California ISO
Your Link to Power

CALIFORNIA INDEPENDENT SYSTEM OPERATOR

2008

CAISO Transmission Plan

A Long – Term Assessment of the California ISO's Controlled Grid (2008 – 2017)

Planning and Infrastructure Development Department

January 2008

This page is intentionally left blank

Table of Contents

This page is intentionally left blank

Executive Summary

By January 2007, the California Independent System Operator (CAISO) completed its first Transmission Plan for the CAISO Controlled Grid. The completion of this report and the effort by all Market Participants involved played a key role in establishing the initial framework for an integrated planning process by creating a single plan for the CAISO Controlled Grid. CAISO efforts during 2008 were primarily focused towards completing the transition to the CAISO's new planning process towards a goal of proactive, coordinated, and transparent transmission planning across the CAISO Controlled Grid. During the course of developing this Transmission Plan, stakeholder input, CAISO initiatives, and regulatory requirements were the key drivers contributing to the 2007 planning cycle. The CAISO 2008 Transmission Plan (Transmission Plan) documents the analysis performed by the CAISO and Participating Transmission Owners (PTOs) as well as the input received from all stakeholders.

The Transmission Plan focuses on four major areas. Firstly, it summarizes key incidents that occurred in 2007 which are of notable importance to system reliability and security as well as providing valuable insight into needed infrastructure improvements. Secondly, it discusses and summarizes study results from technical studies conducted by the CAISO and PTOs as part of this planning cycle. Thirdly, it provides a detailed summary of transmission projects that have been proposed by the CAISO and PTOs. And finally, it documents the the new initiatives that were initiated during 2007 that either will have an impact on the Planning Process and/or infrastructure needs.

During 2007, generation interconnection process continued to challenge staff a the CAISO and PTOs. Overall, the CAISO continued to receive a large amount of new generation interconnection requests, especially for renewable resources, through its interconnection process. Section 1.1.1 discusses the observed renewable resource trends that make up more than 50% of the total generation interconnection capacity interconnection requests in the CAISO Interconnection Queue. This has triggered the need to reform the Large Generation Interconnection Procedure (LGIP) which will undergo a stakeholder review during 2008.

Since the State of California established its aggressive renewable goals, during 2007 the CAISO completed its Renewable Integration Study which analyzed potential transmission and operational concerns attributed to the integration of higher levels of renewable into the CAISO's resource mix. This report provides much needed insight into the infrastructure and operational support that is needed to support the integration of these renewables onto the CAISO Controlled Grid. The recommendations and findings of Renewable Integration Study are summarized in Section 4.4. Furthermore, it also triggers the need to reform the Large

In addition to interconnection issues, drought conditions in 2006 and record peak demands for energy in southern California are also noteworthy. Sections 1.1.2 and 1.1.3 respectively, discuss these issues and as well as results from technical studies conducted by the CAISO to explore potential impacts from persistent drought conditions.

With regard to studies performed as part of the annual planning cycle, other key initiatives were completed including the CAISO Short Term Plan, Reliability Assessments, and Deliverability, and Local Capacity Requirement (LCR) are examples of some technical studies that were conducted in 2007. Details of these studies are provided in chapter 2. Following is a summary from these studies:

- Section 2.4 describes the CAISO Short Term Plan which identified 69 locations of congestion and reliability concerns throughout the CAISO Controlled Grid;

- Reliability Assessments were conducted to identify reliability criteria violations across a ten-year planning horizon for the CAISO Controlled Grid. In general, Reliability Assessment includes technical studies such as Power Flow, Rotor Angle and Voltage Stability analysis to measure system performance against the applicable NERC reliability standards;

- Local Capacity Requirement studies identified capacity requirements in local pockets inside the CAISO Controlled Grid (Humboldt, North Coast/North Bay, Sierra, Greater Bay Area, Stockton, Greater Fresno, Kern, Los Angeles Basin, Big Creek/Ventura, and San Diego) in both a short-term (2008) and long-term (2010, and 2012) timeframe. Table E-1 summarizes the results from the LCR performed

Table E-1 Local Capacity Requirements for 2008, 2010 and 2012

Local Area	Total LCR (MW)[1]		
	2008	2010	2012
Humboldt	175	156	160
North Coast/North Bay	676	826	856
Sierra	2092	1902	2161
Stockton	786	777	880
Greater Bay Area	4688	5225	5452
Greater Fresno	2382	2351	2244
Kern	486	439	499
LA Basin	10130	7000	7000
Big Creek/Ventura	3658	2322	2656
San Diego	3033	2266	2444
Total	**28106**	**23264**	**24352**

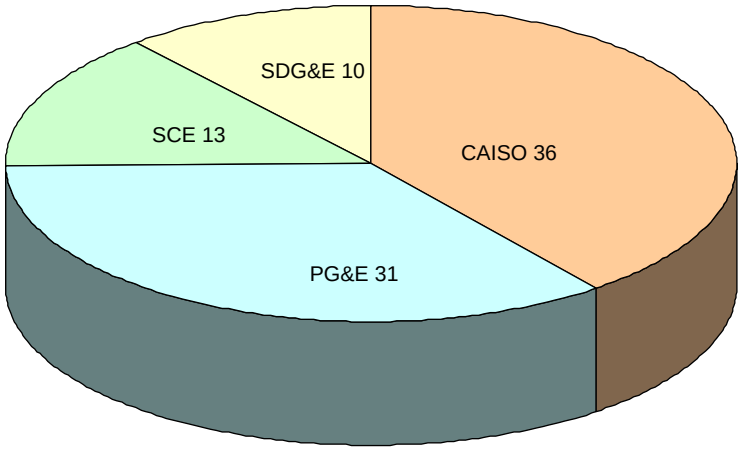
[1]Shaded numbers represent areas with LCR deficiencies

Table E-1 provides an outlook of local capacity requirements over the next 5 years. While electricity demand in each area continues to grow, the assessment results indicate a significant decrease in LCR requirements (approximately 5000 MW in 2010) in several areas. For example, the LA Basin, Big Creek/Ventura, and San Diego areas are expected to experience more than a 20% LCR reduction over the next 5 years. These reductions are a results of new transmission projects such as Sunrise, Green Path North as well as the Vincent-Mira Loma 500 kV lines, Palo Verde-Devers #2, upgrades to the Sylmar-Pardee #1 and #2 230 kV in southern California and Table Mountain-Rio Oso 230 kV lines in northern California.

Similar to the results shown in last year's transmission plan, LCR deficiencies can still be found in several areas and/or smaller pockets are fully contained within the existing LCR areas. However, compared to last year's results, these deficiencies are significantly less due to various transmission upgrades that have been placed into service during 2007.

With regard to the overall reliability assessment, this report documents the results of all technical studies performed to support the need for transmission projects being proposed for CAISO approval. The results of thes analysis is discussed in Chapter 3 of this report and encompasses recommendations for upgrades as well as new project proposals.

From the "short-term" perspective, the CAISO Short Term Plan identified 36 upgrade proposals for the CAISO Controlled Grid. Of the 36 proposals, 22 are in PG&E's area, 6 are in SCE's service territory, and 8 are in San Diego's area. Also noteworthy is that out of the 22 proposals for PG&E's area, 8 upgrades were implemented by PG&E in 2007 due to the collaborative work between CAISO and PTOs.



Reliability criteria violations identified from the Reliability Assessment also resulted in 54 new transmission projects proposals that have been submitted to CAISO for approval. Figure E-1 shows the project recommendations by responsible entity.

Figure E-1 Transmission projects have been proposed as part of this Transmission Plan.

Of the 54 transmission projects that have been presented to the CAISO for approval CAISO Management has completed the following:

- Approved 36 transmission project proposals representing an approximate cost of 360 million dollars. Out of the 36 project proposals, 25 projects are in PG&E service area, 5 projects are in SCE's service area, and 6 projects in SDG&E's service area;

- Did not approve 3 transmission projects. Additional information has been requested and these projects will be reviewed during the 2008 planning cycle;

- Recommended that 15 transmission projects, costing more than 50 Million Dollars, be presented to the CAISO Board of Governors for approval during 2008. This includes 5 project in PG&E's service area, 8 projects in SCE's service area, and 2 projects in SDG&E's service area.

In addition to the transmission project proposals discussed above, the 2008 Transmission Plan also contains another 35 projects that are **currently under development** and will be proposed for CAISO approval in the later time. To assure continuity on past approvals, updates on transmission projects have been approved in previous transmission but not yet in-service. Please refer to chapter 3 of this report for the complete details of transmission projects.

While the activities under the existing CAISO Transmission Plan have already resulted in the construction of a number of transmission projects, the CAISO engaged in several new initiatives in 2007. These new initiatives are briefly discussed below:

- ***Request Windows:*** This new process provides a 3-month window from August 15th to November 15th of each year for stakeholders to submit information to CAISO planning process. The purpose of the Request Window is to provide opportunities for project sponsors and stakeholders to submit their information to be considered in the CAISO planning process. Stakeholders, project sponsors, and neighboring balancing authorities may submit planning data, economic project proposals, or study requests under Economic Planning Study through the Request Window. Upon receiving information from the Request Window, the CAISO will validate each submission to ensure sufficient information has been provided. For example, adequate information to allow for the evaluation of an economic transmission project to be performed is needed along with the submission. Successful submission through the Request Window will be considered in the development of Unified Planning Assumptions for the following year's transmission plan.

- ***Economic Planning Study Methodology:*** Consistent with the CAISO initiatives of mitigating uneconomic congestion and complying with requirements under FERC Order 890, the CAISO developed this new methodology with extensive input from stakeholders in 2007. As a key component to bolster the CAISO planning process toward a proactive process and conform to good utility practices, Economic Planning Study fulfills current activities in the Transmission Plan by actively analyzing congestion in the grid and developing feasible upgrades. The scope also includes analyzing congestion under the MRTU environment and other bottlenecks based on input from stakeholders through the Request Window to support efficient market operation.

- ***Long-Term Congestion Revenue Rights:*** Despite the CAISO expects the released of Long Term CRRs (LT-CRRs) should remain feasible during their full term since the transfer capacity of existing grid facilities are reduced to 60 percent of the normal ratings, it is still possible that extreme and occasional changes to the transmission system may result in infeasibility in certain LT-CRRs. The LT-CRR technical study in the transmission planning process will identify potential ways to mitigate the adverse impacts and will be considered in conjunction with the overall Transmission Plan. The studies consist of Simultaneous Feasibility Tests (SFT) that will be performed over the next 10 year planning horizon.

- ***Location Constrained Resource Interconnection (LCRI):*** The LCRI is a creative financing mechanism that allows for proposal and construction of the transmission "trunk" line to connect Location Constrained Resource Interconnection Generators (LCRIGs), located in Energy Resource Areas (ERAs), to the CAISO Controlled Grid. ERAs will be designated by state agencies. The LCRI policy was proposed to address stakeholders' concerns that the cost of transmission interconnection facilities constitutes a significant barrier to the development of "location constrained resources." Under LCRI, the CAISO proposed that the costs of a Location Constrained Resource Interconnection Facility (LCRIF) would initially be rolled into the Transmission Revenue Requirement (TRR) of the PTO that constructed the facility, and the cost of the facility would be reflected in the CAISO's Transmission Access Charge (TAC). As proposed by the CAISO, each generator that connects to the facility would be responsible for paying its *pro rata* share of the going-forward costs of the line. Until the line is fully subscribed, all users of the grid would pay the costs of the unsubscribed portion of the line which would be included in the TAC. In the Declaratory Order, the FERC approved the CAISO's proposal that the costs of a LCRIF's unsubscribed capacity receive rolled-in rate treatment and that the going-forward costs of a LCRIF be allocated to the interconnecting generators as they come on-line. The CAISO has filed with the FERC an

amendment to its tariff to include the LCRI policy on October 31, 2007. The FERC conditionally accepted the tariff amendment on December 21, 2007.

- ***FERC Order 890 Compliance***: In 2007, the CAISO issued a BPM for the Transmission Planning Process and revised the MRTU tariff language as part of its compliance filing to the FERC regarding this Order. In general, this Order requires demonstration of the compliance with the following principles in transmission provider's planning process:
    - Coordination
    - Openness
    - Transparency
    - Information Exchange
    - Comparability
    - Dispute Resolution
    - Regional Participation
    - Economic Planning Studies
    - Cost Allocation

  The content in the BPM explains the CAISO transmission planning process and includes new elements such as Economic Planning Study and Request Windows. This effort creates a transparent and open planning process for the benefits of customers. The CAISO, with input from stakeholders, has gone through a series of revisions of its transmission planning process and stakeholder outreach activities to ensure compliance with this Order. Related tariff amendments were also included in the scope of this effort as the latest proposed MRTU tariff language.

  The provisions of this BPM are intended to be consistent with the CAISO tariff. If the provisions of this BPM nevertheless conflict with the CAISO tariff, the CAISO is bound to operate in accordance with the CAISO tariff. Any provision of the CAISO tariff that may have been summarized or repeated in this BPM is only to aid understanding. Even though every effort will be made by the CAISO to update the information contained in this BPM and to notify market participants of changes, it is the responsibility of each market participant to ensure that he or she is using the most recent version of this BPM and to comply with all applicable provisions of the CAISO tariff.

- ***Renewable Integration Study:*** The CAISO is establishing a leadership role in integrating renewable into the grid. In support of California's 20% Renewable Portfolio Standard, the CAISO undertook a major engineering study in 2007 to identify challenges and solutions to successfully integrate the growing renewable portfolio into the grid. The study focused on the

transmission planning and operational issues associated with the intermittency of some renewable resources, especially wind generation. The initial findings of the analysis are positive; despite the intermittent nature of renewable. The CAISO anticipates being able to integrate the renewable resources supporting the 20% RPS requirement, subject to the recommendations cited in the Report located at http://www.caiso.com/1ca5/1ca5a7a026270.pdf.

- CAISO is establishing a leadership role in integrating renewable into the grid. In support of California's 20% Renewable Portfolio Standard, the CAISO undertook a major engineering study in 2007 to identify challenges and solutions to successfully integrate the growing renewable portfolio into the grid. The study focused on the transmission planning and operational issues associated with the intermittency of some renewable resources, especially wind generation. The initial findings of the analysis are positive; despite the intermittent nature of renewable. The CAISO anticipates being able to integrate the renewable resources supporting the 20% RPS requirement, subject to the recommendations cited in the Report.

- ***Probabilistic Approach Planning:*** The state of California has vested the CAISO with the responsibility to maintain a reliable electricity system for those regions under its operational control. Specifically, the CAISO has the responsibility to "ensure the efficient use and reliable operation of the transmission grid consistent with the achievement of planning and operating reserve criteria no less stringent than those established by the WECC and the NERC". A previous study investigated reserve margin requirements based on economics and addressed short-term issue at the time. However, for this Planning Reserve Requirements Study (PRRS), the CAISO, the CPUC and the CEC, plan to investigate long-term planning reserve requirements for a ten-year period, using the industry-accepted one day in ten years loss of load expectation (LOLE) criterion. The study results will provide the understanding of the long-term planning reserve requirements based on industry-accepted reliability metrics. The kick-off meeting for this initiative was conducted on November 28 and 29, 2007 and the CAISO anticipates activities related to this initiative will continue in 2008.

- ***Review and Revision of CAISO Planning Standards:*** CAISO Grid Planning Standards presently in effect were established in February 2002. Much has changed since necessitating the need to review and revise the standards. Following the stakeholder's meetings held in September and October of 2007, three working groups were formed to evaluate and recommend revision to parts of the CAISO Grid Planning Standards document. It is anticipated that these activities would be completed by the 2nd quarter of 2008 and the recommendations presented to the CAISO Board for approval.

In addition to the above initiatives, the CAISO was also involved in several other ongoing initiatives such as San Francisco Greater Bay Area Long-Term Study, mitigation of reliance on old thermal generation including those using once-through cooling systems, assessment of the impact from the second dry year which will be carried on in 2008.

This page is intentionally left blank

Introduction

The completion of the California Independent System Operator's (CAISO) 2007 CAISO Transmission Plan established the initial framework for an integrated planning process for the CASIO Controlled Grid. The 2007 CAISO Transmission Plan provided a single source of information relating all planning activities engaged by CAISO, PTOs, and stakeholders during the 2006 planning cycle. Based on comments received from stakeholders, the 2007 CAISO Transmission Plan did achieve its intended goals and objectives, however there were some areas where the 2007 Plan fell "short". As such, further enhancements to the planning process were identified so that future CAISO transmission plans are more proactive and provide a vision of needed future infrastructure development.

For the 2008 Plan, CAISO staff focused on two key transmission planning process areas. First, key initiatives for future plans were identified and developed during the 2008 planning cycle. These new initiatives include the creation of new technical studies and improvement of the transmission planning stakeholder participation processes. Examples of the new studies are the development of the Ecomic Planning study which focuses on mitigating or eliminating congestion under the new market design (Market Redesign and Technology Upgrade – MRTU), Scenario Analysis that concentrates on determining potential system upgrade (e.g. transmission projects) to enhance the system beyond simply meeting applicable reliability standards, and inclusion of Long-Term Congestion Revenue Right (LT-CRR) assessment in the annual planning process to ensure the allocated LT-CRR will be feasible over their full terms. Examples of improved stakeholder participation processes developed during 2007 are the Business Practice Manual (BPM)[1] for Transmission Planning Process to demonstrate CAISO compliance with Order 890, and preparation for compliance with North American Electric Reliability Corporation (NERC) Reliability Standards. However, since the majority of time and resources this year have been spent on designing and renovating the planning process, the product of these technical studies and other initiatives will be much more evident in our transmission planning reports, starting in next year's 2009 Transmission Plan Report.

In addition to these new initiatives, the 2008 Plan contains information from various technical studies and activities occurring in the existing planning process such as reliability project proposals and CAISO approval statuses of these projects, study results for Resource Adequacy purposes, and Short-term study results. As described in the Study Plan for 2008 CAISO Transmission Plan, study results, and the proposed projects in this year will be discussed further in this document.

[1] CAISO relies on the details in the existing and further improvements of its planning process appear in the Business Practice Manual for Transmission Planning to demonstrate its compliance with the planning principles under FERC Order 890

As discussed above, Chapter 1 of the 2008 Plan provides greater detail on major activities that occurred in 2007. This includes recurring activities as part of the existing transmission plan, responding to major system events, and developing new initiatives that the CAISO will need to incorporate into its planning process. Chapter 2 discusses study results and findings based on various technical studies conducted under the existing process. This includes reliability assessment results, Local Capacity Requirements for Resource Adequacy and Reliability Requirement program for 2008 and long-term, Generation Deliverability Assessment results for existing and new generation projects in the Interconnection Queue, results from CAISO Short Term Plan and other studies. Results from these studies or earlier studies lead to transmission upgrade proposals or other mitigation recommendations. Chapter 3 provides updates on the statuses and approval of previous and newly proposed transmission projects. Consistent with the 2007 Transmission Plan Report, updates on transmission projects will be presented in different groups such as ongoing transmission projects, statuses of transmission projects that have been approved previously, and CAISO approval statuses on the projects being proposed in this year's Transmission Plan. Chapter 4 concentrates on explaining the details of new initiatives briefly discussed in Chapter 1 and potential impacts to CAISO planning process. As a roadmap for the future transmission plan, chapter 5 articulates the next and future planning cycle. This includes the draft objectives and schedules for the next steps of CAISO planning process.

This page is intentionally left blank

Chapter 1: Overview of 2007

Overall, 2007 was an active year during which there were several noteworthy events which impacted CAISO controlled area operation and transmission planning. Extended drought conditions and the southern California wildfires stressed system performance, creating challenges for grid operations. A strong growth of generation applications for renewable resources requesting interconnection to the CAISO Controlled Grid created challenges for CAISO and PTO transmission planning resources. On the less severe side of the spectrum, along with the ongoing annual transmission planning process, a series of newly introduced initiatives and preparations for the operation of MRTU have introduced new dimensions of transmission infrastructure development that will also be discussed in this chapter.

1.1 Challenges for 2007

Sections 1.1.1-1.1.4 provides a short summary of key events experienced by the CAISO during the 2007 operating year. These are the selected example of issues that CAISO engineers address while assessing potential impacts on the grid.

1.1.1 New Resource Interconnection

Impacts from the renewable energy policy resulted in an escalated growth of interconnection applications from renewable resources and other types of generation resources. Since implementing LGIP on July 1, 2005 through November 30, 2007, CAISO has received 212 interconnection requests, totaling 65,645 MWs. The CAISO currently has 173 active interconnection requests representing 57,686 MWs. Of this active total, 118 of the interconnection requests and approximately 40,000 MWs of capacity are renewable resources. Figure 1-1 shows the approximated proportion of different types of resources currently in the Generation Interconnection Queue. For more information, please refer to the most updated CAISO Generation Interconnection Queue posted on the CAISO website at (http://caiso.com/14e9/14e9ddda1ebf0.pdf)

The impact from the large amount of new generation applications is also influencing the need to improve the CAISO Large Generation Interconnection Procedure (LGIP). Currently, FERC, the CAISO, and other entities within California and across the country recognize that many interconnection procedures require reconsideration and potential modifications. FERC has opened a new docket to address interconnection procedures. The CAISO anticipates working with stakeholders both within the parameters of this FERC docket and, if necessary, independently to address such concerns. More details of these improvements should be updated through the activities in the planning process as well as in the Generator Interconnection page on CAISO website at http://caiso.com/docs/2002/06/11/2002061110300427214.html

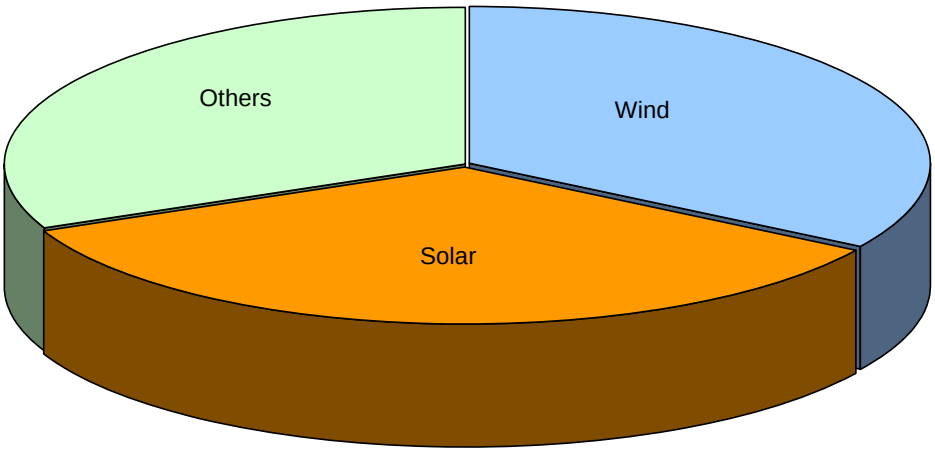


Figure 1-1 Approximated proportion of resource mix in CAISO Interconnection Queue

1.1.2 Demand - New all time peak demands for Southern California

While the system-wide all time peak in July 24, 2006 still claims its fame as the record of the highest demand of 50,270 MW throughout CAISO Controlled Grid (http://www.caiso.com/1c4a/1c4aa642b70.pdf), Southern California summer load continued to set a new record of electricity demand in 2007 with the combined peaks from Southern California Edison and San Diego Gas and Electric of more than 28,000 MW[2]. This indicates the possibilities of even higher system peak demand if a coincident North and South peak similar to conditions on July 24, 2006 were to occur again in the future. Although the probability of such an incident to occur may be less than the 1 in 5 criterion for a CAISO system-wide peak load forecast high, the risks and consequences of experiencing load levels at these new record levels should be considered while planning or operating the grid.

1.1.3 Drought Conditions

During the 2007 planning cycle, Northern California experienced a less than stellar precipitation performance, setting the state up for a lower than normal hydro year, especially in Central and Southern California. Much of Southern California is on track to have one of the driest precipitation years of record, potentially surpassing the prior record set in 2001-2002[3]. In Northern and Central California, forecasts of unimpaired runoff from Sierra Nevada watersheds are well below average. The Colorado River Basin, an important source of water supply for Southern California, continues in drought conditions, having experienced below average runoff in six of the last seven years.

[2] Not the coincident peak
[3] California Department of Water Resource: http://watersupplyconditions.water.ca.gov/

Since the weather patterns in California can experience a number of dry years in succession, in a multi-year drought cycle, the water levels at major reservoirs can drop to less than half of their normal capacity or lower. This could lead to progressively lower hydro generation capacity as well as lower energy production that are available during peak and partial peak loading periods. By realizing the potential impacts from prolonged drought conditions, the CAISO, with support from PG&E, began to work on an initiative in July 2007 to study the potential impacts of low hydro generation scenarios and to make recommendations on how to mitigate the risks to grid reliability. This work is described in detail in Section 4.9 of this Plan.

1.2 Existing Process and Ongoing Activities

Following the transition to a new integrated planning process in 2006, CAISO continued to implement the new planning process as outlined in the 2007 Plan. This includes conducting several new technical studies and a enhanced stakeholder processes. As described in the previous years' Plan and the Transmission Planning Process BPM, three stakeholder meetings were conducted in 2007 at each major step of the transmission planning process as shown below:

- Unified Planning Assumptions: The first 2007 CAISO Transmission Plan Stakeholder Meeting was conducted on June 11, 2007. This meeting focused on the unified planning assumptions for 2008 CAISO Transmission Plan as describe in the Study Plan document that is currently posted on CAISO website (http://caiso.com/1bf4/1bf4740146650.pdf). This is the same step as stage 1 of the transmission planning process as outlined in the BPM.

  The objective of Stage 1 is to determine the goals of, and agree upon assumptions for, the various studies to be performed as part of that year's planning process. This is also when information from the Request Window will be integrated into the study process. Input is also expected from other entities, such as the CEC, PTOs, POUs, CPUC, WECC, and other sub-regional planning groups or neighboring transmission providers. Once all of this information has been accumulated, a Draft Study Plan will be produced by the CAISO. The purpose of the Study Plan is to provide stakeholders with a coordinated plan for completing all of the required studies during that planning cycle. As such, the draft Study Plan will describe basic planning assumptions and inputs, sources for those assumptions and inputs, how assumptions and inputs will be applied, methodology, tools used, study criteria, (i.e. WECC Planning Standards), expected study outputs and, assignments for performing specific analyses to PTOs and third parties. Generally, the components of the Unified Planning Assumptions are demand, transmission system topology, generation assumptions, and imports. Stakeholders will be provided the opportunity to review and comment on the Draft Unified Planning Assumptions prior to incorporation into the final Study Plan by the CAISO.

The information contained in the Study Plan is intended to allow replication of the studies included in the CAISO Transmission Plan by competent transmission engineers.

It should be noted that individual study plans and schedules for large transmission project alternatives with significant capital outlays (i.e., > $50 million) will also be developed during this stage. The development of study assumptions and other inputs, the identification of all project alternatives to be considered, and the schedule may be determined through separately noticed stakeholder meetings and comment periods, and then published independently from the Unified Planning Assumptions. To maximize stakeholder and public participation, this additional meeting on study assumptions may be noticed both through CAISO Market Notices, as well as through the media in the area in which the project will be located. Such meetings may also be held near the project's location. The CAISO attempts to apply the Unified Planning Assumptions on such project alternative analyses to the maximum extent possible, and provides access to updates and information on these larger project alternatives similar to that which is published for studies conducted for incorporation into the Transmission Plan.

Preliminary Study Results: Following the presentation and receipt of stakeholder comments on the Study Plan, CAISO and PTOs continued to work on the studies as outlined in the Study Plan and conducted the second stakeholder meeting on November 20, 2007. These activities are consistent with the Stage 2 of the transmission planning process as appears in the BPM. In this stage, technical studies are performed according to the study plan and initial results are presented to stakeholders. Typically, the information that was presented to the stakeholders include:

- Summary of findings
- Proposed mitigation plans for identified problems
- Findings on stakeholder requested studies and the need for further analysis

- CAISO Transmission Plan: The third stakeholder meeting was conducted on December 19, 2007. This step is consistent with the third stage of the transmission planning process that involves documenting the technical results and addressing stakeholder comments and/or concerns. The products resulting from this stage of the process are the CAISO Transmission Plan, which will be presented to the CAISO Board of Governors, and/or, if consistent with the agreed upon schedule in the Study Plan, the report of other specific technical studies involving larger transmission projects or other identified planning evaluations. Within this stage, as a general matter, the CAISO develops a Draft CAISO Transmission Plan Report based on the final study results. This Report lists the status of the transmission projects

subject to CAISO management approval (i.e., those with capital investment < $50[4] million), along with the basis of the CAISO's decision on such projects, including analyses of other alternatives not recommended by CAISO management. This Report also lists the transmission projects that require more than $50 million of capital investment, which are separately submitted to the CAISO Board of Governors for approval. As noted above, the reports and recommendations for those separately reviewed projects may be prepared concomitantly with the Transmission Plan or on an alternative schedule. After stakeholder comments and necessary changes have been made, the CAISO Transmission Plan will be finalized and scheduled for presentation during the CAISO Board of Governors meeting in January or February.

As indicated in the Study Plan, the ongoing activities in this year's CAISO Transmission Plan involve several technical studies which serve different purposes. The majority of studies in this section are recurring technical studies which have been performing during the past years.

1.2.1 Reliability Assessments

Reliability assessments were conducted to identify the need for upgrades to ensure the system will be securely operated. The studies assess system conditions both on the short-term (up to 5 years) and long-term (up to 10 years) time horizon under various system conditions (e.g. summer peak, winter peak, etc). Study results reveal system performance under these scenarios which will be measured against the applicable standards and responsible entities can issue the mitigation plans to ensure they still comply with mandatory requirements such as NERC, WECC, or CAISO Planning Standards.

1.2.2 Local Capacity Requirements (LCR)

LCR studies were performed to determine the need of capacity in the local areas or throughout the system to ensure reliable and stable market conditions. In this year Transmission Plan, three study scenarios were performed to allow sufficient information to be available to the stakeholders. These three scenarios are:

- 2008 Summer Peak Scenario
- 2010 Summer Peak Scenario
- 2012 Summer Peak Scenario

In order to meet the deadline for CPUC resource procurement, CAISO completed the next year (2008) LCR studies in March 2007. Long-term LCR studies were conducted later and the results are available in section 2.2of this Report.

1.2.3 Generation and Import Deliverability Study

Deliverability assessments are part of LGIP and are designed to determine Net Qualified Capacity (NQC) for resource adequacy purposes along with Network Upgrades required to achieve full deliverability. In 2007, two rounds of Deliverability Assessment were conducted. NQC and Network Upgrades required to achieve full deliverability of new generation projects in CAISO Interconnection Queue up to Queue number 156 were determined during these assessments.

1.2.4 Integration of Renewable Resources

A Renewable Integration Report was prepared by the CAISO in 2007. The purpose of this Report was to ensure the successful integration of 20% renewable resources with the planning, and operation of the power grid. The Renewable Workgroup combined the talents and resources within Planning and Infrastructure Development (P&ID), Grid Operations, Market Operations, Information Technology and External Affairs and representatives from General Electric, Pacific Northwest National Laboratory and AWS Truewind. It also involved coordination and collaboration with IOUs, wind generator owner/operators, Scheduling Coordinators, the CEC, industry experts and adjacent balancing authority operators. The scope of this Report was primarily to provide a detailed focus on Transmission Planning and Operating Issues and secondarily, to focus on forecasting issues and use of storage technology. The goal is to identify any voltage control problems, transient stability performance issues and transmission loading issues. One of the primary drivers behind this Report was to ensure that any transmission control devices (SVCs, reactors, capacitors, etc.) needed to achieve the 20% RPS are ordered as soon as possible. More details of renewable integration studies will be discussed under the New Initiative Section.

1.2.5 Generation Interconnection Studies

The amount of generation interconnection requests, and potential improvement on the Generation Interconnection Queue is another area that requires attention in this Report. Currently, CAISO is working with stakeholders, state and federal entities to explore the opportunities to improve its Interconnection Queue and generation interconnection process. Since this is an ongoing effort, more details will be available later in future stakeholder meetings and Transmission Plan Reports.

1.2.6 Short Term Transmission Plan

A Short Term Plan was produced in the 2006 planning cycle, but the access to this Report was limited due to the confidential information in the Report. Nevertheless, the Plan was a valuable part of the previous year's Plan and the CAISO has continued to work on the Short Term Plan to minimize gaps between long-term transmission planning and day-to-day system operation. In this year's Plan, the CAISO has expanded the scope of the Short Term Plan to address operator concerns from the operational timeframe throughout its Controlled Grid. Several upgrades have been proposed in this

document as shown in section 4.5. As mentioned prior, in response to some concerns due to the drought conditions, CAISO is in the process of conducting low hydro studies to assess the impact of a potential prolonged drought condition and what should be done to prepare for such an incident.

1.3 New Initiatives

In addition to the ongoing works that have been implemented and recurring in the annual process as shown in section 1.2, several new initiatives were introduced this year to serve various purposes. As mentioned earlier in the introduction in order to create a proactive and forward-looking transmission infrastructure development process. CAISO transmission planning process still needs to evolve and strive to improve itself beyond the existing works. These new initiatives are the BPM for Transmission Planning Process creation of the new Economic Planning Study process, completion of a Renewable Integration Study, Location Constrained Resource Interconnection (LCRI) policy, New Long-Term Congestion Revenue Rights (LT-CRR) Study, probabilistic approach planning, revision of CAISO Planning Standards, San Francisco Greater Bay Area Long-Term Study, and Mitigation of Reliance on Old Thermal Generation Including those using Once-Thru Cooling Systems. More details of these New Initiatives will be elaborated in Chapter 4.

This page is intentionally left blank

Chapter 2: System Assessment Results

Section 1.2 provides the overview of the system assessment work that was performed during the 2007 planning cycle. As mentioned earlier, before conducting the studies, the initial stakeholder meeting was held to discuss the scope, assumptions, methodologies, and tools with stakeholders. The Study Plan for 2008 CAISO Transmission Plan was prepared and reviewed by the stakeholders as part of this process. After spending approximately six months of system analysis, the CAISO and PTOs presented the results of their system assessments in the second CAISO Transmission Plan Stakeholder Meeting. These results are briefly summarized below.

As indicated in the Study Plan, the studies in 2007 comprise of Reliability Assessments, LCR Studies, Deliverability Assessment Studies, and CAISO Short-Term Studies. Although the Renewable Integration Study was completed in 2007, it will be discussed under the New Initiative Section.

2.1 Reliability Assessment

This section summarizes reliability assessments that were performed as a component in this annual Transmission Plan. The Study Plan for the 2008 CAISO Transmission Plan and study results conducted by PG&E, SCE, SDG&E, and CAISO are sources of information for this section

2.1.1 Overview of Reliability Assessment

This section summarizes the scope of reliability assessments that were conducted this year:

Frequency of the study: Reliability Assessment, in this context includes (but not limited to) power flow, transient stability, and voltage stability studies are conducted annually between May-October of each year. The studies to be conducted in accordance with the Study Plan that was discussed with stakeholders during the 1st CAISO Transmission Plan Stakeholder Meeting.

Timeframe: The studies were conducted on different timeframes along the 10 year planning cycle. The studies can be divided into 2 categories:

- Long-Term Plan covering scenarios 5 to 10 year in the future
- Short-Term Plan focusing on the assessment of historical and near-term data up to 3 years in the future

Study Scenarios: The Short-Term and Long-Term studies cover the following critical system conditions:

- Summer Peak Conditions
- Winter Peak Conditions
- Spring Conditions

Generation Assumptions: The studies include both existing and planned new generating facilities as shown in section 2.1.2 of the Study Plan. Generation retirement assumptions based on California Energy Commission (CEC) data were also used as elaborated more in section 2.1.3 of the Study Plan.

Import Assumptions: Import on WECC paths which include firm transfer from and to California were used as shown in section 2.1.5 of the Study Plan.

Network Assumptions: CAISO approved transmission projects were modeled in the studies

Demand Assumptions: From the load forecasts provided by CEC, demands modeled in the studies are illustrated in section 2.1.1 of the study plan.

Contingency: The system was evaluated under the following contingency conditions:

- Normal Conditions (No Contingency)
- The following contingency conditions as described in Table I of NERC reliability standards
    - Single Element Outages
    - Multiple Element Outages
    - Extreme Events

Following the identifications of reliability criteria violations or concerns, planned upgrades needed to meet the performance requirements are given in chapter 3.

2.1.2 Assessment Results

From reliability assessments, this section summarizes reliability assessment results conducted by the PTOs. CAISO assessments and project recommendations under Short Term Plan are available in section 2.4.

Pacific Gas and Electric (PG&E)

In accordance with the CAISO tariff, Section 24.2.1, PG&E annually submits an Electric Transmission Expansion Plan covering ten years into the future. This Plan documents projected system performance, describes proposed facility expansion that are needed and evaluates the technical merits of potential transmission, generation and operating plans that can benefit the transmission system. PG&E's 2007 expansion planning effort is structured in two phases. The first phase focuses on system reliability assessment, while the second phase is focused on the development of transmission project proposals to reinforce and expand PG&E's transmission system to meet reliability standards. PG&E's transmission system assessment and reinforcements focus both on local area electric load serving requirements and system-wide (within Northern California) requirements. This transmission planning activity takes place

within a CAISO stakeholder process involving regular stakeholder meetings and solicitation of their involvement through attendance at meetings and submittal of comments.

