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# **Interconnection Facilities Re-study Report**

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Generation Interconnection

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**Starwood Power Midway, LLC**

**Starwood Power Midway, LLC Project**

**FINAL**



**California ISO**  
Your Link to Power

July 23, 2007

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## 1. Executive Summary

Starwood Power Midway, LLC, an Interconnection Customer (IC), has submitted a Interconnection Facilities Re-study (IFAR) request to the California Independent System Operator Corporation (CAISO) for their Starwood Power Midway, LLC (Project). The maximum net output to CAISO's Controlled Grid from the Project is 120 MW. The expected in-service date is September 2009. The IC proposes to interconnect the Project onto Pacific Gas and Electric Company's (PG&E) 115 kV bus at Panoche Substation via the CalPeak Panoche Peaker generator tie line.

CAISO and PG&E had performed an Interconnection System Impact Re-study (ISIR) for this Project and issued ISIR report on March 16, 2007 that provided an analysis of the system impacts by the interconnection of the Project. The ISIR revealed a different system impacts to PG&E's transmission system than the original Interconnection System Impact Study (ISIS). Therefore, the already issued Facilities Report (FS), dated November 3, 2006, was obsolete. Based on the identified system impacts and their mitigations in the ISIR report and under the CAISO's instruction, PG&E is to conduct an Interconnection Facilities Re-study (IFAR) for the Project. This IFAR provides the following:

1. Identified work scope and cost estimates for the Direct Assignment facilities<sup>1</sup> necessary to interconnect the Project to the CAISO Controlled Grid at the Point of Interconnection (POI), and
2. Identified work scope and cost estimates for the Network Upgrade facilities<sup>2</sup> necessary to interconnect the Project to the CAISO Controlled Grid beyond the POI and to mitigate the impact of the Project under various system conditions.

The Direct Assignment facilities work scope consists of the following:

- Provide transmission interconnection from the Project to the POI (the generator tie line to be built by the IC)
- Install a fully redundant, double-pilot current differential scheme
- Provide pre-parallel inspection, testing, SCADA, EMS setup, engineering support, etc.

The Network Upgrade facilities work scope consists of the following:

- Re-conductor the existing CalPeak Panoche Peaker generator tie line at Panoche Substation

<sup>1</sup> The transmission facilities necessary to physically and electrically interconnect the Project to the Point of Interconnection of the CAISO Controlled Grid

<sup>2</sup> The transmission facilities necessary to interconnect the Project safely and reliably to the CAISO Controlled Grid, beyond the Point of Interconnection



- Install associated equipment at Panoche and other substations for protection and communication, and
- Install a special protection scheme (SPS) required to mitigate the Category "C" overload.

The cost of the Direct Assignment facilities to interconnect the Project is approximately **\$1.03 million** which includes ITCC<sup>3</sup>.

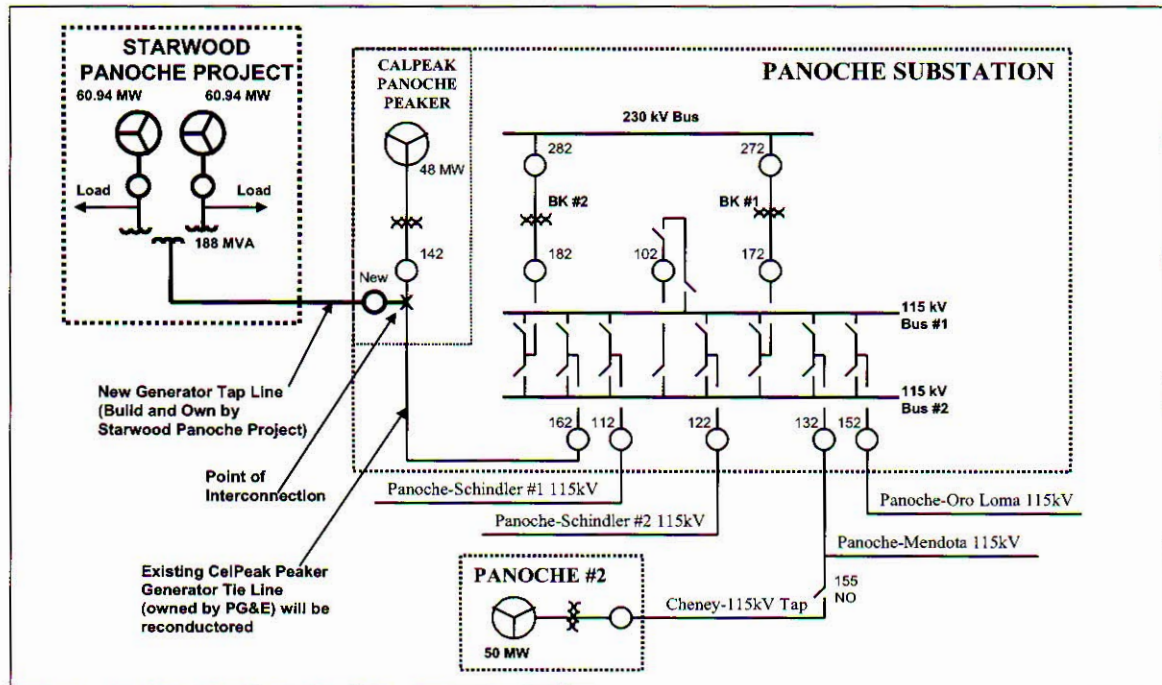
The cost of the Network upgrade facilities to interconnect the Project is approximately **\$0.76 million**.

