
Facilities Study Report

Generation Interconnection

Starwood Power Midway LLC

Panoche Project



*Pacific Gas and
Electric Company*

WE DELIVER ENERGY.

November 3, 2006

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1. Executive Summary

Starwood Power Midway LLC (Midway) proposes to interconnect a new 121.88 MW generating facility to the Pacific Gas & Electric Company's (PG&E) transmission system at Panoche Substation near Firebaugh, California. The new project is called the Panoche Project (Project). The proposed interconnection is tapping the existing generation tie line interconnecting the CalPeak Panoche Peaker (Peaker) and the 115 kV bus at Panoche Substation. The tap point is located at the Peaker's site. PG&E issued a System Impact Study (SIS) on March 30, 2006 that provided an analysis of the system impacts by the Project.

Based on the issued SIS, the Facility Study (FS) provides:

1. Work scope and cost estimates for the Direct Assignment facilities¹ necessary to interconnect the Project to the California Independent System Operator (CAISO) Controlled Grid at the Point of Interconnection (PI)
2. Work scope and cost estimates for the Network Upgrade facilities² necessary to mitigate the impact of the Project under various system conditions

The Direct Assignment facilities work scope consists of:

- Providing transmission interconnection from the Project to the Point of Interconnection including tapping the Peaker generator tie line
- Providing a pre-parallel inspection, testing, SCADA, EMS setup, engineering support, etc.

The Network Upgrade facilities work scope consists of:

- Reconductoring the Peaker generator tie line
- Reconductoring the Le Grand-Dairyland 115 kV Line
- Upgrading relays in Panoche Substation
- Providing special protection schemes (SPS)

The cost of the Direct Assignment facilities to interconnect the Project is approximately **\$0.5 million** including ITCC³.

The cost of the Network upgrade facilities to interconnect the Project is approximately **\$5.1 million**.

The total interconnection cost of the Project is approximately **\$5.6 million**

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

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

³ Income Tax Component of Contribution (currently at 36%)

2. Project Information and Interconnection Plan

The Project consists of two gas turbine generators each rated for 60.94 MW or a combined total of 121.88 MW with a plant auxiliary load of 1.99 MW. The maximum net output to the grid will be 119.89 MW. The two generators are connected to a three-winding step-up transformer. The Project will tap onto the existing 115 kV Peaker generator tie line at the Peaker site.

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.