The reliability assessment portion of this activity was concluded in July 2007 and the proposed Transmission Expansion Plan at the end of 2007. The documented results of this reliability assessment include overall system performance as well as identified locations where potential transmission expansion is required. Specifically, this assessment focuses on system reliability for the years 2008, 2009, 2010, 2011, 2012 and 2017.

Furthermore, at the conclusion of 2007, the proposed City & County of San Francisco (CCSF) Public Utilities Commission obtained final San Francisco government approval to proceed with their San Francisco Reliability Project (SFRP) that consists of installing a 48 MW combustion turbine generator (CT) unit near the San Francisco Airport and three 48 MW CT's near Potrero Substation. This project, in combination with other PG&E transmission projects concludes the CAISO's Action Plan for San Francisco. The development of this Action Plan began in 2002 and included participation of the CCSF, PG&E, local community group representatives, the CAISO, and other interested Market Participants. The Action Plan was completed and approved by the CAISO Board of Governors in November 2004. The Action Plan was formulated to provide an infrastructure improvement plan that would mitigate the electrical system's reliance on the aging generation at the Hunters Point and Potrero Power Plants. While the Hunters Point Power Plant was shut down in 2005 as a result of completing the initial portion of the Action Plan, the full implementation of the Action Plan was originally anticipated to be completed by the end of 2007, however, the SFRP has been delayed several times since the Action Plan was finalized. The completion of the SFRP by the summer of 2009 is of critical importance to assure that there will be sufficient load serving capability in San Francisco to meet the expected load growth in 2009. The CCSF and PG&E have indicated, respectively, that both the CCSF CT's and the last PG&E transmission project (a 3rd Martin and Hunters Point 115 kV cable) will be operational by the summer of 2009. As outlined in the Action Plan, once these projects are placed into service, the continued reliance on the existing Potrero generation (Units 3, 4, 5 & 6) for reliability requirements would be mitigated and the CAISO would terminate their Reliability Must Run (RMR) agreements. Since the Action Plan was approved by the Board of Governors, the CAISO Management has consistently stated that the CAISO will meet its obligation to terminate the RMR agreements for the entire Potrero Power Plant provided all elements of the Action Plan are completed.

Further, analysis indicates that should either or both of these projects not be in operation by the summer of 2009, there would be insufficient load serving capability in San Francisco to remain in compliance with all mandatory NERC planning standards at the forecasted 2009 load. Were this situation to occur, the CAISO would seek to retain Potrero Unit 3 under an Reliability Must Run type of agreement until the CCSF and PG&E projects were completed. Further compounding the importance of completing these two projects as projected, is the lack of certainty that Potrero Unit 3 will remain available for operation beyond

2008. At issue are Potrero Unit 3's permits to operate as a "once through cooled" unit beyond 2008 when these permits expire and whether or not Mirant would be able to renew the required permits should Potrero Unit 3's operation continue to be needed to meet San Francisco reliability requirements in 2009. As such, based on the information that the CAISO has at this time, the expectation is that Potrero Unit 3 and Potrero Units 4, 5, and 6 are not expected to be available for operation after 2008.

Finally, although not part of the Action Plan, the HVDC TransBay Cable Project is scheduled to be in service by summer 2010. This project is needed in 2010 with the SFRP and the 3rd Martin and Hunters Point 115 kV cable to meet reliability needs beginning in 2010 and lasting through 2020.

Southern California Edison (SCE)

Reliability assessment was performed for SCE transmission system for the ten-year planning horizon with 2008, 2012 and 2017 time frame. Figure 2-1 indicates the assessment areas within SCE service territory. The following is a summary of significant findings by areas of study:

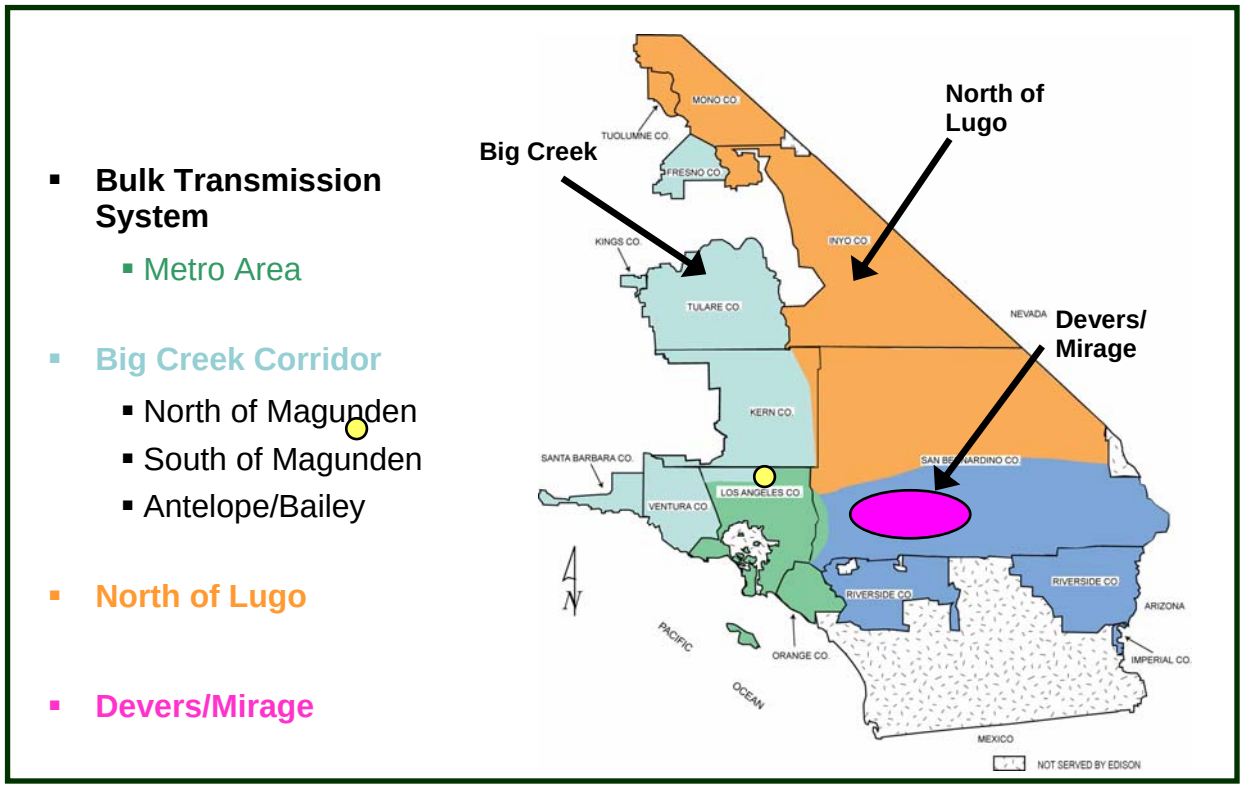


Figure 2-1 Assessment Areas in SCE Service Territory

1. Main Transmission System (L.A. Basin)

a. Currently, some 500/230kV transformers (AA-banks) at the following substations are connected to 500kV buses via disconnect switches: Vincent, Lugo, Mira Loma and Valley Substations. In the event of a stuck breaker failure, two transformers would be forced out of service instead of one. It is proposed that circuit breaker be installed for transformers that are connected to 500kV bus via disconnect switches.

b. The Barre – Ellis 230kV transmission line is subjected to contingency overloading concerns under Categories B (i.e., overlapping G-1 and N-1) and C contingencies for peak 2012 load conditions. SCE Transmission Reliability Assessment and Compliance Plan (2008 – 2017) has further details on these contingencies. Various mitigation plans will be evaluated in details in the upcoming transmission planning cycle.

c. The Barre – Lewis 230kV transmission line is subjected to contingency overloading concerns under Categories B and C for off-peak 2012 load conditions. Mitigation plans will be evaluated in greater details in the upcoming transmission planning cycle.

d. With significant load growth in the San Jacinto area of Riverside County, it is projected that Valley 500/115kV substation load serving capability will be exceeded by summer 2012. As part of the San Jacinto Regional Transmission Plan, a new Alberhill 500/115kV Substation is being evaluated to provide load serving capability to the region.

2. North of Lugo Area

a. Due to significant projected load growth in the Victor Valley, additional transformer capacity will be needed to mitigate potential T-1 contingency overloads at Victor 230/115 kV Substation by 2009. Last year's transmission reliability assessment identified the need for additional transformer capacity by 2012. Significant load growth expedited the need for additional transformer capacity by three years.

b. With load growth in the Victor area, the existing High Desert Special Protection System (HD SPS) was evaluated and found that when Victor load is higher than 450 MW and High Desert Power Plant (HDPP) generation is low, tripping the entire HDPP under the double line outage of the Lugo-Victor 230 kV lines would result in transient instability and post-transient voltage stability concerns. A detailed analysis was performed to evaluate amount of SPS arming of the HDPP to mitigate the transient instability and post-transient voltage stability concerns. The amount of generation arming is based on the total amount of line flow on the Victor – Lugo 230kV lines. The results of SPS verification are included in Appendices B and C of the SCE Transmission Reliability Assessment and Compliance Plan Report.

3. Big Creek Corridor/North of Magunden Area

a. Transmission assessment for 2008 and beyond for the North of Lugo area confirmed the need for previously CAISO-approved dynamic reactive support (200 MVAR SVC) at Rector Substation and the San Joaquin Cross Valley Loop Project to mitigate transient voltage and angular instability and contingency overloading concerns on 230kV transmission lines between the Big Creek Hydro Electric Project and Rector Substation. The Rector 230kV SVC is in operation and the Cross Valley Loop Project is projected to be completed by 2010.

b. Potential contingency overloading concerns were identified for the following transmission facilities between Magunden, Vestal and Rector under low Big Creek hydro generation and summer peak load conditions for 2012 and beyond. Various transmission mitigation plans are being evaluated to mitigate the contingency overloading concerns and will be completed in the upcoming transmission planning cycle. As load growth continues in the San Joaquin Valley (Rector) area, power flow in the south to north continues to increase to serve load in the area. This further exacerbates contingency overloading concerns on the 230kV transmission lines north of Magunden Substation (i.e., Magunden – Vestal – Rector 230kV and Magunden – Springville 230kV).

c. Under heavy summer load conditions and maximum Big Creek generation, transient voltage dip exceeding WECC planning criteria was identified for single and double contingencies in the area between Big Creek and Magunden. In addition, local voltage instability concerns were also identified for double 230kV line contingencies between Big Creek and Rector, Magunden and Vestal, Rector and Vestal Substations. Currently there are several transmission mitigation plans that are evaluated to mitigate the transient voltage criteria violation and thermal overloading concerns under contingency conditions. The transmission mitigation plan will be completed as part of upcoming CAISO Transmission Plan.

d. To comply with NERC requirement of evaluation of Category D contingency, Rector Substation outage was studied, and it resulted in a divergent solution. A Big Creek Corridor “System Separation Scheme” was studied and indicated that it was effective in isolating the North of Magunden area and maintaining the transmission system south of Magunden area stable.

e. Due to continued load growth in the San Joaquin Valley, a new San Joaquin 230/66kV Substation will be needed by 2015 to serve the growing load.

f. To continue serving load in San Joaquin Valley and to mitigate transient voltage and angular criteria violation concerns under critical contingencies in the Big Creek and Rector area, the CAISO, SCE and PG&E are evaluating long-range transmission plan for the area to serve growing loads for both SCE and PG&E service territories in the San Joaquin area. The evaluation includes various transmission options, including proposal for SCE and PG&E system tie in the Big Creek corridor to PG&E-proposed Central California Clean Energy Transmission Project (C3ETP). Further development of this transmission plan to address the needs of both SCE and PG&E will be provided in the upcoming CAISO Transmission Plan.

4. Big Creek Corridor/South of Magunden Area

a. Antelope Valley area may experience potential local voltage collapse concerns due to double line contingency of Antelope – Mesa and Antelope – Vincent 230kV transmission lines, and Antelope – Magunden 230kV #1 and 2 lines. An Antelope Special Protection System (Antelope SPS) was proposed to mitigate post-contingency local voltage collapse concerns for the interim time frame while the permanent Antelope – Pardee and Antelope – Vincent 230kV lines (part of the Tehachapi Renewable Transmission Project) are constructed.

5. Antelope – Bailey 66kV Sub-transmission Area

a. Load projection for this area indicated the need to install additional transformer capacity at Antelope Substation in 2011 and a new 230/66 kV substation in 2013, respectively. Different conceptual line arrangements will be investigated to determine the most cost effective method of service (MOS) for the proposed Valyermo substation, which has a planned operational date of 2013.

b. Post-transient voltage criteria violations (i.e., voltage dip) were identified for Frazier Park and Gorman 66kV buses under single contingency of Bailey – Gorman 66kV line. In addition, post-transient voltage dip beyond WECC criteria was identified for Helijet 66kV bus under single contingency of Antelope – Anaverde – Helijet 66kV line.

6. Devers – Mirage System

The West of Devers (WOD) path is a critical path for delivering power from Devers substation going west to the major load centers in SCE eastern area. The WOD path consists of one 500 kV transmission line and four 230 kV transmission lines:

- Devers-Valley 500 kV line
- Devers-San Bernardino #1 and 2 230 kV line
- Devers-Vista #1 and 2 230 kV line

License agreements with the Morongo Band of Mission Indians for the existing Devers-Vista No. 1 and Devers-San Bernardino No. 1 230 kV transmission lines will expire by 2010 and in 2019 for the Devers-Vista No. 2 and Devers-San Bernardino No. 2 230 kV transmission lines.

The Morongo Band of Mission Indians requested that SCE relocate the two Devers-Vista and two Devers-San Bernardino 230kV transmission lines from the existing right-of-way (currently traversing approximately 7 miles of Morongo Tribal lands) to an alignment south of Interstate 10 (traversing approximately 3 miles of Morongo Tribal land). A preliminary engineering evaluation of the new alignment was conducted by SCE Transmission Engineering and it was determined that the new alignment is feasible.

The WOD corridor was identified of having contingency overloading concerns during light spring conditions when the wind generation is high at Devers and East of River (Path 49) flow is high. In addition, the 230 kV transmission lines within the WOD path may be subjected to contingency overloading under the contingency of the largest generating plant in the area (i.e., Mountain View) and Devers-Valley 500kV line. Currently, there is a Special Protection System (SPS) that was installed that would mitigate the contingency overloading concerns. SCE is currently evaluating long-term plan to relocate the WOD 230kV transmission lines to the new right-of-way and to mitigate the use of the SPS with long-term upgrades.

San Diego Gas and Electric

In accordance with the CAISO FERC Electric Tariff, section 3.2.2.1, SDG&E is required to annually develop a transmission reliability assessment, coordinating with the CAISO and other market participants. The Reliability Assessment was performed for the years 2008 through 2012 and also provided a screening for the year 2017.

The primary objective of the studies was to present the SDG&E 2007 Transmission Plan of Service to the participating stakeholders and specifically to the CAISO for review and approval. In addition, the SDG&E Report highlighted significant developments made in 2007 related to projects addressing congestion, generation development, and expansion of the SDG&E bulk power system. SDG&E continually looks for ways to maintain a reliable transmission system to meet the load growth by developing and constructing cost effective projects. The studies performed by SDG&E included thermal facility loading, voltage stability, transient stability and short-circuit analysis.

The most significant project in this study period is the proposed 500 kV Sunrise Powerlink, which will be the largest upgrade to the SDG&E system in over two decades. This project will help ensure reliability in San Diego while lowering energy costs and providing economic access to the renewable energy needed

to comply with state law. The Sunrise Powerlink will also significantly increase SDG&E's import capability to provide the needed resources to meet the load demand.

Major project milestones achieved in 2007 include the completion of the Miguel-Old Town portion of the Otay Metro Powerloop. Also, SDG&E completed documentation of compliance with NERC mandatory transmission Planning Standards.

The following table summarizes the plan of service for the 2007 SDG&E Reliability Assessment and the CAISO review of the proposed projects.

Table 2-1 SDG&E 2007 Transmission Expansion Plan of Service

Project Number	Project Title	CAISO Approval Status	In service date
Projects Completed in 2007			
P0100	Reconductor TL6916: Sycamore-Scripps (UG only)	Approved	Complete
P03191	New 230 kV lines: Otay Metro Powerloop	Approved	Complete
P05156	Loop-in TL23011C: PEN Switchyard	Approved	Complete
P06126	New 230 kV Capacitors: Miguel Substation	Approved	Complete
Previously Approved Projects with No Proposed Changes			
P99126	Transmission for Otay Mesa Power Generation Project	Approved	Oct-08
P01141	Reconductor TL13836, Talega – Pico	Approved	Jun-09
P01142	Reconductor TL683, Lilac-Rincon	Approved	Deferred
P03170	New 230/69 kV Substation: Silvergate	Approved	Dec-08
P04137	2nd 69 kV line: Division-Naval Station Metering	Approved	Jun-09
P04138	New 500 kV line: Sunrise Powerlink	Approved	Jun-10
P04195	Lake Hodges Pump Storage Project (Generator Interconnection)	Approved	Sep-08
P05153	Reconductor TL689, Escondido-Felicita Tap	Approved	Jun-09
P06134	Loop-in TL651: Silvergate 69 kV Switchyard	Approved	Jun-09
P06136	Rearrange 230 kV Switchyard: San Luis Rey	Approved	Jun-08
P061XX	Reconfigure TL13821 & 13822, Carlton Hills Area	Approved	Jun-10
Previously Approved Projects with ISO Recommendation to Change Operational date			
P00153	Reconductor TL13837, Capistrano-Laguna Niguel	Approved, consider earlier date	Jun-10 to earlier
Previously Approved Projects Requiring ISO Approval for Change in In-Service Date			
P03183	Reconductor TL678, Los Coches-Alpine	Approved	Jun-10
P061XY	Reconductor TL13812, Talega-San Mateo	Approved, consider earlier date	Jun-09
Projects not Requiring Board Approval with the Review in Progress			
P00154	Reconductor TL13802B, Shadowridge- Calavera Tap	other alternatives may be considered	Jun-09
P07XXY	New 230,138 kV Reactive Support: Mission, Sycamore, Telegraph Canyon	More information required	Jun-10
Proposed Projects Requiring ISO Approval (including cancellation) and approved			
P02161	New 69 kV Line: TL6942, Miramar-Sycamore	Cancellation approved	cancelled
P07XXX	Reconductor TL6915, TL6924: Pomerado-Sycamore	Approved	Jun-09
P06131	Loop-in TL13825: Shadowridge 138 kV Switchyard	Approved	Jun-09
P06133	New 230/138 kV transformer: Miguel Substation	Approved	Jan-10

Table 2-1 SDG&E 2007 Transmission Expansion Plan of Service (Cont)

Project Number	Project Title	CAISO Approval Status	In service date
Proposed Projects Requiring CAISO Board Approval that will be presented to the Board			
P06130	Construct 2nd 230 kV line: Encina-Penasquitos	Recommend for approval	Jun-09
Proposed Projects Requiring CAISO Board Approval with the Review in Progress			
P06132	Relocate South Bay Substation	More information required	Dec-10

In addition to the projects included in the above table, SDG&E is developing Orange County Long-Term Expansion Plan. This project is being proposed to address load growth and aging infrastructure, as well as improve reliability by adding a second 230 kV source in Orange County. The Orange County plan will cost more than $50 million and will need CAISO Board approval. SDG&E will submit this project independent of the 2007 Transmission Reliability Assessment. With approval of the Orange County Expansion Plan, projects P061XY (Reconductor TL-13812 Talega-San Mateo) and P00153 (Recondutor TL 13837, Capistrano-Laguna Niguel) would be able to be canceled.

2.2 LCR Study Results

In 2007, CAISO conducted two types of LCR studies to support the Resource Adequacy (RA) initiative. A short-term LCR analysis was conducted on the 2008 system configuration to determine the local capacity requirements that needed to be procured as part of the 2008 resource procurement process. The CAISO completed the 2008 LCR in March 2007 to ensure the study results were available for interested stakeholders before the deadline issued by CPUC. A long-term LCR analysis was also performed to identify local capacity needs in the 2010 and 2012 time frames.. The long-term analysis was performed to provide Market Participants visibility of LCR requirements out to five-years in the future. CAISO completed the long-term LCR studies in early December 2007. A summary of preliminary study results is provided in this section.

As appeared in the LCR Report and indicated in LCR Manual, CAISO performed LCR studies to determine capacity needs in each local area. In 2008, there are 10 load pockets throughout CAISO Controlled Grid as shown below:

PG&E Service Territory	SCE Service Territory
• Humboldt • North Coast and North Bay • Sierra • Greater Bay Area • Stockton • Greater Fresno • Kern	• Los Angeles (LA) Basin • Big Creek/Ventura
	SDG&E Service Territory
	• SDG&E Area

It is imperative to emphasize that each load pocket is unique and different in size of capacity requirements due to different system design philosophy. For example, Humboldt is a small pocket with total capacity requirements approximately 200 MW while LA-Basin is much larger in size with the total capacity requirements close to 10,000 MW. Short-term and Long-term LCR study results from this year's studies are shown in Table 2-2.

Table 2-2 Local Capacity Needs for 2008, 2010 and 2012[5]

Local Area	2008 NQC	2010-12 NQC	Total LCR Need (MW)		
			2008	2010	2012
Humboldt	180	211	175	156	160
North Coast/North Bay	883	938	676	826	856
Sierra	1780	1780	2092	1902	2161
Stockton	536	536	786	777	880
Greater Bay Area	6214	7081	4688	5225	5452
Greater Fresno	2991	3764	2382	2351	2244
Kern	646	646	486	439	499
LA Basin	12093	13135	10130	7000*	7000*
Big Creek/Ventura	5396	5443	3658	2322	2656
San Diego	2919	2963	3033	2266**	2444**
Total	**33638**	**36497**	**28106**	**23264**	**24352**

These study results provide an outlook of local capacity requirements over the next 5 years. While electricity demand in each area continues to grow, the assessment results indicate significant decrease in LCR requirements (approximately 5000 MW in 2010) in several areas. These reductions are driven by new transmission projects such as Sunrise, Green path north, Palo Verde-Devers #2 and later Vincent-Mira Loma 500 kV as well as upgrades to the Sylmar-Pardee #1 and #2 230 kV in southern California and Table Mountain-Rio Oso 230 kV lines in the north. Not withstanding these infrastructure additions, this year's LCR study results still show LCR deficiencies in several areas. However, compared to previous year results, these deficiencies have been significantly decreased due to various transmission upgrades. From a different perspective, the study results also show a heavy local reliability reliance on old thermal and once through cooling power plants across the five year horizon studies. The greatest need occurs in the first two years and decreases somewhat due to planned transmission infrastructure additions. The CAISO's analysis indicates that without these power plants the CAISO would not be able to meet the mandatory industry reliability standards and certain local systems would experience numerous load-shedding days across the system peak. As mentioned earlier, this local need becomes diluted in outer years after new transmission and/or generation become operational. The results are briefly summarized by load pocket below.

- Humboldt area solely relies on the existing Humboldt Bay Power Plant in order to maintain local reliability until the both Humboldt Reactive Support transmission project and the Humboldt Bay Repower are operational.

[5] Numbers shown in the shaded include LCR deficiencies either for the overall area requirement and/or for some smaller LCR pockets included within these areas (please see more details in the LCR report)
* Potentially lower requirements – limit not reached (please see more details in the LCR report)
** Potentially higher requirements combined with another area (please see more details in the LCR report)

- San Francisco pocket solely relies on the existing Potrero Bay Power Plant in order to maintain local reliability until the CAISO Revised Action Plan for SF is complete which include the CCSF Peakers, HP#4 115 kV cable) is operational, followed by timely completion of the Trans Bay 230 kV Cable in order to meet future growth.

- The Pittsburg pocket solely relies on the existing Pittsburg Plant in order to maintain local reliability. The Tesla-Pittsburg 230 kV reconductoring, when operational, will reduce this need.

- Bay Area on aggregate will continue to rely on multiple power plant in the same situation, specifically, Contra Costa, Pittsburg, and Potrero until additional new generation or possible new transmission upgrades are developed and become operational.

- Barre pocket heavily relies on multiple old thermal and once through cooling power plants: El Segundo, Redondo and Huntington Beach until additional new generation or possible new transmission upgrades intended to solve the Barre pocket reliability limitations are operational.

- LA Basin area on aggregate relies on multiple power plants in the same situation like: El Segundo, Redondo, Huntington Beach, Alamitos, Etiwanda and SONGS. This area gets a good decrease in local capacity needs after Rancho Vista 500 kV substation, Paloverde-Devers #2 500 kV Line, Green Path North (LADWP) and later Vincent-Mira Loma 500 kV (part of Tehachapi Upgrade) along with some new local area generation become operational. However this will not completely remove the need for some of these power plants and it will make the zonal (SP26) requirement binding making some of the same units required in order to meet those needs. Additional new generation within SP26 and/or LA Basin local area coupled with some more transmission projects in the same areas need to be operational in order to eliminate reliance on all of these power plants.

- Big Creek/Ventura area on aggregate relies on two old thermal and once through cooling power plants: Mandalay and Ormond Beach. This area gets a great decrease in local capacity needs after the Sylmar-Pardee 230 kV Upgrade and the Green Path North (LADWP) become operational. However this will not completely remove the need for some smaller portion of these power plants. Additional new generation within SP26 and/or Big Creek/Ventura local area coupled with some more transmission projects in the same areas need to be operational in order to eliminate reliance on both of these power plants.

- San Diego area on aggregate relies on two power plants in the same situation: Encina and South Bay. This area gets a partial decrease in local capacity needs after Sunrise 500 kV line and Otay Mesa (with 230 kV transmission line upgrades past Miguel) become operational. However this will not completely remove the need for both of these power plants. Additional new generation within

San Diego local area coupled with some more transmission projects in the same areas need to be operational in order to eliminate reliance on both of these power plants.

Figure 2-2 shows the trends of LCR requirements for the complete details of study results please refer to long-Term LCR Report posted on CAISO website at (http://caiso.com/1cc2/1cc2dab86fd50.pdf) .The CAISO will do additional studies during 2008 to estimate the reliance on these old thermal and once through cooling power plants from a zonal and system perspective. The CAISO will continue to evaluate these issues and consider cost-effective infrastructure improvements (transmission and/or resource) to address these issues.

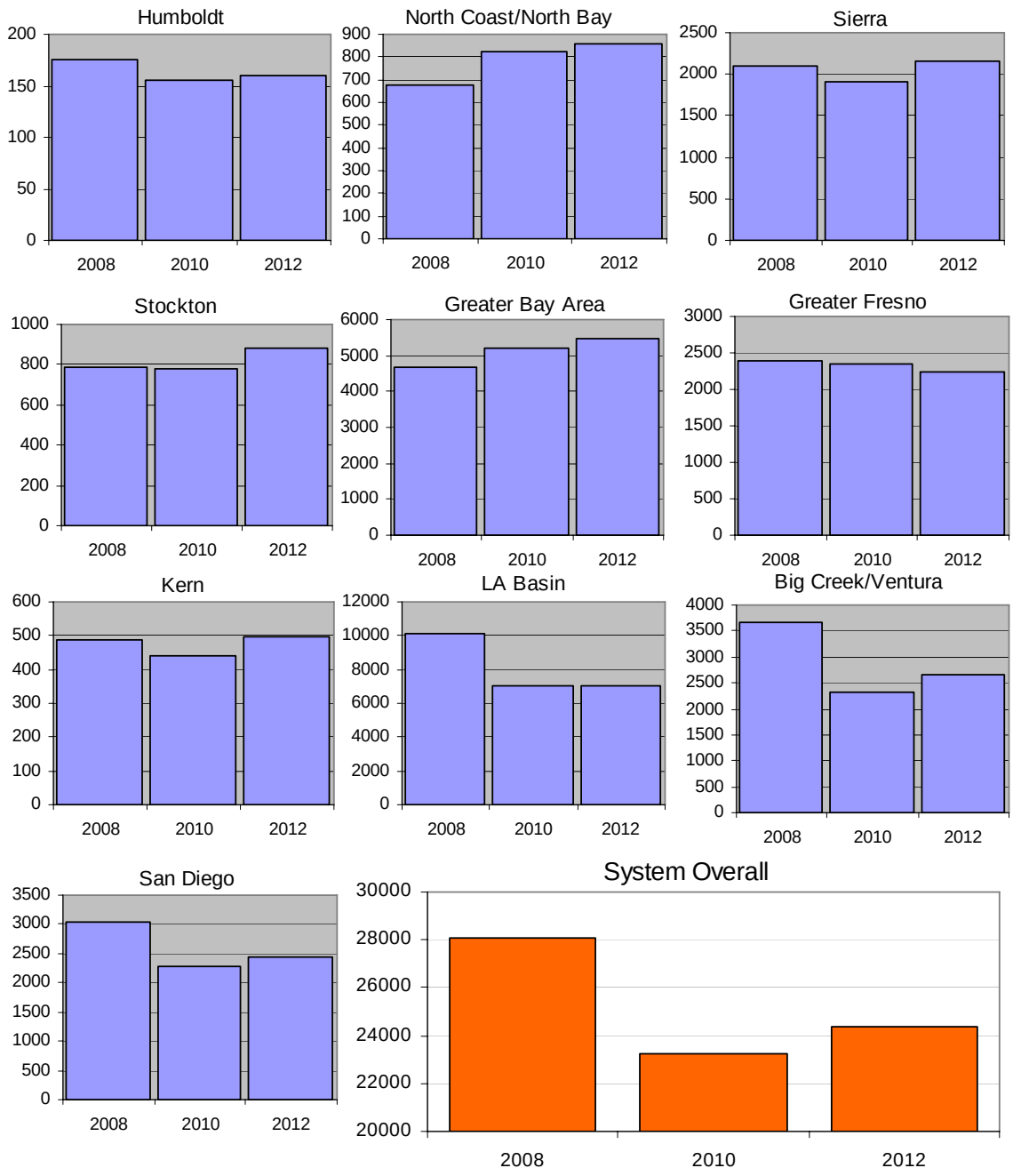


Figure 2-2 Next year and Long-Term LCR results

Furthermore, figure 2-3 illustrates geographical locations of the LCR areas.

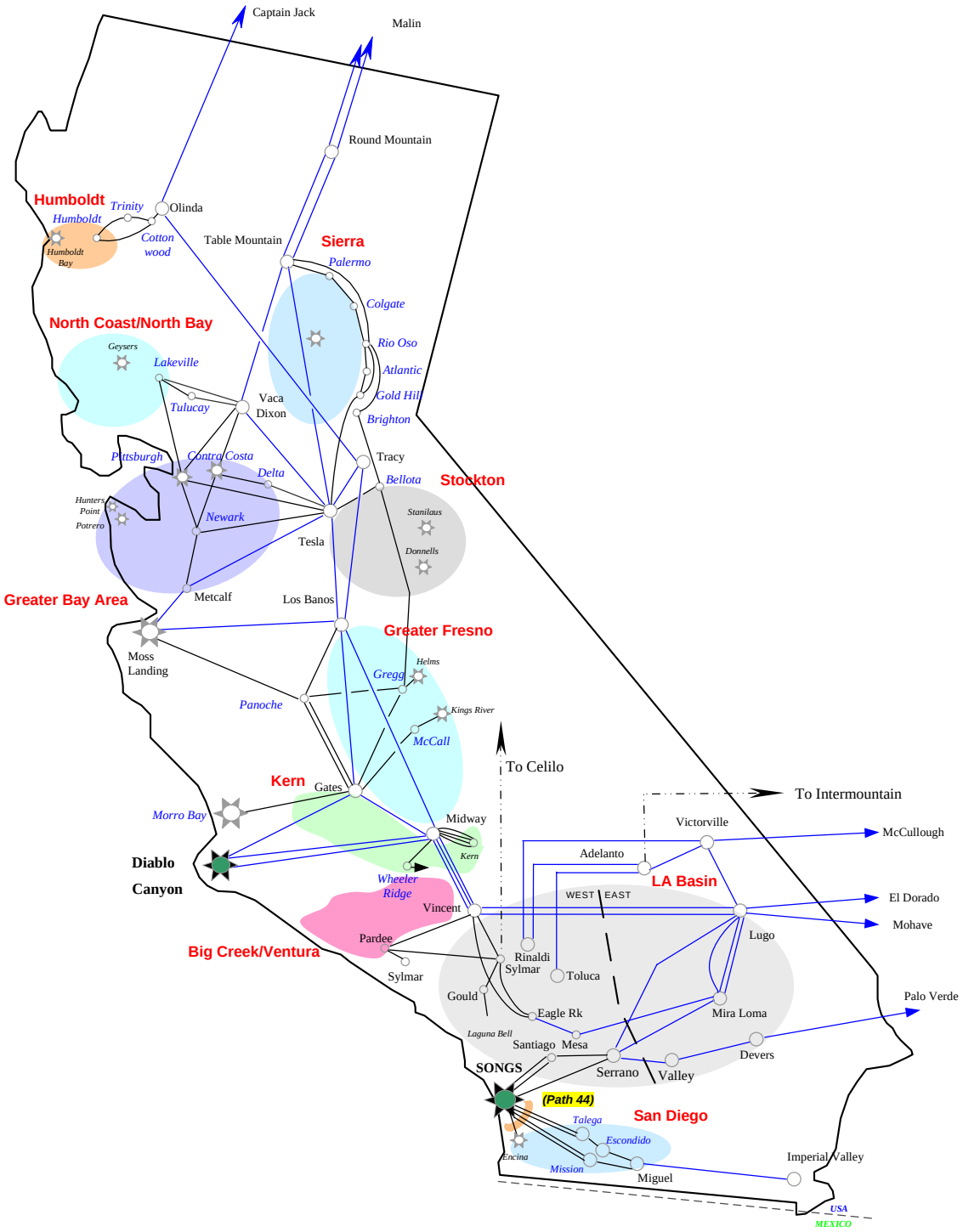


Figure 2-3 Approximated Geographical Locations of LCR Areas

2.3 Deliverability Study Results

As part of the generation interconnection process, CAISO continues to work on Deliverability Assessment in addition to studies performed previously in Phase IIA and Phase IIB Deliverability Assessment. Based on the deliverability methodology and availability of models, in 2007, CAISO completed two rounds of Deliverability Assessments as follows:

- Phase III Deliverability Assessment was completed in July 2007, covering new generation up to Queue number 130 in the CAISO Interconnection Queue in PG&E service territory. The Study Plan for this study is available at http://www.caiso.com/188d/188da0bf1d440.pdf
- Phase IV (Quarter 3 of 2007): Deliverability Assessment includes generation further in the queue beyond Phase III study. Due to the availability of models of generation projects in the queue, a different set of new generators in the north (PG&E system) and south (SCE and SDG&E systems) were modeled in the study. Generally, the study in the north includes existing and new generators up to queue number 212 in CAISO Interconnection Queue while the southern study include up to queue number 156. The Study Plan and latest study results for this study is available at http://www.caiso.com/1c44/1c44b5c31cce0.html

Upon the completion of the studies, study results from these 2 phases of deliverability assessments are available on CAISO website at http://www.caiso.com/1c44/1c44b5c31cce0.html

Preserving Generation Deliverability is also another issue related this activity. Under the state's resource adequacy program, as facilitated by the CAISO's MRTU Tariff, resources must be deliverable to serve Load in order to be entitled to count towards resource adequacy obligations and potentially receive an associated capacity payment. The CAISO has stated that it intends to utilize its existing Generator Interconnection Queue process to ensure that new generator interconnections do not degrade the deliverability of existing generators. Moreover, the CAISO has noted that it will consider deliverability in analyzing the transmission project alternatives. However, CAISO management has elected not to include in its applicable FERC filing such as Order No. 890 an explicit obligation to use the Transmission Planning Process to ensure the deliverability of existing generation resources should system changes, such as the location of Demand or generator retirements. The simple reason is that it may not be economically efficient to build a transmission upgrade or addition to preserve a generator's deliverability. If, in fact, an upgrade is economically efficient based on an increase in the availability of deliverable capacity, that project may be approved under the CAISO's existing category of economic transmission projects.

2.4 CAISO Short Term Transmission Plan Study Results

A key accomplishment for 2007 has been the expansion of the CAISO Short Term Transmission Plan. Covering a three-year assessment horizon, the 2007 Short Term Transmission Plan presents a much broader view of technical assessment than had been achieved in 2006. As with the introduction of any new planning process, the initial steps in their development are small and reflect on clarifying goals and objectives to be achieved as the planning effort matures. The concept of the Short Term Transmission Plan was introduced in 2006 and, based on stakeholder comments, was well received even though its purpose in the CAISO's planning process was not as clearly articulated as it should have been. During 2007, CAISO Staff refocused its assessment effort towards identifying and addressing operational gaps that traditionally exist between real time operation and planning. These gaps tend to manifest themselves in the form of congestion and operating constraints that present challenges to Grid Operations on a daily basis. For 2007, the Short Term Plan primarily focused on analysis on the following areas:

- Identify gaps that include concerns from system operators. These concerns include reliability issues such as thermal overload, voltages, and stability or market-related issues such as congestion. In some cases, the identified concerns may have been addressed by the long-term upgrades but due to the design and construction lead time, additional mitigations might be needed to ensure reliability and an efficient system.
- Identify solutions: Following the identification of the concerns, solutions were proposed as part of the Short Term Plan. In the scenarios where lead time was of major concern, the interrelationship between the short-term and long-term mitigation plans were identified and always considered during the course of developing Short Term Plan upgrades to ensure both mitigation plans will work seamlessly.

