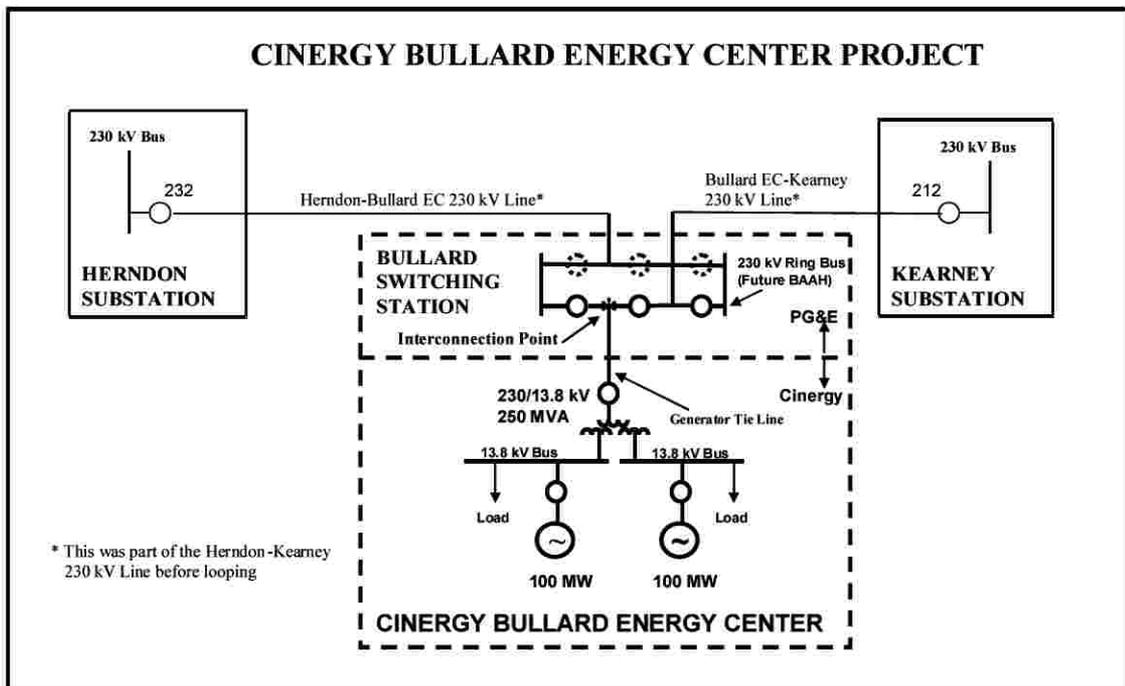


Figure 2-1: Conceptual one-line Diagram

Figure 2-2 shows the approximate location of the Project and the transmission facilities in the area.