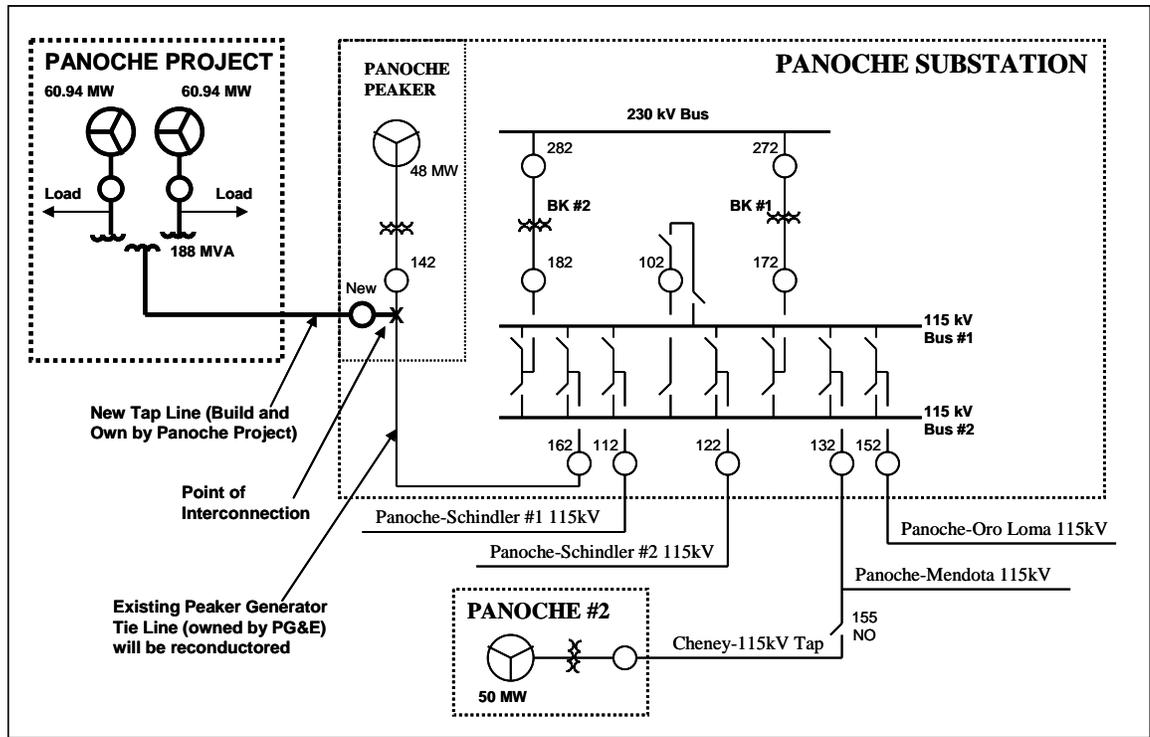


Figure 2-1: Conceptual One-line Diagram

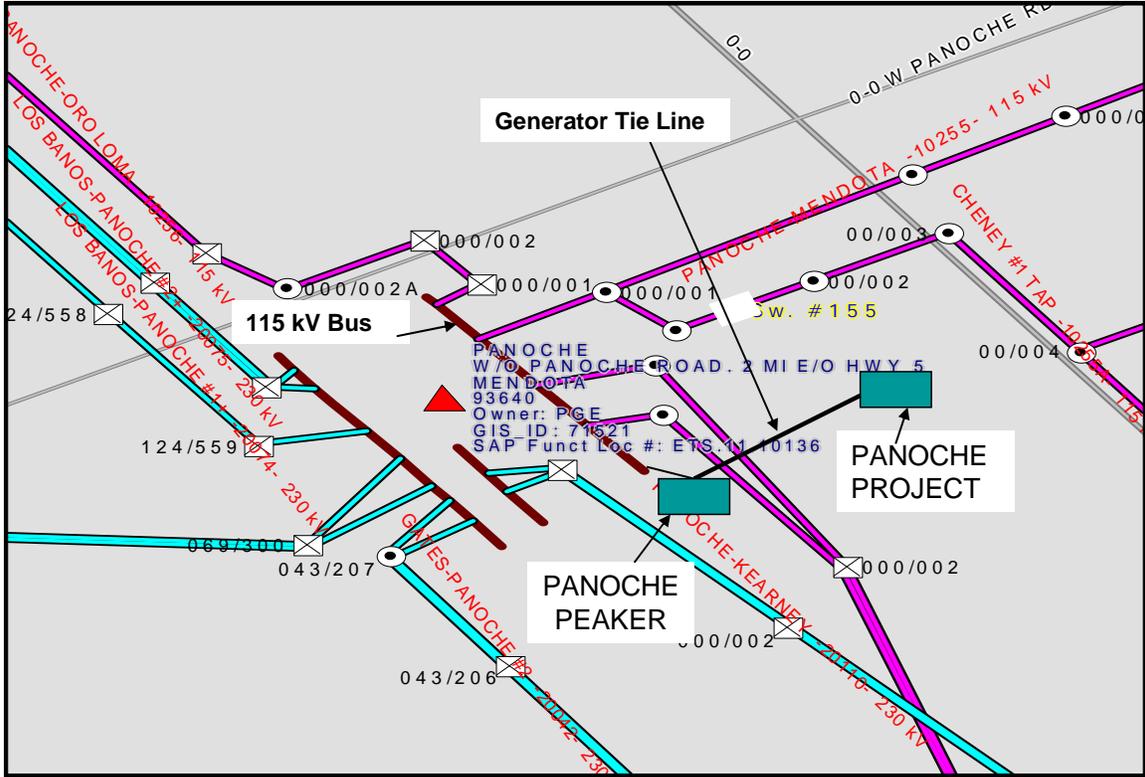


Figure 2-2: Location Map

3. Cost Summary and Schedule

A cost summary is provided in Table 3-1, with more detailed Direct Assignment and Network Upgrade facilities 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.

Total Direct Assignment Cost	\$400,000		
ITCC Tax @ 36 %	\$144,000		
Total Direct Assignment Facilities Cost with ITCC		\$544,000	
Total Network Upgrade Cost	\$5,085,000		
Total Network Upgrade Facilities Cost		\$5,085,000	
Total Project Interconnection Cost			\$5,629,000

Table 3-1 Cost Estimate Summary

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 Point of Interconnection on the CAISO Controlled Grid.

Substation Work			
<i>Panoche Substation and The Project Site</i>			
Perform pre-parallel inspection, testing, SCADA, EMS setup, Maintenance, etc.	\$200,000		
Subtotal Substation Work		\$200,000	
Transmission Line Work			
Raise 2 existing lines for new generator tap line crossing and provide the tapping connection	\$150,000		
Subtotal Transmission Line Work		\$150,000	
Land Services Work			
Land engineering support, rights-of-way, property improvement, and permitting activities to support construction of the new tap line	\$50,000		
Subtotal Land Services Work		\$50,000	
Total Direct Assignment Cost before ITCC			\$400,000

Table 3-2 Direct Assignment Cost Estimates

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 Point of Interconnection.

Substation Work			
<i>Panoche Substation</i>			
Update equipment/relays	\$255,000		
<i>Install SPS</i>			
Mitigate overload on the Coalinga No.1- Coalinga No. 2 line	\$250,000		
Mitigate overload on the Wilson-Oro Loma line	\$250,000		
<i>Telecommunication Equipment</i>		\$165,000	
Subtotal Substation Work		\$920,000	
Transmission Line Work			
Re-conductor the Peaker generator tie line	\$65,000		
Re-conductor the Le Grand-Dairyland line	\$4,000,000		
Subtotal Transmission Line Work		\$4,065,000	
Land Services Work			
Land engineering support, rights-of-way, property improvement, and permitting activities to support reconductoring	\$100,000		
Subtotal Land Service Work		\$100,000	
Total Network Upgrade Cost			\$5,085,000

Table 3-3 Network Upgrade Cost Estimates

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 between 12 and 18 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.

4. Study Assumptions

PG&E conducted the FS with the following assumptions:

- 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 grid is 119.89 MW.
- The expected commercial operation date is January 2009.
- 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.
- Midway will engineer, procure, construct, own, and maintain its project facility including a tap line from the Project to the existing Peaker at Panoche Substation. The tap line shall be 954 kcmil Al or equivalent size conductor.
- PG&E will provide the tapping interconnection.
- The existing interconnection from the Peaker to the 115 kV bus will be upgraded by PG&E in order to accommodate the Project and the Peaker.
- This study took into account the planned generating facilities in PG&E's service territory whose schedules are concurrent with or precede the Project's.