In analyzing the operational gaps, the CAISO Short Term Plan focuses on overload and voltage issues, under both normal and emergency conditions. A constraint that has generation available to mitigate it is considered congestion, whereas a situation with no generation available for mitigation is considered reliability.

This section presents the summary of the following elements related to the short-term plan studies:

1. Study Assumptions: Summary of assumptions regarding the commissioning dates of CAISO-approved transmission projects over the next three years used in the study. The comprehensive list of these transmission projects is shown in Appendix A.
2. List of Congestion Concerns[6] shown in Table 2-3
3. List of reliability concerns based on system operator's experiences is provided in Table 2-4

[6] Currently, congestion cost is considered as market sensitive information. This information will not be included in this public document.

Congestion Concerns[7]

The CAISO utilizes operating procedures to mitigate congestion as it is observed in real-time. Table 2-3 lists all of the congested areas identified by the CAISO along with any projects that have already been proposed through the long-term planning process to address these congested areas. The Gap column is intended to indicate the number of summers expected for the issue to persist starting from the summer of 2007. The shaded items are significant issues that will be discussed in detail further in the document.

The Table 2-3 identifies 55 areas of concern across the CAISO Controlled Grid. It also points out several mitigation projects that have been lined up to mitigate these overloads. However, it is imperative to point out that it is not necessary for every point of congestion to have a project to mitigate the constraint. Since these limits are monitored to protect against the most extreme load and generation patterns on the system, some Limits rarely experience violations for which a Mitigation Project may not be economical. Recommendations from CAISO short-term plan will focus only on the cost-effective upgrades.

Table 2-3: Summary of Congested Areas Identified in CAISO Operating Procedures

#	Contingency - Overload	Region	Mitigation Project	Targeted In-Service Date	Gap (Yrs)
1	O/L Potrero-Bayshore-Martin #2	PG&E – Bay Area	T897: New Martin – Hunters Point Cable or T1031: San Francisco Underground Cable Replacement	04/01/2009 (slip from 04/2008) 05/01/2010 (expedited from 2015)	2 3
2	N-1 Hunters Point-Martin #1 115kV O/L Hunters Point-Martin #3 115kV	PG&E – Bay Area	T897: New Martin – Hunters Point Cable or T1031: San Francisco Underground Cable Replacement	04/01/2009 (slip from 04/2008) 05/01/2010 (expedited from 2015)	2 3
3	N-1 Panoche-Kearney 230kV line O/L Dairyland-Le Grand 115kV line	PG&E – South	None	--	--
4	N-1 Gates-Gregg 230kV line O/L Panoche-Kearney 230kV line	PG&E – South	None	--	--
5	N-1 McCall 230/115kV Bank 3 O/L McCall 230/115kV Bank 2	PG&E – South	T923A: McCall 230/115kV Bank 1 replacement with new 420 MVA bank	05/01/2008	1

[7] In this report, it represents limitations that can be mitigated by dispatching resources

Table 2-3: Summary of Congested Areas Identified in CAISO Operating Procedures (Cont)

#	Contingency - Overload	Region	Mitigation Project	Targeted In-Service Date	Gap (Yrs)
6	N-1 Gates-McCall 230kV line O/L Helm-McCall 230kV line or Panoche-Helm 230kV line	PG&E – South	None	--	--
7	N-1 Panoche-Helm 230kV line O/L Gates-McCall 230kV line	PG&E – South	None	--	--
8	O/L Warnerville-Wilson 230kV line	PG&E – South	None	--	--
9	O/L Wilson-Gregg 230kV line	PG&E – South	None	--	--
10	O/L Gregg-Borden 230kV line	PG&E – South	None	--	--
11	O/L Wilson-Borden 230kV line	PG&E – South	None	--	--
12	Panoche-Kearney 230kV line	PG&E-South	None	--	--
13	O/L Gates-McCall 230kV line	PG&E – South	None	--	--
14	O/L Dairyland-Le Grand 115kV line	PG&E – South	None	--	--
15	Le Grand-Chowchilla 115kV line	PG&E – South	None	--	--
16	N-1 Panoche-Helm 230kV line O/L Schindler-Stroud 70kV line	PG&E – South	None	--	--
17	N-1 Moss Landing-Metcalf 500kV O/L Moss Landing-Metcalf #1 & #2 230kV lines	PG&E – Bay Area	T867: Reconductor the Metcalf-Moss Landing 230kV Lines	12/01/2008 (Slip from 12/2007)	2
18	N-1 Vaca 500/230kV #11 Bank O/L Tesla-Delta Sw Yard 230kV	PG&E – Bay Area	T783B: Install 2nd Vaca Dixon 500/230kV Transformer	01/15/2008 (Slip from 12/2007)	1
19	N-1 Oakland D-L 115kV Cable & O/L Oakland C-X 115kV Cable	PG&E – Bay Area	T983: New Oakland C-X #2 115kV Cable	05/01/2010	3
20	N-1 Pittsburg-San Mateo 230kV O/L Pittsburg-East Shore 230kV	PG&E – Bay Area	None	--	
21	N-1 Pittsburg-Tesla 1 230kV line O/L Pittsburg-Tesla 2 230kV line	PG&E – Bay Area	T984: Reconductor both Pittsburg-Tesla 230kV lines	05/01/2010	3

Table 2-3: Summary of Congested Areas Identified in CAISO Operating Procedures (Cont)

#	Contingency - Overload	Region	Mitigation Project	Targeted In-Service Date	Gap (Yrs)
22	N-2 Ravenswood-San Mateo 1 & 2 230kV lines O/L Ravenswood-San Mateo 115kV	PG&E – Bay Area	T920A: South of San Mateo Capacity Increase Or T081: Bair-Belmont 115kV Reconductor	05/01/2011 (Slip from 5/2009) 05/01/2007	3 0
23	N-1 Tesla 500/230kV Bank 6 O/L Tesla 500/230kV Bank 4	PG&E – Bay Area	None	--	--
24	N-1 MontaVista-Jefferson 1 230kV O/L MontaVista-Jefferson 2 230kV	PG&E – Bay Area	None	--	--
25	N-2 Tesla-Ravenswood 230kV line & Newark-Ravenswood 230kV line O/L Newark-Ames Dist 115kV line	PG&E – Bay Area	None	--	--
26	N-1 Sobrante-Grizzly-Claremont 1 O/L Sobrante-Grizzly-Claremont 2	PG&E – Bay Area	None	--	--
27	N-1 Pittsburg 230/115kV Bank 12 O/L Pittsburg 230/115kV Bank 13	PG&E – Bay Area	None	--	--
28	N-1 Metcalf-Morgan Hill 115kV O/L Metcalf-Llagas 115kV	PG&E – Bay Area	None	--	--
29	O/L Gilroy-Llagas 115kV line	PG&E – Bay Area	None	--	--
30	Humboldt Area Imports N-1 Humboldt Thermal Unit 1 or 2 O/L Low voltage	PG&E – North West	T945: Humboldt Reactive Support	05/01/2009	2
31	N-1 Trinity-Cottonwood 115kV line O/L Keswick-Cascade 60kV line	PG&E – North West	None	--	--
32	N-1 Humboldt 115/60kV Bank 1 O/L Humboldt 115/60kV Bank 2	PG&E – North West	None	--	--
33	N-1 Eagle Rock-Fulton 115kV O/L Clear Lake–Hopland 60kV	PG&E – North West	None	--	--
34	Placer-Gold Hill #1 & #2 115kV lines	PG&E – North East	T444: Reconductor Gold Hill-Placer 1 & 2 115kV lines	05/01/2009 (Slip from 5/2008)	2
35	N-1 Bell-Placer 115kV line O/L Drum-Rio Oso 1 & 2 115kV	PG&E – North East	None	--	--

Table 2-3: Summary of Congested Areas Identified in CAISO Operating Procedures (Cont)

#	Contingency - Overload	Region	Mitigation Project	Targeted In-Service Date	Gap (Yrs)
36	O/L Placer-Gold Hill #2 115kV line	PG&E – North East	T444: Reconductor Gold Hill-Placer 1 & 2 115kV lines	05/01/2009 (Slip from 5/2008)	1
37	Palermo-Bogue 115kV line, Palermo-Nicolaus 115kV line, Palermo-Pease 115kV line	PG&E – North East	T686A: Reconductor Palermo-Rio Oso 115kV lines OR Bogue Jct Reconfiguration	12/01/2009 (Slip from 5/2008) 05/01/2009	2.5 2
38	N-1 Palermo-Colgate 230kV line O/L Palermo 230/115/60kV Bank	PG&E – North East	T686B: Palermo 230/115kV Transformer	05/01/2008	1
39	N-1 Table Mtn-Rio Oso 230kV line O/L Palermo 230/115/60kV Bank	PG&E – North East	T686B: Palermo 230/115kV Transformer	05/01/2008	1
40	N-1 Table Mtn-Rio Oso 230kV line O/L Table Mtn-Palermo 230kV line	PG&E – North East	Maintenance Project: South of Table Mountain Maintenance	05/01/2008	1
41	N-1 Bogue-Rio Oso 115kV line O/L Palermo-Bogue 115kV line	PG&E – North East	T686A: Reconductor Palermo-Rio Oso 115kV lines	12/01/2009 (Slip from 5/2008)	2.5
42	N-1 Colgate 230/60kV Bank 3 O/L Colgate-Palermo 60kV line	PG&E – North East	T815: Pease-Marysville 60kV line or T686A: Palermo-Rio Oso 115kV Reconductor	12/01/2009 (Slip from 5/2007) 12/01/2009 (Slip from 5/2008)	2.5 2.5
43	N-1 Rio Oso 230/115kV Bank 2 O/L Rio Oso 230/115kV Bank 1	PG&E – North East	T985B: Replace the Rio Oso transformers 1 & 2 (420 MVA each)	05/01/2009	2
44	N-1 Table Mt-Vaca 500kV line O/L Table Mt-Rio Oso 230kV line	PG&E – North East	Maintenance Project: South of Table Mountain Maintenance	05/01/2009	2
45	O/L Kasson-Lammers 115kV line	PG&E – North East	T680A: Reconductor with 477 SSAC (224 MVA)	05/01/2008	1
46	N-1 Schulte-Kasson 115kV line O/L Tesla-Schulte 115kV line	PG&E – North East	None	--	
47	N-1 Tesla-Manteca 115kV line O/L Tesla-Salado-Manteca 115kV	PG&E – North East	T680B: Tesla 115kV Capacity Increase	05/01/2010	3
48	O/L Los Banos-Westley 230kV line	PG&E – South	None	--	--
49	N-1 Los Banos-Tesla 500kV line O/L Los Banos-Westley 230kV line	PG&E – South	None	--	--

Table 2-3: Summary of Congested Areas Identified in CAISO Operating Procedures (Cont)

#	Contingency - Overload	Region	Mitigation Project	Targeted In-Service Date	Gap (Yrs)
50	N-1 Magunden-Vestal 220 kV line O/L Remaining Magunden-Vestal 220 kV line	SCE	San Joaquin Cross Valley Rector Loop	09/01/2009	2
51	Lugo-Victorville 500 kV Line (Path 61) Nomogram and Sylmar Transformer Bank Loading N-1 Multiple 500 kV lines O/L Lugo-Victorville 500 kV line	SCE	None	--	--
52	SCE Area Generation Requirement N-1 Barre-Villa Park 220 kV line O/L Barre-Lewis 220 kV line	SCE	None	--	--
53	Antelope-Vincent 220 kV Overload Mitigation	SCE	Antelope (formerly known as Tehachapi) Transmission Project - Phase 1	12/31/2008	2
54	Imperial Valley Banks T-1 Bank 81 O/L Bank 80	SDG&E	IV Bank 82 Addition	06/01/2009	--
55	Miguel Banks T-1 Miguel 500/230kV Bank O/L Remaining Parallel Bank	SDG&E	None	--	--

Reliability Concerns[8]

In addition to the congested areas, Table 2-4 summarizes 14 facilities with reliability concerns (thermal overloading problems) based on the information collected from real-time operation. Similarly to the congestion, the shaded items are significant issues that will be discussed in detail further in the document and there are several long-term transmission projects have been lined up to mitigate these concerns.

Table 2-4 Itemized Reliability Concerns

#	Contingency - Overload	Region	Mitigation Project	Targeted In-Service Date	Gap (Yrs)
1	N-1 McCall-Reedley 115kV line O/L Sanger-Reedley 70kV line	PG&E – South	None *Short Term Solution:* Cut out the line test on the McCall-Reeldey at Reedley (dropping Whatoke).	--	--
2	N-1 Atlantic-Pleasant Grove #1 60kV line O/L Atlantic-Pleasant Grove #2 60kV line	PG&E – North East	T759B: Atlantic-Pleasant Grove 60kV Reconductoring T161: Atlantic-Lincoln 115kV Conversion	05/01/2009 (Slip from 05/2008) 05/01/2009 (Slip from 5/2008)	1 1
3	Normal Overload: O/L Atlantic 230/60kV Bank 2	PG&E – North East	T759C: Atlantic-Lincoln 115kV Conversion *Short Term Solution:* Piggy-Back Bank 1 & 2 for increased capacity.	05/01/2009 (Slip from 5/2008) 05/01/2007	2 0
4	Normal Low Voltage: Woodland & Davis 115kV Substations	PG&E – North East	None. *Short Term Solution:* Install UVLS relays at Woodland.	May 2012 07/20/2007	5 0
5	N-1 Brighton 230/115kV Bank 10 O/L Brighton 230/115kV Bank 9	PG&E – North East	T758A: Replace Brighton Bank 9 with a 420MVA Unit.	11/01/2009 (Slip from 5/2009)	2

[8] Similarly to the previous footnote, this represents transmission limitations that resource is insufficient for mitigation

Table 2-4 Itemized Reliability Concerns (Cont)

#	Contingency - Overload	Region	Mitigation Project	Targeted In-Service Date	Gap (Yrs)
6	N-1 Brighton-Davis 115kV line O/L West Sac-Brighton 115kV line	PG&E – North East	T177B: Reconductor the West Sac-Brighton 115kV Line	05/01/2009	2
7	SCE GCC OP-074 N-1 Paloverde-Devers 500 kV line O/L Julian Hinds-Mirage 220 kV line	SCE	None	--	--
8	AA Bank Double Breaker Position Upgrades	SCE	Upgrade Mira Loma and Valley 500 kV AA Banks to a double breaker configuration	12/31/2009	2
9	N-1-1 concerns for SDG&E large load centers (< 100 MW)	SDG&E	--None	--	--
10	N-1 South Bay 138/69kV Transformer O/L TL606	SDG&E	Add a new Division-Naval Station Metering #2 69kV line	6/1/2009	--
11	N-1-1 TL 13816/13833, TL 13833/13836, or TL 13831/13836 O/L TL 13812	SDG&E	Reconductor TL 13812 Talega-San Mateo	6/1/2009	--
12	N-1 Miguel 69 kV South Bus SPS O/L TL 13826	SDG&E	--None	--	--
13	N-1 Escondido Bank 70 or 71 Post contingency voltage performance	SDG&E	--None	--	--
14	N-1-1 TL 696/679 O/L TL 689C	SDG&E	--None	--	--

As discussed earlier regarding the next step of short-term plan, CAISO recommendations for the upgrades to mitigate the congestion and reliability concerned are presented in section 3.5 of this report.

This page is intentionally left blank

Chapter 3: Transmission Projects

Information on future transmission projects is a crucial piece of the overall Transmission Plan. In this chapter, a complete list of transmission projects along with a summary of project details are compiled to show the trend of future infrastructure development based on current plans. This includes the status updates on the projects that have been approved in the previous transmission plans and their anticipated online date in section 3.1, a list of transmission projects that CAISO management approved as part of this planning cycle in section 3.2, a list of transmission project proposals that requires CAISO Board of Governors approval[9] in section 3.3, the projects CAISO management currently did not approve due to various reasons in section 3.4, and section 3.5 contains the updates of ongoing transmission project initiatives not seeking approval in the Plan but should not be overlooked due to their potential impacts. In addition, upgrade recommendations from CAISO Short Term Plan is also another key piece of information that will be discussed in section 3.6 of this chapter.

Due to the fact that initiation of each project could be different due to different drivers, each project can provide multiple benefits as will be discussed again in this Chapter. In addition, major transmission projects may appear in multiple sections since they provide not only a single benefit but also impact multiple issues related to transmission planning.

3.1 Updates on the Statuses of Approved Transmission Projects

Tables 3-1 to 3-3 below show the latest status of approved transmission projects in PG&E, SCE, and SDG&E service territories.

Table 3-1 Status of previously approved Transmission Projects in PG&E system

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
1	Herndon-Bullard 115 kV Reconductoring	Meet Customer Demand and Improve Service Reliability	Fresno and Madera	Reconductor 115 kV Lines	5M - 10M	2008
2	Kasson-Lammers 115 kV Reconductoring	Reduce LCR and Meet Customer Demand	San Joaquin	Reconductor 115 kV Lines	<1M	2008
3	Lone Tree Substation	Interconnect Customer	Contra Costa	Interconnect Distribution Substation	1M - 5M	2008

[9] Transmission projects cost more than 50 Million Dollars. However, the 50 Million Dollars threshold will be used in the near future due to increasing costs of material and construction of transmission projects.

Table 3-1 Status of previously approved Transmission Projects in PG&E system (Cont)

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
4	McCall 230/115 kV Transformer Replacement	Reduce LCR and Improve Service Reliability	Fresno	Transformer Replacement	5M - 10M	2008
5	Metcalf - El Patio 115 kV Reconductoring	Reduce LCR, Meet Customer Demand, and Improve Service Reliability	Santa Clara	Reconductor 115 kV Lines	5M - 10M	2008
6	Monta Vista 115/60 kV Transformer	Meet Customer Demand and Improve Service Reliability	Santa Clara	Install 115/60 kV Transformer	5M - 10M	2008
7	Newark - Fremont 115 kV Reconductoring	Meet Customer Demand and Improve Service Reliability	Mission	Reconductor 115 kV Lines	5M - 10M	2008
8	Palermo 230/115 kV Transformer	Reduce LCR	Butte	Install a 230/115 kV Transformer	10M - 20M	2008
10	Stagg 230/60 kV Transformers	Meet Customer Demand and Improve Service Reliability	San Joaquin	Transformer Replacements	10M - 20M	2008
11	Templeton – Atascadero 70 kV Reconductoring	Meet Customer Demand	San Luis Obispo	Reconductor 70 kV Line	1M - 5M	2008
12	Weber #1 60 kV Line	Improve Service Reliability	San Joaquin	Reconductor and reconfigure the Weber #1 60 kV Line	1M - 5M	2008
13	Humboldt - Harris 60 kV Reconductoring	Meet Customer Demand	Humboldt	Reconductor 60 kV Line	1M - 5M	2008
14	Martin 115/60 kV Transformer Replacement	Meet Customer Demand	San Francisco	Transformer Replacement	5M - 10M	2008
15	Metcalf-Moss Landing 230 kV Reconductoring	Improve Service Reliability	Monterey and Santa Clara	Reconductor 230 kV Lines	20M - 50M	2008
16	Martin-Hunters Point 115 kV Cable	Reduce LCR and Improve Service Reliability	San Francisco	Construct New Underground Cable	50M - 100M	2009
17	DCPP (Mesa) 230 kV Shunt Capacitors	Improve Service Reliability	Los Padres	Install Shunt Capacitors	1M - 5M	2009
18	Glass – Madera 70 kV Reconfiguration (Scope change)	Meet Customer Demand	Madera	Install 70 kV Breaker and Construct Additional Line	1M - 5M	2009
19	Gold Hill - Clarksville 115 kV Line Reconductoring	Meet Customer Demand	El Dorado	Reconductor 115 kV Lines	1M - 5M	2009
20	Hollister 115 kV Reconductoring	Meet Customer Demand and Improve Service Reliability	San Benito	Reconductor 115 kV Lines	5M - 10M	2009

Table 3-1 Status of previously approved Transmission Projects in PG&E system (Cont)

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
21	Lakeville – Ignacio #2 230 kV Line Project	Reduce LCR and Improve Service Reliability	Sonoma	Re-establish Lakeville – Ignacio #2 230 kV Line	1M – 5M	2009
22	Lakeville 230/60 kV Transformer Capacity Increase	Meet Customer Demand and Improve Service Reliability	Sonoma	Install Second 230/60 kV Transformer	5M - 10M	2009
23	North Coast Breaker and Switch Upgrades[10]	Reduce LCR	Sonoma	Breaker Replacement & Line Rerate	1M - 5M	2009
24	Pease-Marysville 60 kV Line	Meet Customer Demand and Improve Service Reliability	Yuba and Sutter	Construct New 60 kV Line	10M - 20M	2009
25	Rio Oso 230/115 kV Transformer Upgrades	Meet Customer Demand and Reduce LCR	Sutter	Transformer Replacements	10M - 20M	2009
26	West Point – Valley Springs 60 kV Line	Meet Customer Demand	Calaveras	Reconductor 60 kV Line	5M – 10M	2009
27	Gregg 230 kV Reactor	Improve Service Reliability	Madera	Install Shunt Reactors	5M - 10M	2009
28	Bay Meadows 115 kV Reconductoring	Meet Customer Demand	San Mateo	Reconductor 115 kV Lines	5M – 10M	2010
29	Contra Costa – Moraga 230 kV Line Reconductoring	Reduce LCR	Contra Costa	Reconductor 230 kV Lines	10M - 20M	2010
30	Half Moon Bay Reactive Support	Meet Customer Demand and Improve Service Reliability	San Mateo	Increase 60 kV Transmission Capacity	5M – 10M	2010
31	Mendocino Coast Reactive Support	Improve Service Reliability	Mendocino	Install 10 to 15 MVArs of reactive support at Fort Bragg or Big River 60 kV Substations	5M – 10M	2010
32	Moraga Transformer Capacity Increase	Reduce LCR Meet Customer Demand and Improve Service Reliability	Contra Costa	Replace either Moraga 230/115 kV Bank No. 1 or 2 with a larger bank	10M – 20M	2010
33	Oakland Underground Cable	Reduce LCR and Reduce Congestion	Alameda	Construct New Underground Cable	50M - 100M	2010
34	Pittsburg – Tesla 230 kV Reconductoring	Reduce LCR	Contra Costa	Increase 230 kV Capacity	10M – 20M	2010
35	Cortina 60 kV Reliability	Reduce LCR and Improve Service Reliability	Colusa	Install Additional Transformer	5M – 10M	2011

[10] This project was previously called the Sobrante, Lakeville and Ignacio Capacity Increase Project.

Table 3-1 Status of previously approved Transmission Projects in PG&E system (Cont)

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
36	Monta Vista - Los Altos 60 kV Reconductoring	Meet Customer Demand	Santa Clara	Reconductor 60 kV Line	1M – 5M	2011
37	Pittsburg 230/115 kV Transformer Capacity Increase	Reduce LCR, Meet Customer Demand, and Improve Service Reliability	Contra Costa	Install a third 230/115 kV transformer at Pittsburg	10M - 20M	2011
38	Soledad 115/60 kV Transformer Capacity	Meet Customer Demand and Improve Service Reliability	Monterey	Replace transformers at Soledad Substation with 200 MVA Transformers	10M - 20M	2011
39	South of San Mateo Capacity Increase	Reduce LCR and Improve Service Reliability	San Mateo	Increase 115 kV Transmission Capacity	10M - 20M	2011
40	Tesla-Newark 230 kV Path Upgrade	Reduce LCR	Contra Costa	Increase 230 kV Capacity	5M – 10M	2011
41	Metcalf-Evergreen 115 kV	Meet Customer Demand	Santa Clara	Reconductor 115 kV Lines	5M - 10M	2012
42	Metcalf-Piercy & Swift and Newark-Dixon Landing 115 kV Upgrade	Meet Customer Demand	Santa Clara	Reconductor 115 kV Lines	5M - 10M	2012
43	Ignacio-San Rafael and Ignacio - Las Gallinas 115 kV Reconductoring	Meet Customer Demand and Improve Service Reliability	Marin	Reconductor 115 kV Lines	5M - 10M	2015
44	San Leandro - Oakland J 115 kV Line Reconductoring	Meet Customer Demand and Improve Service Reliability	Contra Costa	Reconductor San Leandro - Oakland J 115 kV Line	5M - 10M	2015
45	San Mateo and Moraga Synchronous Condenser Replacement	Improve Service Reliability	San Mateo and Contra Costa	Replace Synchronous Condensers	5M - 10M	2015
46	Woodward 115 kV Reinforcement	Meet Customer Demand	Fresno	Reconductor 115 kV Lines	5M - 10M	2016

Table 3-2 Status of previously approved Transmission Projects in SCE system

#	Project Title	Purpose And Benefit	Cost Range ($)	Target In-Service Date
1	Etiwanda-San Bernardino 230 kV Disc Upgrade	Reliability - Mitigate overloads under N-2 conditions	< 1M	11/7/2007
2	West of Devers (WOD) SPS	Reliability - Mitigate overloads west of Devers under N-1 conditions	< 5 M	7/1/2007
3	Rector SVC and Big Creek RAS Upgrades	Reliability - Mitigate reliability problems (transient and post transient) in the San Joaquin Valley area under contingency conditions	< 50 M	6/1/2007
4	Antelope SPS	Reliability - Mitigate potential N-2 voltage collapse during peak load conditions	< 5M	6/1/2008
5	HDPP SPS	Reliability - Mitigate potential N-2 voltage collapse during peak load conditions	< 1M	12/31/2008
6	La Fresa-Redondo 230 kV T/Ls Nos.1&2	Reliability - Mitigate line overloads under maximum generation dispatch and contingency conditions	< 1M	12/31/2007
7	Valley 500 kV Shunt Capacitors	Reliability - Prevent voltage collapse in the Valley area under the outage of Serrano-Valley 500 kV line	< 50M	7/13/2007
8	Antelope 280 MVA 230/66 kV #3 transformer bank Replacement	Reliability - Mitigate bank overloads under peak load and T-1 conditions	<10 M	6/1/2008
9	Antelope-Oasis-Palmdale-Quartz Hill and Antelope-Shuttle 66 kV Line Reconductor Project	Reliability - Prevent base case and N-1 line overloads under peak load conditions	<10M	6/1/2008
10	Method of Service for 56 MVA Ritter Ranch 66/12 kV Sub	Load Growth - Provide a method of service to a new substation	< 20M	6/1/2009
11	San Joaquin Cross Valley Loop	Reliability - Mitigate reliability problems (transient and post transient) in the San Joaquin Valley area under contingency conditions	< 100M	4/1/2010
12	Antelope 66 kV Capacitor	Reliability - Correct projected VAR deficit in Antelope-Bailey 66 kV system	< 1M	6/1/2009
13	BC3-BC8 SPS	Reliability - Mitigate potential N-2 line overloads during maximum hydro output conditions	< 1M	6/1/2009

Table 3-2 Status of previously approved Transmission Projects in SCE system (Cont)

#	Project Title	Purpose And Benefit	Cost Range ($)	Target In-Service Date
14	Devers-Coachella Valley 230 kV Line Loop	Reliability - Mitigate potential voltage collapse in Palm Spring/Rancho Mirage area under contingency conditions	< 20M	6/1/2010
15	Devers-Mirage 115 kV System Split	Reliability - Mitigate base case line overloads under peak load conditions and high import from IID area	< 20M	6/1/2010
16	Mira Loma 500 kV Shunt Capacitors	Reliability - Maintain operating voltage at 515 kV or greater on the transmission system	< 20M	6/1/2009
17	New Antelope-Quartz Hill 66 kV line #2	Reliability - Mitigate potential N-1 line overloads under peak load conditions	<10M	6/1/2009
18	Rancho Vista 500/230 kV Substation	Reliability - Provide additional transformer capacity to serve growing load demand in the eastern LA basin and bank relief to Mira Loma Substation	< 300M	6/1/2009
19	Jurupa 230/66 kV Sub	Load Growth - Provide a method of service to a new substation serving City of Riverside	< 50M	10/1/2009
20	Devers-Palo Verde 500 kV T/L #2 (DPV2)	Economics - Access low cost resources in the Southwest	< 1000M	12/1/2011
21	Method of Service to El Casco 230/115 kV Sub	Load Growth - Provide a method of service to a new 560 MVA 230/66 kV Substation	< 20 M	6/1/2010
22	Two-Line Service to Acton 66/12 kV Sub	Reliability - Improve reliability service to Acton Sub	<5M	6/1/2011
23	Victor #3 280 MVA 230/115 kV Transformer Bank	Reliability - Eliminate T-1 overloads	< 20M	12/1/2009
24	Del Sur 66 kV Terminal Upgrades	Reliability - Mitigate N-1 line overloads	< 1M	6/1/2014

Table 3-3 Status of previously approved Transmission Projects in SDG&E system

#	Project Title	Target In-Service Date	Note
P0100	Reconductor TL6916: Sycamore-Scripps (UG only)	Complete	
P03191	New 230 kV lines: Otay Metro Powerloop	Complete	
P05156	Loop-in TL23011C: PEN Switchyard	Complete	
P06126	New 230 kV Capacitors: Miguel Substation	Complete	
P99126	Transmission for Otay Mesa Power Generation Project	Oct-08	Previously Approved with no proposed changes
P01141	Reconductor TL13836, Talega – Pico	Jun-09	Previously Approved with no proposed changes
P01142	Reconductor TL683, Lilac-Rincon	Deferred	Previously Approved with no proposed changes
P03170	New 230/69 kV Substation: Silvergate	Dec-08	Previously Approved with no proposed changes
P04137	2nd 69 kV line: Division-Naval Station Metering	Jun-09	Previously Approved with no proposed changes
P04138	New 500 kV line: Sunrise Powerlink	Jun-10	Previously Approved with no proposed changes
P04195	Lake Hodges Pump Storage Project (Generator Interconnection)	Sep-08	Previously Approved with no proposed changes
P05153	Reconductor TL689, Escondido-Felicita Tap	Jun-09	Previously Approved with no proposed changes
P06134	Loop-in TL651: Silvergate 69 kV Switchyard	Jun-09	Previously Approved with no proposed changes
P06136	Rearrange 230 kV Switchyard: San Luis Rey	Jun-08	Previously Approved with no proposed changes
P061XX	Reconfigure TL13821 & 13822, Carlton Hills Area	Jun-10	Previously Approved with no proposed changes
P00153	Reconductor TL13837, Capistrano-Laguna Niguel	Jun-10 to earlier	CAISO recommends change operation date

3.2 CAISO Management Approved - New Transmission Projects Proposals

Based on the project proposals CAISO received during this year transmission planning cycle, Tables 3-4 to 3-6 below list the transmission projects proposals in Pacific Gas and Electric, Southern California Edison, and San Diego Gas and Electric service territories areas that CAISO management approvals have been granted. In addition, justifications for approving these projects are provided in Appendix B.

Table 3-4 Projects Proposals in PG&E system that received CAISO Management Approval

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
1	Menlo 60 kV Switch Upgrade	Reliability - Meet Customer Demand	San Mateo	Replace 60 kV switches at Menlo 60 kV Substation	<1M	2008
2	Merced 115 kV Bus Reconductoring	Reliability - Meet Customer Demand	Merced	Reconductor 115 kV Bus	<1M	2008
3	Stone Substation Capacity Increase (D)	Reliability - Interconnect Customer	Yolo	Change Distribution Substation Interconnection	1M - 5M	2008
4	Plainfield Substation Capacity Increase (D)	Reliability - Interconnect Customer	Yolo	Change Distribution Substation Interconnection	1M - 5M	2008
5	Live Oak Substation Capacity Increase (D)	Reliability Interconnect Customer	Sutter	Change Distribution Substation Interconnection	5M – 10M	2008
6	Plumas Substation Capacity Increase (D)	Reliability - Interconnect Customer	Sutter	Change Distribution Substation Interconnection	5M – 10M	2008
7	Davis 115 kV Circuit Breaker	Reliability - Improve Service Reliability	Yolo	New Circuit Breaker/ Line Reconfigure	1M - 5M	2008
8	Potrero Bus Parallel Circuit Breaker Project	Reliability - Improve Service Reliability	San Francisco	Add a second parallel breaker	1M - 5M	2009
9	7th Standard Substation Capacity Increase (D)	Reliability - Interconnect Customer	Kern	Interconnect Distribution Substation	1M - 5M	2009
10	Battery Storage Project	Reliability - Meet Customer Demand and Improve Service Reliability	San Mateo	Install a 5 to 7 MW sodium-sulfur (NaS) battery system Salmon Creek Substation	10M - 20M	2009

Table 3-4 Projects Proposals in PG&E system that received CAISO Management Approval (Cont)

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
11	Humboldt Reactive Support (Scope Change)	Reliability - Improve Service Reliability	Humboldt	Install SVC at Humboldt Substation	1M - 5M	2009
12	Newark – Ravenswood 230 kV Line (Scope Change)	Reliability - Meet Customer Demand and Improve Service Reliability	San Mateo and Alameda	Reconductor Newark – Ravenswood and Tesla – Ravenswood 230 kV Line	10M – 20M	2009
13	West Sacramento-Brighton 115 kV Reconductoring	Reliability - Meet Customer Demand and Improve Service Reliability	Yolo	Reconductor 115 kV Lines	5M – 10M	2009
14	Brighton 230/115 kV Transformer Replacement	Reliability - Meet Customer Demand	Sacramento	Transformer Replacement	5M – 10M	2009
15	Contra Costa – Las Positas 230 kV Line (Scope Change)	Meet Customer Demand and Improve Service Reliability	Contra Costa	Reconductor the Contra Costa – Las Positas and Contra Costa – Lone Tree 230 kV Lines	10M – 20M	2010
16	Cooley Landing 115/60 kV Transformer Capacity Upgrade	Reliability - Meet Customer Demand and Improve Service Reliability	San Mateo	Replace Cooley Landing 115/60 kV Transformer No. 1 by 2010 and No. 2 by 2011	10M - 20M	2010
17	Table Mountain – Rio Oso 230 kV Line Reconductor and Tower	Reliability - Meet Customer Demand and Improve Service Reliability	Yuba and Sutter	Line Reconductor	1M - 5M[11]	2010
18	Tesla 115 kV Capacity Increase	Reliability - Meet Customer Demand and Reduce LCR	San Joaquin	Increase Transmission Capacity	10M – 20M	2010
19	West Fresno Reactive Support	Reliability	Fresno	Install Caps At West Fresno	1M – 5M	2010
20	Wheeler Ridge 230/70 kV Transformer	Reliability	Kern	Add a Second 230/70 kV bank	5M – 10M	2010
21	East Nicolaus 115 kV Area Reinforcement	Reliability - Meet Customer Demand	Sutter	Increase 115 kV Transmission Capacity	5M – 10M	2011
22	Missouri Flat - Gold Hill 115 kV Line	Reliability - Meet Customer Demand and Improve Service Reliability	Calaveras	Line Reconductor	10M – 20M	2011

[11] Cost reflects only capacity increase costs.

Table 3-4 Projects Proposals in PG&E system that received CAISO Management Approval (Cont)

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
23	Placer - Horseshoe 115 kV Reinforcement Project12	Reliability - Meet Customer Demand	Placer	Reconductor Placer to Horseshoe of Placer-Gold Hill Nos. 1 & 115 kV Lines	40M -50M	2009
24	Vaca Dixon - Birds Landing 230 kV Reconductoring	Reliability - Meet Customer Demand and Access Resource	Solano	Reconductor 230 kV Lines	20M – 30M	2009
25	Central Coast Switching Station (Crazy Horse)	Reliability - Improve Service Reliability	San Benito	Construct New Switching Station	30M – 40M	2009

Table 3-5 Projects Proposals in SCE system that received CAISO Management Approval

#	Project Title	Purpose And Benefit	Cost Range ($)	Target In-Service Date
1	Mira Loma Substation Install new 500kV CBs for AA Banks	Reliability - to meet SCE substation reliability criteria and provide operational flexibility	<10M	6/1/2009
2	Vincent Substation Install new 500kV CBs for AA Banks	Reliability - to meet SCE substation reliability criteria and provide operational flexibility	< 20M	12/1/2008
3	Lugo Substation Install new 500kV CBs for AA Banks	Reliability - to meet SCE substation reliability criteria and provide operational flexibility	< 10M	12/1/2011
4	Helijet Shunt Capacitor Bank	Reliability - Mitigate voltage criteria for N-1	< 1M	6/1/2009
5	Frazier Park Dynamic Voltage Support	Reliability - Mitigate voltage criteria for N-1	< 5M	6/1/2009

[12] This project was formerly called the Placer 115 kV Reinforcement Project

Table 3-6 Projects Proposals in SDG&E system that received CAISO Management Approval

#	Project Title	Purpose And Benefit	Cost Range ($)	Target In-Service Date
P03183	Reconductor TL678, Los Coches-Alpine	Reliability , N-1 thermal violations, existing project, needed advancement	5-10M	June 2010
P061XY	Reconductor TL13812, Talega-San Mateo	Reliability , N-1 thermal violations, existing project, needed advancement	1-5M	June 2009,ISO recommended earlier
P02161	New 69 kV Line: TL6942, Miramar-Sycamore	Reliability , N-1 thermal violations, was replaced by other projects	N/A	Cancelled
P07XXX	Reconductor TL6915, TL6924: Pomerado-Sycamore	Reliability , N-1 thermal violations	1-5M	June-09
P06133	New 230/138 kV transformer: Miguel Substation	Reliability, South Bay generation retirement	20-50 M	Jan-10
P06131	Loop-in TL13825: Shadowridge 138 kV Switchyard	Load service, reliability - mitigate thermal violations, serve new distribution	20-50M	June-09

3.3 New Transmission Projects Proposals Require CAISO Board Approval

This section contains the list and overview of transmission project proposals costing more than 50 Million dollars that require CAISO Board of Governors approval. While the dates they will be submitted to the Board are still to be determined, Tables 3-7 to 3-9 compile these proposals by each PTO. In some cases, CAISO staff has assessed the needs for these proposals and conclude their recommendations as shown in Appendix C of this document.