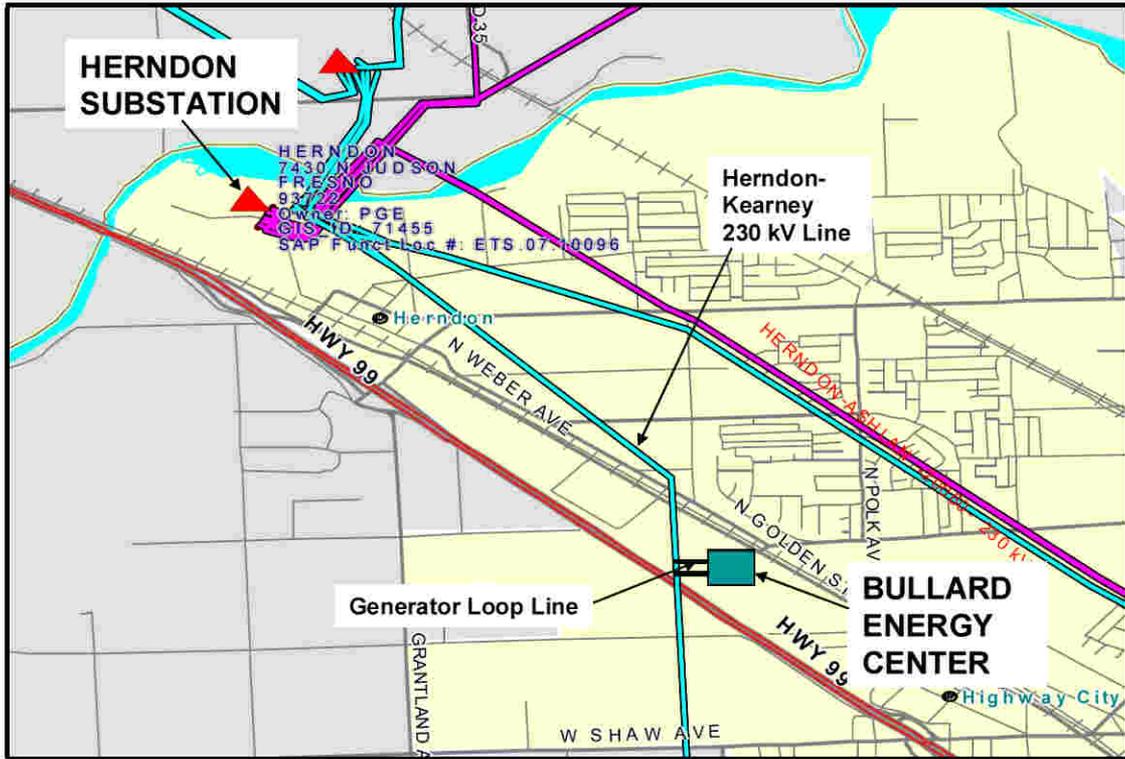


Figure 2-2: Location Map

### 3. Cost Summary and Schedule

A cost summary is provided below in Table 3-1, with more detailed Direct Assignment and Network Upgrades costs provided in [Subsection 3.1](#) and [Subsection 3.2](#). Costs provided are not final and will need to be reconciled with actual costs upon completion of the project. [Section 6](#), [Section 7](#) and [Section 8](#) provide the work scope of the required work.

Total Direct Assignment Cost	\$220,000		
ITCC Tax @ 34 %	\$74,800		
<b>Total Direct Assignment Cost with ITCC</b>		<b>\$294,800</b>	
Total Network Upgrade Costs	\$12,270,000		
<b>Total Network Upgrade Cost</b>		<b>\$12,270,000</b>	
<b>Total Project Cost before ITCC</b>			<b>\$12,564,800</b>

Table 3-1 Cost Estimate Summary

#### 3.1 Direct Assignment Cost

A summary of the Direct Assignment cost estimates for the facilities required to interconnect the Project with PG&E's transmission system is shown in Table 3-2. These facilities are necessary to physically and electrically

interconnect the Project to the ISO Controlled Grid at the point of interconnection. These costs are not final and will need to be reconciled with actual costs upon completion of the project.

<b>Miscellaneous Substation Work</b>			
Pre-parallel inspection, testing, SCADA, EMS setup, engineering support, etc.	\$220,000		
<b>Subtotal Substation Work</b>		<b>\$220,000</b>	
<b>Total Direct Assignment Cost before ITCC</b>			<b>\$220,000</b>

Table 3-2 Direct Assignment Cost Estimates

### 3.2 Network Upgrades Costs

A summary of the Network Upgrade cost estimates for the facilities required to interconnect the Project with PG&E's transmission system is shown in Table 3-3. These facilities are necessary to physically and electrically interconnect the Project to the ISO Controlled Grid beyond the point of interconnection. These costs are not final and will need to be reconciled with actual costs upon completion of the project.