5. System Impact Study Results

The SIS issued on March 30, 2006 concluded that the Project would:

1. Cause one new Category "A" normal, one new Category "B" emergency, and two new Category "C" emergency overloads on PG&E's transmission facilities that require mitigation by the Project. The overloaded facilities are:
 - a. The Le Grand – Dairyland 115 kV Line (Normal and Category "B")

- b. The Coalinga No. 1 – Coalinga No. 2 70 kV Line between the Tornado Jct. and Coalinga 1 section (Category “C”)
 - c. The Wilson – Oro Loma 115 kV Line between the Oro Loma and El Nido section (Category “C”)
2. Exacerbate two normal, three Category “B” emergency, and eleven Category “C” emergency pre-project overloads. Several projects with superior queue positions and earlier commercial operation dates are responsible for mitigating these overloads. Should those projects not materialize, Midway may be responsible for mitigating these overloads.
 3. Require a fully redundant, double-pilot current differential scheme utilizing dual fiber optic communications for the Project’s generator tie line.
 4. Have no adverse impact on the transmission system’s transient stability performance by the Project following the selected contingencies.
 5. Exacerbate three pre-project overstressed breakers. However, a project with a superior queue position and an earlier online date is responsible for replacing these three breakers. Should this project not materialize, Midway may be responsible for replacing these breakers.

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 Point of Interconnection. The final Direct Assignment facilities work scope will be determined after detailed design and engineering is completed. The work scope includes:

- Provide a tap interconnection at the Peaker generator tie line
- Rearrange or rebuild the Panoche-Shindler 115 kV No. 1 and 2 lines to accommodate crossing of the new tap line

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 Point of Interconnection. The final Network Upgrades facilities work scope will be determined after detailed design and engineering is completed. The work scope includes:

- Re-conductor the Peaker generator tie line between CB 142 at the Peaker and CB 162 at Panoche Substation with 477 kcmil ACSS conductor

- Re-conductor the Le Grand – Dairyland 115 kV Line

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 Point of Interconnection. The final Network Upgrades facilities work scope will be determined after detailed design and engineering is completed. The work scope includes:

- Modify the existing fully redundant double-pilot current differential protection scheme to a fully redundant, 3 Terminal, double-pilot current differential scheme utilizing dual fiber optic communications
- Perform a pre-parallel inspection, testing, SCADA, EMS setup, engineering support, etc.

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 Point of Interconnection. The final Network Upgrades facilities work scope will be determined after detailed design and engineering is completed. The work scope includes:

- Upgrade substation equipment (protection relays, CTs, panels, conduits, etc) when required
- Provide telecommunication requirements
- Provide SPS to mitigate the overload of the Coalinga No.1-Coalinga No.2 70 kV Line
- Provide SPS to mitigate the overload of the Wilson-Oro Loma 115 kV Line

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 Point of Interconnection. The work scope includes:

- Surveying, mapping, land or land rights acquisition activities required to assist the Project for constructing the generator tap line
- 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 intervener'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 Point of Interconnection. The work scope includes:

- Surveying, mapping, land or land rights acquisition activities required to assist the reconductoring the Le Grand – Dairyland 115 kV Line

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

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 FS 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 Large Generation Interconnection Procedures (LGIP) may be required to re-evaluate the Project's impact on PG&E's transmission grid. The Project 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. Midway should contact their Generation Interconnection Services representative regarding this service.

Note: Midway 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.

Appendix A

Facilities Study Plan

Facilities Study Plan

Starwood Power Midway LLC

Panoche Project

REVISION 2



*Pacific Gas and
Electric Company*

WE DELIVER ENERGY.

September 26, 2006

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[Facilities Study Agreement](#)

1. Introduction

Starwood Power Midway LLC (Midway) proposes to interconnect a new 121.88 MW generating facility to Pacific Gas & Electric Company’s (PG&E) 115 kV bus at Panoche Substation near Firebaugh, California. The project is called the Panoche Project (the Project). PG&E issued a System Impact Study (SIS) for the Project on March 30, 2006 that provided an analysis of the system impacts. The commercial operation date of the Project is January 2009.

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

1. Work scope and cost estimates for the Direct Assignment¹ facilities necessary to interconnect the Project to PG&E’s grid
2. Work scope and cost estimates for the Network Upgrade² facilities necessary to mitigate the impact of the Project under various system conditions

This FS Plan will form the basis for the [Facilities Study Agreement](#) (FSA) by defining the scope, content, assumptions, and terms of reference of the FS.

2. Study Fee

PG&E has estimated a study fee of \$25,000 for performing the FS. The final cost to complete the FS will be based on actual cost.

PG&E will provide Midway a record of actual costs for performing the FS roughly two months after the study is completed. PG&E will bill Midway the remaining balance if the actual cost is higher than the estimated \$25,000. If the actual cost is less than the estimated study fee, PG&E will refund the balance to Midway.

3. Schedule

Table 3-1 shows the tentative milestones/schedules associated with this FS.

Task	Milestone Description	Target Date
1	Establish study commencement date based on receipt of study fee with the FS Agreement	June 19, 2006
2	Issue Facilities Study Report	October 6, 2006

Table 3-1: Study Schedule

¹ The transmission facilities necessary to physically and electrically interconnect the Project to the ISO Controlled Grid at the point of interconnection.

² The transmission facilities, other than Direct Assignment Facilities, beyond the point of interconnection necessary to interconnect the Project safely and reliably to the ISO Controlled Grid.

Because of the complexity of this study, the FS will require more than 60 calendar days to complete.

Per the CAISO Tariff, Midway must execute and return the attached FSA along with the study deposit of \$25,000 by the tenth business day from the tendering of this study plan. If Midway fails to return an executed FSA with the estimated study fee by the tenth business day, the Project will be removed from the CAISO Interconnection Application Queue.