Table 3-7 Projects Proposals in PG&E system that require CAISO Board of Governors approval

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
1	Atlantic-Lincoln Transmission Projects	Reliability - Meet Customer Demand and Improve Service Reliability	Placer	Convert 60 kV Facilities to 115 kV and Construct New 115 kV Line	50M – 100M	2009
2	Palermo-Rio Oso 115 kV Line Reconductoring	Reliability - Meet Customer Demand and Improve Service Reliability	Yuba and Sutter	Reconductor 115 kV Lines	50M – 60M	2009
3	San Francisco 115 kV Recabling Project	Reliability - Reduce LCR and Meet Customer Demand	San Francisco	Reconductor 115 kV Cables	50M – 100M	2010
4	Atlantic – Rio Oso – Gold Hill 230 kV Lines	Reliability - Reduce LCR Meet Customer Demand and Improve Service Reliability	Placer	Reconductor Rio Oso – Gold Hill and Rio Oso – Atlantic 230 kV lines	50M – 100M	2012
5	Embarcadero-Potrero 230 kV Cable	Reliability - Reduce LCR Meet Customer Demand and Improve Service Reliability	San Francisco	Build new 230 kV underground cable	100M – 150M	2012

Table 3-8 Projects Proposals in SCE system that require CAISO Board of Governors approval

#	Project Title	Purpose And Benefit	Cost Range ($)	Target In-Service Date
1	West of Devers 230kV Rebuild	Reliability - Mitigate line overloads west of Devers under contingencies	> 50M	6/1/2010
2	66kV Antelope-Bailey-WinHub System Reconfiguration	Reliability - Provide needed bank capacity to relieve base case overload	>50M	6/1/2010 - 2012
3	Alberhill 500/115 kV Substation	Reliability - Provide needed transformer bank capacity to serve load growth in western Riverside County	> 50 M	6/1/2012
4	Devers-Mirage #3 230 kV Line	Reliability - Mitigate potential line overloads and voltage criteria violations in the Mirage area	>50M	6/1/2011
	Magunden-Rector 230 kV T/Ls	Reliability - Mitigate reliability problems (transient and post transient) in the San Joaquin Valley area under contingency conditions	>50M	6/1/2013
5	Antelope Valley (Valyermo) New 230/66 kV Substation and related T/L	Reliability - Provide needed transformer bank capacity to serve load growth in Palmdale/Lancaster area	>50 M	6/1/2013
6	Method of Service for San Joaquin 230/66 kV Sub	Reliability - Provide needed transformer bank capacity to serve load growth in Rector area	TBD	6/1/2016
	Upgrade Barre - Ellis 230kV T/L	Reliability - to meet N-1, N-2 NERC Reliability Criteria	TBD	6/1/2012
7	Upgrade Barre - Lewis 230kV T/L	Reliability - to meet N-1, N-2 NERC Reliability Criteria	TBD	6/1/2012
8	Auld 500/115 kV Substation and Transmission Lines	Reliability - Provide needed transformer bank capacity to serve load growth in western Riverside County	>50 M	6/1/2017
	San Joaquin Valley Master Plan	Load service, reliability - mitigate reliability criteria violations for N-0, N-1,N-2	> 50M	6/1/2013-2016

Table 3-9 Projects Proposals in SDG&E system that require CAISO Board of Governors approval

#	Project Title	Purpose And Benefit	Cost Range ($)	Target In-Service Date
P06130	Construct 2nd 230 kV line: Encina-Penasquitos	Maintaining of the South-of-SONGs path rating, possible economics	50-100M	June-09
P06132	Relocate South Bay Substation	Aging infrastructure, South Bay generation retirement	>100M	Dec-10

3.4 New Transmission Projects Proposals Not currently Approved by CAISO Management

This section lists the transmission project proposals in 2007 planning cycle CAISO does not grant approval at this time. Typically, this includes project proposals CAISO is requesting more clarifications, additional information to support its justification or the proposals CAISO denies approval. Table 3-10 shows these project proposals as well as the explanations of such decisions are provided in Appendix B.

Table 3-10 Projects Proposals currently not approved by CAISO

#	Project Title	PTO	Targeted In-Service Date
1	Valley Springs 60 kV Line No. 1 Reconductor	PG&E	2011

For the following projects, the review is still in progress

#	Project Title	PTO	Targeted In-Service Date
P00154	Reconductor TL13802B, Shadowridge- Calavera Tap	SDG&E	Jun-09
P07XXY	New 230,138 kV Reactive Support: Mission, Sycamore, Telegraph Canyon	SDG&E	Jun-10

3.5 Upgrades Recommended under CAISO Short Term Transmission Plan

Results from short-term studies shown in section 2.4 (primarily Tables 2-2 and 2-3) lead to a number of CAISO recommendations for the upgrades in the Short Term Plan, the solutions proposed in this Plan are limited to projects with lead times less than three years. These types of projects include:

- Transmission Line Re-Rates
- Transformer Re-Rates
- New SPS/RAS
- Enhance Existing SPS/RAS
- SCADA/RTU installation
- System Re-Configuration
- Maintain or Expedite projects already scheduled.

Tables 3-11 to 3-13 list the recommendations of the Short Term Plan. Out of all 36 recommendations issued in this Report, 22 recommendations are in PG&E area, 6 recommendations are in SCE territory as well as another 8 recommendations target on concerns in SDG&E area driven by 17 reliability concerns and 19 congestion points. Among these recommendations, 7 of them have been implemented and operational in the field.

Table 3-11 Summary of Upgrades Recommended in the Short-Term plan in PG&E System

#	Project Title	Region	Needs	Recommendation	Status
1	Woodland Davis Voltage Support	PG&E – North East	Reliability concerns	**Long Term:** Consider new project to install a shunt capacitor at Woodland or Davis Substation. **Short Term:** Install UVLS relays at Woodland Substation	Maintained: May 2012 Implemented: July 2007
2	Atlantic 230/60kV Bank	PG&E – North East	Reliability concerns	**Long Term:** Convert the 60kV to 115kV. Maintain the In-Service date; slipped 1 year since last year's plan. **Short Term:** Complete necessary bus work to operate with both N.O. Bank 1 and Bank 2 in-service. They can be in parallel or split on the 60kV bus.	Implemented: Piggy-Back Banks 1 & 2 May 2007
3	Table Mt-Rio Oso 230kV Upgrade and Tower Raise	PG&E – North East	Congestion concerns	**Long Term:** Reconductor the line, current schedule is May 2009. **Short Term:** Complete any interim upgrades available.	Maintained: May 2009
4	McCall Bank #1 Upgrade	PG&E – South	Congestion concern	**Long Term:** Maintain or expedite the McCall 230/115kV Transformer Replacement May 2008	Maintained: May 2008
5	Palermo Bank Addition	PG&E – North East	Congestion concerns	**Long Term:** Maintain current schedule or expedite. Do not let the current schedule of May 2008 slip. **Short Term:** Apply Short Term Emergency rating on the Palermo Bank	Maintained: May 2008 Implemented into T-165 June 2007

Table 3-11 Summary of Upgrades Recommended in the Short-Term Plan in PG&E System (Cont)

#	Project Title	Region	Needs	Recommendation	Status
6	Panoche-Kearney 230kV line Upgrade	PG&E – South	Congestion concerns	**Long Term:** Consider new project to reconductor the Panoche-Kearney 230kV line or build another source into Gregg. **Short Term:** Apply Short Term Emergency Rating across peak and Temperature Adjust when pumping at Helms.	Implemented: July 2007
7	Gates-McCall, Panoche-Helm, and Helm-McCall 230kV lines	PG&E – South	Congestion concerns	**Long Term:** Consider new project to reconductor the Panoche-Helm, Helm-McCall, and Gates-McCall 230kV lines or build another source into Gregg or McCall. **Short Term:** Apply Short Term Emergency Rating to the Panoche-Helm, Helm-McCall, and Gates-McCall 230kV lines across peak and Temperature Adjust when pumping at Helms.	
8	New Pease-Marysville 60kV line Palermo-Rio Oso 115kV Reconductor	PG&E – North East	Congestion concerns	**Long Term:** Maintain current schedule or expedite. Do not let the current schedules slip. Pease-Marysville 60kV line slipped since last year's plan.	Slipped to: Dec 2009 (From 2007)
9	Rio Oso 230/115kV Banks 1 & 2 Upgrade	PG&E – North East	Congestion concerns	**Long Term:** Maintain current schedule of May 2009. **Short Term:** Apply Short Term Emergency rating on the Rio Oso Banks	Maintained: May 2009 Implemented: July 2007
10	Kasson-Lammers 115kV Reconductor	PG&E – North East	Congestion concerns	**Long Term:** Maintain current schedule. Do not let the current schedule of May 2008 slip.	Maintained May 2008

Table 3-11 Summary of Upgrades Recommended in the Short-Term Plan in PG&E System (Cont)

#	Project Title	Region	Needs	Recommendation	Status
11	Third Oakland 115kV Cable	PG&E – Bay Area	Congestion concerns	**Long Term:** Maintain May 2010 date for new Oakland C-X #2 cable.	Maintained May 2010
12	Larkin Breaker Upgrade	PG&E – Bay Area	Congestion concerns	**Short Term:** Determine upgrades required at Larkin to permanently close CB 192.	
13	South of San Mateo Capacity Increase	PG&E – Bay Area	Congestion concerns	**Long Term:** Maintain May 2009 schedule to reconductor the Ravenswood-San Mateo 115kV line	Slipped to: May 2011 (From 2009)
14	Placer-Gold Hill #1 & #2 115kV lines	PG&E – North East	Congestion concerns	**Long Term:** Maintain May 2008 schedule to reconductor the two lines.	Slipped to: May 2009 (From 2008)
15	Brighton 230/115kV Bank 9	PG&E – North East	Reliability concerns	**Long Term:** Maintain current schedule to replace Bank 9.	Slipped to Nov 2009 (was 5/2009)
16	West Sacramento-Brighton 115kV line	PG&E – North East	Reliability concerns	**Long Term:** Maintain May 2009 schedule to reconductor the line. **Short Term:** Undo the 4fps re-rate back to the standard emergency rating.	Maintained May 2009
17	Drum-Rio Oso #1 and #2 115kV line Reconductor or Drum Generation SPS.	PG&E – North East	Congestion concerns	**Long Term:** Consider new project to reconductor the Drum-Rio Oso #1 and #2 115kV lines **Short Term:** Install an SPS that drops Drum Area generation post-contingency.	
18	Bellota-Gregg 230kV Reconductor	PG&E – South	Congestion concerns	**Long Term:** Consider new project to reconductor the Warnerville-Wilson, Wilson-Gregg, Gregg-Borden, and Wilson-Borden 230kV lines. **Short Term:** Temperature adjust the lines only when pumping at Helms	Implemented into T-129

Table 3-11 Summary of Upgrades recommended in the short-term plan in PG&E system (Cont)

#	Project Title	Region	Needs	Recommendation	Status
19	Dairyland-Le Grand and Le Grand-Chowchilla 115kV Protection Upgrade	PG&E – South	Congestion concerns	**Long Term:** Replace the over-current relays with impedance relays. **Short Term:** De-rate the line in the winter season	Implemented into T-129 Feb 2007
20	Long Term Planning Observations	PG&E	Reliability Concerns	**Long Term:** • Propose projects that protect against drought or low hydro conditions. Consider hydro generation sensitivities under peak load conditions. Re-analyze all re-rates implemented on the system for 10am to 7pm violations.	
21	Fresno 70kV system plan	PG&E – South	Reliability Concerns	**Long Term:** Add more banks to account for Helm and Mendota on radial or make 70kV upgrades to allow for looped operation. **Short Term:** Radial the Helm and Mendota 70kV systems	Implemented into T-129 June 2007
22	West Fresno Shunt Capacitor	PG&E – South	Reliability Concerns	**Long Term:** Consider new project to install shunt capacitor at West Fresno.	Maintained: 2010

Table 3-12 Summary of Upgrades Recommended in the Short-Term Plan in SCE System

#	Project Title	Region	Needs	Recommendation	Status
1	Victorville-Lugo 500kV Terminal Equipment Upgrade	SCE	Congestion Concerns	**Short Term:** Upgrade the terminal equipment to at least 3,300 Amps on the LADWP side.	
2	Barre Lewis 220kV Upgrade	SCE	Congestion concerns	**Short Term:** Upgrade terminal equipment at Barre and Lewis to allow for a higher rating.	
3	Magunden-Vestal #1 and #2 220kV line upgrade	SCE	Congestion concerns	**Long Term:** Consider a new project to reconductor the 220kV lines to cover the N-1. **Short Term:** Resolve Clearance issue to allow for higher Short Term Emergency rating.	
4	New Antelope-Pardee 220 kV line to relieve overloads on Antelope-Vincent 220 kV	SCE	Congestion concerns	**Long Term:** Advance the new Antelope-Pardee 220 kV line to 6/2008 instead of 12/2008	
5	AA Bank Double Breaker Position Upgrades	SCE	Reliability Concerns	**Long Term:** Upgrade 9 500 kV AA Banks at Eldorado, Lugo, Mira Loma, Valley and Vincent to a double-breaker or breaker-and-a-half configuration.	
6	Julian Hinds-Mirage 220 kV Line Upgrades	SCE	Reliability Concerns	**Short Term:** Resolve ground clearance issues to get a higher rating for Julian Hinds-Mirage line	

Table 3-13 Summary of Upgrades Recommended in the Short-Term Plan in SDG&E System

#	Project Title	Region	Needs	Recommendation	Status
1	Imperial Valley Banks 80&81	SDG&E	Congestion concerns	**Long Term:** Add a third bank at IV	
2	Miguel Banks 80 & 81	SDG&E	Congestion concerns	**Short Term:** Reconfigure SPS for loss of one Miguel Bank	
3	New Division-Naval Station Metering 69kV #2 line	SDG&E	Reliability Concerns	**Short Term:** Expedite project to build a second Division-Naval Station 69kV #2 line to June 2008	
4	Reconductor TL 13812 Talega-San Mateo	SDG&E	Reliability Concerns	**Short Term:** Expedite the Reconductor project depending on load forecast	
5	Upgrade Miguel 69kV feeders to be double breaker double bus configuration	SDG&E	Reliability Concerns	**Short Term:** Consider upgrading the feeders at Miguel 69kV bus to be double breaker double bus arrangement.	
6	Escondido 230kV Bank Breaker	SDG&E	Reliability Concerns	**Short Term:** Replace Bank 70 & 71 230kV disconnects with Circuit Breakers.	
7	New Escondido-Ash 69kV line	SDG&E	Reliability Concerns	**Short Term:** Consider providing operation instructions in operating procedures to avoid load shedding for N-1-1 contingencies	
8	Add a third source to big load centers (>100 MW)	SDG&E	Reliability Concerns	**Long Term:** Consider building a third source to Margarita, Granite Hills, Laguna Miguel, and Mesa Rim.	

3.6 Ongoing Transmission Projects

This section offers the updates on major transmission project initiatives inside or connecting CAISO Controlled Grid with outside systems. In general, these projects are in the formation stages, being pursued by various project sponsors, and still require more development in their detailed scope before proposing for CAISO approval. However, this section also provides an update of transmission projects that CAISO has previously approved but incur major changes and should be mentioned as well. Examples of these projects are Sunrise, Tehachapi, and Palo Verde – Dever No 2. Typically, this consists of transmission projects to access renewable resources, improve system reliability and operational flexibility, promote economic operation of the grid, and major generation interconnection projects.

3.6.1 Pacific Northwest to Northern California Project[13]

The Canada / Pacific Northwest to Northern California Transmission Project ("Project") is envisioned to be an Extra High Voltage (EHV) transmission project between British Columbia and Northern California. The US Project Sponsors: Avista, PacifiCorp, and PG&E, along with British Columbia Transmission Corporation, Sierra Pacific Power ("SPP"), and Transmission Agency of Northern California ("TANC"), are the six transmission-owning utilities whose service footprints could be traversed by the Project. Together they form the Steering Team for the Project.

The Project was presented to stakeholders on December 12, 2006 at a "kickoff" meeting in San Francisco. A description of the project and an announcement of the first project meeting were sent to WECC members as well as public officials and other interested parties, and posted on the Project website. At the kickoff meeting three subcommittees were formed, a Loads and Resources ("L&R") Working Group, Technical Analysis Committee ("TAC"), and an Economic Analysis Committee ("EAC"), inviting all interested parties to participate in any or all of the committees. These subcommittees would focus on identification of loads and resources, technical feasibility and economic feasibility. Membership on the committees was diverse, including participation from renewable developers, energy marketers, investor-owned and municipal utilities, energy industry consultants, regional planning entities, and independent transmission companies. The subcommittees met regularly and were instrumental in developing subcommittee reports, which are posted on the Project website. In addition to the regular subcommittee meetings and the December 12, 2006 kickoff meeting, two other stakeholder meetings were held on August 2, 2007 and October 22, 2007.

[13] Source: http://www.pge.com/biz/transmission_services/canada/.

Project Descriptions

The detailed plan of service for the proposed Project will be finalized by the US Project Sponsors through the WECC Rating Process. The Project was evaluated as a regional project intended to meet three primary objectives:

1. Enhance access to significant incremental renewable resources in Canada and the Pacific Northwest.
2. Improve regional transmission reliability.
3. Provide market participants with beneficial opportunities to use the facilities. Initially, the project did not provide specific terminations for such a project, but offered three distinct alternatives for satisfying the above objectives. The three alternatives included:
    I. An overland alternative from Southeast British Columbia to Northern California
    II. An overland alternative from Idaho to Northern California.
    III. An undersea alternative from Western British Columbia to Northern California.

For more information please refer to http://www.pge.com/biz/transmission_services/canada/. At this time, this project has advanced to WECC phase I path rating.

3.6.2 Midway – E2 project

The Central California Clean Energy Transmission Project (C3ETP) was formerly known as the Midway – Gregg Project. With the project, PG&E proposed to build a new 500 kV double-circuit tower line (DCTL) from the Midway 500 kV station to the Fresno area. For the 500 kV line, the original route was identified as “Midway – Gregg”. Later on, a more preferred route “Midway – E2” was identified by PG&E. With the preferred route, the proposed 500 kV line will arrive a new 500/230 kV substation named “E2”, instead. The CAISO has conducted a preliminary economic planning study for the Midway – E2 500 kV line. Currently, the CAISO is expanding the study scope to evaluate more transmission alternatives to compare with the Midway – E2 500 kV alternative. The new transmission alternatives being studied include additional 500 kV alternatives, a number of 230 kV alternatives, and a plan to establish an interconnection between PG&E and SCE in the Fresno – Big Creek area. Once all alternatives are studied, the CAISO will deliver the study results to the stakeholders. The study results will compare all the alternatives and lead to the determination of the most beneficial transmission plan.

3.6.3 Sunrise Power Link

Sunrise Powerlink (Sunrise) is a transmission project proposed by SDG&E and consisting of a 90 mile 500 kV transmission line from the Imperial Valley substation in Imperial County to a new 500 kV substation east of Anza Borrego Desert State Park. A pair of new 45 mile 230 kV transmission circuits would also be built which would carry the power into Sycamore Canyon 230 kV substation in San Diego. Sunrise provides access to 2700 MW or more geothermal, solar, and wind renewable generation resources which require transmission in order to be developed in Imperial County and the California/Mexico border. It also reduces the local generation capacity requirements in the San Diego load pocket by 1000 MW. Extensive CAISO analysis demonstrates the economic need for this project. Most importantly, the Sunrise project is needed in 2010 in order to meet a local capacity deficiency in San Diego caused by the retirement of the 50 year old South Bay Power plant, and load growth. Sunrise has an estimated cost of $1,275 Million.

Sunrise was initially evaluated by the CAISO South Regional Transmission Plan for 2006 (CSRTP) study group and the findings of that group were contained in a Report issued on July 28, 2006. Based on the CSRTP Report, CAISO management recommended that Sunrise be approved, and the Board of Governors approved the project on August 2 (***), 2006. The CAISO continued its reliability and economic studies of Sunrise, and alternatives to the project, as a participant in the SDG&E application for a Certificate of Public Convenience and Necessity (CPCN), filed with the California Public Utilities Commission (CPUC) on August 4, 2006. That case is currently pending and a CPUC decision on the application is expected to be issued in the third quarter of 2008. Sunrise was scheduled to be on-line in 2010, but this date is now at risk given the schedule of the CPCN proceeding.

A more detailed project description follows. In addition, Figure 3-1 shows the preferred route of the project.

Project Description and Scope:

- A 500 kV transmission line from the Imperial Valley (IV) Substation to a new Imperial Irrigation District (IID)-owned San Felipe substation.
- A 500 kV transmission line from the San Felipe Substation to a new SDG&E-owned Central Substation in central San Diego County.
- A double circuit 230 kV transmission line from Central Substation to the existing Sycamore Canyon Substation.
- A 230 kV transmission line from Sycamore Canyon Substation to Penasquitos Substation.
- A 3rd San Luis Rey 230/69 kV transformer.
- Re-conductor of the Sycamore Canyon- Elliott 69 kV line.

- A total of 240 MVAR reactive support at Central, San Luis Rey and South Bay substations.

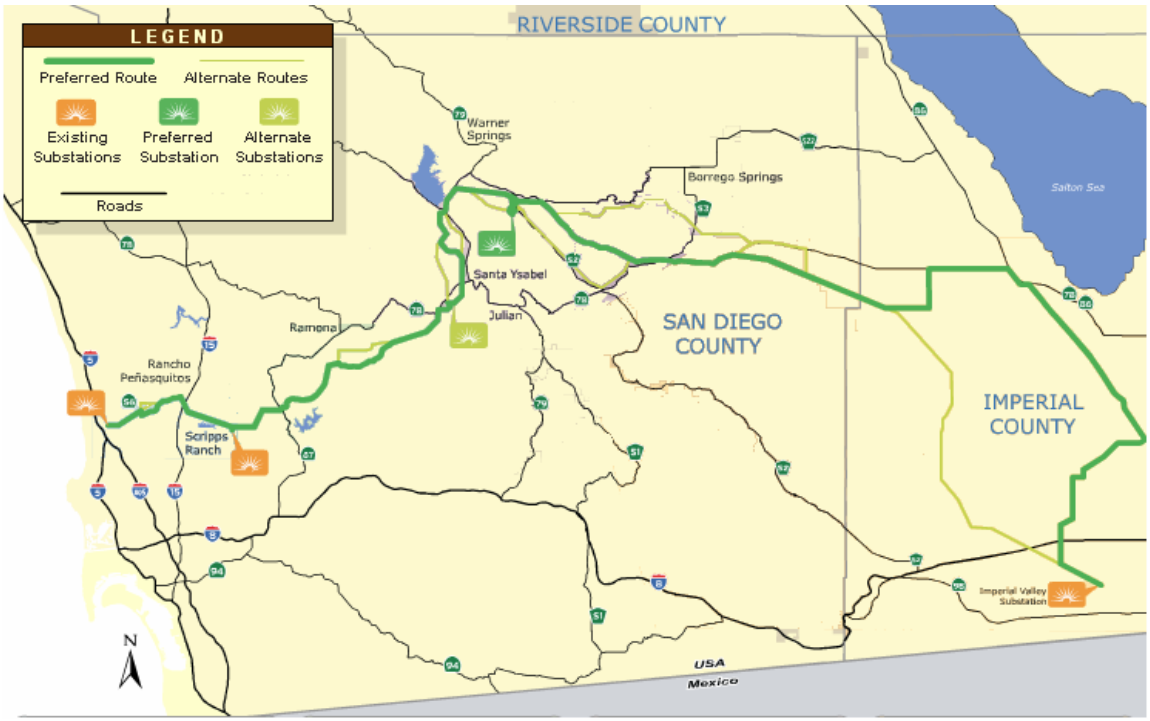


Figure 3-1 Sunrise Powerlink preferred route

Based on its analysis, the CAISO determined that Sunrise is needed to meet SDG&E's reliability need, will provide significant net economic benefits, and is a critical component to SDG&E meeting Renewable Portfolio Standard ("RPS") requirements. For these and the reasons listed below, the CAISO strongly supported the granting of the requested CPCN for Sunrise through testimony and active participation in the CPUC proceeding.

Summary of CAISO Analysis:

- A resource deficiency/reliability needs to exists in SDG&E's service area by the beginning of 2010.
- Sunrise will increase SDG&E's import capability into its service area from 2850 MW to at least 4000 MW, thus enabling SDG&E to meet its resource deficiency/reliability need in 2010 and beyond without introducing new reliability concerns.
- A conservative estimate of the net economic benefits of Sunrise is $52 million per year (levelized) and could exceed $200 million per year depending on the actual amount of renewable development scenario that is realized.

- The CAISO evaluated over 60 proposed alternatives to Sunrise and ran more than 80 models analyzing the reliability and economic impacts of these alternatives. Based on the CAISO's analysis, Sunrise provides superior long-term benefits to any of the alternatives.
- Sunrise facilitates SDG&E compliance with California's Renewable Portfolio Standard requirements by providing access to renewable resources expected to be developed in the Salton Sea and other areas in the Imperial Valley.
- Sunrise will provide options for future expansion of import capability and strategic interconnections between SDG&E and SCE.
- Sunrise will provide much needed long-term improvement to California's aging transmission infrastructure.
- Sunrise will facilitate the replacement of old and inefficient power plants currently needed to ensure reliability in SDG&E's service area.
- Sunrise will provide insurance against unexpected load growth and/or extreme weather conditions, such as the July 2006 heat storm experienced in Southern California.

3.6.4 Tehachapi

Current law and policies require California utilities and other electricity retailers to purchase 20% of their electricity from renewable sources deliverable to the CAISO controlled grid by 2010. Transmission constraints have been identified as one of the obstacles to achieving this objective, and the CAISO has identified supporting state renewable policies as a corporate objective.

The CAISO began the study process by forming a technical project team. It included CAISO's PTOs (PG&E, SCE and SDG&E), technical representatives from other project sponsors (Nevada Hydro Company, Citizens Energy, Imperial Irrigation District, Oak Creek Energy System/Tehachapi Holdings), and technical representatives from the CEC and the California Electricity Oversight Board (EOB). The team became known as the CAISO South Regional Transmission Planning (CSRTP-2006) Team. This team was not a stakeholder forum but rather a technical group for providing the CAISO with the necessary technical data as well as the "real-time" technical advice it needed to conduct its analysis.

The origin of the Tehachapi Transmission Project is the Tehachapi Collaborative Study Group, coordinated by the CPUC, which was formed in 2004 to develop a comprehensive transmission development plan for the phased expansion of transmission capabilities in the Tehachapi Wind Resource Area (TWRA). The TCSG issued two study reports to the CPUC in March 2005 and in April 2006. The outcome of the collaborative study group process was the identification of a number of alternatives for the transmission infrastructure and a recommendation to further study of these alternative schemes by the CAISO. The CAISO studied the Tehachapi Transmission Project as part of its CAISO South Regional Transmission Plan for 2006 (CSRTP-2006) in full collaboration with SCE and other CSRTP-2006

participants and developed a least-cost solution for the network component of the transmission infrastructure that will interconnect planned generation projects in TWRA to the CAISO Controlled Grid.

PROJECT DESCRIPTION

The Tehachapi Transmission Project consists of following major facilities:

Major Transmission Facilities Planned

Table 3-14 Major Transmission Facilities related to Tehachapi Project

Major Transmission Facilities Planned	In-Service Date
Antelope – Pardee 230 kV Line (500 kV Specifications) & Antelope Substation Expansion	Dec 2008
Antelope – Vincent 230 kV Line #1 (500 kV Specifications)	Mar 2009
WindHub Substation	Mar 2009
Antelope – WindHub (aka Substation 1) 230 kV Line	Mar 2009
Antelope – Vincent 230 kV Line #2	Mar 2011
Whirlwind 500/230 kV Substation (aka 5) with Loop in of Midway – Vincent #3 500 kV line	Aug 2011
Antelope – Whirlwind 500kV line	Aug 2011
WindHub Substation 500 kV Upgrade	Mar 2011
Antelope Substation 500 kV Upgrade	Mar 2011
Vincent Substation 500 kV & 220 kV Upgrade	Sep 2011
Whirlwind – WindHub 500 kV line	Oct 2011
Replacement of Vincent – Rio Hondo No. 2 230kV line	Nov 2011
Vincent – Mira Loma 500 kV line	Apr 2012
Vincent – Mesa 500/220 kV Line and Mesa Substation Work	Nov 2013

The proposed Tehachapi Project will increase California's ability to import additional energy mainly from renewable resources from Tehachapi Wind Resource Area (TWRA). Figure 3-2 shows the general configuration of the Tehachapi Transmission Project.

The total cost of the Tehachapi Transmission Project is estimated at $1.8 billion dollars in nominal terms. This cost includes the cost of the Antelope-Pardee line segment ($90 million), previously approved by the CAISO Board, but excludes the cost of Interconnection Facilities, i.e., radial wind collector transmission systems that interconnect the individual generation projects to the grid and are the responsibility of generation developers. The full cost and ownership of the Network Upgrades associated with this project will be assigned to SCE. SCE will recover such costs, including the commensurate rate-of-return, directly through the CAISO Transmission Access Charge (TAC) upon approval from FERC.

A. THE ANTELOPE TRANSMISSION PROJECT

The Antelope Transmission Project (ATP) consists of new transmission between Antelope and Pardee, between Antelope and Vincent, and between Antelope and Tehachapi. The project also includes the addition of two new substations in the TWRA. Applications for Certificates for Public Convenience and Necessity (CPCN) for the Antelope-Pardee 500 kV (Segment 1), Antelope-Vincent

500 kV (Segment 2), and Antelope-Tehachapi (Segment 3) 500 kV transmission lines were submitted to the CPUC on December 9, 2004. A supplemental filing for the Antelope-Vincent 500 kV and Antelope-Tehachapi 500 kV transmission lines was submitted on September 30, 2005. The CPUC has issued approvals for these CPCN applications. The CPCN decisions are: D.07-03-012 for the Antelope-Pardee CPCN issued March 1, 2007; and D.07-03-045 for the Antelope-Vincent 500 kV (Segment 2) and Antelope-Tehachapi 500 kV and 220 kV (Segment 3) CPCN issued March 15, 2007. SCE is currently working with the Angeles National Forest (ANF) to obtain final use permits in order to commence construction of the Antelope-Pardee transmission line. With the addition of the Antelope Transmission Project, the maximum amount of increased system capability has been identified to be 700 MW, as limited by transmission south of Antelope.

B. THE TEHACHAPI RENEWABLE TRANSMISSION PROJECT

The Tehachapi Renewable Transmission Project (TRTP) is the final plan of service developed to interconnect new planned generation resources, above the 700 MW provided by the ATP, in the TWRA. These facilities, needed to interconnect and transmit the electrical power from the new planned generation resources, have been identified through a collaborative planning process held as part of the CAISO South Regional Transmission Plan. SCE filed for a CPCN for these facilities with the CPUC on June 29, 2007.

Segment 4

- Two new 230 kilovolt (kV) transmission lines traveling approximately 4 miles over new right-of-way (R-O-W) from the Cottonwind Substation to the proposed new Whirlwind Substation.
- A new 500 kV transmission line, initially energized to 230 kV, traveling approximately 16 miles over expanded R-O-W from the proposed new Whirlwind Substation to the existing Antelope Substation.
- New 500 kV transmission lines to loop existing Midway-Vincent No.3 500 kV line in and out of proposed Whirlwind (part of Segment 9) substation.
- Whirlwind 500/230 kV switchyard equipment required to support loop-in and lines to Cottonwind.

Segment 5

- A rebuild of approximately 18 miles of the existing Antelope – Vincent 230 kV T/L and the existing Antelope – Mesa 230 kV T/L to a second single Antelope-Vincent 500 kV T/L over existing R-O-W between the existing Antelope Substation and the existing Vincent Substation.

- Increase operating voltage of initial Antelope-Vincent 500 kV T/L

Segment 6

- A rebuild of approximately 32 miles of existing 230 kV transmission line to 500 kV standards from existing Vincent Substation to the southern boundary of the Angeles National Forest (ANF). This segment includes the rebuild of approximately 27 miles of the existing Antelope – Mesa 230 kV T/L and approximately 5 miles of the existing Rio Hondo – Vincent 230 No. 2 T/L.

Segment 7

- A rebuild of approximately 16 miles of existing 230 kV transmission line to 500 kV standards from the southern boundary of the ANF to the existing Mesa Substation. This segment would replace the existing Antelope – Mesa 230 kV T/L.

Segment 8

- A rebuild of approximately 33 miles of existing 230 kV transmission line to 500 kV standards from a point approximately 2 miles east of the existing Mesa Substation (the "San Gabriel Junction") to the existing Mira Loma Substation. This segment would also include the rebuild of approximately 7 miles of the existing Chino – Mira Loma No. 1 line from single-circuit to double-circuit 230 kV structures.

Segment 9

- Whirlwind Substation, a new 500/230 kV substation located approximately 4 to 5 miles south of the Cottonwind Substation near the intersection of 170th Street and Holiday Avenue in Kern County in the TWRA.
- Upgrade of the existing Antelope, Vincent, Mesa, Gould, and Mira Loma Substations to accommodate new transmission line construction and system compensation elements.

Segment 10

- A new 500 kV transmission line traveling approximately 17 miles over new R-O-W between the Windhub Substation and the proposed new Whirlwind Substation.

Segment 11

- A rebuild of approximately 19 miles of existing 230 kV transmission line to 500 kV standards between the existing Vincent and Gould Substations. This segment would also include the addition of a new 230 kV circuit on the vacant side of the existing double-circuit structures of the Eagle Rock – Mesa 230 kV T/L between the existing Gould Substation and the existing Mesa Substation.