The total interconnection cost of the Project is approximately **\$1.8 million**.

## 2. Project Information and Interconnection Plan

The Project consists of two gas turbine generators rated for 121.88 MW with a plant auxiliary load of 1.99 MW. The maximum net output to the CAISO Controlled Grid will be 119.89 MW. Both generators share one three phase three winding 13.8/13.8/115 kV step-up transformer with rating of 188 MVA. The Project will connect to the 115 kV bus at PG&E's Panoche Substation by tapping the existing CalPeak Panoche Peaker generator tie line.

A conceptual one-line diagram of the Project is shown in Figure 2-1. Figure 2-2 shows the approximate location of the Project and transmission facilities in the area.



<sup>3</sup> Income Tax Component of Contribution (currently at 36%)





### 3.1 Direct Assignment Cost

Cost estimates for the Direct Assignment facilities required to interconnect the Project is summarized in Table 3-2. These facilities are necessary to physically and electrically interconnect the Project to the POI on the CAISO Controlled Grid.

Table 3-2 Direct Assignment Cost Estimates

<b>Substation Work</b>			
<i>Starwood Power Midway, LLC</i>			
<i>Project Site</i>			
Install DTT and perform pre-parallel inspection, testing, SCADA, EMS setup, Maintenance, etc.	\$240,000		
<i>Panoche Substation</i>			
Install DTT and perform pre-parallel inspection, testing, SCADA, EMS setup, Maintenance, etc.	\$240,000		
<b>Subtotal Substation Work</b>		\$480,000	
<b>Transmission Line Work</b>			
Rebuild the Panoche-Schindler No.1 and 2 115kV lines to accommodate the new generator tap line for under crossing	\$150,000		
Provide tap connection Panoche Station	\$100,000		
<b>Subtotal Transmission Line Work</b>		\$250,000	
<b>Land Services Work</b>			
Land engineering support, rights-of-way, property improvement, and permitting activities to support construction of the generator tie line	\$50,000		
<b>Subtotal Land Services Work</b>		\$50,000	
<b>Total Direct Assignment Cost before ITCC</b>			<b>\$780,000</b>

### 3.2 Network Upgrades Costs

Cost Estimates for the Network Upgrade facilities required to interconnect the Project is summarized in Table 3-3. These facilities are necessary to physically and electrically interconnect the Project on the CAISO Controlled Grid beyond the POI.

Table 3-3 Network Upgrade Cost Estimates

<b>Substation Work</b>			
<i>Panoche Substation</i>			
Upgrade protection/communication equipment/relays	\$200,000		
<i>Hammonds/Panoche Substation</i>			
Install Special Protection Scheme	\$250,000		
<i>CalPeak Panoche Peaker</i>			
Replace protection/communication	\$50,000		
<b>Subtotal Substation Work</b>		\$500,000	

<b>Transmission Line Work</b>			
Re-conductor CalPeak Panoche Peaker generator tie line	\$65,000		
<b>Subtotal Transmission Line Work</b>		\$65,000	
<b>Telecommunication Work</b>			
Engineering and construction inside Panoche Substation	\$135,000		
Materials	\$30,000		
<b>Subtotal Telecommunication Work</b>		\$165,000	
<b>Total Network Upgrade Cost</b>			<b>\$730,000</b>

### 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 IFAS is approximately between 18 and 24 months from the execution of the Large Generator Interconnection Agreement (LGIA) and payment of the estimated Direct Assignment and Network Upgrade facilities 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.

**PG&E cannot guarantee that such interconnection can be completed by January 2009, due to the potential work required for this interconnection. However, PG&E will work with the IC to achieve that interconnection as quickly as possible.**

## 4. Study Assumptions

PG&E conducted the IFAR using the following assumptions:

1. The maximum total output from the two generators of the Project are 121.88 MW (60.94 MW each) with an expected total plant auxiliary load of 1.99 MW. Therefore, the maximum net output to the CAISO Controlled Grid is 119.89 MW.
2. The expected commercial operation date is January 2009.
3. The Project employs one three-phase three winding step-up transformer. It is rated for 13.8/13.8/115 kV and 112/148/188 MVA (OA/FA/FA) with an impedance of 14% at a 112 MVA base.



4. The IC will engineer, procure, construct, own, and maintain its project facility including a generator tap line from the Project to the CalPeak Panoche Peaker site and a new 115 kV breaker (located inside of the CalPeak Panoche Peaker site). The tap line shall be 954 kcmil Al conductor or equivalent and are about 300 to 400 feet in length.
5. PG&E will provide the tapping connection including installation of line switches.
6. PG&E will re-conductor the CalPeak Panoche Peaker generator tie line in order to accommodate the Project and the CalPeak Panoche Peaker generations.