4. Cost Estimates

All costs provided will be estimates only. Charges for implementing the interconnection of the Project will be made based upon the actual costs incurred.

4.1 Direct Assignment Costs

A cost estimate will be provided based upon a commercial operation date in January 2009. This cost estimate will include any substation and transmission line facilities required to interconnect the Project. The estimate will not include any facilities constructed, owned, and operated by Midway.

4.2 Network Upgrade Costs

A cost estimate will also be provided for any transmission facility additions or upgrades for mitigating any negative impacts on PG&E's existing facilities that are beyond the Interconnection Point.

5. Project and Interconnection Information

The Project will consist of two gas turbine generators each rated for 60.94 MW or a total of 121.88 MW with a plant auxiliary load of 1.99 MW. The maximum net output to the grid will be 119.89 MW. The generators are connected to one three winding step-up transformer. The Project will interconnect to the 115 kV bus at PG&E's Panoche Substation the existing CalPeak Panoche Peaker (Peaker) generator tie line.

A conceptual one-line diagram of the Project is shown in Figure 5-1.

Figure 5-2 shows the approximate location of the Project and transmission facilities in the area.

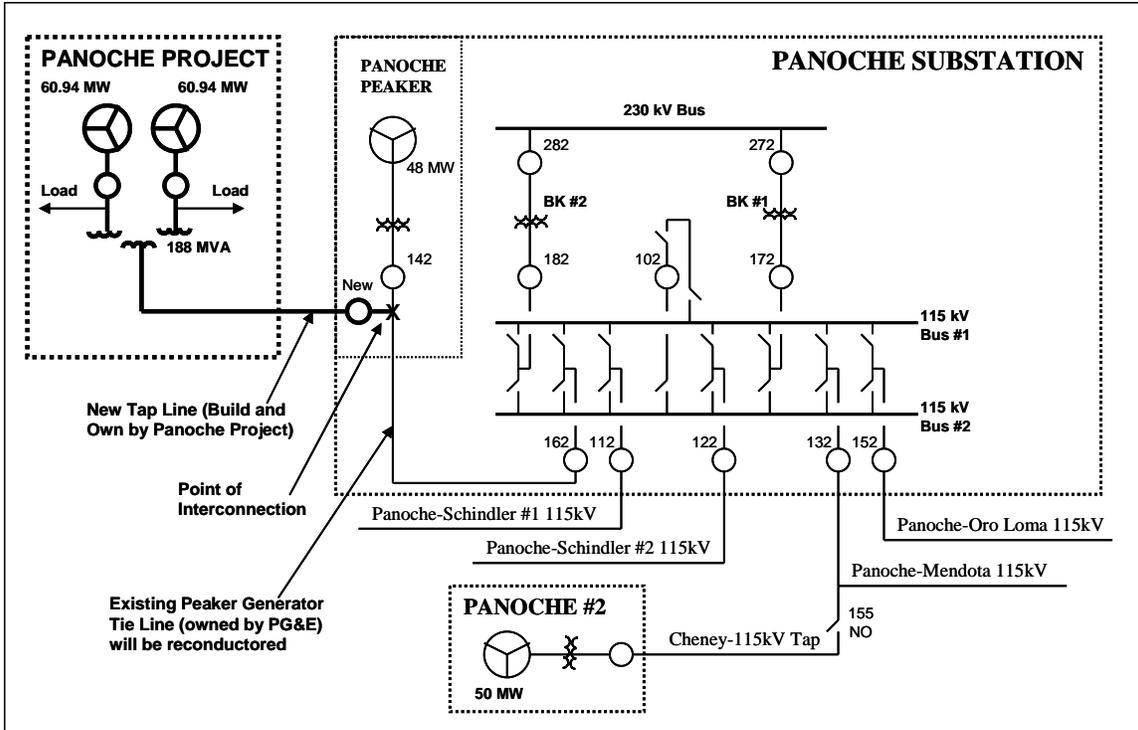


Figure 5-1: Conceptual one-line Diagram

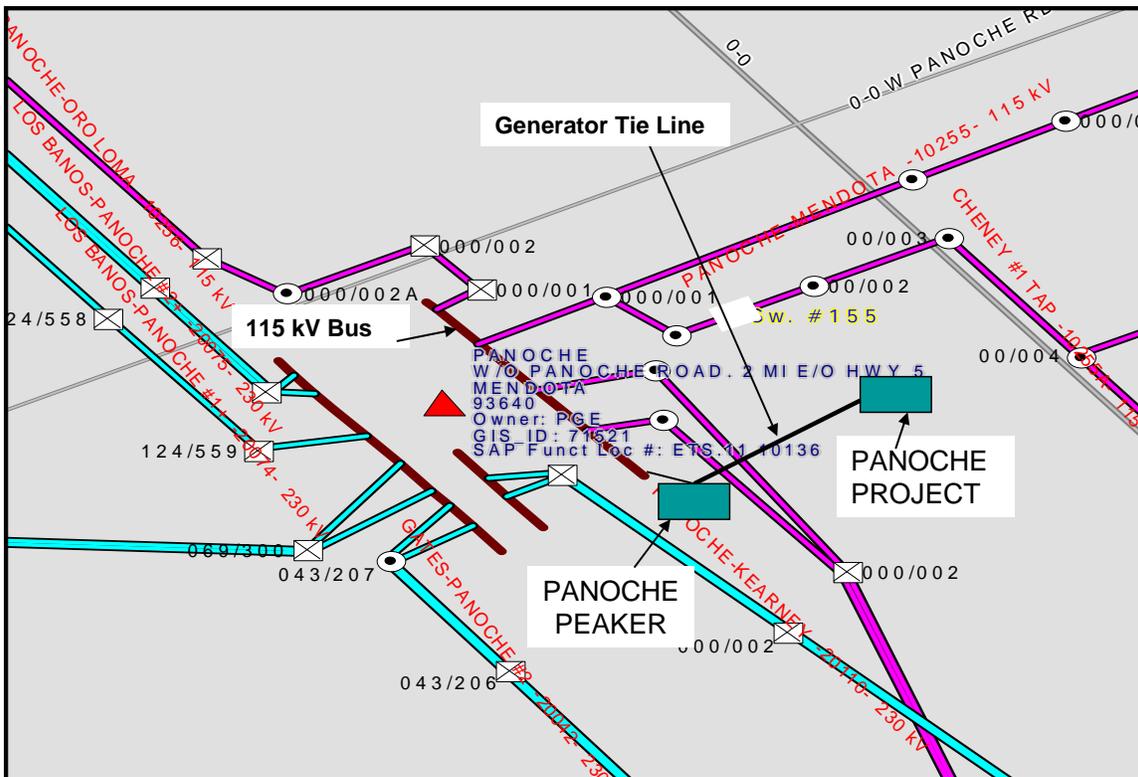


Figure 5-2: Location Map

6. Study Assumptions

PG&E will conduct the FS 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 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. Midway will engineer, procure, construct, own, and maintain its project facility.
5. Midway will engineer, procure, construct, own, and maintain a generator tap line from the Project to the tap point at the Peaker site. The generator tap line is about 1,000 feet with 715.5 kcmil Al or equivalent size conductor.
6. This study took into account the planned generating facilities in PG&E's service territory whose schedules are concurrent with or precede the Project's.

The existing configuration of the Panoche 115 kV bus is double-bus, single breaker. The issued SIS assumed that the project could be interconnected using the existing bus configuration at the Panoche Substation. This FS will determine the configuration that conforms to PG&E's existing standards for bus design. Any additional interconnection costs resulting from a new bus configuration will be the responsibility of the Project.

7. System Impact Study Results

The SIS issued on March 30, 2006 concluded that the Project would:

- Cause one new Category "A" normal, one new Category "B" emergency, and two new Category "C" emergency overloads on PG&E transmission facilities that require mitigation by the Project. The overloaded facilities are:
 1. The Le Grand – Dairyland 115 kV line (Normal and Category "B")
 2. The Coalinga No. 1 – Coalinga No. 2 70 kV line between the Tornado Jct. and Coalinga 1 section (Category "C")