More information of this project is available at http://www.sce.com/Feature/Archive/Tehachapi.htm

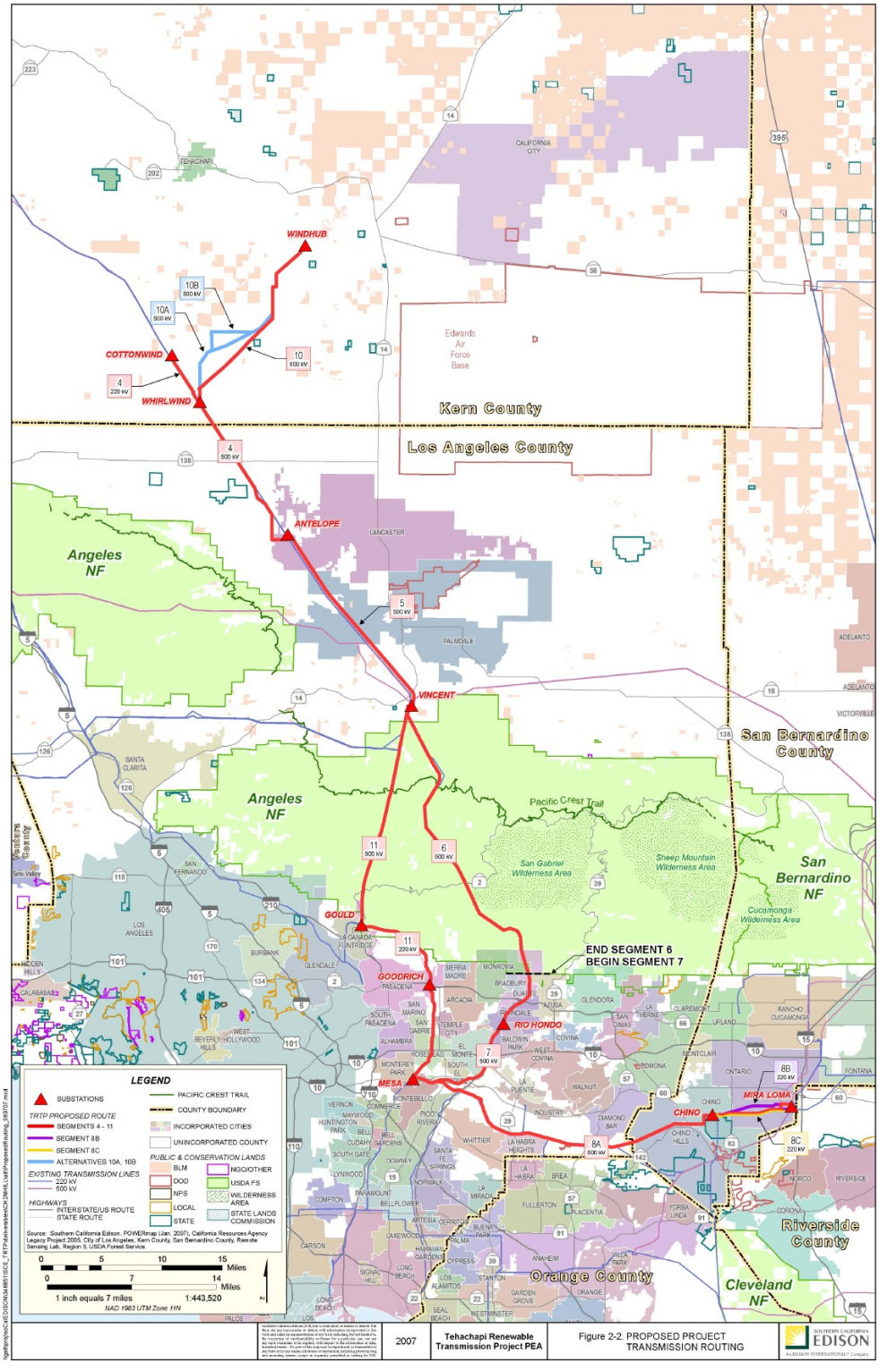


Figure 3-2 Tehachapi Transmission Project

3.6.5 TE/VS Project

Combined LEAPS Pumped Hydro Plus TE/VS Transmission Project

The TE/VS Transmission Project (TE/VS) is the 500 kV interconnect portion of the combined TE/VS and LEAPS pumped hydro storage project sponsored by the Nevada Hydro Company (TNHC). 14 As described in the 2007 CAISO Transmission Plan, TNHC originally requested that the CAISO study LEAPS as a transmission asset and have it rate-based through the Transmission Access Charge (TAC), consistent with an application for such incentive rate treatment filed with FERC. This request was based on a provision of the Energy Policy Act of 2005 (EPACT2005) that refers to pumped storage plants as advanced transmission technologies. In response to the TNHC incentive rate proposal for LEAPS, FERC directed the CAISO to hold a stakeholder process and report its findings on several issues related to the CAISO's operational control of the pumped hydro facility.

In its May 2007 comments submitted to FERC at the close of the stakeholder process, the CAISO made three primary points regarding the appropriate rate treatment for LEAPS: (1) EPAct 2005 did not require that pumped storage be rolled into transmission rates; (2) there were strong policy reasons for precluding TAC recovery for LEAPS, and the CAISO should not have operational control of LEAPS; and (3) there is nothing so unique about LEAPS that requires its costs to be included in TAC: the products and services that LEAPS provides (e.g., energy, ancillary services, and capacity) can also be provided by other resources in the CAISO's competitive marketplace. FERC has not yet ruled on the TNHC rate incentive treatment application for the combined projects.

TE/VS Project Description

In October of 2007, TNHC filed an application with the CPUC for a CPCN for TE/VS as a stand-alone transmission project. As proposed in that application, TE/VS is approximately 30-mile 500 kV alternating current regional interconnection transmission line with a nominal design capacity of 1000 MW. TE/VS would extend from the LEAPS powerhouse substation 3 southward to SDG&E's existing 230-kV Talega-Escondido transmission line in northern San Diego County and northward to SCE's existing 500 kV Valley-Serrano transmission line in western Riverside County. The interconnection with SDG&E would be between SDG&E's existing Talega and Escondido substations at a new substation in the vicinity of United States Marine Corps Camp Joseph H. Pendleton ("Camp Pendleton"), and the interconnection with SCE would be at a point between SCE's existing Valley and Serrano substations at a new substation

[14] LEAPS is a proposed 500-MW advanced pumped storage facility. It would have a pumping capacity of 600 MW provided by two single-stage reversible Francis-type pump turbine units operating under an average net head of approximately 1,600 feet. LEAPS would firm and store renewable energy (much of which is otherwise inherently interruptible), primarily wind energy, and, according to THNC, will be one of the most efficient storage facilities in the nation, rated at 82%. This efficiency rating means that for every 100 MWh of electricity withdrawn from the grid to operate the pumps to refill the LEAPS water reservoir, 82 MWh of electricity will be returned to the grid when LEAPS is operated to convert the storage to electricity. TNHC and the EVMWD submitted an application to the FERC for a hydropower license for LEAPS in February 2004, in FERC Docket No. P-11858. In that application, it was proposed that LEAPS be connected to the grid over a route that is identical to that proposed by TNHC in the CPCN Application for the TE/VS Interconnect. [Source: TE/VS CPCN filing]

in the vicinity of Lee Lake. For most of its route alignment, TE/VS would be located on the federal lands located within the Cleveland National Forest, Trabuco Ranger District, and within Camp Pendleton. While this project is still ongoing and its details might subject to change, one option for the project is shown in Figure 3-3 below.

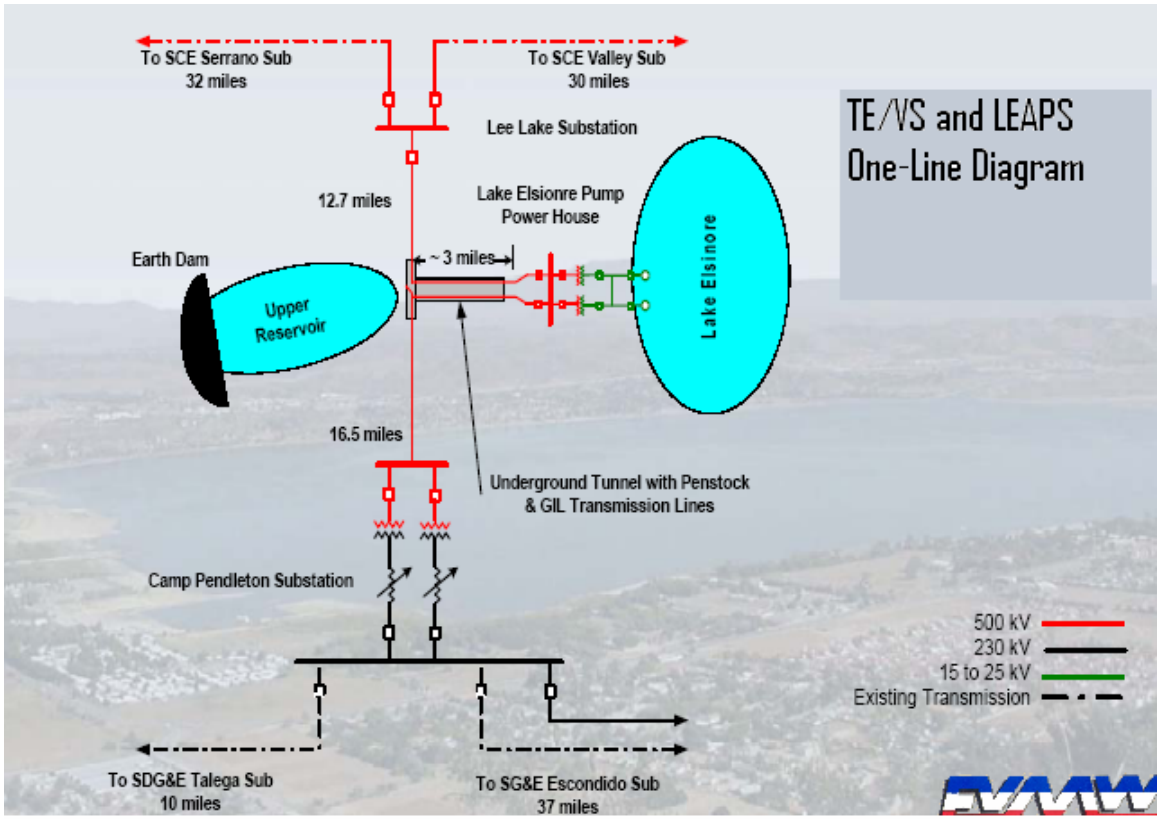


Figure 3-3 One-line diagram of TE/VS and LEAPS project

In addition to the above-described transmission facilities, according to TNHC's CPCN filing, LEAPS and TE/VS would require the following network upgrades to be constructed by SDG&E and SCE:

1. Upgrades to SDG&E's existing 230-kV single circuit Talega-Escondido transmission line in northern San Diego County.

2. Upgrades to SDG&E's existing Talega and Escondido Substations.

3. As proposed, an approximately 47-mile long second (double circuit) 230-kV transmission line, Talega-Escondido No. 2, to be installed along existing support structures (already containing one 230-kV circuit) connecting SDG&E's Talega and Escondido Substations. In addition, approximately 8 miles of existing 69-kV transmission line would be removed from the existing towers and installed on new wooded or steel poles within the existing SDG&E right-of-way.

4. Upgrades to SCE's existing 500 kV and 230 kV system.

5. Upgrades to SCE's existing Serrano and Valley Substations.

TNHC is in the process of negotiating the Large Generator Interconnection Agreements ("LGIAs") with SCE, SDG&E and the CAISO regarding the above described network upgrades.

The CAISO anticipates that TNHC will submit TE/VS on a stand-alone basis to the CAISO for evaluation as an economic transmission project, based on statements in its CPUC application

3.6.6 Palo Verde – Dever #2

The Palo Verde – Devers #2 500 kV line project (PVD2) was approved by the CAISO Board of Governors on February 24, 2005 as an economic transmission project providing benefits to the CAISO ratepayers. The Project included construction of a 230 mile 500 kV transmission line connecting the Palo Verde Hub to Southern California. This Project would provide a maximum of 1200 MW of transfer capability to facilitate delivering economic generation in the Palo Verde Hub to Southern California, particularly when the resources are more available during off-peak season. The Project received the CPUC's Certificate of Public Convenience and Necessity (CPCN) permit for construction. However, the Arizona Corporation Commission (ACC) did not grant SCE the approval on environmental permit to construct the portion of the 500kV facility in Arizona.

Following the Arizona Corporation Commission's negative decision on SCE's proposed PVD2 project in early summer 2007, SCE has begun working with Arizona entities, through the Southwest Area Transmission ("SWAT") regional planning group and Colorado River Transmission ("CRT") subcommittee, seeking input on how to enhance the benefits to Arizona of PVD2.

Furthermore, SCE representative recently attended the CRT Workgroup meeting. The purpose of this meeting was for the Central Area Project ("CAP") to initiate its open season for a proposed transmission project, and to discuss enhancements to the Arizona benefits of PVD2. Part of CAP's proposed project is to interconnect to PVD2 to enhance reliability and increase CAP's access to the market. Moreover, a consortium of small utilities in Arizona also expressed their interest in developing generation in western Arizona for serving Arizona load and for commercial benefits via PVD2. SCE plans to continue to work with Arizona entities with a firm interest in PVD2 through the CRT forum.

Concerning timing on the Project, the CAISO and Stakeholders have asked SCE whether PVD2 will have a new scope of work, and if there is, what will be the new project scope for PVD2. SCE responded that it is currently working on the scope of the project, and hopes to have a more clearly defined project scope after the Arizona outreach process described above is further along. SCE plans to bring a clearly defined scope into the next CAISO transmission planning cycle. The CAISO is committed to work with SCE and Stakeholders on the new project scope for PVD2 and re-evaluation of the Project, if necessary. The CAISO plans to bring the Project to the CAISO Board for approval on the new scope of the Project when it is clearly defined and is deemed to be still providing economic benefits to the CAISO ratepayers. In addition to economic benefits, the CAISO will work with SCE to determine if the new project scope would

provide other benefits such as reliability and delivery of new generation. Figure 3-4 outlines the estimated route of this project.

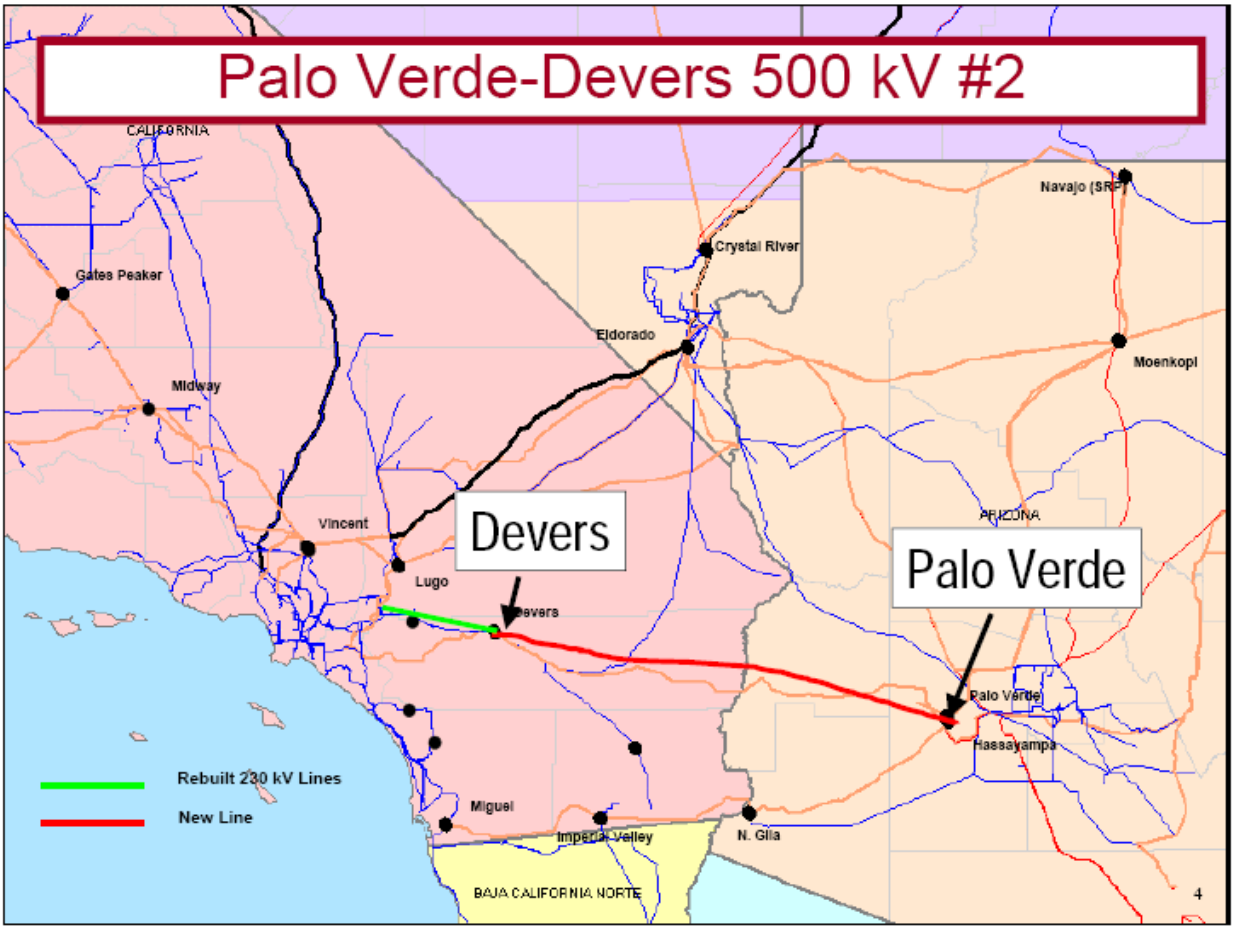


Figure 3-4 Palo Verde – Devers #2 500kV Line Project

3.6.7 Other Projects

In addition to the major ongoing projects shown in sections 3.3.1 – 3.3.5, summary of other ongoing projects or projects that require further analysis are provided in Table 3-15.

Table 3-15 Other Ongoing Transmission Projects in PG&E Area

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
1	Bogue Reconfiguration	Access Resource	Sutter	Reconfigure 115 kV lines at Bogue Junction	1M – 5M	May 2010
2	Lockeford – Lodi 60 kV Reconductoring	Meet Customer Demand	San Joaquin	Reconductor 60 kV Line	5M – 10M	May 2011
3	Metcalf – Morgan Hill 115 kV Reinforcement	Meet Customer Demand and Improve Service Reliability	Santa Clara	Loop Morgan Hill 115 kV Substation. Reconductor Metcalf – Morgan Hill 115 kV Line No. 1 and Metcalf – Morgan Hill 115 kV Line No. 2	10M – 20M	May 2011
4	Mosher Substation Reinforcement	Improve Service Reliability	San Joaquin	Replace switches with circuit breakers at Mosher Substation and Reconductor Lockeford #1 60 kV Line	5M – 10M	May 2011
5	Valley Springs 230/60 kV Transformer addition	Meet Customer Demand and Improve Service Reliability	San Joaquin	Add a second Valley Springs 230/60 kV Transformer rated at 200 MVA	5M – 10M	May 2011
6	Atlantic - Placer Voltage Conversion15	Meet Customer Demand and Improve Service Reliability	Placer	Increase Area Capacity	10M – 20M	May 2012
7	Atwater-Merced 115 kV Line Reliability	Improve Service Reliability	Merced	Build a new Gallo-Cressey 115 kV Line. Install 115 kV line breakers at Livingston, Gallo, and Cressey Substations	10M – 20M	2012
8	Missouri Flat Expansion	Reduce LCR	El Dorado	Reconfigure Missouri Flat by adding two circuit breakers	5M – 10M	May 2012
9	Oakland Capacity Upgrade	Meet Customer Demand and Improve Service Reliability	Alameda	Add new cable other reinforcements to Oakland	100M – 200M	May 2012

[15] This project has also been called the Atlantic – Placer Capacity Increase Project.

Table 3-15 Other Ongoing Transmission Projects in PG&E Area (Cont)

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
10	Sanger – Reedley Area Reinforcement Project	Meet Customer Demand and Improve Service Reliability	Fresno	Convert Sanger – Reedley 70 kV Line 115 kV. Reinforce existing 70 kV and 115 kV lines	20M – 50M	May 2012
11	Vaca Dixon – Davis 115 kV Conversion	Meet Customer Demand and Improve Service Reliability	Sacramento and Yolo	60 to 115 kV Conversion	20M – 50M	May 2012
12	Vaca Dixon - Sobrante - Moraga 230 kV Reinforcement16	Access Resource	Solano and Contra Costa	Increase Transmission Capacity to Access Resources	50M – 100M	2012 or later
13	Table Mountain – Vaca Dixon 230 kV Reinforcement[17]	Access Resource	Shasta, Tehama, Glenn, Colusa, Yolo, and Solano	Increase Transmission Capacity to Access Resources	50M – 200M	2013 or later
14	Bay Area 500 kV Station	Reduce LCR, Meet Customer Demand, and Improve Service Reliability	Bay Area Counties	Construct 500 kV Facilities	250M – 500M	May 2013
15	Borden – Coppermine 70 kV Plan	Meet Customer Demand and Improve Service Reliability	Fresno	Convert Borden Coppermine 70 kV Line	20M – 50M	May 2013
16	Brighton - Davis 115 kV Reconductoring	Meet Customer Demand	Sacramento and Yolo	Reconductor 115 kV Lines	5M – 10M	May 2013
17	Clear Lake – Eagle Rock 60 kV Line Reconductoring	Meet Customer Demand	Colusa and Lake	Reconductor 60 kV Line	5M – 10M	May 2013
18	E1 Substation	Meet Customer Demand and Improve Service Reliability	Fresno	Construct a new 230/115/70 kV Substation in East Fresno	40M - 50M	May 2013
19	Essex Jct – Arcata – Fairhaven 60 kV Line Reconductoring	Meet Customer Demand and Improve Service Reliability	Humboldt	Reconductor 60 kV Line	1M – 5M	May 2013
20	Fulton – Fitch Mtn 60 kV Line Reconductoring	Meet Customer Demand and Improve Service Reliability	Sonoma	Reconductor 60 kV Line	1M – 5M	May 2013
21	Vaca Dixon - Lakeville 230 kV Reconductoring	Reduce LCR	Solano, Sonoma and Napa	Reconductor 230 kV Lines	50M – 100M	May 2013

[16] The implementation of this project is dependent upon the development of reneable resources in Norhern Califorinia
[17] The implementation of this project is dependent upon the development of reneable resources in Norhern Califorinia

Table 3-15 Other Ongoing Transmission Projects in PG&E Area (Cont)

#	Project Title	Purpose And Benefit	County	Project Scope	Cost Range ($)	Targeted In-Service Date
22	California Clean Energy Project[18]	Access Resource	Fresno, Kings, and Kern	Increase Transmission Capacity to Access Resources	750M – 1000M	2013
23	Cortina - Eagle Rock 115 kV Reconductor	Reduce LCR	Colusa and Lake	Reconductor 115 kV Lines	20M - 50M	May 2014
24	Ravenswood – Cooley Landing 115 kV Reconductoring Project	Meet Customer Demand and Improve Service Reliability	San Mateo	Reconductor Ravenswood – Cooley Landing 115 kV Line Nos. 1 and 2	5M – 10M	May 2014
25	East Bay – San Francisco Transmission Line Project	Meet Customer Demand and Improve Service Reliability	Alameda, Contra Costa and San Francisco	Construct a new 230 kV Transmission cable from the East Bay to San Francisco	100M - 200M	May 2017
26	Gates-Gregg 230 kV Double Circuit Tower Line	Reduce LCR, Meet Customer Demand, and Improve Service Reliability	Fresno, Kings and Madera	Construct 230 kV Lines	100M - 200M	May 2017

Table 3-16 Other Ongoing Transmission Projects in SDG&E Area

#	Project Title	PTO	Targeted In-Service Date
1	Reconductor TL13802B, Shadowridge- Calavera Tap (P00154)	SDG&E	June 2009
2	New 230,138 kV Reactive Support: Mission, Sycamore, Telegraph Canyon (P07XXY)	SDG&E	June 2010

[18] This project was previously called the Midway – Gregg 500 kV Transmission Line Project.

This page is intentionally left blank

Chapter 4: New Initiatives

While the creation of a single and comprehensive Transmission Plan with inputs from participated entities is a major step toward efficient and proactive infrastructure development, enhancement to this process still continued in 2007. Particularly the focus of the Plan is shifting to be more actively identifying potential cost effective upgrades rather than simply approving project proposals. In order to provide an overview picture of the direction and goals of these efforts, this chapter is dedicated to the discussion of these issues as shown below.

Generally, the objectives of Transmission Plan are consistent with the CAISO Corporate Objectives. The Five-Year Business Plan (http://www.caiso.com/1bbf/1bbfb29771f52.pdf) articulates the significant impacts that the transmission planning process has on these achievements. Reliability, effective markets, infrastructure development, and customer care are the four cornerstones influencing the development of these new initiatives along with the regulatory requirements.

4.1 Transmission Planning BPM and FERC Order 890 Compliance

In 2007, CAISO created a BPM for the Transmission Planning Process and revised MRTU tariff language (http://www.caiso.com/1bda/1bdab40d5960.html) as part of its compliance to FERC Order 890 (http://www.ferc.gov/whats-new/comm-meet/2007/021507/E-1.pdf). This order, issued on February 16, 2007, requires demonstration of the compliance with the following principles in transmission provider's planning process

- Coordination
- Openness
- Transparency
- Information Exchange
- Comparability
- Dispute Resolution
- Regional Participation
- Economic Planning Studies
- Cost Allocation

The content in the BPM explains the CAISO transmission planning process including the scope and schedule of each stage of the coordinated, open, and transparent process that complies with the Order. This effort creates a transparent and open planning process for the benefits of customers as the details of

each principle are available more in the Order and various documents. CAISO, with the input from stakeholders, has gone through a series of revisions of its transmission planning process and stakeholder outreach activities to ensure compliance with this Order. A section on CAISO website regarding FERC 890 has documented all key activities and documents related to this initiative (http://www.caiso.com/1bda/1bdab40d5960.html). In general, CAISO articulates its proposal for FERC 890 compliance through the BPM for Transmission Planning Process as a key document to explain the CAISO Transmission Planning Process. To be more specific, the BPM describes CAISO's Annual Transmission Plan produced by the transmission planning process, and how other associated processes performed by the CAISO's Planning and Infrastructure Development Department serve to guide the enhancement and expansion of transmission facilities to ensure that the CAISO Controlled Grid can satisfy the needs of a competitive bulk power market in a reliable, economically efficient, and environmentally acceptable manner. Related tariff amendments are also included in the scope of this effort as the latest proposed MRTU Tariff language.

The provisions of this BPM are intended to be consistent with the CAISO Tariff. If the provisions of this BPM nevertheless conflict with the CAISO Tariff, the CAISO is bound to operate in accordance with the CAISO Tariff. Any provision of the CAISO Tariff that may have been summarized or repeated in this BPM is only to aid understanding. Even though every effort will be made by the CAISO to update the information contained in this BPM and to notify market participants of changes, it is the responsibility of each market participant to ensure that he or she is using the most recent version of this BPM and to comply with all applicable provision of the CAISO Tariff.

While a number of changes have been made to the CAISO planning process over the course of developing this compliance, sections 4.1.2 – 4.1.6 conclude key components in the BPM ranging from enhancement or creation of new technical studies to be conducted as part of the annual plan, new procedures to assure comparability and transparency of the process, or other changes of which stakeholders should be informed.

Since the intent of this section is to provide a brief update on this initiative, for the complete details of the process, please refer to the FERC filed BPM available on CAISO website at http://www.caiso.com/1bda/1bdab40d5960.html.

4.1.1 Process Improvement

Figure 1-2 in the 2007 CAISO Transmission Plan Report (http://caiso.com/1b6b/1b6bb4d51db0.pdf) outlines the big pictures of CAISO planning process and its interaction with other components that was introduced in last year Transmission Plan. in the FERC filed transmission planning process is outlined in Figure 4-1, which has some changes from the previously posted version.. For example, Request Window, new technical studies, possibility of additional meetings, as well as refinement of timeline for

potential coordination with regional and/or sub-regional planning groups were proposed to tighten coordination between entities, and promote the transparency, and efficiency of the process.

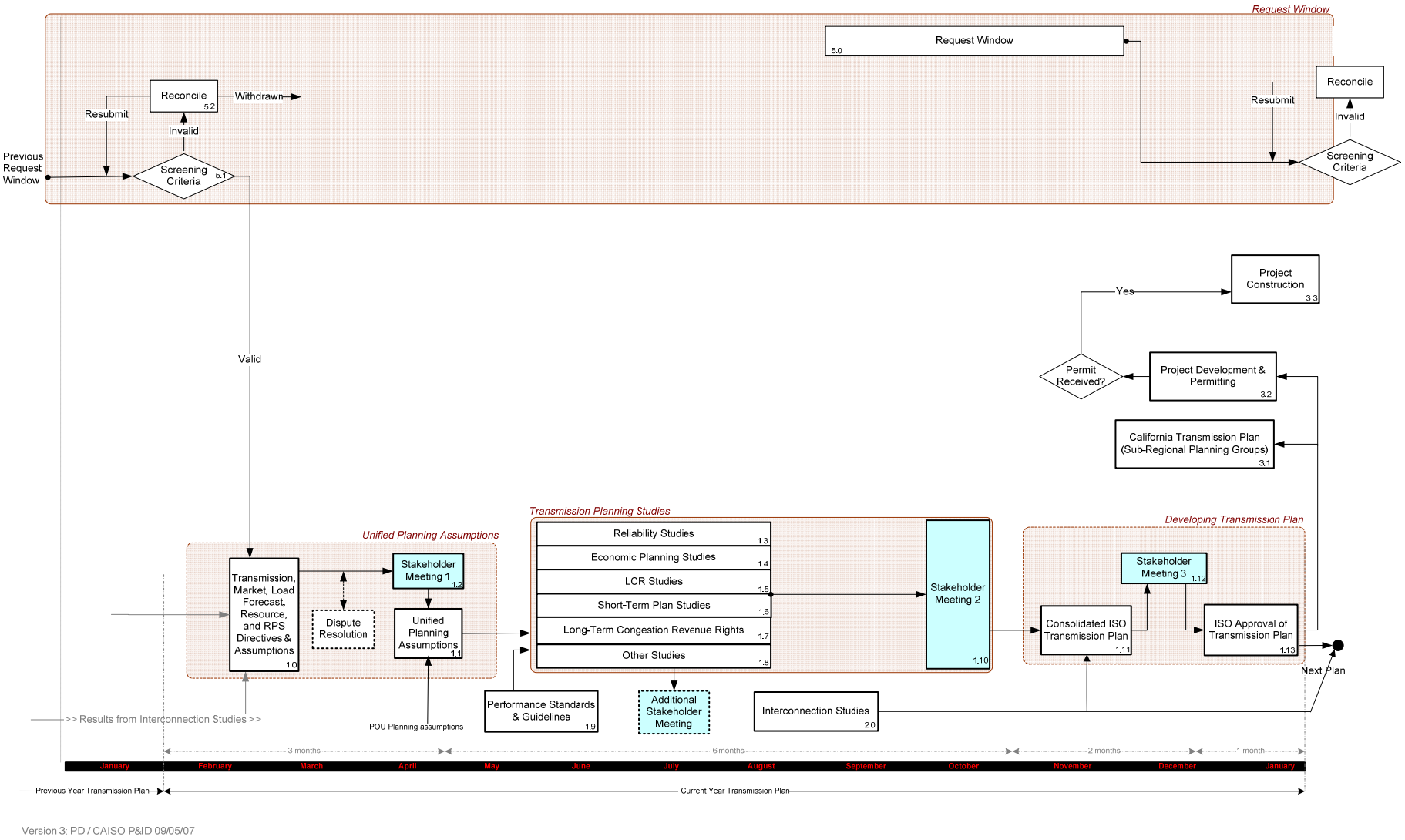


Figure 4-1 The current CAISO Planning Process

4.1.2 Request Window (formerly called Open Season)

An integral part of the CAISO's planning process is a "Request Window." Its purpose is to provide stakeholders with the opportunity to propose Transmission Projects, study requests, or otherwise submit additional relevant data to the CAISO for inclusion in the following year's annual transmission planning Process. *Request Windows begin August 15th and close November 15th of each planning cycle.* The types of transmission projects and study requests, as well as the data that may be submitted through the Request Window, include:

- Economic transmission project proposals and alternative analyses, including upgrades or additions proposed to reduce Local Capacity Requirements, reduce or eliminate congestion, or Merchant Transmission Facilities to obtain Long-term Congestion Revenue Rights
- Location Constrained Resource Interconnection Facilities (LCRIFs) not otherwise identified through CAISO Interconnection Studies
- Economic Planning Study requests
- Demand response, generation, and other resources for potential inclusion in the transmission planning process analyses

However, the Request Window will *not* apply to:

- Reliability Transmission Projects proposed by PTOs
- Network Upgrades identified through CAISO Interconnection Studies
- Location Constrained Resource Interconnection Facilities identified through CAISO Interconnection Studies
- Transmission upgrades or additions determined to be the appropriate mechanism to maintain the feasibility of allocated Long-term CRRs
- Operating solutions to reduce Local Capacity Requirements

The CAISO will apply "screening criteria" to select the projects and Economic Planning Study requests that will be included in the preparation of the Unified Planning Assumptions and Study Plan that will underlie the analyses included in the CAISO's transmission planning process.

The screening process generally assesses proposed transmission projects against two categories of criteria: (1) whether the submissions are "complete" in that they provide all necessary data or information requested by the CAISO with respect to the particular category of submission; (2) whether the proposal is or is not functionally duplicative of transmission upgrades or additions that have been previously approved by the CAISO; and (3) whether the proposal, if a sub-regional project that affects other interconnected. Request Window process will apply to projects submitted to CAISO for approval starting from January 1, 2008 and beyond. The projects that were proposed on or prior to December 31, 2007 are considered as existing projects and do not have to go through the Request Window process.

4.1.3 Economic Planning Study

Reducing uneconomic congestion on the CAISO grid is one of the CAISO's Corporate Performance Metrics in its Five-Year Business Plan. CAISO management envisions proactive planning as taking a lead in identifying and proposing mitigations for uneconomic congestion[19]. In a related issue, the FERC Order 890, has directed transmission providers to include Economic Planning Study in the scope of their planning activities. Stakeholders should have the right to submit study requests to Transmission Providers and have a number of study requests performed as part of the planning process. According to these drivers, CAISO staff has been involved in the development of the Economic Planning Study through the stakeholder process to create a new study to be included in its Annual Transmission Plan as more details are described in this Section.

In summary, in each planning cycle, the CAISO will conduct five High Priority Economic Planning Studies as requested by stakeholders during the Request Window period. The term "High Priority Study" is a term defined in the Order representing a number of economic studies Transmission Providers will conduct on behalf of stakeholders. In this context, each study may represent a single system limitation or a cluster of closely electrical-connected limitations. However, the CAISO may elect to perform additional High Priority studies should congestion conditions warrant. Stakeholders will have the opportunity to comment on selected High Priority Economic Planning Studies during the Unified Planning Assumptions and Study Plan Stakeholder Meeting.

In general, the Economic Planning Study process involves three major steps. The overview of Economic Planning Study process is shown in Figure 4-2.

Step 1: Identification of Significant and Recurring Congestion: This step occurs by October of each year and is intended to provide information to stakeholders to assist Economic Planning Study requests during the Request Window. Significant and Recurring congestion is identified for the following scenarios:

- Congestion during the past 12 months ending September 14.
- Congestion during a 10-year planning horizon simulation. CAISO-approved reliability transmission projects and future system conditions will be modeled in these studies to ensure the impact from reliability projects will be reflected in the Economic Planning Study.

Significant and Recurring Congestion is determined by the cost and duration of the congestion as follows:

- Congestion that costs more than 5 million dollars,
- Congestion that occurs more than 8 percent of the time[20]

[19] This refer to the congestion that the cost of mitigation measure does not the benefits gained from implementation the fixes

[20] Cost of congestion will be used as a primary source to justify impact of congestion. Frequency is intended to be used as only a tiebreaker.

Step 2: Determine congestion to be studied as High Priority Economic Planning Studies.

The criteria used to make this determination are set forth in Section 3.5 of the BPM. The CAISO's selection of the five High Priority Economic Planning Study will be discussed during the first CAISO stakeholder meeting to address the Unified Planning Assumptions and Study Plan. The CAISO's selection of High Priority Economic Planning Studies will not be subject to Section 13 of the CAISO Tariff.

Step 3: Evaluate Congestion Mitigation Alternatives: In this step, the CAISO identifies potential mitigation plans to mitigate the studied Congestion. The studies analyze at least 2 mitigation plans for each limitation. Study results will be presented to stakeholders during the second and third CAISO Transmission Plan Stakeholder Meetings.

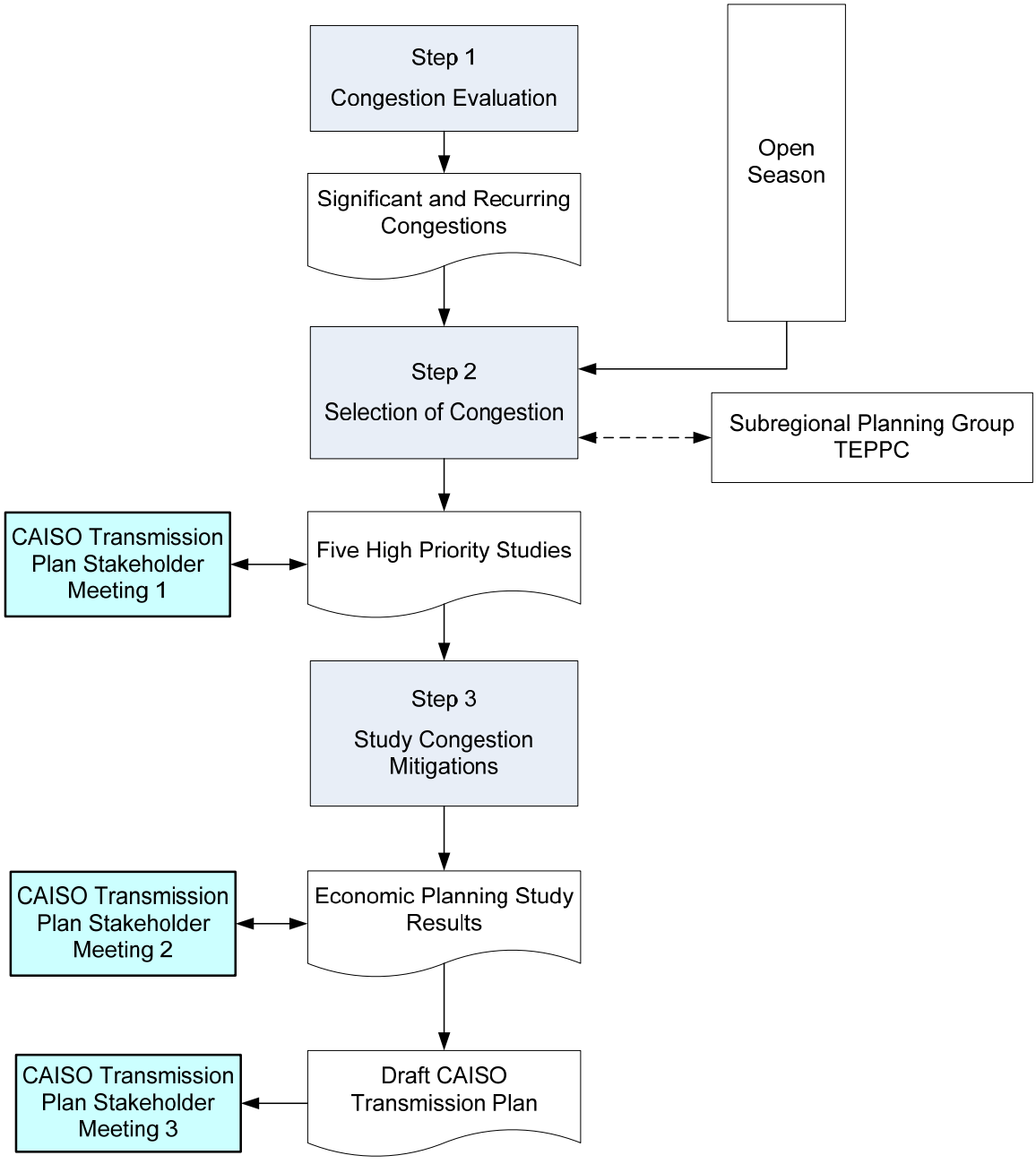


Figure 4-2 The proposed Process for Economic Planning Study

In addition, at these stakeholder meetings, the CAISO will also evaluate Economic Planning Studies that may have been performed by third parties. Stakeholders can also perform Economic Planning Studies in addition to those designated as High Priority. The parties will be responsible for conducting the studies and the costs of the studies. As noted, the results of the studies may be submitted at the time the preliminary results of any analyses performed under the Study Plan are presented. The CAISO will

cooperate with such parties to ensure that the assumptions and methodologies employed are consistent with the CAISO's Economic Planning Studies to permit appropriate comparison and consideration.