## **5. System Impact Re-study Results**

The ISIR issued on March 16, 2007 concluded that the Project would:

- 1) Cause one new Category C emergency overload that the Project will provide mitigation:
  - The Panoche – Oro Loma 115 kV Line (Panoche Jct – Hammonds)
- 2) Exacerbate the following pre-project Category B and C emergency overloads:
  - Borden – Gregg 230 kV Line (Normal, Category “B”)
  - Oro Loma - Canal #1 70 kV Line section Oro Loma to Dos Palos (Category “B”)
  - Wilson - Gregg 230 kV Line section Storey 1 to Gregg (Category “B”)
  - Helm - Kerman 70 kV Line section Agrico Jct. to Kerman (Category “B” and “C”)
  - Coppermine - Tivy Valley 70 kV Line (Category “C”)
  - Tivy Valley - Reedley 70 kV Line (Category “C”)
  - Wilson - Le Grand 115 kV Line (Category “C”)
  - Herndon - Ashlan 230 kV Line (Category “C”)
  - LeGrand - Dairyland 115 kV Line (Category “C”)
  - Wilson - Oro Loma 115 kV Line section LeGrand Jct to Wilson (Category “C”)

These pre-project overloads were mitigated by the projects, aheaded in CAISO project queue position, that caused these overloads.

**Should all of these Projects not materialize, the IC may be responsible for mitigating these pre-project overloads.**

- 3) Overstress one 115 kV breaker (CB 112) and two 230 kV breakers (CB 222 and 322) at Panoche Substation. A project with a superior queue position and an earlier online date is currently responsible for replacing these three breakers.



**Should this project not materialize, the IC may be responsible for replacing these breakers.**

- 4) Cause minimal adverse transient performance impacts on the transmission system.
- 5) Require the Project to install a fully redundant, double-pilot current differential scheme at Panoche Substation.

## **6. Transmission Line Evaluation**

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

The Transmission Line Evaluation determined the Direct Assignment facilities work scope for which the Project will be responsible. These include all transmission line engineering, design, and construction activities from the Project up to the POI. The final Direct Assignment facilities work scope will be determined after detailed design and engineering is completed. The work scope includes:

- Provide tapping connection onto the existing CalPeak Panoche Peaker generator tie line including installation of line switches
- Rebuild the Panoche-Schindler No.1 and 2 115kV lines to accommodate the new generator tap line for under crossing

Since the IC will construct the generator tap line from the Project to Panoche Substation, cost estimates or work scope for the construction of the generator tap line will not be provided in the IFAR.

### **6.2 Network Upgrade Work Scope**

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

- Re-conductor the existing CalPeak Panoche Peaker generator tie line with 477 kcmil ACSS conductor or equivalent.

## **7. Substation Evaluation**

Substation work scope is detailed in [Appendix B](#).

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

The Substation Evaluation determined the Direct Assignment facilities work scope for which the Project will be responsible. These include all substation engineering, design, and construction activities from the Project facility up to the POI. The final Network Upgrades facilities work scope will be determined

after detailed design and engineering is completed. The work scope includes:

- Install a fully redundant, double-pilot current differential scheme (DTT)
- Pre-parallel inspection, testing, SCADA, EMS setup, engineering support, etc.

Since the IC will install a new 115 kV breaker at the CalPeak Panoche Peaker site for the interconnection of the Project, cost estimates or work scope for the new 115 kV breaker will not be provided in the IFAR.

## **7.2 Network Upgrade Work Scope**

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

- Replace/upgrade associated protection relays in affected PG&E substations and CalPeak Panoche Peaker site
- Installation of SPS to mitigate the following Category "C" emergency overload for the Panoche – Oro Loma 115 kV Line (Panoche Jct – Hammonds)

# **8. Land Services Evaluation**

## **8.1 Direct Assignment Work Scope**

The Land Services Evaluation determined the Direct Assignment facilities work scope for which the Project will be responsible. These activities include land engineering and real estate activities from the Project up to the POI. The work scope includes:

- Surveying, mapping, land or land rights acquisition activities required to assist the Project for constructing the generator tie line, and
- Preparing and filing 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 these activities. The General Order 131-D approval process is not within PG&E's scheduling control and is dependent upon intervenor's interest.

## **8.2 Network Upgrade Work Scope**

The Land Services Evaluation determined the Network Upgrade facilities work scope for which the Project will be responsible. These activities include land engineering and real estate activities beyond the PI. Since the CalPeak Panoche Peaker generator tie line is located inside Panoche Substation, there is no land Network Upgrade work is provided in the IFAR.



## **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, Switching Stations, 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**

Since 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 IFAR was performed according to the assumptions shown in the Section titled "[Study Assumptions.](#)" In the event that these assumptions are changed, a re-study according to the LGIP may be required to re-evaluate the Project's impact on CAISO Controlled Grid. The IC would be responsible for paying for any such study update.

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

This study did not address any requirements for stand-by power that the Project may require. The IC should contact their Generation Interconnection Services representative regarding this service.

**Note:** The IC 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.