 3. The Wilson – Oro Loma 115 kV line between the Oro Loma – El Nido section (Category "C")

- Exacerbate two normal, three Category “B” emergency, and eleven Category “C” emergency pre-project overloads. Several projects with superior queue positions and earlier commercial operation dates are responsible for mitigating these overloads. Should those projects not materialize, Midway may be responsible for mitigating these overloads.
- Require a fully redundant, double-pilot current differential scheme utilizing dual fiber optic communications for the Project’s generator tie line.
- Have no adverse impact on the transmission system’s transient stability performance by the Project following the selected contingencies.
- Have to rearrange or rebuild to avoid multiple line crossings for the construction of the Project’s generator tie line.
- Exacerbate three pre-project overstressed breakers. However, a project with a superior queue position and an earlier online date is responsible for replacing these three breakers. Should this project not materialize, CalPeak may be responsible for replacing these breakers.

8. Facilities Study Scope

The FS will provide the work scope and cost estimates for: (1) Direct Assignment Facilities required interconnecting the Project to the PG&E grid and (2) Network Upgrades to PG&E transmission facilities required to mitigate system impacts and interconnect the project. The specific studies conducted by the FS are:

8.1 Transmission Line Evaluation

8.1.1 Direct Assignment

The generator tap line from the Project to the Peaker Plant will be built and owned by Midway. Therefore, no cost estimates or work scope will be provided in the FS for this line.

PG&E will provide the tapping connection at the tap point.

8.1.2 Network Upgrades

The transmission line evaluation will provide work scope and cost estimates for:

- The existing generator tie line connecting the CB 142 at the Peaker and the 115 kV CB 162 at Panoche Substation will be evaluated for the combined outputs of both plants. The work scope and related cost estimates will be provided if reconductoring is needed.
- Reconductoring the Le Grand – Dairyland 115 kV line with 715 kcmil AAC conductor or equivalent (11.4 miles)

8.2 Substation Evaluation

8.2.1 Direct Assignment

The Project's substation will be built and owned by Midway, therefore, no cost estimates or work scope and associated cost estimate will be provided in the FS for this substation. The substation shall incorporate the required relaying as specified in the PG&E interconnection handbook per Section G2.1. Note that there is a redundancy requirement for application of multifunction relays.

The substation evaluation will provide work scope and cost estimates for new substation equipment at Panoche Substation that is needed to interconnect the Project. These facilities include but are not limited to the following:

- Fully redundant, double-pilot current differential protection scheme utilizing fiber optic communications
- Communications equipment
- Pre-parallel inspection, testing, SCADA, EMS setup, Maintenance, etc.