4.1.4 Availability of Information on CAISO Website

Providing greater details of information to stakeholders is one of the requirements from Order 890. Although the current CAISO planning process already provides significant details of information to the interested stakeholders through various channels such as CAISO website or during the stakeholder meetings, accessibility to some type of data (especially the data that subject to Critical Energy Infrastructure Information (CEII) is somewhat limited due to the nature of this information. Requirement under Order 890 may allow access to this type of information by stakeholders but in a controlled and secured manner. For example, stakeholders who have executed the Non-Disclosure Agreement or similar contract may be granted access to this type of information from a secured non-public section.

Therefore, CAISO is in a process of creating a secured section on its website to store this type of information as well as drafting the Non-Disclosure Agreement. A user from CAISO OASIS may be redirected to this page as well through the hyperlink. At this time, it is possible that digitalcertificate will be used for accessing this section. Completion of this section is anticipated in the first quarter of 2008, CAISO will inform stakeholders when this portion of the website is ready.

4.1.5 Regional Coordination

To enhance the ongoing coordination efforts with neighboring entities and regional organizations as well as a component of the CAISO's transmission planning process, the CAISO acts as an initiator, organizer, and participant in relevant forums for sub-regional and regional transmission planning. Through its participations in different forums, this section explains the CAISO's coordination with interconnected systems at both the sub-regional and regional levels.

Sub-Regional Coordination

Ensuring regional coordination through a robust sub-regional planning process is an important objective of the CAISO's transmission planning process. The CAISO will enhance its existing provisions regarding coordination within the WECC by including specific requirements to exchange information with sub-regional planning groups and, in their absence, directly with interconnected neighbors. The CAISO is currently pursuing a bifurcated approach. First, the CAISO's transmission planning process itself offers an open, transparent, and structured opportunity for interconnected neighbors to exchange planning information and objectives. Second, the CAISO is participating in the development of a Pacific South Planning Association (PSPA) formerly called California Sub-Regional Planning Group (CASPG), which hopes to encompass most of the transmission systems in California.

Through either of these means, the CAISO will satisfy its requirement that transmission providers coordinate with neighboring systems to ensure simultaneous feasibility of their respective plans and

assess the possibility of efficiencies through mutual cooperation. However, until the PSPA is created, the CAISO will continue to collaborate with representatives from adjacent transmission providers and existing sub-regional planning organizations through existing processes. Through this interim collaboration, the CAISO intends to:

- Ensure transmission expansion plans from neighboring transmission providers and the CAISO are simultaneously feasible and maximize the efficiency of infrastructure investment
- Communicate major activities that may impact respective control areas
- Coordinate requests for planning or economic studies that appear to impact more than one control area.

In this regard, the CAISO shall expressly request the participation of the proposed PSPA entities in providing information during the Request Window timeframe, participating in the creation of the Unified Planning Assumptions and Study Plan, and review study results and draft Transmission Expansion Plans. Requests for participation will be sent directly through electronic means to identified transmission planning representatives of the proposed PSPA entities. The CAISO will also actively participate in the planning activities of the proposed PSPA entities and provide any information requested to facilitate those activities (subject to confidentiality limitations).

Regional Coordination

CAISO also actively participates at the WECC through various WECC committees such as the Board of Directors, Planning Coordination Committee, Operations Committee, and the Transmission Expansions Planning Policy Committee, among other subcommittees or workgroups. Through this participation, the CAISO seeks to:

- Exchange information, e.g. notification of potential projects that may impact multiple entities
- Participate in regional technical studies, such as the WECC path rating process

4.2 Preserving Long-Term Congestion Revenue Right

Despite the fact that the CAISO expects released Long Term CRRs (LT-CRRs) will remain feasible during their full term due to the fact that the transfer capacity of existing grid facilities will be reduced to 60 percent of the normal ratings, as well as the expectation that most proposed transmission upgrades will reduce congestion. However, for those extreme and occasional changes to the transmission system that could result in substantial adverse impacts on binding constraints and cause infeasibility in certain Long-Term CRRs, the CAISO plans to perform an annual Simultaneous Feasibility Test (SFT) analysis to identify this outcome. In such instances, the transmission planning process would identify potential ways to mitigate the adverse impacts, to be considered in conjunction with the overall Transmission Plan.

This new technical study, consisting of Simultaneous Feasibility Tests, will be integrated in the CAISO planning process and will be performed in the context of (a) Planned or proposed transmission projects; (b) Generating unit or transmission retirements; (c) Generating unit interconnections; and (d) The interconnection of new Load. At this time, CAISO will continue to work on this issue with the input from stakeholders.

4.3 Location Constrained Resource Interconnection (LCRI)

The CAISO has filed with FERC the amendment to its Tariff to include the Location Constrained Resource Interconnection (LCRI) policy on October 31, 2007. The LCRI is a creative financing mechanism that allows for proposal and construction of the transmission "trunk" line facility to connect Location Constrained Resource Interconnection Generators (LCRIGs), located in Energy Resource Areas (ERAs) to be designated by the state agencies, to the CAISO transmission grid. The LCRI policy was proposed to address stakeholders' concerns that the cost of transmission interconnection facilities constitutes a significant barrier to the development of "location constrained resources". Under LCRI, the CAISO proposed that the costs of a Location Constrained Resource Interconnection Facility (LCRIF) would initially be rolled into the Transmission Revenue Requirement (TRR) of the PTO that constructed the facility, and the cost of the facility would be reflected in the CAISO's Transmission Access Charge (TAC). As proposed by the CAISO, each generator that connects to the facility would be responsible for paying its *pro rata* share of the going-forward costs of the line. Until the line is fully subscribed, all users of the grid would pay the costs of the unsubscribed portion of the line which would be included in the TAC. In the Declaratory Order, FERC approved the CAISO's proposal that the costs of a LCRIF's unsubscribed capacity receive rolled-in rate treatment and that the going-forward costs of a LCRIF be allocated to the interconnecting generators as they come on-line. The CAISO proposed to FERC that the amendment be made effective January 1, 2008.

As the details of LCRI both the stakeholder process and the descriptions are well documented on CAISO website (http://www.caiso.com/1816/1816d22953ec0.html), Figure 4-3 below illustrates the process diagram for LCRIF evaluation.

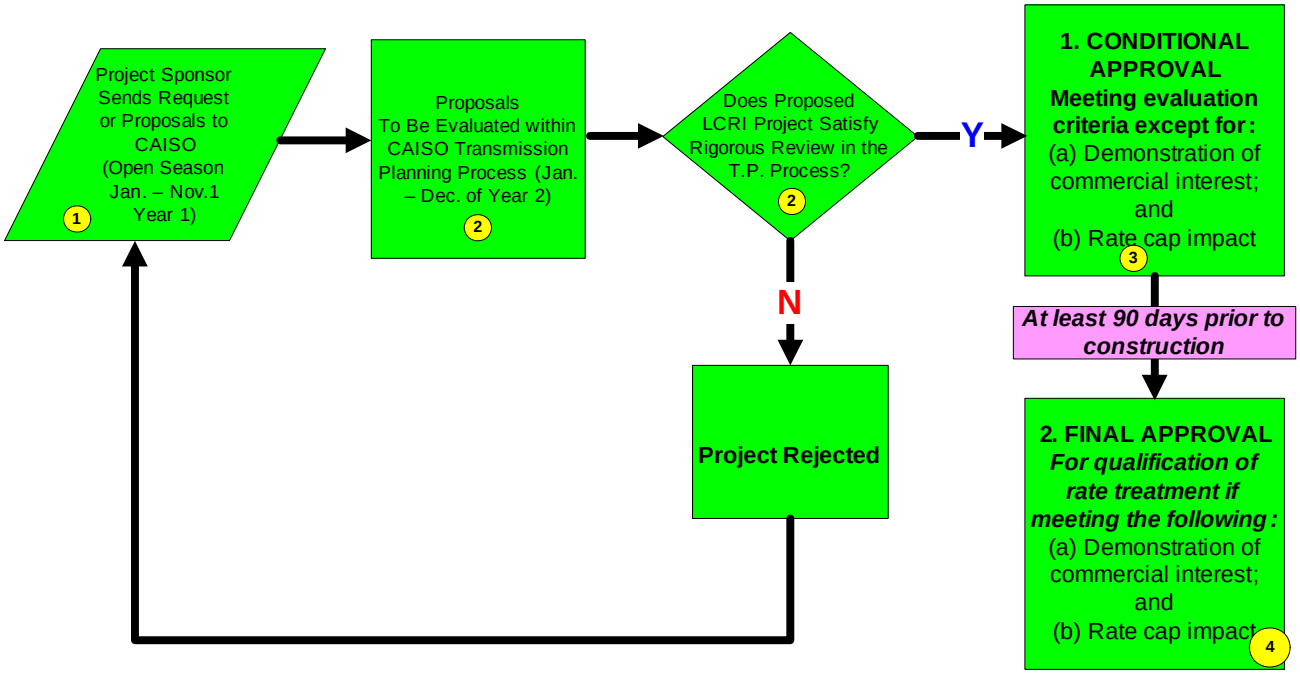


Figure 4-3 Process Diagram of LCRIF Evaluation

4.4 Renewable Integration

California is a leader in promoting environmentally friendly generating resources and the CAISO is establishing a leadership role in integrating renewable into the grid. Two of CAISO's Long Term Strategic Plan Key Initiatives address renewable resource integration. CAISO has provided regional and national leadership in renewable integration through the Participating Intermittent Resources Program (PIRP), and led ground-breaking regulatory work with FERC on transmission to connect location constrained resources to move renewable energy from remote locations to load centers. In support of California's 20% Renewable Portfolio Standard, the CAISO undertook a major engineering study in 2007 to identify challenges and solutions to successfully integrate the growing renewable portfolio into the grid.

The study focused on the transmission planning and operational issues associated with the intermittency of some renewable resources, especially wind generation. The initial findings of the analysis are positive; despite the intermittent nature of renewable, the CAISO anticipates being able to integrate the renewable resources supporting the 20% RPS requirement, subject to the recommendations cited in the report.

Published on November 29, 2007, the Integration of Renewable Resources Report focuses on the ramping, load following capacity, forecasting, regulation capacity and over generation issues that need to be managed in order to accommodate new renewable resources. On September 26, 2007, the CAISO hosted a public meeting to review with stakeholders the assumptions, methodology and initial findings of

the engineering study. Over 50 stakeholders attended and were asked to provide written comments on the study by October 3, 2007. Clarifications were included in the Final Study Report.

The study focuses on wind generation because of its intermittent characteristics and because wind is expected to add the largest volume of new renewable generation in the next few years. The CAISO anticipates that the largest increase in renewable energy resources will come from new wind generation in the Tehachapi Wind Resource area.

The engineering study examined the unique characteristics of renewable resources utilizing the Tehachapi transmission system to model and forecast transmission plans and operational requirements for renewable resources. The study first analyzes the transmission system and planning assumptions, and then analyzes the operational/forecasting issues of wind integration. Initial findings and conclusions are presented in each area.

As part of the concluding recommendations, statewide and regional cooperation are identified as key to successful renewable integration. Implementing the 20% RPS requires a coordinated effort, both within existing CAISO programs, and between the CAISO and other regional entities. Some of the recommendations include determining:

(1) The impact of wind generation on system operation, both by steady-state and transient stability analysis.

(2) The need to significantly improve wind forecasting methodologies to incorporate into scheduling processes and integrate with unit commitment and dispatch applications.

(3) The need to change existing operational processes to improve utilization of existing hydro-electric generation, and possibly increase reliance on existing fast-ramping fossil generation.

(4) The need to deal with larger ramps, larger reserve requirements, and fast starts generation.

(5) The need to increase the supplemental energy stack to meet intra-hour load following needs.

Additional work will be required to turn the recommendations from the study into operational reality. That work will be started soon. For the complete details of this study, please refer to the study report at http://www.caiso.com/1ca5/1ca5a7a026270.pdf.

4.5 Probabilistic Approach Planning

The State of California has vested the California Independent System Operator (CAISO) with the responsibility to maintain a reliable electricity system for those regions under its operational control[21]. Specifically, the CAISO has the responsibility to "ensure the efficient use and reliable operation of the transmission grid consistent with the achievement of planning and operating reserve criteria no less stringent than those established by the Western Electricity Coordinating Council (WECC) and the North American Electric Reliability Council[22]". Although there was a previous study that investigated reserve margin requirements[23], the study was based on economics and addressed short-term issues at the time. With this Planning Reserve Requirements Study (PRRS), the CAISO, in partnering with the CPUC and the CEC, plan to investigate long-term planning reserve requirements for ten-year period, using the industry-accepted one day in ten years *loss of load expectation (LOLE)* criterion. The study results will provide the CAISO, State energy regulatory agencies, the Load Serving Entities (LSEs) within its Controlled Grid, Regional Reliability Organization and interested parties with the understanding of its long-term planning reserve requirements based on industry-accepted reliability metrics. The CAISO plans to share its study findings and will post work-in-progress and finalized reports on its following website: http://www.caiso.com/1c8e/1c8ee01d439a0.html

The CAISO has posted the Planning Reserve Requirement Study (PRRS) Study Scope and Work Plan on the above website on November 8, 2007. In addition to the Study Scope and Work Plan, the CAISO also sent Market Notice for Stakeholders meetings on November 28 and 29, 2007, for kick-off meeting. At the Stakeholder meetings on November 28 – 29, 2007, the CAISO provided introduction to long-term planning reserve margin study based on one-day-in-ten-years LOLE, overview of the Study Scope and Work Plan, and presentations on the CAISO Request for Proposal on the PRRS from four nationally recognized Vendors in the field of planning reserve margin studies. These Vendors included General Electric Energy, Siemens PTI, Associated Power Analysts and Global Energy Decisions. The Vendors' presentations on the subject were also posted on the CAISO website.

The PRRS will be a collaborative effort between the three agencies (CAISO, CPUC and the CEC). In addition, the three agencies will seek suggestions and inputs to the Study Scope and Work Plan from the Stakeholders such as Load Serving Entities (LSEs), Independent Power Producers, Energy Service Providers (ESPs) and interested parties. After the Stakeholders meetings, the CAISO, in consultation with the CPUC and the CEC, have sent out the Stakeholder Comments Template on December 6, 2007, asking Stakeholders to provide comments by December 20, 2007. Next steps will be evaluation of the Vendors and selection of the best Vendor for the PRRS. Suggestions and inputs from the CPUC, CEC

[21] California Public Utility Code No. 345
[22] Now known as North American Electric Reliability Corporation (NERC)
[23] "Preliminary Study of Reserve Margin Requirements Necessary to Promote Workable Competition", CAISO Department of Market Analysis, Anjali Sheffrin, Ph.D., November 19, 2001

and the Stakeholders will be part of key elements for evaluating successful candidate to perform the Study. In addition, the CAISO also has asked the Stakeholders to provide suggestions to the Study Scope and Work Plan. The CAISO hopes to have decisions on the successful Vendor in February 2008.

4.6 Review and Revision of CAISO Planning Standards

CAISO Grid Planning Standards presently in effect were established in February 2002. Because much has changed since that time, review and revision of the standards is necessary. Stakeholder meetings were held in September and October of 2007. As a result, three work groups were formed to evaluate and recommend revision to parts of the CAISO Grid Planning Standards document. The responsibilities of the groups were outlined as:

Group 1.

- Reference to NERC/WECC Planning Standards
- Reference to Specific Nuclear Unit Standards
- Comb Line and Generator Outage Standard
- Reference to Locational Capacity Requirements Criteria

Group 2.

- SF Greater Bay Area Generation Outage Standard (researching CAISO related activity, but revision based on recent history and projected state of gen in the SF Bay Area will be done)
- Generation Assumptions for Grid Planning Studies (most likely, will draft a revision for clarity and to reflect present state of new gen development)
- Combine-Cycle Generator Unit Outage Standards (most likely, will start researching historical basis for establishing a new standard)
- Reference to Aging Thermal Generation Plants (most likely,will include reference to various state and CAISO activities)

Group 3.

- New Transmission versus Involuntary Load Interruption Standard
- Guides for New Generator Special Protection Systems
- Off-Peak Planning Assumptions
- Demand –Side Load Management Guidelines

This stakeholder activity is scheduled to complete it's activities by the 2nd quarter of 2008 and take their recommendations to the CAISO Board for approval.

4.7 San Francisco Greater Bay Area Long-Term Study

This long-term planning activity is intended to provide the genesis for maintaining reliable electric load-serving capability for at least 10 years with an outlook at 15 years. It is very important that sufficient time be allowed within the time-frame for transmission planning for the development of new and additional programs associated with distributed and renewable resources and load management and therefore include their impact on the amount of electric load that needs to be served. This study is the next step in evaluating the reliability to serve load within the Greater Bay Area (GBA) beyond those transmission projects presently planned and approved by the CAISO for operation. This study only represents transmission reinforcement alternatives to increase power imported into the GBA. Other very important alternatives involve generation (both re-powering of existing generation and new generation within the GBA). It is assumed that development of generation alternatives will follow this activity in determining a long-term reliable load-serving plan for the GBA. This GBA study includes the investigation of several scenarios where the justification for transmission system reinforcement will be to maintain reliability of power delivered through the transmission system and to more economically establish a mix of transmission system reinforcement, existing and new generation resources. An important aspect of this study is that part of the basis for proposing transmission reinforcement to increase power imported into the GBA is mitigation of reliance on several old thermal generation units within and adjacent to the GBA. These aging units also utilize once-through cooling systems, which are inconsistent with Federal and State policy. This study includes a determination of the technical merits of reinforcement options for each import path or establishing a new import path. A written report that documents the technical study results and includes a recommended long-term preferred alternative solution for reliably serving load within the GBA will be prepared by the CAISO, PG&E and stakeholders. This activity is scheduled to be completed by the end of 2007.

The transmission alternatives considered included:

1. Status Quo
2. Tesla-Newark (TESN)
3. Metcalf (MEC)
4. Contra Costa-Pittsburg (CCP)
5. Vaca-Dixon-Contra Costa (VCC)
6. Vaca-Dixon-Contra Costa-Pittsburg (VCCP)
7. Sunol (near Newark) 500 (SUN)
8. Tesla/Tracy-Livermore-Newark/Northern Receiving Station (TRN)
9. Collinsville 500 (COL)

10. Sunol 500 with Vaca Dixon-Contra Costa-Pittsburg (SUNV)
11. Vaca Dixon-Contra Costa-Pittsburg & Tesla/Tracy-Livermore-Newark/Northern Receiving Station (VCCT)

Of these, alternatives 7, 9, 10 and 11 appear to be solutions for increasing imports in place of re-powered generation or new generation within the GBA. More investigation is required before recommending a preferred alternative. These alternatives are further defined as:

Alternative 7: SUN plus reactive support

a. Build new 500 kV substation w/2 transformers
b. Loop Los Banos-Tesla 500 kV line into new substation
c. Reconfigure existing 230 kV lines near new substation
d. Reconductor Sunol-Castro Valley, Sunol-Ravenswood & Sunol-Tassajara 230 lines

Alternative 9: COL plus reactive support

a. Build new 500 kV substation w/2 transformers
b. Loop Vaca Dixon-Tesla 500 kV line into new substation
c. Build new Collinsville-Pittsburg double-circuit 230 kV line
d. Build new Tesla/Tracy 500/230 transformer
e. Build new Tesla/Tracy 500/230 transformer

Alternative 10: SUNV plus reactive support

a. Same as SUN, but no Sunol-Tassajara 230 line reconductoring
b. Build new Vaca Dixon-C.Costa-Pittsburg double-circuit 230 kV line

Alternative 11: VCCT (TBD)

a. Build new Vaca Dixon-C.Costa-Pittsburg double-circuit 230 kV line
b. Build new Tracy/Tesla-Newark/NRS double-circuit 230 kV line

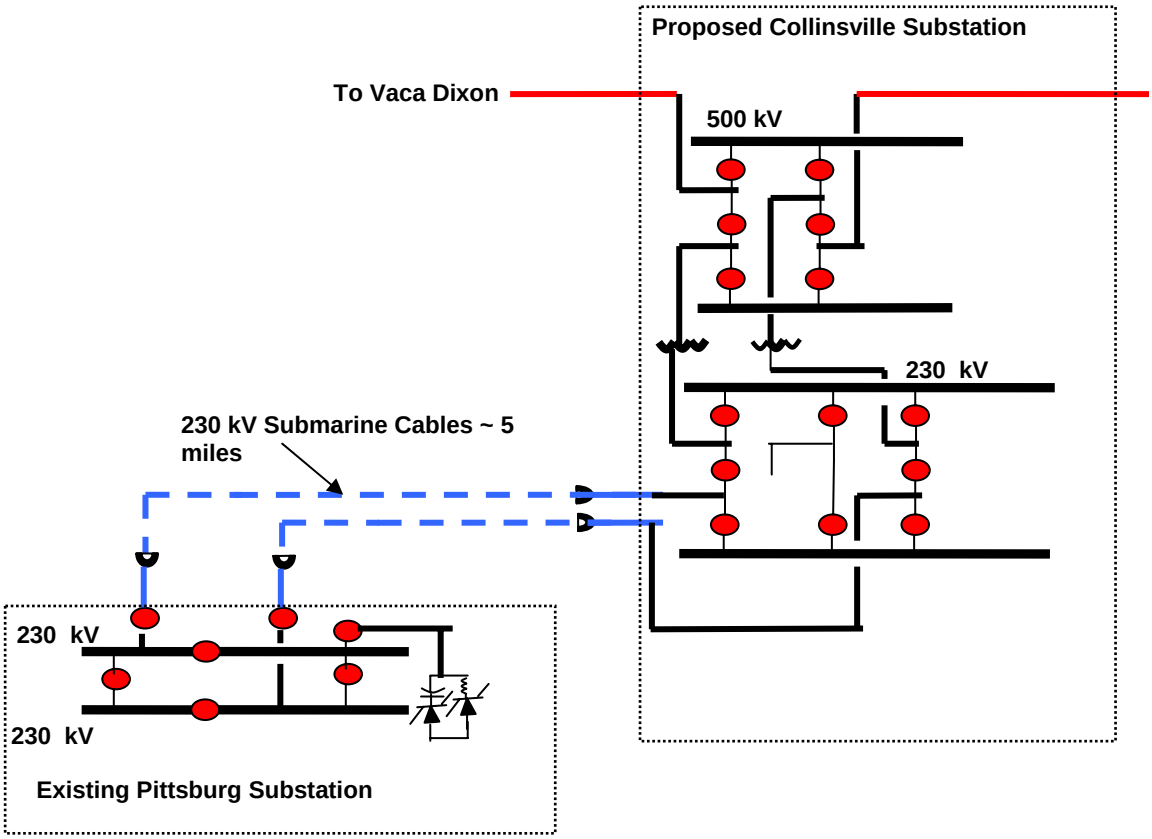


Figure 4-4 Collinsville Interconnection schematics

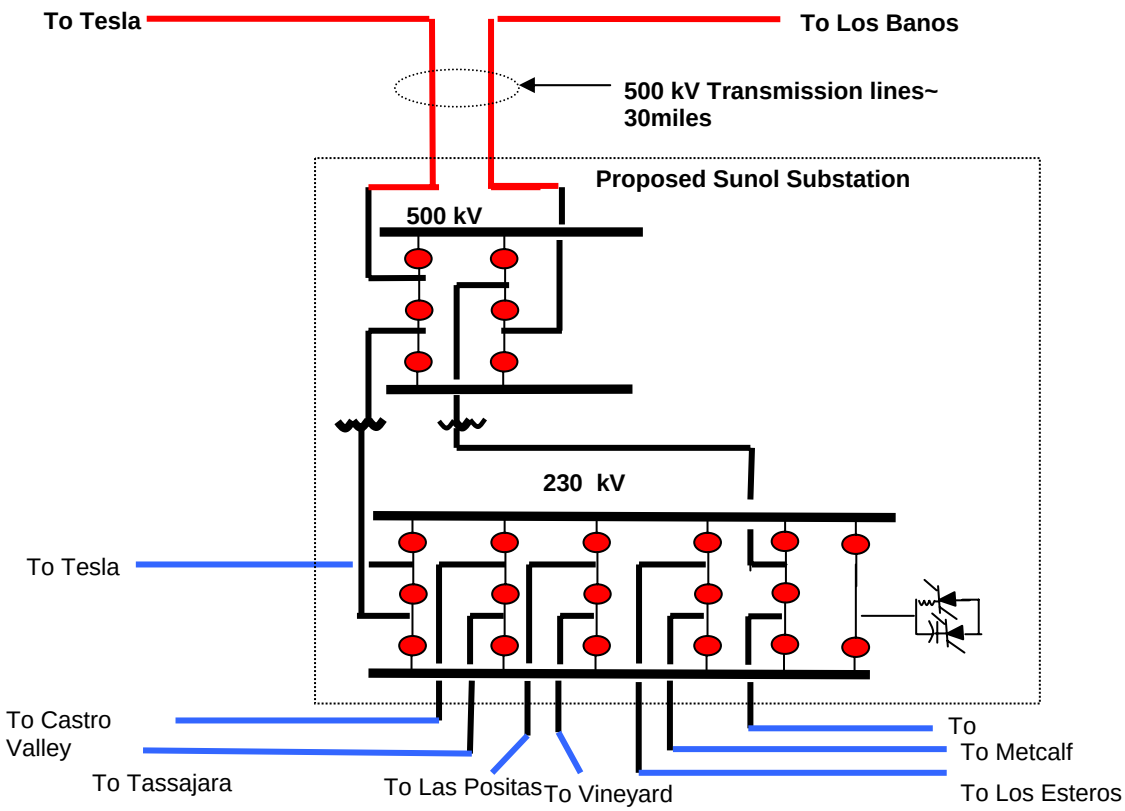


Figure 4-5 Sunol Interconnection schematics

4.8 Mitigation of Reliance on Old Thermal Generation Including Those Using Once-Thru Cooling Systems

This is a California wide study to analyze the impact on the electric transmission system of retrofitting, retiring and/or replacing old thermal generator units and those with once-through cooling systems via a comprehensive approach for assessing the long-term load serving capability of the bulk transmission network. The California State Water Resources Control Board ("SWRCB") has called for a significant reduction and eventually, elimination of once-through cooling (OTC) for electric generation power plants due to the detrimental environment impact of entrainment of marine organisms within cooling water intake structures along with the discharge of warmer cooling water. Depending on how SWRCB regulations are ultimately promulgated, they have the potential to require significant retrofit of aging power plants using OTC. Feasible and effective retrofit options for OTC are very limited and very expensive and therefore stringent regulations may have the effect of forcing the retirement of aging and less efficient power plants that cannot sustain the economic impact of expensive compliance. Even if retrofit is feasible, effective, and has acceptable cost, such retrofit typically results in material heat rate penalties and de-rating of peak generating capacity. However, it must also be noted that older plants may run much less often than new

plants with better heat rates. Thus, the effects of replacing older plants with newer plants may not lessen the total emissions in an optimized or economically dispatched system. Also, depending upon how these policies are implemented, there is the potential that a number of the existing thermal generation units could be retired. If a sufficient amount of generation is retired, transmission reinforcements and/or new generation will most likely be needed to maintain grid reliability and to allow for the import of renewable and economic energy into California. The CAISO will work in coordination with stakeholders to identify potential grid impacts and develop a range of potential solutions to mitigate these impacts.

This activity is primarily a technical study to support California policy objectives related to mitigation of reliance on aging thermal generator units and those that utilize once-through cooling systems. The objective is to identify transmission system and operating reliability problems and alternative potential mitigation options which will maintain reliable electric grid operations in the future. It is recognized that this technical study activity will pro-actively establish only one of many critical decision criteria that are considered when recommending a preferred plan and that a final decision, based in part on generation procurement costs, will occur following completion of this activity and would be accomplished through the California Public Utilities Commission Resource Adequacy Process and therefore via procurement decisions of Load Serving Entities. A mix of scenarios will be developed that will include generator operational restrictions for OTC compliance, heat rate penalties and de-rating effects associated with retrofit of OTC, retirement/replacement of old thermal generation, development of new generation (particularly renewable generation) and related reinforcement of the electric transmission system. It is intended that this will be followed by other activities for an economic assessment of mitigation alternatives as well as involvement of other Western Electricity Coordinating Council (WECC) members outside of California whose electric systems may be impacted depending on the results of the technical study and proposed mitigation plans.

In supporting California policies while maintaining reliable transmission grid operations, the following are the main objectives of this study effort.

Working in a collaborative and pro-active manner, the Study team and stakeholders will complete the following objectives:

1. Develop alternative potential future resource plans for California that consist of multiple planning scenarios, including plans with potential operational restrictions, that may facilitate retrofit, retirement and/or replacement of aging thermal generating units including those which utilize once through cooling systems.
2. Formulate and develop alternative plans to mitigate system grid reliability problems. The mitigation plans would include transmission reinforcement and/or new generation as well as accounting for and simulating the growth of distributed and renewable resources and load management programs.

3. Develop sufficient consensus that various defined alternate plans, when implemented, might allow the retrofit, re-powering and/or replacement of some generation and the upgrading or modifications to the transmission system in a manner that solves various California policy objectives in a least cost manner.

4. Develop alternative plans that involves fully utilizing of the existing transmission system while recognizing the costs and impacts of building new transmission infrastructure. This includes incorporating CAISO analysis addressing economic alternatives to Reliability Must-Run / Locational Capacity generation requirements.

5. Develop alternative long-term generation (retrofit/retirement/replacement) & transmission system reinforcement plans considering existing and potential new generation resources (including distributed and renewable), and load management programs within California.

6. Provide comprehensive transmission impact information related to the potential retrofit, retirement, and/or replacement of OTC facilities to state OTC policy makers like the SWRCB, Regional Water Quality Control Boards, CPUC, California Energy Commission, Ocean Protection Council, State Lands Commission, and other state agencies involved in OTC assessments. It is intended that the results of this study and effects to electrical grid reliability should be considered by these agencies regarding promulgation of any state OTC regulation or policy.

7. Address, and quantify, if possible, the operational challenges identified by the CAISO in the recently completed 20% RPS integration study and also include the effects of future GHG requirements.

These efforts, along with other initiatives in compliance with regulatory standards such as NERC compliance will transform the CAISO planning process to be much more proactive and provide forward-looking direction for infrastructure development than the past. New studies in the annual process allows CAISO to identify more potential problems, propose upgrade solutions, and initiate opportunities to enhance the grid even further. However, even with these efforts, CAISO anticipates this plan will evolve over time for the best benefits of CAISO customers.

4.9 Assessment of the Impact from the Second Dry Year

The weather patterns in California can experience a number of dry years in succession. In a multi-year drought cycle, the water levels at major reservoirs can drop to less than half of its normal capacity or lower. This could lead to progressively lower hydro generation capacity as well as lower energy production that are available during peak and partial peak loading periods. Sever drought conditions have occurred in the most recent two decades and most certainly can repeat themselves in the near future. To prepare for this operating condition, the CAISO and PG&E began to work on this initiative in July 2007 to

study the potential impacts of low hydro generation scenarios and to make recommendations on how to mitigate the risks to grid reliability and ultimately to California customers. While the study and implementation of the results from this study are still ongoing, this section provides the overview of this study, preliminary results, and next steps of this effort as a preparation for possible prolong drought conditions.

Current Hydro Conditions and Worst-Case Outcome for 2008

As of September 1, our statewide reservoir water storage was about 85 percent of average. Real drought levels would be in the 70 - 75 percent of average storage range which would take another drought year to get to that level. The worst case scenario for reduction of generating capability is based on the worst case conditions found during the 1980's, which results in an approximate 50% reduction for total CAISO hydro generation during the latter months of the summer season. This leaves approximately 4,000 MW of hydro generation available to meet daily peak demands during August – September. These levels can be available for durations of only a few hours each day, leaving even lesser amounts of generating capabilities during other near-peak hours of the day. This level of reduction in generating capability is a very low probability, but it gives a frame of reference for what the worst case scenario looks like.

System Wide Resource Picture

Based on a preliminary analysis of the loads and resources balance for the summer 2008, there are a number of inputs such as a reduction in expected import levels that will result in reduced planning reserve margins (PRM) for 2008. The potential for loss of capacity due to adverse hydro conditions have the potential to overshadow all other impacts to the PRM for the summer 2008. If the extreme reduction of hydro capacity as described above were to occur (approximately 4,000 MW at time of peak) the PRM will likely decline to below the 15-17 percent target set in the Resource Adequacy program.

One other noteworthy potential impact could come from state and federal pumping operations, which could be restricted by judicial decree, administrative direction, or extreme runoff shortage, resulting in reduced load available for demand response.

Study Areas/Assumptions

Hydro generation levels are modeled based on a hydro generation report from PG&E. This hydro generation report shows various hydro generation patterns for each of the hydro generators under various water levels and various load levels. Approximately 2500 MW hydro generation is assumed available in this study for the northern California system, focusing on the central and south valley areas which typically peak approximately 2 to 3 hours after the system peaks. With a maximum capacity of 9000+ MW, the northern California hydro generators normally provides 5000 to 7000 MW of generation under normal summer peak loading conditions.

Impacts of Low Hydro Generation Availability

With a low level hydro generation of 2500 MW, the northern California power grid would be stretched to and beyond its limits. Using 2008 summer base cases, studies have shown that normal overloads would occur on 12 transmission lines and 1 transformer. In addition numerous contingency overloads were also identified. There would be little additional generation resources available to mitigate the congestion which can occur when N-1 flow limits are violated. Studies have also shown potential voltage stability concerns in the event of single and/or double line contingencies.

To remove the normal and/or emergency overloads, firm load at the certain valley locations may be at risk of interruption during valley peaking hours which normally occurs 2 to 3 hours after the system peak. Additionally, close to capacity level of import energy was assumed in the analysis. The actual import could be much less if the drought affects a larger area than California. Under such conditions, there could be little if any energy reserve when firm load shedding would be needed to safeguard the reliability of the power grid.

Recommended Solutions

To mitigate the risks identified in this study, a number of short term and long term solutions are shown below. It is important to note that these projects may not solve all the problems identified in this assessment. They will however significantly reduce the risk of voltage collapse and remove some of the severe overloads. Additionally, this assessment is a work in progress. CAISO and PG&E are continuing the effort to find more solutions that will reduce the reliability risk even further. Some of the solutions could take two years or longer to implement.

Preliminary results show that numerous normal and contingency overloads can occur under the study conditions. To remove normal and/or emergency overloads, firm load may be at the risk of interruptions. The risk to load is especially a concern in a sustained heat wave and during shoulder peaking hours when valley load is at its highest and hydro generation is on its way down. Immediate actions are required by PG&E and CAISO to reduce the risks identified in this study.

Next Steps

1. CASIO and PG&E will work together to implement all the recommendations that are due for 2008 and continue to work on identifying longer term solutions.
2. CAISO and SCE to study the potential impacts and the mitigation measures of drought conditions on southern California.
3. CAISO and the neighboring utilities in the Western Interconnect to study the potential impacts and mitigation measures of wide spread drought conditions in the whole WECC areas.