<b>Transmission Line Work</b>			
Provide loop interconnection	\$420,000		
Re-conductor the Herndon-Bullard 230 kV Line	\$1,500,000		
<b>Subtotal Transmission Line Work</b>		<b>\$1,920,000</b>	
<b>Substation Work</b>			
<i><b>Herndon Substation</b></i>			
Engineering, construction, project management, testing, maintenance and operations support.	\$405,000		
Replace 4 Breakers	\$1,800,000		
<i><b>Kearney Substation</b></i>			
Engineering, construction, project management, testing, maintenance and operations support.	\$365,000		
<i><b>New Bullard Switching Substation</b></i>			
Construct new loop station*	\$7,000,000		
<i><b>Install SPS</b></i>			
Los Banos - Westley 230 kV Line	\$ 250,000		
Herndon – Figarden T1 section of the Herndon – Ashlan 230 kV line	\$ 250,000		
<b>Subtotal Transmission Line Work</b>		<b>\$10,070,000</b>	
<b>Land Services Work</b>			
Land engineering and survey activities, prepare transmission line profile for loop line and re-conductor line	\$50,000		

Temporary land acquisition and crop damage compensation	\$220,000		
Prepare and file NOC	\$10,000		
<b>Subtotal Land Services Work</b>		<b>\$280,000</b>	
<b>Total Network Upgrade Cost</b>			<b>\$12,270,000</b>

Table 3-3 Network Upgrade Cost Estimates

\*The FS assumes that Cinergy will construct the new Bullard Switching Station. This cost reflects the cost if the work to be done by PG&E.

### 3.3 Tentative Construction Schedule

The tentative schedule to construct the Direct Assignment and Network Upgrade facilities based on the work scope outlined in this FS is approximately 18 to 24 months from the execution of the Large Generator Interconnection Agreement (LGIA) and payment of the estimated Direct Assignment and Network Upgrade costs. This schedule reflects only the time PG&E requires to engineer, design, schedule, procure materials and construct the necessary facilities.

The Construction Schedule includes only the time required to obtain permits anticipated in [Section 8](#). Other permits that may be required by the CPUC, state, local, or federal agencies are described in [Section 9](#). Additional permits required beyond those anticipated will impact the Project's schedule.

## 4. Study Assumptions

PG&E conducted the FS using the following assumptions referenced in [Appendix A](#):

- 1) The Project will consist of two gas turbine generators, each rated for 102.6 MW or 205.2 MW total. The total plant load is 5.2 MW. The maximum net output to the grid is 200 MW.
- 2) The commercial operating date is June 1, 2008.
- 3) The Project has one three phase three winding 13.8/13.8/230 kV step-up transformer rated 150/200/250 MVA (OA/FA/FA) with an impedance of 9% @ 150 MVA base for HX and HY windings and 18% @ 150 MVA for XY winding.
- 4) Cinergy will engineer, procure, construct, own, and maintain its project facility. Cinergy will also engineer, procure, and construct the new Bullard Switching Station. The new Bullard Switching Station shall comply with PG&E standards. Cinergy will deed the new Bullard Switching Station to PG&E after its completion. PG&E will own and maintain the new Bullard Switching Station.

- 5) PG&E will provide the looping interconnection from the Herndon-Kearney 230 kV line to the new Bullard Switching Station.

## **5. System Impact Study Results**

The SIS issued on May 17, 2005 concluded that the Project would:

- 1) Cause one new normal overload to the Herndon-Bullard EC 230 kV line. The mitigation alternatives are either reducing generation net output to the grid from 200 MW to 152 MW or re-conductor the Herndon-Bullard EC 230 kV line. Cinergy shall select the final mitigation plan when the project moves forward to the signing of a GSFA.
- 2) Cause four Category "B" emergency overloads and three of these four overloads will require mitigation by the Project: the Canandaigua and Glass section of the Glass-Biola 70 kV line, the Kingsburg-Corcoran No. 1 and 2 115 kV lines.
  - The mitigation alternative for the Canandaigua and Glass section of the Glass-Biola 70 kV line is opening CB-12 at Biola Substation whenever the summer ratings are utilized.
  - The mitigation alternative for the Kingsburg-Corcoran No. 1 and 2 115 kV lines consist of monitoring these lines via SCADA, and opening CB 142 at Corcoran at a pre-set flow limit on the Kingsburg-Corcoran 115 kV lines. PG&E has an unapproved project to install SCADA at Corcoran in 2006, and the FS will assume this SCADA project is in place.
- 3) Aggravate four existing Category "C" emergency overloads and cause ten Category "C" emergency overloads. The mitigations are operation solution, generation output reduction, and installation of special protection schemes (SPS). The following two Category "C" emergency overloads will be mitigated by SPS:
  - Los Banos-Westley 230 kV line overloads following the outage of the Herndon-Bullard EC and Gates-Gregg 230 kV lines
  - Herndon-Figarden T1 section of the Herndon-Ashlan 230 kV line overloads following the outage of the Gregg-Herndon #1 and #2 230 kV lines
- 4) Require building of a new 230 kV switching station with a three breaker ring-bus with future expansion to a breaker and a half (BAAH) configuration
- 5) Be responsible for the replacement of four 115 kV breakers at Herndon Substation: CB 122, CB 132, CB 142, and CB 152
- 6) Cause no adverse transient performance impacts on the transmission system

- 7) Require a fully redundant, double-pilot current differential scheme utilizing dual fiber optic communications for the Herndon-Bullard EC 230kV Line and a two terminal carrier scheme for the Bullard EC-Kearney 230kV Line

## **6. Transmission Line Evaluation**

### **6.1 Direct Assignment Work Scope**

The Transmission Line Evaluation determined the Direct Assignment work scope for which the Project will be responsible. These activities include all transmission line engineering, design, and construction activities from the Project facility up to the point of interconnection. There is no Transmission Line Direct Assignment work scope for the Project.

### **6.2 Network Upgrades Work Scope**

The Transmission Line Evaluation determined the Network Upgrades work scope for which the Project will be responsible. These activities include all transmission line engineering, design, and construction activities beyond the point of interconnection. The final Network Upgrades work scope will be determined after detailed design and engineering is completed. The work scope includes the following:

- Provide loop interconnection from the Herndon-Kearney 230 kV line to the new Bullard Switching Station
- Re-conductor the Herndon-Bullard EC 230 kV Line with 1113 kcmil ACSS conductor or equivalent (about 2 miles)

## **7. Substation Evaluation**

The detail substation work scope is shown in [Appendix C](#).

### **7.1 Direct Assignment Work Scope**

The Substation Evaluation determined the Direct Assignment work scope for which the Project will be responsible. These activities include all substation engineering, design, and construction activities from the Project facility up to the point of interconnection. The final Direct Assignment work scope will be determined after detailed design and engineering is completed. The work scope includes the following:

- Engineering, construction, project management, testing, maintenance, and operations support required by PG&E personnel
- Pre-parallel inspection, testing, SCADA, EMS setup, engineering support, and any other activities required to commission the Project

## 7.2 Network Upgrade Work Scope

The Substation Evaluation determined the Network Upgrades work scope for which the Project will be responsible. These activities include all substation engineering, design, and construction activities beyond the point of interconnection. The final Network Upgrades work scope will be determined after detailed design and engineering is completed. The work scope includes the following:

- Provide SPS for Los Banos-Westley 230 kV line overloads following the outage of the Herndon-Bullard EC and Gates-Gregg 230 kV lines
- Provide SPS for Herndon-Figarden T1 section of the Herndon-Ashlan 230 kV line overloads following the outage of the Gregg-Herndon #1 and #2 230 kV lines
- Replacing the existing line protection and carrier equipment at Kearney and Herndon. The Herndon – Bullard 230kV Line will have a fully redundant, double-pilot current differential scheme utilizing dual fiber optic communications. The Bullard– Kearney 230kV Line will utilize a two terminal carrier scheme. The Bullard – Bullard EC 230kV Line will have a fully redundant, double-pilot current differential scheme utilizing dual fiber optic communications.
- Replace four (4) overstressed 115 kV circuit breakers (CB 122, 132, 142, and 152)
- Upgrade relays at Herndon Substation
- Upgrade Relays in Kearney Substation
- Cinergy to construct a new loop station, the new Bullard Switching Substation, with a three-breaker 230 kV ring bus. Breakers must be in a breaker and a half configuration with minimum two future bays.