8.2.2 Network Upgrades

The substation will provide the work scope and cost estimates for any required substation work that is beyond the point of Interconnection. This work includes but is not limited to:

- Modifying existing protective relay settings
- Upgrading and/or adding to system protection equipment at affected PG&E Substations
- Installing special protection scheme (SPS) to mitigate overloads on:
 1. The Coalinga No.1 – Coalinga No. 2 70 kV line between the Tornado and Coalinga 1 section
 2. The Wilson – Oro Loma 115 kV line between the Oro Loma – El Nido section

8.3 Land Evaluation

8.3.1 Direct Assignment

PG&E's Corporate Real Estate Department will determine if any new land rights and/or easements are needed to install new

facilities that might be required for the interconnection of the Project. The work scope and cost estimates will be provided for new land rights and permit requirements.

8.3.2 Network Upgrade

PG&E's Corporate Real Estate Department will determine if any new land rights and/or easements are needed to upgrade existing PG&E facilities that are negatively impacted by the Project. The work scope and cost estimates will be provided for new land rights and permit requirements.

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.). This includes 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 include 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

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

This FS will be 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 Large Generation Interconnection Procedures (LGIP) may be required to re-evaluate the Project's impact on PG&E's transmission grid. Midway would be responsible for paying for any such updating study.

11. Stand-by Power

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

Note: Midway 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.



FACILITIES STUDY AGREEMENT

Starwood Power Midway LLC (Applicant) has reviewed the Facilities Study Plan for the interconnection of Applicant's Panoche Project with PG&E's system at Panoche Substation in Fresno County, State of California, and agrees with the proposed study plan.

Applicant agrees to pay the proposed study fee.

Dated this _____ day of _____, 2006

APPLICANT:

BY: _____
(Signature)

(Type or Print Name)

TITLE: _____

MAILING ADDRESS:

Appendix B

Starwood Power Midway Panoche Project Substation Work Scope

Starwood Power Midway Panoche Project

Substation Work Scope

9/26/06

PG&E's Panoche Substation

OUTDOOR:

Outdoor construction requires installing dedicated pull boxes and 4' PVC conduits between PG&E's Panoche Substation and CalPeak Panoche Peaker. These underground conduits will be used for installing new fiber optic cables for redundant communication paths for the line protective relays. PG&E's substation work will include these conduits up to the divider fence line between the two parties.

PG&E will purchase and install the optic fiber cables inside these conduits. The exact routing of these conduits will be determined at the time of final engineering design.

INDOOR

Currently control and the line relays are located on switchboard panels 7F and 7R respectively inside the control building. Relay changes will include the following

- Remove Alstom LFCB 102 relay and associated test switch assembly
- Install new Schweitzer SEL 311L current differential relay with two test switch assemblies
- Install one SEL 2505 I/O board
- Wire this SEL 311L and re-wire existing GE L90 relay for three-terminal application
- Wire new alarms points to station annunciator
- Wire new SCADA points to existing RTU
- Update EMS/SCADA and build new SCADA screen

CalPeak Panoche Peaker Site

CALPEAK PANOCHE PEAKER SCOPE

- Review CalPeak Panoche Peaker's protection and revenue metering design that concern PG&E, including the new three-terminal line current differential scheme. Note the existing Alstom LFCB 102 relay at CalPeak Panoche Peaker will have to be replaced.

MIDWAY SCOPE

- Connect PG&E pull boxes (installed above) and CalPeak Panoche Peaker raceway
- Install all required equipment/relays
- Install and connect raceways between Midway Panoche Project and CalPeak Panoche site

Midway Panoche Project Site

PG&E SCOPE

- Review Midway Panoche Project's protection and revenue metering design that concern PG&E, including the new three-terminal line current differential scheme.
- Review SCADA and EMS design and provide telecom support for EMS telemetry and SCADA. PG&E's ISTS department's job scope is described in a separate document
- Provide pre-parallel inspection and witness testing per Interconnection Handbook requirements

MIDWAY SCOPE

- Provide raceway to connect the Midway Panoche Project and CalPeak Peaker site. This requires installing dedicated pull boxes and 4' PVC conduits. These underground conduits will be used for installing new fiber optic cables for redundant communication paths for the line protective relays.
- Install fibers and relays

Appendix C

Starwood Power Midway LLC Panoche Project Protection Requirements

**STARWOOD POWER MIDWAY LLC PANOCHE PROJECT
PRELIMINARY PROTECTION REQUIREMENTS**

August 25, 2006

The following Preliminary Protection Requirements are for estimating purposes only for the Starwood Power Midway LLC Panoche Project (the Project). The actual relays specified in the final protection requirements may differ from those outlined in this document.

Per Section G2.1 of the PG&E Interconnection Handbook, PG&E protection requirements are designed and intended to protect PG&E's system only. Generation Entity is responsible for the protection of its own system and equipment and must meet the requirements in the PG&E Interconnection Handbook.

ASSUMPTIONS:

- 1) The Project will consist of two gas turbine generators each rated at 60.94 MW with a plant auxiliary load of 1.99 MW.
- 2) The Project will be tapped onto the existing 115 kV CalPeak Panoche Peaker (the Peaker) generator tie line (connecting CB 142 at the Peaker and CB162 at Panoche Substation). The new generator tap line, connecting the Project and the Peaker, is about 1,000 feet of 954 kcmil Al conductor or equivalent.
- 3) The existing CB 162 and the existing overhead 115 kV tie line (upgraded) between the Peaker and Panoche Substation will be the generator tie line for both the Project and the Peaker.
- 4) The existing 115 kV bus at Panoche Substation is a double bus/single breaker configuration.
- 5) Due to the very short length of the overhead 115 kV tie line the existing protection for the Peaker will be upgraded to a fully redundant, 3-Terminal, double-pilot current differential protection scheme utilizing dual fiber optic communications in order to achieve coordination with all lines connected to the 115 kV bus at Panoche Substation.
- 6) Dual CT's will be required on the Project's breaker. Line protection, Set A relay will be on one set, Set B relay and breaker failure relay will be on another set.
- 7) These protection requirements will not cover special protection set-ups for temporary transmission line shoo-fly configurations that may be necessary to complete this project.
- 8) Line relays specified are per existing System Protection list of relays approved for purchase. Existing Engineering Design Standards are associated with application of these relays.