This page is intentionally left blank

Chapter 5: Conclusions and Next Steps

Following the inception of the new integrated planning process, the CAISO Transmission Plan has gone through a series of improvements triggered by various drivers. For example, creation of the Transmission Planning Process BPM and for the first time a common study plan with Unified Planning Assumptions was prepared and followed by the CAISO, its PTOs and stakeholders for the analyses done for this 2008 CAISO Transmission Plan. Both are examples of the enhancements of the planning process to meet corporate objectives and state and to comply with federal requirements. The results from this type of ongoing work are started to provide a plan that is consistent with objectives of comprehensive and proactive planning. For example, last years recommendations for upgrades under CAISO Short Term Plan were incorporated into this year's list of transmission projects proposed by PTOs. In addition, this year the CAISO initiated a study, in coordination with stakeholders, to identify potential grid impacts and develops a range of potential solutions to mitigate the potential impacts of aging power plants being replaced by renewable generation. The objective of this collaborative work is to ensure system reliability and promote efficient electricity market.

Many of the new initiatives introduced this year will go into production mode in 2008. The details of these new initiatives have been elaborated in this Report, and the CAISO expects that the implementation of these initiatives (e.g. FERC Order 890 compliance, NERC Compliance program, etc) will result in continued progress towards meeting the CAISO transmission planning objectives. However, some of these concepts are new and will be implemented for the first time next year. Once these elements have been implemented, it is anticipated that the contents in the next and future CAISO transmission plans will be even more effective and informative than the current version, towards ensuring that the necessary and cost-effective infrastructure will be in place when it is needed. However, it is imperative to note that although major improvements have been implemented and introduced this year, the CAISO intends to continue improving its transmission planning process based on the needs and stakeholder inputs. This process is expected to continue to evolve over time and to ensure it will produce results that fit the needs of California ratepayers and stakeholders.

The incidents that occurred in 2007, findings from short-term and long-term studies, new initiatives, comments received from stakeholders, and ongoing development of infrastructure developments are the excellent sources of information provided in this document. Putting them together, the following are interesting conclusions observed during the course of this Transmission Plan.

The analysis of CAISO generation interconnection queue and process in chapter 1 highlights several key interesting issues.

- The statistics shows interconnection requests from renewable resources have outpaced the conventional fossil resources, both in the total number and capacity of the projects. This incident is consistent with the ongoing trend influenced by the related recent policies.

- Figure 1-2 also points out interesting differences of the average size of the project between wind and solar renewable resources that should to be considered in system planning and operation.
- This arising number of renewable resources also confirms the need for early preparation of higher level renewable penetration. Without proper planning, the mixes of resources may introduce new challenges to grid operations and planning. CAISO is well aware of this situation and has started to look at this scenario more closely. The completion of the Renewable Integration Study in this planning cycle, as summarized in section 4.4, is an example of such effort. The conclusion from the study results point out some important issues that need to be addressed according to the scope of the study. Considering these challenges and the future goals for integrating renewable resource, further evaluation is needed for this activity.
- The trends of interconnection requests also play a role in introducing a new challenge to the generation interconnection process. There are the needs to enhance the current LGIP process to accommodate this situation. CAISO is currently working with regulatory agencies and stakeholders toward the improvement of this process.

On the demand side, although the highest peak demands of July 24, 2006 still holds the record of all-time peak in CAISO footprint:

- New record peaks in southern California are the indications of a potential higher peak in the future.
- Combining with potential impacts from severe weather patterns such as heat waves or multi-year drought conditions being brought to attention in various forums, impacts from these adverse scenarios should be closely monitored and considered in the scope of the short-term and long-term strategic Transmission Plan.

Long-Term LCR Study results show the sign of improvements regarding the amount of LCR over the time being studied. The Report provides a description of the 2010 and 2012 LCR Study objectives, inputs, methodologies and assumptions, and the important policy considerations that are presented by the study results. The following are the observations from this Report:

- Most LCR requirements trend up by about 2%/year mainly due to load forecast increase.
- However, overall, there is significant decrease (over 5000 MW) mainly due to new projects such as Palo Verde-Devers #2, Sunrise, Green path north and later Vincent-Mira Loma 500

kV as well as upgrades to the Sylmar-Pardee #1 and #2 230 kV in southern California and Table Mountain-Rio Oso 230 kV lines in the north.

- There are still some areas with LCR deficiencies. Although the long-term assessments have shown the trend of LCR reduction in many areas in the CAISO footprint, further evaluation of cost-effective upgrades are still needed.

Section 4.1.3 describes the needs and components in the new Economic Planning Study which will be integrated in the annual CAISO planning process starting in 2008.

- The thresholds to determine significant and recurring congestion may be subject to future revision. Since this methodology was developed before the inception date of the new market design, these thresholds were created based on the historical congestion under the existing market paradigm. As CAISO indicated, this methodology will evolve over time, if the market results indicate the revision of these thresholds are needed,[24] CAISO will propose the changes to the criteria with the input and recommendations from stakeholders.
- While most of the discussion of this process focuses on congestion, other benefits from the upgrades proposed from this study process needs to be included in the benefit framework. Examples of these benefits are capacity payment reduction or other cost savings.

Coordination with neighboring control areas, sub-regional, and regional planning group such as TEPPC generate the following needs:

- Coordination of study schedules. Particularly the timing of Request Window among CAISO Transmission Plan, TEPPC, and sub-regional planning groups. This coordination is extremely important to streamline the two-way communication process for managing study requests from stakeholders. At this time, the proposed Request Windows from CAISO and TEPPC appear to fit very well. However, any revisions to these schedules may require further refinement on the schedule of transmission planning process.

Furthermore, implementation of other key elements addressed in the scope of FERC Order 890 compliances will be another key area in 2008. CAISO will continue this effort and provide stakeholders with updates regarding this issue on a regular basis.

[24] E.g. report too many or too few congestion

This page is intentionally left blank

Appendix A: Transmission Assumptions in CAISO Short Term Plan

Study Assumptions

Table A-1: Summary of Projects with Completion date before June 1, 2008

#	Project Title	Region	Project Scope	Targeted In-Service Date
1	Lakeville-Petaluma "C" 60kV Re-Rate	PG&E – North West	Re-rate the 60kV line to 528 A Normal and 610 A Emergency.	12/01/2007
2	Tulucay Bank 1 Replacement	PG&E – North West	Replace Tulucay Bank #1 (120MVA)	12/01/2007
3	Maintenance Project: New Melones SPS	PG&E – North East	Decrease New Melones PP following the loss of Bellota-Melones or Melones-Wilson, enabling Melones PP to operate at Pmax pre-contingency.	07/01/2007
4	Maintenance Project: Table Mountain 500kV Shunt Reactors	PG&E – North East	Replace 500 kV shunt reactors.	12/01/2007
5	Bellota 230/115kV Bank 1	PG&E – North East	PGEX34: Replace Transformer No. 1 with a 200 MVA, 3-phase, transformer	12/15/2007
6	Lockeford-Lodi #1 60kV line Re-rate	PG&E – North East	Re-rate the 60kV line ratings to 336 A Normal, and 386 A Emergency	05/01/2008
7	Lodi-Industrial 60kC line Re-rate	PG&E – North East	Re-rate the 60kV line ratings to 759 A Normal, and 881 A Emergency	05/01/2008
8	Palermo 230/115kV Transformer	PG&E – North East	T686B: Install a new 230/115kV transformer (420 MVA)	05/01/2008
9	Stagg 230/60kV Transformers	PG&E – North East	Replace the existing Stagg 230/60kV transformers (200 MVA each)	05/01/2008
10	Kasson-Lammers 115kV Reconductor	PG&E – North East	T680A: Reconductor the Kasson Lammers 115kV line with 477 SSAC (224 MVA)	05/01/2008
11	Weber #1 60kV line Reconductor	PG&E – North East	Reconfigure and Reconductor Weber #1.	05/01/2008

Table A-1: Summary of Projects with Completion date before June 1, 2008 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
12	Drum-Bell 115 kV Line Switches	PG&E – North East	T953: Replace and upgrade switches on the Drum-Bell 115 kV Line	05/01/2008
13	Plainfield Substation Capacity Increase (Transmission)	PG&E – North East	The project scope is to rebuild the existing Plainfield 60 kV Tap Line to accommodate a double circuit arrangement and reconfigure Plainfield Substation into a flip-flop design.	05/01/2008
14	Vaca Dixon 115kV BAAH Conversion	PG&E – North East	PGEX48: Convert 115 kV bus to Breaker-And-A Half Scheme and add 2 MPAC buildings	6/01/2008
15	Metcalf-Monta Vista 230kV #1 and #2 Reconductor	PG&E – Bay Area	T647A: Reconductor the Metcalf-Monta Vista 230kV lines 1 and 2 (600 MVA)	10/01/2007 (In-Service)
16	Vaca Dixon 500/230kV Bank 12	PG&E – Bay Area	T783B: Install a 2nd 500/230kV Transformer Bank. (1122MVA)	01/15/2008 (Slipped)
17	Stone Substation Expansion (Transmission)	PG&E - Bay Area	T1055: Change distribution substation interconnection by reconfiguring the 115 kV connections into Stone Substation by creating a flip-flop configuration, which can be converted into a loop configuration in the future. This project will also involve installation of new 115 kV circuit breakers at Stone.	03/01/2008
18	Lone Tree 230kV Substation	PG&E – Bay Area	T141: Loop new Distribution station on the Contra Costa-Newark #2 230kV line	05/01/2008
19	Monta Vista 60kV upgrade	PG&E – Bay Area	T776: Install a new 115/60kV transformer (200 MVA)	05/01/2008
20	Newark-Fremont 115kV Reconductor	PG&E – Bay Area	T847: Reconductor 115kV lines with 477 ACSS	05/01/2008
21	Metcalf-El Patio 115kV lines	PG&E – Bay Area	T694: Reconductor 115kV lines with 477 SSAC (224 MVA)	05/01/2008
22	Ravenswood Reactive Support	PG&E – Bay Area	T790B: Install 4 steps of 75 MVAR shunt capacitors on the 230kV (300 MVAR)	06/01/2008 (Slipped)
23	Helm-Kerman 70kV line Reconductor (By Fresno Cogen)	PG&E – South	P.02140: Reconductor the Helm-Kerman 70kV line (Helm-Agrico) with 715 AL to allow Fresno Cogen to operate at 73 MW.	05/30/2007 (complete)
24	Maintenance Project: Tivy Valley-Reedley 70kV lines Reconductor	PG&E - South	Replace the de-rated 3/0 AL conductor section on the Tivy Valley-Reedley 70kV line with 397 AL	12/31/2007

#	Project Title	Region	Project Scope	Targeted In-Service Date
25	Del Monte 115/60kV Bank	PG&E - South	T949: Install 2nd 115/60kV Bank (200 MVA)	03/01/2008 (Slipped)

Table A-1: Summary of Projects with Completion date before June 1, 2008 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
26	Herndon-Bullard 115kV Reconductor	PG&E – South	T122: Reconductor the 115kV lines between Herndon and Bullard with 477 SSAC (224 MVA)	05/01/2008
27	Templeton-Atascadero 70kV Reconductor	PG&E – South	T966: Reconductor the Templeton-Atascadero 70kV line (100 MVA)	05/01/2008
28	Atwater SPS	PG&E – South	T1012: Install SPS to drop load in the event of a DCTL outage.	05/01/2008
29	Merced Bus Reconductoring	PG&E – South	T1013: Reconductor limiting portion of Merced 115kV Bus	05/01/2008
30	McCall 230/115kV Transformer Replacement	PG&E - South	T923A: Replace McCall 230/115kV Bank 1 (420 MVA)	05/01/2008
31	Maintenance Project: McCall 115 kV Bus BAAH Conversion	PG&E – South	PGE45: Convert the 115 kV bus to a BAAH design.	5/01/2008

Table A-1: Summary of Projects with Completion date before June 1, 2008 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
32	Etiwanda-San Bernardino 230 kV Disc Upgrade	SCE	Upgrade 230 kV disconnects on the existing Etiwanda-San Bernardino 230 kV line	6/1/2007 (Complete)
33	Goleta Bank 1A Replacement	SCE	1A Bank will be changed out from a 120 MVA to a 280 MVA transformer and a ground bank will be added. 2A Bank will be removed and the existing ground bank will be fed from the 66 kv side and will become the Station Light and Pwr transformer.	6/1/2007 (Complete)
34	Valley 500 kV Shunt Capacitors	SCE	Install 2x150 MVAR 500 kV shunt capacitors at Valley	6/22/2007 (Complete)
35	West of Devers RAS	SCE	Install RAS to trip Devers AA banks or remaining West of Devers 220 kV line upon detection of line overloads on the West of Devers 220 kV lines	7/10//2007 (Complete)
36	Rector SVC	SCE	Install 200 MVAR 230 kV SVC at Rector	7/11/2007 (Complete)
37	San Bernardino Substation 220 kV Reconfiguration	SCE	Relocate 2A Bank from south 220 kV bus to CBs 432 and 632; relocate 3A Bank from North 220 kV bus to CBs 452 and 652.	7/12/2007 (Complete)
38	La Fresa-Redondo 230 kV 1&2 T/Ls	SCE	Remove existing wavetraps on the La Fresa-Redondo 230 kV lines	7/21/2007 (Complete)
39	Vincent – Replace 1AA B phase Transformer	SCE	Replace 1AA (B) phase unit	8/9/2007 (Complete)
40	Vermont Substation – City of Anaheim	SCE	Build new 230 kV / 69 kV Vermont Substation, ratings for 69 kV CB's – 2000 & 3000 A and 40 kA; For 230 kV CB's – 2000 & 3000 Amps and 63 kA	9/15/2007
41	Lewis – Vermont 230 kV Transmission line – City of Anaheim	SCE	Install 1.5 mile Lewis – Vermont 230 kV Transmission Line, Bundled 1590 ACSR 45/7 Lapwing, 3230 Amps continuous rating. 3710 Amps and 4360 Amps	10/15/2007
42	Barre 3A Bank Transformer Replacement	SCE	Replace existing 3A Bank Westinghouse three-phase 150/200/250 MVA transformer with a new Hyundai three-phase 168/224/280 MVA transformer, replace 66 kV bank disconnects	12/15/2007
43	Antelope SPS	SCE	Install SPS to drop up to 200 MW of Antelope load for an N-2 condition	12/31/2007

Table A-1: Summary of Projects with Completion date before June 1, 2008 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
44	Lugo Sub	SCE	Replace Eldorado 500 kV Line Reactors (3)	12/31/2007
45	Walnut 4A Bank Transformer Replacement	SCE	Replace existing 4A Bank Westinghouse three-phase 150/200/250 MVA transformer with a new Hyundai three-phase 168/224/280 MVA transformer, replace 66 kV bank disconnects	3/1/2008
46	New Grant Hill (previously named Uptown)	SDG&E	Grant Hill - New 138/12 kV Substation & C1434, 1435 & 1436	12/01/2007
47	San Luis Rey 230 kV rearrangement	SDG&E	Relocate 230 kV lines with in the substation	06/01/2008
48	Rebuild Chollas Substation	SDG&E	Substation modifications include 69 kV bus, 3-69 kV banks, control shelter and 12 kV switch gear	12/01/2007
49	Tap TL13825 into Shadowridge with new OLS	SDG&E	Tap TL13825 into Shadowridge with new OLS	07/15/2007 (Complete)

Table A-2: Summary of Projects with Completion date before June 1, 2009

#	Project Title	Region	Project Scope	Targeted In-Service Date
1	Humboldt-Harris 60kV Reconductor	PG&E – North West	T958: Reconductor the Humboldt-Harris 60kV line (51 MVA)	12/01/2008
2	Lakeville 230/60kV Transformer	PG&E – North West	T571: Add a new 230/60kV transformer (200 MVA)	12/01/2008 (Slipped)
3	Humboldt Reactive Support	PG&E – North West	T945: Replace existing synchronous condenser with new reactive device	05/01/2009
4	Lakeville-Ignacio #2 230kV Line	PG&E – North West	T994: Re-establish 2nd Lakeville-Ignacio 230kV line	05/01/2009
5	Davis 115 kV Circuit Breaker	PG&E – North East	T177E: The project scope is to install a new 115 kV circuit breaker to provide a direct connection to University of California Davis' (UCD) new substation.	09/01/2008
6	Vaca-Birds Landing 230kV Reconductoring	PG&E – North East	T972: Reconductor the 230 kV lines between Vaca Dixon and Birds Landing with 1113 ACSS conductors or larger	05/01/2009
7	Bellota 230/115kV Bank 2	PG&E – North East	PGEX52: Replace Transformer No. 2 with 200 MVA, 3-phase, transformer	05/01/2009
8	Atlantic-Lincoln Transmission Project	PG&E – North East	T759C: Convert the Atlantic-Lincoln 60kV to 115kV	05/01/2009 (Slipped)
9	Bogue Junction Reconfiguration	PG&E – North East	Open the 115kV connections between Palermo and Rio Oso at Bogue Jct.	05/01/2009
10	West Point-Valley Springs 60kV line reinforcement	PG&E – North East	T880B: Reconductor the West Point-Valley Springs 60kV line (66 MVA)	05/01/2009 (Slipped)
11	Atlantic-Pleasant Grove 60kV Reconductor	PG&E – North East	T759B: Reconductor the Atlantic-Pleasant Grove 60kV lines with 477 SSAC (117 MVA)	05/01/2009 (Slipped)
12	Rio Oso 230/115kV Transformers	PG&E – North East	T985B: Replace the Rio Oso transformers 1 & 2 (420 MVA each)	05/01/2009
13	Gold Hill-Clarksville 115kV Line Reconductor	PG&E – North East	T444B: Reconductor the first 6 miles of the Gold Hill-Clarksville 115kV line	05/01/2009
14	West Sac-Brighton 115kV Reconductor	PG&E – North East	T177B: Reconductor approximately 14 miles of the West Sacramento – Brighton 115kV Line	05/01/2009

Table A-2: Summary of Projects with Completion date before June 1, 2009 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
15	Rio Oso-Brighton 230kV line Re-rate	PG&E – North East	Re-rate the 230kV line to 886 A Normal, and 1005 A Emergency	05/01/2009
16	Maintenance Project: South of Table Mountain Maintenance	PG&E – North East	Raise transmission towers and replace the existing conductors on the Table Mountain – Palermo – Colgate – Rio Oso 230 kV Lines with 795 ACSS conductors	05/01/2009
17	Placer-Gold Hill 115kV lines	PG&E – North East	T444: Reconductor 115kV lines with 477 ACSS	05/01/2009
18	Martin 115/60kV Transformer	PG&E – Bay Area	T980: Replace Martin 115/60kV Transformer with higher capacity unit or install a second unit (200 MVA).	12/01/2008
19	Metcalf-Moss Landing 230kV Reconductor	PG&E – Bay Area	T867: Reconductor 230kV Lines	12/01/2008 (slipped)
20	Sobrante 115kV Bus Sectionalizing Breakers	PG&E – Bay Area	Swap the El Cerrito G and Sobrante-Grizzly-Claremont 115kV lines.	12/01/2008
21	Reliability Project: Contra Costa Substation	PG&E – Bay Area	Loop the Contra Costa-Moraga #2 230kV line in and out of the Contra Costa Sub	12/01/2008
22	Shiloh II Generation Interconnection	PG&E – Bay Area	P.01728: Interconnect Shiloh II generation project to the Shiloh I Switching Station, which is interconnected to the Vaca Dixon-Contra Costa #2 230kV	12/01/2008 (Slipped)
23	High Winds III Generation Interconnection	PG&E – Bay Area	P.01701: FPL Energy, LLC plans to add 38MW of generation to its High Winds wind-gen project at Birds Landing.	12/01/2008 (Slipped)
24	Martin-Hunter Point 115kV Underground Cable	PG&E – Bay Area	T897: Install a new 115 kV underground cable between Martin and Hunters Point substations	04/01/2009
25	Newark-Ravenswood 230kV Reconductor	PG&E – Bay Area	T982: Reconductor the Newark-Ravenswood 230kV line	05/01/2009
26	Menlo 60 kV Switch Upgrade	PG&E – Bay Area	T1036: The project scope is to replace all 60 kV switches that have a rating of less then 800 Amps in Menlo 60 kV Substation with switches that have a capability of 800 Amps or greater.	05/01/2009
27	Henrietta 230/70kV Capacity Increase	PG&E – South	T778: Install 2nd 230/70kV transformer (200 MVA)	06/01/2007 (in-service)

Table A-2: Summary of Projects with Completion date before June 1, 2009 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
28	Lompoc Wind Power Project Interconnection	PG&E – South	P.01379: Interconnect 119 MW of wind power generation into the Cabrillo-Divide 115kV line	10/01/2008
29	Maintenance Project: Hernrietta Bank	PG&E - South	PGE49: Replace 230/115kV Bank 3	12/01/2008
30	Maintenance Project: Kern PP Bank	PG&E - South	PGE50: Replace 115/70kV Bank #2	12/01/2008
31	Maintenance Project: Coppermine-Tivy Valley 70kV line reconductor	PG&E - South	Replace the de-rated 3/0 AL conductor section on the Coppermine-Tivy Valley line with 397 AL	12/01/2008
32	Kern Oil/ South Kern Front	PG&E - South	PGE56: Convert Kern Front to BAAH	3/31/2009
33	Kern PP 115kV BAAH Conversion	PG&E - South	PGE57: Convert 115kV to BAAH + 2 MPAC buildings	3/31/2009
34	Madera 70kV Bus Conversion	PG&E - South	PGE58: Convert 70kV to Main-Aux and ad MPAC building	4/01/2009
35	Hollister 115kV Reconductor	PG&E - South	T458C: Reconductor the Hollister 115kV tap section on the Moss Landing-Salinas 115kV lines (140 MVA)	05/01/2009
36	Crazy Horse Substation Project	PG&E – South	T-970: Construct 115kV switching station	05/01/2009
37	Moss Landing -Salinas-Soledad Reconductoring	PG&E - South	T970B: Reconductor the Moss Landing-Salinas-Soledad 115kV lines.	05/01/2009
38	Borden-Madera 70kV Line	PG&E – South	T964: Create a new 70kV path from Borden to Madera	05/01/2009
39	Maintenance Project: Mendota 115/70kV Transformer	PG&E – South	PGE54: Upgrade Mendota 115/70kV Transformer (100 MVA)	05/01/2009
40	Glass-Madera 70kV Reconfiguration	PG&E - South	T968: Reconfigure 70kV network to create a new 70kV line between Glass and Biola (39 MVA) – Confirm complete as stated by AB 970?	05/01/2009 (Slipped)
41	Mesa 115kV Shunt Capacitors	PG&E – South	T965: Install 25 MVARs of 230kV shunt caps	05/01/2009 (Slipped)

Table A-2: Summary of Projects with Completion date before June 1, 2009 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
42	7th Standard Substation Interconnection (D)	PG&E - South	T1020: Loop the a new distribution 7th Standard Substation off the Kern-Lerdo-Kern Oil 115 kV Line. Looping the 7th Standard Substation would require building a new 115 kV double circuit tower line (3.5 miles long) from 7th Standard Substation to the Kern-Lerdo-Kern Oil 115 kV Line.	05/01/2009
43	Maintenance Project: Corcoran 115kV BAAH Conversion	PG&E - South	PGE59: Convert 115 kV to Breaker-And-A Half Scheme, add MPAC building and replace 115/70 kV Bank 2, 100 MVA	06/01/2009
44	Etiwanda Sub	SCE	Relocate all 220 kV lines W/O Etiwanda to vacate property to construct Ranch Vista 500/220 kV Substation	6/1/2008
45	Moorpark Add New A-Bank	SCE	Add new 280 MVA A Bank and split 66 kV system	6/1/2008
46	Mirage Sub	SCE	Build new MEER, add new 115 kV rack, split the Mirage-Tamarisk 115 kV line, split the Conch-Indian Wells 115 kV line, install SASII.	6/1/2008
47	Antelope 280 MVA 230/66 kV Transformer Bank	SCE	Replace existing 120 MVA with a new 280 MVA 230/66 kV transformer bank (used as a station spare)	6/1/2008
48	Antelope-Oasis-Palmdale-Quartz Hill and Antelope-Shuttle 66kV Line Reconductor Project	SCE	Reconductor approx. 5 miles of the Antelope leg of the Antelope-Oasis-Palmdale-Quartz Hill and 5 miles of Antelope-Shuttle, convert Quartz Hill to looped service from P/E, upgrade terminal equipment at both ends of the newly formed Antelope-Quartz Hill, and construct about 1.5 miles of new 66 kV line section and tap existing Antelope-Shuttle to form Antelope-Shuttle-Quartz Hill.	6/1/2008
49	Method of Service for new 56 MVA Ritter Ranch 66/12 kV Substation	SCE	Loop existing Antelope-Anaverde and Antelope-Acton-Shuttle-Palmdale 66 kV lines into Ritter Ranch	6/1/2008
50	HDPP RAS	SCE	Modify existing HDPP RAS arming settings and install additional relays	8/1/2008
51	Etiwanda Sub	SCE	Relocate all 220 kV lines W/O Etiwanda to vacate property to construct Ranch Vista 500/220 kV Substation	8/1/2008
52	Santa Clara - Add new 3A Bank & assoc. 220 kV and 66 kV CBs	SCE	Add new 3A Bank & associated 220 kV and 66 kV CBs	12/31/2008

#	Project Title	Region	Project Scope	Targeted In-Service Date
53	Antelope (formerly known as Tehachapi) Transmission Project - Phase 1	SCE	Segment #1: Construct a new 25.6 mile 500 kV transmission line between existing 220 kV substation (Pardee and Antelope)	12/31/2008

Table A-2: Summary of Projects with Completion date before June 1, 2009 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
54	MVPP RAS Expansion	SCE	Upgrades to MVPP RAS from and N-2 to an N-3	12/31/2008
55	Rector Replace 2A Bank, 220/66 kV	SCE	Replace 2A Bank ,220/66 kV, 120 MVA, with 280 MVA transformer and relocate to CB 4073 and 6073	1/1/2009
56	New 230/69kV Substation: Silvergate	SDG&E	Construct new 230/69kV Silvergate Substation to replace existing Main St. Substation and improve capability to serve Downtown-Centre City load	12/01/2008
57	Lake Hodges Pumped Storage Project	SDG&E	Interconnect 40 MW Lake Hodges Pumped Storage by looping into the Olivenhain-Bernardo 69kV Tap Line	9/01/2008
58	Reconductor 13802B, 138kV Shadow Ridge-Calvera Tap	SDG&E	Reconductor 3.5 miles of the 138kV Shadow Ridge-Calvera Tap transmission line;	06/01/2009
59	Reconductor TL13836, Talega-Pico	SDG&E	Reconductor 0.68 miles of 138kV line between Talega and Pico Substations; Increase the transmission capacity to Pico and Trabuco substations to meet the projected load growth.	06/01/2009
60	New Division-Naval Station Metering #2	SDG&E	Build a second line from Division to Naval Station Metering	06/01/2009
61	Loop-in TL651: Silvergate 69 kV Switchyard	SDG&E	Loop-in TL651 into Silvergate substation	06/01/2009
62	Encina - Penasquitos 230 kV #2	SDG&E	Build a second line between Encina to Penasquitos 230 kV	06/01/2009
63	Loop-in TL13825 into Shadowridge	SDG&E	Loop-in TL13825 into Shadowridge substation	06/01/2009
64	Reconductor TL689C: Escondido-Felicita Tap	SDG&E	Reconductor Escondido-Felicita Tap 69kV Line	06/01/2009
65	Otay Mesa 230kV switchyard	SDG&E	Energize Otay Mesa switchyard	06/01/2009
66	Reconductor TL 13812, Talega – San Mateo	SDG&E	Reconductor TL 13812, Talega – San Mateo	06/01/2009
67	Transmission for Otay Mesa Generation Project	SDG&E	Transmission interconnection for Otay Mesa Generation Project (under Calpine's filing)	10/01/2008

Table A-3: Summary of Projects with Completion date before June 1, 2010

#	Project Title	Region	Project Scope	Targeted In-Service Date
1	Mendocino Coast Reactive Support	PG&E – North West	T993: Install reactive support around the Ft. Bragg 60kV system	05/01/2010
2	Brighton 230/115kV Transformer	PG&E – North East	T758A: Replace Brighton 230/115kV Transformer #9 with a 420 MVA unit	11/01/2009 (Slipped)
3	Palermo-Rio Oso 115kV Reconductor	PG&E – North East	T686A: Reconductor the 115kV lines between Palermo and Rio Oso with 477 SSAC (224 MVA)	12/01/2009 (Slipped)
4	Pease-Marysville 60kV line	PG&E – North East	T815: Construct new 60kV transmission line (117 MVA)	12/01/2009 (Slipped)
5	Rio Oso 115kV Reactor	PG&E – North East	T985A: Install 115kV reactors at Rio Oso.	05/01/2010
6	Tesla 115 kV Capacity Increase	PG&E – North East	T 680B: The project scope is to either reconductor the Tesla-Schulte, Tesla-Salado-Manteca and Vierra-Tracy-Kasson 115 kV lines or to construct a new 1.5 mile 115 kV line from Tesla-Stockton Cogen 115 kV line to Kasson Substation and reconductor Tesla-AEC and Vierra-Tracy-Kasson 115 kV lines.	05/01/2010
6	Robles Substation	PG&E – Bay Area	T142: Connect the Robles Dist. Stn into the Pittsburg-Moraga 230kV line	12/01/2009 (Slipped)
7	Bay Meadows 4/0 Cu Line Reconductor	PG&E – Bay Area	T249: Reconductor 2.5 miles of lines #1 & #2 from San Mateo to Bay Meadows	05/01/2010
8	Contra Costa-Las Posita 230kV Reconductoring	PG&E – Bay Area	T772: Reconductor Contra Costa-Las Positas 230kv line	05/01/2010

#	Project Title	Region	Project Scope	Targeted In-Service Date
9	Monta Vista-Los Altos 60kV Reconductoring	PG&E – Bay Area	T981: Transfer Los Altos to be served from Monta Vista and recoductor 2 miles of Monta Vista-Los Altos 60kV	05/01/2010
10	Oakland Cable	PG&E – Bay Area	T983: Construct additional C-X or D-L 115kV cable	05/01/2010
11	Pittsburg-Tesla 230kV Reconductoring	PG&E – Bay Area	T984: Reconductor #1 & #2 lines with larger capacity conductors	05/01/2010
12	SF Underground Cable Replcmnt	PG&E – Bay Area	T1031: Upgrade the Potrero – Martin and the Martin – Hunter Point 115 kV UG cables	05/01/2010
13	Gregg 230kV Reactor	PG&E - South	T258A: Install 230kV shunt reactors at Gregg Substation	10/01/2009
14	Maintenance Project: Arco Bank	PG&E – South	PGE60: Replace 115/60 kV Bank 1	12/01/2009
15	Maintenance Project: Gates Bank	PG&E – South	PGE62: Replace 115/70 kV Bank 2 with 4 1-ph 60 MVA	12/01/2009

Table A-3: Summary of Projects with Completion date before June 1, 2010 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
16	Maintenance Project: Salinas Bank	PG&E – South	PGE63: Replace 115/60 kV Bank 2	12/01/2009
17	Sanger -- convert 115KV Bus to BAAH	PG&E – South	PGE64: Convert 115 kV bus to Breaker-And-A Half Scheme	03/31/2010
18	Sanger-Reedley Reinforcement	PG&E - South	Reinforce some of the 70kV and 115kV lines in the Sanger Area	05/01/2010
19	Antelope (formerly known as Tehachapi) Transmission Project - Phase 1	SCE	Segment #1: Construct a new 25.6 mile 500 kV transmission line between existing 220 kV substation (Pardee and Antelope)	06/01/2009
20	Ritter Ranch	SCE	New 66/12 kV Substation	06/01/2009
21	Antelope 28.8 MVAR 66 kV Capacitor	SCE	Install a new 28.8 MVAR 66 kV capacitor at Antelope	06/01/2009
22	BC3-BC8 SPS	SCE	Modify Big Creek SPS to run back Eastwood for N-2 (BC2-BC3 and BC1-Rector)	06/01/2009
23	Devers-Mirage 115 kV System Split	SCE	Separate Devers and Mirage 115 kV systems from ISO grid control. Install new transformers 3A & 4A at new 115 kV switch rack at Mirage. Farrell, Eisenhower, Thornhill, Garnet, Tamarisk, Santa Rosa, Indian Hills & Concho substations along with associated lines and the 92 kV (CM) tie to IID will be removed from ISO grid control.	06/01/2009
24	Devers-Coachella Valley 230 kV Line Loop	SCE	Loop existing Devers-Coachella Valley into Mirage	06/01/2009
25	Rancho Vista 500/230kV Substation Project	SCE	Construct a new 500/230 kV substation in eastern LA basin area	06/01/2009
26	Mira Loma 500 kV Shunt Capacitors	SCE	Install 2x150 MVAR 500 kV shunt capacitors at Mira Loma	06/01/2009
27	Jurupa Substation - City of Riverside	SCE	Develop a 2X560 MVA Jurupa 230/66 kV Substation for Riverside. Loop the existing Mira Loma-Vista #1 line and construct about 8 miles of double circuit to Jurupa.	09/01/2009
28	San Joaquin Cross Valley Rector Loop	SCE	Loop Big Creek3-Springville 230 kV line into and construct about 20 miles of 230 kV double circuits to Rector	09/01/2009
29	Devers-Valley 500 kV line	SCE	Relocate Devers 500 kV line position from GIS to open air rack	12/31/2009
30	Barre New A-Bank	SCE	Add new A Bank 280 MVA to C section	12/31/2009

Table A-3: Summary of Projects with Completion date before June 1, 2010 (Cont)

#	Project Title	Region	Project Scope	Targeted In-Service Date
31	AA Bank Double Breaker Position Upgrades	SCE	Upgrade Mira Loma and Valley 500 kV AA Banks to a double breaker configuration	12/31/2009
32	Reconductor 13837 Capistrano-Laguna Niguel Transmission Line	SDG&E	Reconductor 2.9 miles of 138kV line from Capistrano Substation to Laguna-Niguel Substation	06/01/2010
33	Reconfigure TL13821 & 13822, Carlton Hills Area	SDG&E	Rearrange Carlton Hill Tap	06/01/2010
34	Miguel BK 61	SDG&E	Add a new bank to Miguel substation	01/01/2010
35	Otay Substaion Rebuild	SDG&E	Rebuild	12/01/2009
36	Sunrise Powerlink 500kV Line	SDG&E	Sunrise Powerlink 500kV Line	06/01/2010

Appendix B: Justifications of Proposed Projects costing less than $50M

PG&E Service Area

Project No 1	Menlo 60 kV Switch Upgrade - replace all 60 kV switches that have a rating of less then 800 amps in Menlo 60 kV Substation with switches that have a capability of 800 amps or greater.
Operating date	May 2008
Status	CAISO grants approval for this project.
Justifications:	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. The Jefferson-Stanford 60 kV line is approximately 10 miles long and is located in San Mateo County. The limiting conductor on the line is 714.4 AAC conductor with a summer normal and emergency coastal rating of 703 and 802 Amps, respectively. The limiting equipments for that facility are switches located on or near the Menlo 60 kV bus with a summer normal and emergency rating of 600 Amps. This 60 kV line is critical in providing power to Emerald Lake, Menlo, and Glenwood Substations, which serve approximately 15,490 electric customers. In 2008, planning analysis has determined a potential thermal overload on the Jefferson-Stanford 60 kV line switches following an outage of the Cooley Landing-Stanford 60 kV Line overlapped with Cardinal (L-1/G-1). The proposed project will mitigate potential future overloads.
Project No 2	Merced 115 kV Bus Reconductoring
Operating date	May 2008
Status	CAISO grants approval for this project.
Justifications	The planning study has demonstrated that it is necessary to re-conductor the bus section to avoid overload in peak load conditions. The bus reconductoring will also allow an SPS to be implemented in order to mitigate LCR in the Merced area. In view of both reliability needs, the CAISO considers that this upgrade is a must.

Project No 3	Stone Substation Capacity Increase - Increases the capacity and reliability of the transmission facilities serving Stone Substation through installation of two 45 MVA 115/12 kV transformer banks.
Operating date	March 2008
Status	CAISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. This substation is currently tapped off of the Metcalf -Evergreen No. 2 115 kV line with a back tie to Markham 115 kV Substation. There is a switch (switch No. 139 at Markham Substation) that is operated normally open which isolates the two substations. Stone substation presently has two distribution transformers rated at 30 and 20 MVA. The proposed project will mitigate potential future overloads.

Project No 4	Plainfield Substation Capacity Increase
Operating date	May 2008
Status	The Cal-ISO grants approval for this project.
Justifications	It was demonstrated that the preferred alternative is a prudent and technically sound solution to the connection of new distribution transformer required to serve increased load. This approval covers the transmission portion of the project like: new switches (including SCADA control) and bus arrangement on the 60 kV side with upgraded protection requirements if needed. The step down transformer and lower kV voltage upgrades are distribution cost and they do not require CAISO approval.

Project No 5	Live Oak Distribution Substation Capacity Increase
Operating date	May 2008
Status	The Cal-ISO grants approval for this project.
Justifications	It was demonstrated that the preferred alternative is a prudent and technically sound solution to the connection of new distribution transformer required to serve increased load. This approval covers the transmission portion of the project like: new switches (including SCADA control) and bus arrangement on the 60 kV side with upgraded protection requirements if needed. The step down transformer and lower kV voltage upgrades are distribution cost and they do not require CAISO approval.