## 8. Land Services Evaluation

### 8.1 Direct Assignment Work Scope

The Land Services Evaluation determined the Direct Assignment work scope for which the Project will be responsible. These activities include land engineering and real estate activities from the Project to the point of interconnection. There is no Land Services Direct Assignment work scope for the Project.

### 8.2 Network Upgrade Work Scope

The Land Services Evaluation determined the Network Upgrades work scope for which the Project will be responsible. These activities include all land

engineering and real estate activities beyond the point of interconnection. The final Network Upgrades work scope will be determined after detailed design and engineering is completed. The work scope includes the following:

- Surveying, mapping, land or land rights acquisition activities required as a result of the Network Upgrade work scope associated with the Project.
- Temporary land acquisition and crop-damage compensation for the Network Upgrade line reconductoring work scope associated with the Project.
- Preparation and filing of the Notice of Construction (NOC) in compliance with General Order 131-D after the interconnection engineering and EMF studies are completed. PG&E will require approximately two months for the Network Upgrade line reconductoring work scope associated with the Project. The General Order 131-D approval process is not within PG&E's scheduling control and is dependent upon intervener interest.

## **9. Environmental Evaluation / Permitting**

### **9.1 CPUC General Order 131-D**

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, switchyards, etc.). These facilities include all facilities to be constructed by others and deeded to PG&E. In most cases where PG&E's electric facilities are under 200 kV and are part of a larger project (i.e., electric generation plant), the Order exempts PG&E from obtaining an approval from the CPUC provided its planned facilities have been included in the larger project's California Environmental Quality Act (CEQA) review, the review has included circulation with the State Clearinghouse, and the project's lead agency (i.e., California Energy Commission) finds no significant unavoidable environmental impacts. PG&E or the project developer may proceed with construction once PG&E has filed notice with the CPUC and the public on the project's exempt status, and the public has had a chance to protest PG&E's claim of exemption. If PG&E facilities are not included in the larger project's CEQA review, or if the project does not qualify for the exemption, PG&E may need to seek approval from the CPUC (i.e., Certificate of Public Convenience and Necessity or Permit to Construct) taking as much as 18 months or more since the CPUC would need to conduct its own environmental evaluation (i.e., Negative Declaration or Environmental Impact Report).

PG&E recommends that the project proponent includes PG&E facility work in its project description and application to the lead agency performing CEQA review on the project. The lead agency must consider the environmental impacts of the interconnection electric facility, whether built by the developer

with the intent to transfer ownership to PG&E or to be built and owned by PG&E directly, and make a finding of no significant unavoidable environmental impacts from construction of those facilities. Once the project has completed the review process and the environmental document (i.e., Negative Declaration or Environmental Impact Report) finds no significant unavoidable environmental impacts from PG&E's work, 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 may then need to apply for a formal permit to construct the project (i.e., Certificate of Public Convenience and Necessity or Permit to Construct). Facilities built under this procedure must also be designed to include consideration of 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, 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](http://www.cpuc.ca.gov/PUBLISHED/GENERAL_ORDER/589.htm)

## 9.2 CPUC Section 851

Because PG&E is subject to the jurisdiction of the CPUC, it must also comply with Public Utilities Code Section 851. Among other things, this code provision requires PG&E to obtain CPUC approval of leases and licenses to use PG&E property, including 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. Study Updates

The FS was performed according to the assumptions shown in the Section titled "[Study Assumptions.](#)" In the event that these assumptions are changed, updating the 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 study update. Some of the changes that might prompt a study update are:

- Change in queue position
- Modifications to a superior queue project
- Change in the FS assumptions

## **11. Stand-by Power**

This study does not address any requirements for stand-by power that the Project 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 Project's start-up date