- 9) Relay coordination was not reviewed for this study. Re-coordination studies could result in the required replacement of relays that are determined to be out of range as a result of this interconnection.
- 10) Study is based upon existing information available, any changes to the interconnection queue, connection point, or project information will result in a restudy of the area.

PROTECTION REQUIREMENTS

The Protection Requirements will consist of a fully redundant, 3 Terminal, double-pilot current differential scheme utilizing dual fiber optic communications. If substitution for the Project's breaker is required by customer, PG&E will utilize over current protection for the tie line. The details are as follows:

PANOCHÉ SUBSTATION

1. Replace existing LFCB line current differential relay with a SEL 311L line current differential relay for breaker CB 162
2. All CTs contribution to the existing L90 and SEL 311L relays will be the same
3. If substitution for CB 162 is required by the Project, PG&E will utilize over current protection for the tie line. To coordinate with the lines into Panoche 115 kV substation, it would be necessary to set the over current relay with instantaneous protection. This relay would operate instantaneously for faults on the generation tie line and in the generation facility. In the case of faults with in the facility, faults will be cleared by both the facility protective devices and the remote tie line breaker resulting in the unnecessary loss of the whole generation facility. This will, also, prevent accurate fault location and delays in restoration of the generation facility for faults on the tie line and within the facility.

CALPEAK PANOCHÉ PEAKER SUBSTATION

1. Replace existing LFCB line current differential relay with a SEL 311L line current differential replay
2. All CTs contributions to the existing L90 and SEL 311L relays will be the same

MIDWAY PANOCHÉ SUBSTATION

1. Install one-115 kV SF6 circuit breakers with bushing CTs rated 3000/5 and all CTs to be pulled into the control room
2. Install G.E. L90 SET A current differential relay as one terminal of a three-terminal Panoche Substation – the Project pilot scheme using dual fiber optic communication line. Wire to outermost Bus-side CT.

3. Install SEL 311 L SET B current differential relay as one terminal of a two-terminal Panoche Substation – the Project pilot scheme using dual fiber optic communication line. Wire to innermost Bus-side CT.
4. Install three (3) bus-side CCVTs to provide polarizing potentials for line protection and station automatics
5. Install one (1) line-side CCVTs to provide synchronizing potential for station automatics

COMMUNICATIONS:

1. Install redundant fiber optic cables between Panoche Substation (CB 162) and the Project, Path A and Path B (redundant paths)
2. Modify the existing redundant fiber optic cables between Panoche Substation (CB 162) and the Peaker (CB 142) Path A and Path B (redundant paths), if needed
3. Install redundant fiber optic cables between the Project and the Peaker (CB 142) Path A and Path B (redundant paths)

RELATION WITH OTHER PROJECTS

The above protection requirements do not take into account other projects such as Panoche Bank 1 replacement and protection relays upgrade, Bank 2 protection relays upgrade, or installing a new 115 kV MPAC building.

Appendix D

Telecommunications Requirements

Starwood Power Midway LLC Panoche Project Telecommunications Requirements, Rev. 2

September 20, 2006

The following Information Systems and Technical Services (ISTS) Requirements are for estimating purposes only of the Starwood Power Midway LLC Panoche Project (the Project) and are based upon the preliminary protection requirements. The proposed interconnection is that the Project taps onto the existing CalPeak Panoche Peaker (the Peaker) generator tie line located at the Peaker site. The Peaker is currently interconnected to the 115 kV bus via CB 162 at Panoche Substation. The actual relays specified in the final protection requirements may differ and as such, the final telecommunications requirements may differ as well.

Per Section G1 and Appendix F of the PG&E Interconnection Handbook, the Project will require the following:

1. EMS/SCADA Telemetry

Telemetry signals must be transmitted via telephone company leased circuits between the Project and the responsible PG&E Electric Control Center. With an output of 121 MW, the Project will require a single SCADA circuit and redundant EMS circuits. A GE Harris D20C I/O board and SEL RS232 Fiber Transceivers installed in the Project could use fiber to provide connectivity to the existing RTU located at the Peaker. A new Alternate EMS lease and modem could be terminated using the existing HVP equipment and RTU to provide telemetry data for both the Project and the Peaker thereby eliminating the need for an additional RTU.

2. Protection

Preliminary protection requirements call for redundant fiber optic cables from the Panoche substation to the Project. A 24 Strand fiber optic cable exists between the Panoche Substation and the Peaker. Recommendation is for two new fiber optic cables to be installed in underground conduits (routes to be determined): one fiber optic cable to be installed between the Project and the Peaker and a second fiber cable to be installed between Panoche Substation and the Peaker to provide redundancy. Cables entry into Panoche Substation and the Project should use in separate conduits within the conduit banks.

3. Business Telephone

A business telephone is required at the locations of TT, telemetry, alarm, and metering equipment, so that maintenance and repair work can be performed efficiently.

4. Remedial Action Scheme (RAS)

Equipment and related circuits required for participation in a RAS has not been identified nor included at this time.

5. ISTS Scope:

The Project:

- ISTS will provide fiber optic cable specifications and installation requirements.
- ISTS will install fiber optic splice/patch panels, terminate, test and accept fiber optic cables and jumpers used for protective relaying.
- ISTS will install D20C I/O board and fiber interface for Telemetry.
- ISTS will install SEL RS232 Fiber Transceivers and interconnection to Calpine furnished RIG/DPG.
- ISTS will assist with Database configuration.

The Peaker

- ISTS will assist with testing and acceptance of new Telephone Company leased circuit.
- ISTS will provide fiber optic cable specifications and installation requirements.
- ISTS will install fiber optic splice/patch panels, terminate, test and accept fiber optic cables and jumpers used for protective relaying.
- ISTS will install fiber interface for Telemetry and connection to existing GE Harris RTU.
- ISTS will install SEL RS232 Fiber Transceivers and interconnection to existing GE Harris RTU from DPG/RIG port.
- ISTS will install new D20 Modem for Alternate EMS leased circuit.
- ISTS will assist with Database configuration.

Panoche Substation

- ISTS will continue the installation of the underground fiber optic cable from the first pull-box outside the substation into the switchgear building.
- ISTS will install fiber optic splice/patch panels, terminate, test and accept fiber optic cables and jumpers used for protective relaying.

Los Banos Substation

- ISTS will assist with the RTSCADA Database configuration, testing and acceptance.

Fresno Operations Center

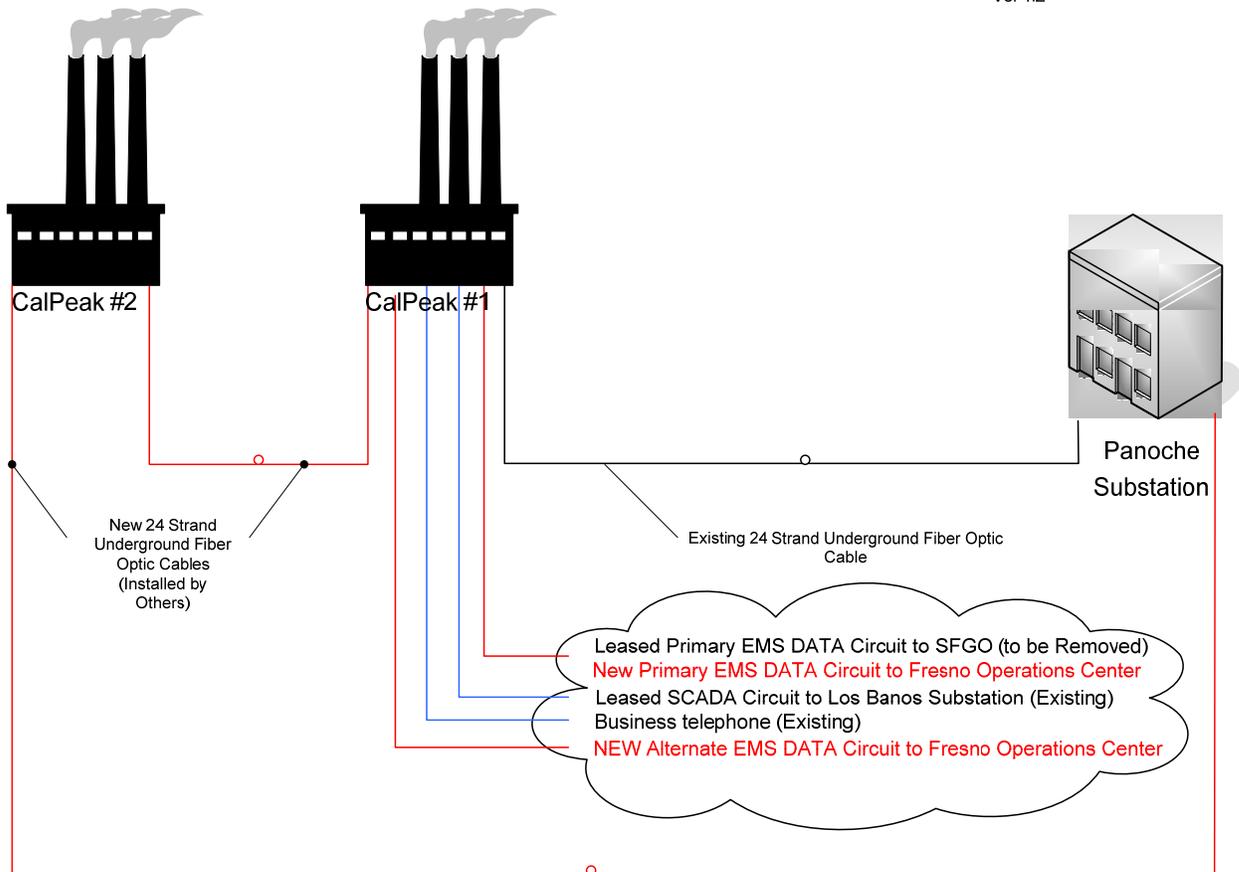
- ISTS will assist with the installation, testing and acceptance of telephone company leased circuits.

- ISTS will install telemetry modems, cabling and final connections to the Primary and Alternate EMS systems.
- ISTS will assist with the ESO EMS Database configuration, testing and acceptance.

Notes & Assumptions:

- The purchase of the redundant fiber optic cables and installation outside Panoche substation is not included in the ISTS scope or cost estimate.
- Existing fiber optic cable between the Peaker and Panoche Substation contains 24 or more strands with only 12 strands currently terminated.
- The purchase and installation of protection Relay Equipment is not included in the ISTS scope or cost estimate.

CalPeak Panoche Project
Proposed Protection & Telemetry
Communications
Ver 1.2



Note: CalPeak #1 is the Peaker, and CalPeak #2 is the Project.