Project No 6	Plumas Distribution Substation Capacity Increase
Operating date	May 2008
Status	The Cal-ISO grants approval for this project.
Justifications	It was demonstrated that the preferred alternative is a prudent and technically sound solution to the connection of new distribution transformer required to serve increased load. This approval covers the transmission portion of the project like: new switches (including SCADA control) and bus arrangement on the 60 kV side with upgraded protection requirements if needed. The step down transformer and lower kV voltage upgrades are distribution cost and they do not require CAISO approval.

Project No 7	Davis 115 kV Circuit Breaker
Operating date	May 2008
Status	The Cal-ISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified customer concerns as well as preventing serious reliability criteria violations given that the UCD substation and equipment will be used on a flip/flop configuration. A looped through configuration in not envisioned since the loop will connect two different sources and outages on the PG&E system could cause unintended consequences in the UCD owned substation. The PTO (in this case PG&E) will not be maintaining the equipment and protection relaying in this new UCD substation and furthermore the UCD personal or maintenance practices are not under CAISO jurisdiction. The historical data has proven that the customer owned substations don't always get proper maintenance or that protection changes are not always coordinated such that critical outages can occur. In this area miss operation could cause the outage of two critical lines (West Sacramento-Davis and Brighton-Davis 115 kV) potentially causing voltage collapse or lots of load shedding in the area. In the new configuration only one of these critical lines is taken out for any miss operation in the new UCD substation.

Project No 8	Potrero Bus Parallel Breaker Replacement - This project will add a new bus-parallel breaker on 115 kV Bus Section E at Potrero substation.
Operating date	March 2009
Status	CAISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. Installing the new parallel breaker would allow the flexibility of not having to switch all the transmission facilities onto one bus section and to reduce the number of transmission facilities that could be out of service due to a potential bus fault.

Project No 9	7th Standard Substation Capacity Increase (D)
Operating date	May 2009
Status	CAISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent solution to address load growth in Kern area. This proposed project is recommended where the new substation is built and the Kern-Lerdo-Kern Oil 115 kV line is looped into the new substation.

Project No 10	Battery Storage Project - Install a 6 MW NaS (Sodium Sulfur) battery system at Emerald Lake 60 kV Substation.
Operating date	May 2009
Status	CAISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. This project will improve service reliability to 7,600 electric customers in the communities of Woodside and Redwood City, advance the research of NaS batteries for utility applications and provide research information on how to best create economic value from an energy storage installation in the California energy market by providing the CAISO with services such as regulation control, VAR support, peak shaving and black start capability.

Project No 11	Humboldt Reactive Support (Scope Change)
Operating date	May 2009
Status	CAISO grants approval for this project.
Justifications	This project proposal involves a scope change of the previously approved project. CAISO concurs with PG&E assessment results showing the needs for reactive power support in Humboldt which is critical to the reliable operation of this area. Along with other supporting reason such as the age of the existing equipment and cost benefits of several alternatives, this project is granted approval and CAISO encourages PG&E to implement this project in a timely manner.

Project No 12	Newark-Ravenswood Reconductoring – Reconductor 9 miles 0f 230 kV DCTL between Newark and Ravenswood Substations.
Operating date	May 2009
Status	CAISO grants approval for this project.
Justification	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. This project includes reconductoring with 795 SSAC conductors or larger the Newark-Ravenswood 230 kV line and that portion of the Tesla-Ravenswood 230 kV line (approximately 9 miles) that runs on common towers across San Francisco Bay with the Newark-Ravenswood line. This project supports electric load growth within San Francisco and the Peninsula in combination with decreased generation resources located in San Francisco. It will mitigate potential future overloads.

Project No 13	West Sacramento-Brighton 115 kV Reconductor
Operating date	May 2009
Status	The Cal-ISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. CAISO studies show that the Rio Oso-West Sacramento 115 kV line needs to be reconductored as well (parts of it in this project) and it should be done (at least the portion on the DCTL) concurrent with this project because otherwise conductors with different weights and slack can swing into each other causing additional problems in this area. It is recommended to use the conductor with the highest rating that can be carried by the existing towers but not less the 477 SSAC.

Project No 14	Brighton #9 230/115 kV Transformer Replacement
Operating date	May 2009
Status	The Cal-ISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. Replace the existing bank with one 420 MVA 230/115 kV bank.

Project No 15	Contra Costa-Las Positas 230 kV & Contra Costa-Lone Tree 230 kV Lines Reconductoring – Reconductor the Contra Costa-Las Positas (approximately 24 Miles) and Contra Costa-Lone Tree (approximately 4.2 miles) 230 kV circuits with a conductor having an emergency rating of at least 1,500 Amps.
Operating date	March 2010
Status	CAISO grants approval for this project.

Justification	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. At Contra Costa PP, a new 530-megawatt combined-cycle generation facility named Gateway Generating Station (formerly Contra Costa Unit 8) will connect into the 230 kV switchyard. The Gateway plant is expected to be operational at the end of 2009. The addition of this new generation will increase loading on the 230 kV lines out of Contra Costa. Planning studies show that the Contra Costa-Las Positas and the Contra Costa-Lone Tree 230 kV lines could experience normal overloads in 2010 if the new Gateway generation and Contra Costa Units 6 and 7 are generating. The planned reconductoring will mitigate the potential future overloads.
Project No 16	Cooley Landing 115/60 kV Transformer Capacity Increase – Replace the existing 115/60 kV Transformer No. 1 with four 60 MVA, single-phase units by 2010, and Transformer No. 2 with three 60 MVA, single-phase units by 2011 and provide an on-site spare transformer unit, and adequate transformer capacity for the foreseeable future.
Operating date	May 2010 and May 2011
Status	CAISO grants approval for this project.
Justification	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. The Cooley Landing 115/60 kV Transformers No. 1 and No. 2 do not have adequate capacity to meet anticipated demands. Transformer No.1 has a summer normal/emergency rating of 84/100 MVA, respectively. Tranformer No. 2 has a summer normal/emergency rating of 96/107 MVA, respectively. During forecast 2010 summer peak load conditions, planning analysis projects an 8% overload on Transformer No. 1 for an outage of Transformer No. 2, and a 99% loading on Transformer No. 2 for an outage of Transformers No. 1. As electric demand continues to grow, Transformer No. 2 is forecasted to overload in 2012 for the same T-1 outage stated above. Transmission Planning recommends implementing this project in two phases. Phase 1 would involve replacing Transformer No. 1 by 2010 and phase 2 would involve replacing Transformer No. 2 by 2011, respectively. The proposed project will mitigate potential future overloads.

Project No 17	Table Mountain-Rio Oso 230 kV Line Reconductoring and Tower Raises
Operating date	Staged implementation (2008-2010)
Status	The Cal-ISO grants approval for this project.
Recommendations	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The conductor replacement and tower raise is covered by the maintenance project and it is recommended to use the conductor with the highest rating that can be carried by the existing towers. The approval here refers to the upgrade (where needed) of any breakers and terminal equipment to accommodate the higher capacity conductor.

Project No 18	Tesla 115 kV Capacity Increase
Operating date	May 2010 or earlier
Status	The Cal-ISO grants approval for this project.
Recommendations	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. To be clear the Project Scope is to reconductor 21 miles of the Tesla-Salado-Manteca 115 kV line and about 1 mile of the Schulte-Lammers 115 kV line. The CAISO is requesting that the Tesla-Salado-Manteca line be reconductored with the highest capacity conductor possible for the existing towers/wood poles and no less then 477 SSAC. Also, since these are existing problems, the project should be expedited as much as possible. (The Schulte-Lammers reconductoring is only 1 mile and it may be possible to get it done before summer of 2008).

Project No 19	West Fresno Reactive Support
Operating date	May 2010
Status	CAISO grants approval for this project.
Justifications	The proposal to install shunt capacitors at the West Fresno 115 kV substation will provide needed voltage support for the load area. The study has demonstrated that the preferred alternative is both cost-effective and technically-sound to mitigate the identified voltage issues.

Project No 20	Wheeler Ridge 230/70 kV Transformer
Operating date	May 2010
Status	CAISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent and technically-sound solution to the identified reliability criteria violations. Installing this new 230/70 kV transformer is needed to meet load demand in Wheeler Ridge area under N-1 conditions. While weighing the alternatives of installing a new 230/115 kV transformer versus a new 230/70 kV transformer, the CAISO recommended the latter alternative. The reason is that the 230/70 kV transformer is not only less expensive but also more suited to the existing electrical configuration.

Project No 21	East Nicolaus Area Reinforcement
Operating date	May 2011 or earlier
Status	The Cal-ISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. Please rename this project to East Nicolaus #2 115/60 kV transformer replacement. Also, since this is an existing problem, the project should be expedited as much as possible.

Project No 22	Valley Springs #1 60 kV Line Reconductor
Operating date	May 2011
Status	The Cal-ISO does not approve this project.
Justifications	After a review of the information provided by PG&E, the Cal-ISO has concluded that while PG&E has demonstrated that mitigation is required to meet ISO Grid Planning Standards, there is insufficient information available for the Cal-ISO to make a reasonable, technical assessment that certain proposed projects are both prudent and technically sound. As a result the Cal-ISO approval could not be provided at this time. The Cal-ISO requests PG&E to resubmit these projects with the required analysis as soon as possible, but no later than the completion of the 2007 Electric Transmission Grid Expansion Plan. This section also includes Cal-ISO comments on some potential transmission projects not yet submitted for Cal-ISO approval

Project No 23	Missouri Flat-Gold Hill 115 kV Lines
Operating date	May 2011 or earlier
Status	The Cal-ISO grants approval for this project.
Justifications	It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The CAISO is requesting that these lines be reconductored with the highest capacity conductor possible for the existing towers and no less then 954 SSAC. Also, since these are existing problems, the project should be expedited as much as possible. If the existing towers can not take the weight of this conductor and the project reverts to 477 SSAC then please prepare additional projects in this area in order to eliminate all category B and C criteria violations (see 2008 or 2010-2012 CAISO LCR reports).

Project No 25	Vaca Dixon – Birds Landing 230 kV Line Reconductoring - Reconductor the Vaca Dixon – Peabody, Vaca Dixon – Lambie and Lambie – Birds Landing 230 kV lines with 1113 ACSS conductors or equal.
Operating date	May 2009
Status	CAISO grants approval for this project
Justifications	This project is estimated to cost more than $20 million and as such, requires specific CAISO Board Approval. It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. Planning analysis concluded that under minimal wind generation and with Contra Costa Units 6 and 7 offline, outage of the Vaca Dixon – Peabody 230 kV line during 2008 summer peak load conditions could overload the Lambie – Birds Landing 230 kV circuit. Similarly, an outage of the Lambie-Birds Landing 230 kV line could overload the Vaca Dixon-Peabody 230 kV line. Furthermore, with the anticipated addition of new generating facilities in the north, loading on these 230 kV lines would also increase. By 2011, an outage of the Vaca Dixon-Peabody 230 kV line could overload both the Vaca Dixon-Lambie 230 kV line and the Lambie - Birds Landing 230 kV line. The proposed reconductoring will mitigate the potential overloads.

SCE Service Area

Project No 1	Install 500kV Circuit Breakers for 500/230kV AA-Bank at Mira Loma Substation
Operating date	June 1, 2009
Status	CAISO grants approval for this project.
Justifications	Currently the 500/230kV 3AA transformer bank is connected to the 500kV bus via a disconnect switch. If there is a fault on the high side of the 3AA bank, and the circuit breaker in the adjacent bay got stuck, this event would have taken out the additional AA-bank (2AA bank). Installation of a 500kV circuit breaker to replace the disconnect switch for 3AA bank would mitigate this event. In addition, having the high side 500kV circuit breaker for 3AA bank would provide operational flexibility for removing the 3AA bank for maintenance.

Project No 2	Install 500kV Circuit Breakers for 500/230kV AA-Banks at Vincent Substation
Operating date	December 1, 2008
Status	CAISO grants approval for this project.
Justifications	Currently the 500/230kV 1AA and 2AA transformer banks are connected to the 500kV buses via disconnect switches. If there is a fault on the high side of either transformers, or the circuit breaker on other bay got stuck, this event would have taken out either the additional AA-bank or 500kV line. Installation of 500kV circuit breakers on the high side of these AA-banks would mitigate this event. In addition, having the high side 500kV circuit breaker for AA bank would provide operational flexibility for removing the AA bank for maintenance.

Project No 3	Install 500kV Circuit Breakers for 500/230kV AA-Banks at Lugo Substation
Operating date	December 1, 2011
Status	CAISO grants approval for this project.
Justifications	Currently the 500/230kV 1AA and 2AA transformer banks are connected to the 500kV buses via disconnect switches. If there is a fault on the high side of either transformers, or the circuit breaker on other bay got stuck, this event would have taken out an additional 500kV line. Installation of 500kV circuit breaker on the high side of AA-banks would mitigate this event. In addition, having the high side 500kV circuit breaker for AA banks would provide operational flexibility for removing the AA banks for maintenance.

Project No 4	Helijet Shunt Capacitor Banks
Operating date	June 1, 2009
Status	CAISO grants approval for this project.
Justifications	Post-transient analyses indicated that the voltage at Helijet 66kV Substation would be subject to voltage deviation more than 5% for single element contingency of Antelope – Anaverde – Helijet 66kV line. It is proposed to install a 66kV 28.8 MVAR shunt capacitor at Helijet Substation to mitigate the post-transient voltage dip concern.

Project No 5	Frazier Park Dynamic Voltage Support
Operating date	June 1, 2009
Status	CAISO grants approval for this project.
Justifications	Post-transient analyses indicated that the voltage at Frazier Park and Gorman 66kV Substations would be subject to voltage deviation of about 12% for single element contingency of Bailey - Gorman 66kV line. It is proposed to install a 66kV 12 MVAR Dynamic VAR support at Frazier Park to mitigate the post-transient voltage dip concern. Vernier control (i.e., continuous control) of the dynamic reactive support is required to limit the change in voltage for the post-contingency condition to stay within WECC post-transient voltage dip limit. Switching of a static shunt capacitor, however, does not mitigate the change in voltage to stay within WECC post-transient voltage dip limit.

SDG&E Service Area

Project No P00153 Reconductor TL13837, Capistrano – Laguna Niguel

Operating date June 2010

Status CAISO grants approval for this project and recommends to change the operational date

Justifications: This project increases the transmission capacity to Laguna Niguel Substation and has been based on load growth and Reliability. The projected peak loads in 2010 at Laguna Niguel and San Mateo are 104.4MW and 34.7MW, respectively. The project was previously approved with the in-service date of 2010. It may be needed sooner than 2010 depending on the load growth. With an outage of the Talega-San Mateo 138 kV line, loading on the Capistrano-Laguna Nigel line might exceed the capacity of the transmission line, according to the SDG&E load forecast. The CAISO recommends accelerating the project's in-service date.

Project No P03183 Reconductor TL678, Los Coches - Alpine

Operating date June 2010

Status CAISO grants approval for this project.

Justifications: The project calls for the reconductor of 8.2 total miles of 69 kV circuit TL678 from Los Coches to Alpine Substations. 6.8 miles will be reconductored from 1-336 ACSR to1- 636 ACSR/AW, and 1.4 miles will be reconductored from 1-336 ACSR to 2-336 ACSR/AW to achieve a minimum circuit rating of 95MVA.

Advancement of the project to the 2010 was recommended by the CAISO, and the CAISO approves the 2010 in-service date.

Project No P061XY	Reconductor TL13812, Talega-San Mateo
Operating date	June 2009
Status	CAISO grants approval for advancement of this project.
Justifications:	This project increases the transmission capacity to San Mateo Substation and has been based on Load Growth and Reliability. The projected peak loads in 2009 at Laguna Niguel and San Mateo are 103.5MW and 34.3 MW, respectively. The in-service date for this project is dependent upon the load forecast at Laguna Niguel and San Mateo. SDG&E will continue to evaluate the in-service date for this project based on new load forecasts. The CAISO approves advancement of this project. In the CAISO estimate, according to the SDG&E load forecast, reconductoring may be needed even sooner unless the line has an emergency rating.

Project No P00154	Reconductor TL13802B, Shadowridge - Calavera Tap
Operating date	June 2009
Status	CAISO review of this project is still in progress. Additional justification for the project is required.
Justifications:	Since the project is needed for an N-1-1 outage (SWPL out of service with another outage) and overload is not significant and occurs only with high Encina generation, the CAISO recommends to evaluate such an alternative as re-dispatching generation after the SWPL outage to mitigate this overload instead of reconductoring the line and requests to provide additional information that the reconductoring is the optimal alternative.

Project No P07XXY	New 230, 138 kV Capacitors: Mission, Telegraph Canyon, and Sycamore Canyon Substations
Operating date	June 2009
Status	CAISO review of this project is still in progress. Additional information is required.
Justifications:	Even if the CAISO agrees that additional reactive support is needed, we request SDG&E to provide study results that would justify the capacitors' locations and sizes. Study results needs to be provided that would prove that no additional reactive support is required prior to 2010 (what was the worst outage, if it was Imperial Valley-Miguel, justification is needed that no additional reactive support was required with the maximum flow on this line), and the study results for 2010 that would show what was the margin deficiency and that the selected capacitor locations and sizes were the optimal.

Project No P02161	New 69 kV line: TL6942, Miramar - Sycamore Canyon
Operating date	N/A
Status	This project is cancelled
Justifications:	The project justification has been eliminated due to the completion of projects P0100-Reconductor of TL6916 (Sycamore-Scripps) and the Sycamore 230/138 kV transformer. Additionally, a new 230 kV line from Sycamore to Penasquitos (included in the 500 kV Sunrise Powerlink plan of service) would reduce the contingency loading on TL6916. The CAISO approves cancellation of this project.

Project No P07XXX	Reconductor TL6915, TL6924: Pomerado-Sycamore
Operating date	June 2009
Status	CAISO grants approval for this project.
Justifications:	This project is driven by load growth at the Pomerado, Poway, and Rancho Carmel substations. The loss of one Pomerado-Sycamore circuit loads the other above its normal rating. Each line has an emergency rating of 136 MVA (9-hour) and 143 MVA (one half-hour). However, loading curves for Pomerado substation show that the lines may remain highly loaded for longer than nine hours, exceeding the capability of the circuit. The CAISO approves this project.

Project No P06131	Loop-in TL13825: Shadowridge 138 kV Switchyard
Operating date	June 2009
Status	CAISO grants approval for this project.
Justifications:	Based on the 2007 system configuration, TL13825C (Shadowrige-Meadowlark Tap) could be overloaded by 28% for the loss of TL13801 (Encina-Cannon). This proposed project will eliminate the overload problem and increase transmission capacity at Shadowridge to provide adequate support for a total of 9 MW of load transfer from Melrose helping to eliminate the reconductoring of TL680B & TL693 (San Luis Rey-Melrose-San Marcos 69 kV lines) and Escondido Bank 50 upgrade. This project also supports the area long term plan for a new distribution substation. The CAISO concurs with the needs of this proposed project.

Project No P6133	New 230/138 kV Transformer: Miguel Substation
Operating date	June 2009
Status	CAISO grants approval for this project.
Justifications:	This is a project that will support the 138 kV system once the South Bay 138 kV bus is eliminated. The CAISO concurs with the needs of this proposed project and approve this project as part of this planning cycle.

Appendix C: Recommendations on Proposed Projects costing more than $50M

Project No 3	Central Coast Switching Station - Install a new 115 kV Switching Station at the site of the existing Lagunitas Switches.
Operating date	May 2009
Status	This project requires CAISO Board of Governors approval
Justifications	This project is estimated to cost more than $50 million and as such, requires specific CAISO Board Approval. It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. With continuing growth along the Highway 101 corridor, additional distribution substations will be needed. There are plans to re-establish the San Justo Substation, which is east of Hollister, by 2009. And a new Natividad Substation in north Salinas is expected by 2010. Both of these distribution substations would be fed from the Moss Landing-Salinas-Soledad 115 kV lines. In addition, Distribution Planning expects to construct several new substations between Gilroy and Hollister in the next 10 to 15 years, depending upon area load growth. The proposed new 115 kV switching station at the location of the Lagunitas Switches would solve capacity and reliability problems over the long-term for the local 115 kV transmission system in this area. Installation of a new substation will greatly decrease the duration of 115 kV outages experienced at Hollister, Salinas and Soledad substations. The new Central Coast Switching Station will facilitate reconfiguration of the 115 kV transmission systems to provide more reliable looped connections to the existing substations at Hollister, and Prunedale; and to the future planned substations at San Justo and Natividad. In addition, the reconductoring of the 115 kV line sections between Moss Landing and the new substation, combined with the Hollister 115 kV Line Reconductoring Project, will provide sufficient transmission capacity to the area for the next 15 years.

Project No 6 San Francisco 115 kV Recabling Project - Reconductor the two Potrero-Bayshore-Martin (A-H-W) Nos. 1 and 2 Cables and the Martin-Hunters Point (H-P) Nos. 1 and 3 Cables with 2000 kcmil CU cables. Station equipment at the line terminations will be upgraded, as needed, to meet the new circuit capabilities.

Operating date: March 2010

Status: This project requires CAISO Board of Governors approval

Justifications: This project is estimated to cost more than $50 million and as such, requires specific CAISO Board Approval. It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability.

Pacific Gas and Electric Company's 115 kV transmission network in San Francisco delivers power to five substations. This system is connected to the bulk transmission system at Martin Substation via five 115 kV underground transmission lines:

- Potrero-Bayshore-Martin (A-H-W) Nos. 1 and 2 lines
- Martin-Hunters Point (H-P) Nos. 1 and 3 lines
- Martin-Larkin (H-Y) No. 1 line

The majority of the power to the 115 kV stations ihn San Francisco is transmitted over these five "import" lines. The remaining power is presently supplied from Mirant's Potrero Power Plant. The underground cables on these five circuits were installed over 40 years ago. The cables are pipe-type construction, with a nitrogen-cooling system to cool the cable conductors. Cable sizes are 1000 and 1250 kcmil copper. Several years ago, PG&E implemented short-term interim emergency ratings for these five circuits. Studies conducted by the CAISO and PG&E over the last three years have shown that the load-serving capability of the transmission system serving San Francisco is limited by these 115 kV import lines. The proposed reconductoring would mitigate the potential limitations and replace the interim emergency ratings that were established as part of the CAISO Action Plan for San Francisco.

Project No 8	Embarcadero-Potrero 230 kV Cable - Vaca Dixon – This alternative proposes to construct a new 230 kV line between Embarcadero Substation and Potrero P.P. Substation. A new 230 kV circuit breaker will be installed at Embarcadero. At Potrero, the 230 kV line will be terminated in a new 230 kV bus to be constructed, and a new 230/115 kV transformer will be installed to connect the 230 kV bus with the 115 kV buses.
Operating date	May 2012
Status	This project requires CAISO Board of Governors approval
Justifications	This project is estimated to cost more than $50 million and as such, requires specific CAISO Board Approval. It has demonstrated that the preferred alternative is a prudent and technically sound solution to the identified reliability criteria violations. The propose project is to meet future electric demand increase and improve grid reliability. The majority of San Francisco's power needs are satisfied by power imported from Martin Substation. Power imported from Martin Substation is delivered to distribution substations within the City by separate 230 kV and 115 kV systems. Two, seven-mile 230 kV underground cables deliver power to Embarcadero Substation, which supplies the downtown area. The 230 kV cables were installed in 1974. The Trans Bay Cable (TBC) HVDC Project, being constructed by Babcock & Brown, will deliver up to 400 MW of power from Pittsburg to Potrero and is scheduled to be operational in Spring 2010. This new Potrero-Embarcadero 230 kV cable will both deliver power from the TBC to downtown electric loads and assure reliability under over-lapping outage of the two cables between Martin and Embarcedero Substations.

Project No P6130	Construct 2nd 230 kV line: Encina-Penasquitos
Operating date	June 2009
Status	This project requires CAISO Board of Governors approval
Justifications:	The overload occurs with the SWPL out of service, high Encina generation and one more transmission line out (N-1-1). The Project is required to maintain the South of SONGS path rating and for the system reliability to allow the South Bay generation to retire.

Project No P06132	Relocate South Bay Substation
Operating date	December 2010
Status	This project requires CAISO Board of Governors approval
Justifications:	The Project's in-service date is December 2010, and the South Bay Power plant is scheduled to retire in December 2009. A plan is required to provide for the system operation between December 2009 and December 2010 when the South Bay plant retires and the South Bay Substation relocation project is not completed yet. Since the cost of the project is very high, breakdown of the costs (cost of each of the upgrades) needs to be provided. Also, power flow study results needs to be provided to confirm reliable system operation. It is not clear what amount of additional reactive support, if any will be required for the project. The project will be presented to the CAISO Board of Governors after the additional more detailed information is provided.

Appendix D: Stakeholder Comments and Responses

CAISO appreciates comments from stakeholders during the course of 2008 CAISO Transmission Planning Process. Table F-1 below is the matrix showing received comments and responses.

Table D-1 Stakeholder Comments and CAISO Responses

No	Entity	Subject	Comment	Responses
Comments received after the first CAISO Transmission Plan Stakeholder meeting on June 11, 2007				
B1	BAMx	General Comments - Timing	Opportunity for stakeholders to offer proposed projects after deficiencies are identified in the system performance assessments	CAISO believes the implementation of FERC 890 compliance and continuing improvements on the CAISO planning process will eventually address this issue.
B2	BAMx	Objectives: Probabilistic study	More clarification of the probabilistic analysis is needed	Since this initiative is just start in late 2007 and will continue in 2008, more details on its scope and methodology will be provided during 2008 planning cycle.
B3	BAMx	Objectives: LT-CRR, and each PTO	More details on the methodology on Long-Term CRR study also more clarifications on various issues	More details have been provided through a white paper issued on July 25, 2007, various stakeholder meetings, and the transmission plan report. Furthermore, CAISO will continue to improve the study plan as suggested by stakeholders
B4	BAMx	Short Term Plan	More information regarding operations concerns should be provided through a password-protected web page	More information related to the short-term plan should be available through the Economic Planning Study and MRTU

Comments received after the second CAISO Transmission Plan Stakeholder meeting on November 20, 2007				
No	**Entity**	**Subject**	**Comment**	**Responses**
B1	BAMx	Approval Standards	The CAISO should adopt standard defined terminology describing the reasons to approve a transmission project, thereby allowing all stakeholders to utilize the same terminology and thus greatly enhancing our communications and comments.	The CAISO has attempted to utilize terms consistently and has modified the BPM and tariff in response to BAMx comments. However, the CAISO continues to believe that the terms should not be defined in a manner that is too prescriptive and prevents the flexibility necessary to adapt to the specific circumstances of proposed transmission upgrades.
B2	BAMx	Request Window	BAMx and others have previously noted that the requirements for stakeholders to propose projects in November of year X-1 for year X grid plan is discriminatory and unworkable. While the 3rd Draft of the BPM in compliance with FERC Order No. 890 obligates "PTOs economic transmission upgrades or additions" to follow the Open Season process, it has not been made clear, as mentioned above, on what distinguishes an "economic project" from one that is defined as "reliability transmission upgrades or additions" when project justifications are inconsistently classified.	The CAISO does not believe the open season proposal is discriminatory or unworkable. The open season serves several purposes. First, the open season provides a time for the CAISO to seek and entities to information that can be used to develop the next year's Study Plan, including a description of anticipated transmission needs and other infrastructure concerns that may be address by the Transmission Planning Process. Second, the open season provides an opportunity for parties to propose specific solutions to address problems, concerns or results generated by the prior year's Transmission Planning Process. Accordingly, the CAISO believes the schedule and structure of the open season is reasonable for its intended purpose and allows all parties to propose economic transmission projects. While all transmission projects have potential economic and reliability value, the CAISO believes its definitions are sufficient to enforce the distinction and the need for participation in the open season.

No	Entity	Subject	Comment	Responses
B3	BAMx	Approval Process	The timing of projects and their approval process remain confusing and opaque to stakeholders. Complete guidelines should be developed statewide for requesting CAISO approval.	The timing of approval is described. Projects with estimated capital costs of less than $50 million are anticipated to be part of the Transmission Plan Report, which will be completed and presented to the Governing Board in January. Projects within this category included in the Transmission Plan Report have already been approved by CAISO management. Other projects that require Governing Board approval may or may not, because of study complexity, be completed in time for inclusion in the Transmission Plan Report and may be presented to the Governing Board on a separate schedule determined during the development of the Study Plan.
B4	BAMx	Biennial Process	We recognize an overall limitation of resources to make improvements to the CAISO planning process. Ideally resources need to be added so that meaningful results are available to stakeholders about mid-year, not in December. One suggestion on ways to improve the process without necessarily increasing the resources applied is to go through a biennial transmission planning process. We recognize that would require a change in the tariff language and associated BPMs, but given FERC Order No. 890 compliance and MRTU tariff proposals, this may be an opportune time to consider a biennial planning process.	If experience demonstrates that further refinement to the Transmission Planning Process is necessary, the CAISO will again proceed by means of a stakeholder process in which BAMx will have the opportunity to raise this issue.

No	Entity	Subject	Comment	Responses
N1	NCPA	CAISO Transmission Plan	CAISO wide planning studies to put together the forward looking efforts of the three PTOs should be included in the transmission plan	CAISO will consider this suggestion in the following planning cycle.
N2	NCPA	ISO Short Term Plan	Recommendation for further improvement: Each of the recommended upgrades should be supported by data of congestion costs incurred	CAISO anticipates more information and the implementation of MRTU and Economic Planning study will address this issue by providing better information regarding congestion cost from market operation.
N3	NCPA	The Economic Planning Study	Lacking or inadequacies of data will affect the performance and economics of the project under study. A pilot project should be selected and studies performed before any theoretical proposed plan is made into an accepted methodology	CAISO intends to perform Economic Planning Study based on TEAM methodology using WECC database. This should provide a good start of economic data sufficient for this type of study. However, any further improvements on the database can be done once they become available. Furthermore, any technical difficulties shall be addressed during the course of Economic Planning Study implementation starting in 2008.
S1	SCE	Deliverability Assessment	Request update of the status of the Deliverability Assessment by Mid January.	CAISO agrees to provide this information
S2	SCE	FERC 890 - Availability of Information	Request CAISO to provide clarity how information regarding projects that have a system-wide impact will be made available	As identified in the BPM, the information of network upgrades will be provided in the future transmission plan report
S3	SCE	LCR Analysis	Request CAISO share the results of its long-term LCR study during the next stakeholder meeting	CAISO agrees to provide this information
S4	SCE	Economic Planning Study	Request CAISO staff provide an update on the status of expected supplemental studies associated with DPV2 Line project	CAISO believes this request does not belong to Economic Planning Study and will be addressed later in an appropriate forum

Comments received after the third CAISO Transmission Plan Stakeholder meeting on December 19, 2007				
No	**Entity**	**Subject**	**Comment**	**Responses**
B1	BAMX	Comprehensive analysis of multiple projects	Suggest a comprehensive analysis of separate efforts as a whole e.g. Bay area 500 kV and C3ETP projects	CAISO will consider this suggestion in the next and future planning cycles
B2	BAMX	Timing Concerns	Availability of Long-Term LCR and other study results	During the 3rd CAISO Transmission Plan stakeholder meeting, CAISO discussed LT-LCR study results with stakeholders and posted this study report on December 28, 2007. Furthermore, CAISO continue to improve its planning process in accordance with its FERC Order 890 compliance that was filed to FERC on December 21, 2007 that should result in better timing in its planning process.
B3	BAMX	Project Justifications	Better delineation between Reliability and Economic projects should be provided	CAISO agrees that clear definitions of these 2 types of projects are needed. Section 4 of the BPM provides the delineation between Reliability and Economic project and it should be used accordingly.
B4	BAMX	Application of Reliability Standards	Reliability Standards: Application of the standards, More transparency in using reliability standards. More details e.g. criteria violations and contingency driven the violations should be presented as part of reliability projects	CAISO agrees to continue improving on the details of transmission projects and appreciates several good questions that were raised in the comments. Also, CAISO believes the question such as upgrades regarding N-2 and load shedding requires more attention and anticipates more discussion regarding this issue in the CAISO Transmission Plan stakeholder meetings.
B5	BAMX	Require further clarifications	Items 1, 18: Describe the term "Economic Planning Study"	Section 4.1.3 of this report already provides more details of the Economic Planning Study.
B6	BAMX	Require further clarifications	Items 2-3: The scope of the 2nd transmission plan stakeholder meeting	The write-up provides of the scope based on the compliance filing (BPM) that will start its implementation in 2008. To prevent any confusion, this part has been removed

No	Entity	Subject	Comment	Responses
B7	BAMX	Require further clarifications	Item 4: The evident stakeholder comments from previous meeting have been addressed	According to stakeholder comments on the 2nd CAISO Transmission Plan stakeholder meeting, the following comments/requests were addressed during the 3rd meeting: 1) The presentation of long-term LCR was added in the agenda 2) LCR section in the transmission plan report and 3) Modifications of tables 3-4 through 3-8 to further clarify "type" of transmission projects (e.g. Reliability verses Economic) are examples of the responses to stakeholder comments
B8	BAMX	Require further clarifications	Item 5: Further opportunities should be provided for stakeholders to comment on the CAISO finalized Transmission Plan	Considering the transmission planning is a recurring process and ample opportunities have been provided throughout a planning cycle, CAISO does not believe another round of comment period is needed.
B9	BAMX	Require further clarifications	Items 6, 20: Further describes the details of approved mitigation projects including Appendix B	Please see B4
B10	BAMX	Require further clarifications	Items 8-9, 15: Clarifications of Congestion Concerns under Short-term plan	CAISO anticipates the implementation of MRTU and Economic Planning study will provides better information and clear definitions of these terms
B11	BAMX	Require further clarifications	Item 10: Is 100 MW is the break point for proposing project to eliminate an overload for an N-1-1 vs. allowing the controlled dropping of firm load	This is only general guidelines for San Diego area – not directly relating to how a transmission project to be proposed.
B12	BAMX	Require further clarifications	Items 11-14: The CAISO should strive to achieve consistency in defining purpose and benefit in the table	CAISO agrees to make further improvement on this issue

No	Entity	Subject	Comment	Responses
B13	BAMX	Require further clarifications	Item 17: The terminology, congestion concerns should be better defined	Please see B10 for the future plan as well as footnote 12 for more explanation. Also, CAISO agrees to make further improvement on this issue.
B14	BAMX	Require further clarifications	Item 19: More details of LOLE study	At this time, CAISO just starts this initiative through a stakeholder process. More details will be provided through future stakeholder meetings and transmission plan report.
B15	BAMX	Require further clarifications	Item 21: Corrections in Appendix C to show $50 Million as the threshold for board approval	Implemented
R1	RTO Advisors	Long-Term LCR	Why PG&E planned upgrades do not result in LCR reduction	The PG&E planned projects do account for reduction in LCR requirements do of smaller magnitude (see Humboldt, Sierra, Stockton) because these projects are smaller in nature 60, 115 and some 230 kV. The great decreases in Southern California are all due to major 500 kV projects not envisioned yet for Northern California.
R2	RTO Advisors	Long-Term LCR	What CAISO foresee of any new Local Reliability Areas in 2018	The creation or elimination of LCR areas is a function of transmission configuration as well as new/retired generation and or load addition to the grid and it will be updated through the years as tings change. At this point in time the CAISO does not foresee the creation or elimination of any significant LCR area. Small changes may be possible as stated above.
R3	RTO Advisors	Long-Term LCR	Provide the link to the latest Long-Term LCR study	The final transmission plan report includes a link to detail information of this study report (http://www.caiso.com/1ca5/1ca5d8334b920.html)

No	Entity	Subject	Comment	Responses
R4	RTO Advisors	Long-Term LCR	Explain on the statement on the presentation "local needs are no longer binding" and the "zonal needs" may be reached first in LA Basin	For detail information please read the 2010-2012 Local Capacity Study Report posted at: http://www.caiso.com/1ca5/1ca5d8334b920.html
R5	RTO Advisors	Long-Term LCR	Forecast of any expected modifications to the current zonal allocations for LSEs	At this point in time, the CAISO does not foresee any change in the current zonal allocation process for LSEs
S1	SCE	Long-Term LCR	Request sensitivity study LT LCR without DPV2 for both B and C	The CAISO will take your "sensitivity request" under advisement and the completion of work will greatly depend on the CAISO staff time committed on doing other corporate assignments. There were no upgrades modeled for the West of Devers in both base cases.
S2	SCE	Long-Term LCR	Request detailed modeled for WOD upgrades in 2010, 2012	
S3	SCE	Long-Term LCR	List of transmission projects In Big Creek/Ventura in 2010 and 2012 LCR	Projects, with LCR significance, that are in service and modeled in the base cases have been summarized under the generation table for each area independently (see detail write-up) in the 2010-2012 Local Capacity Study Report posted at: http://www.caiso.com/1ca5/1ca5d8334b920.html
S4	SCE	Transmission projects	Request the scope of WOD 230 kV rebuild project	For consistency of the information in the transmission plan report, at this time, detailed information of each transmission project requires CAISO board of governors approval should be available though other sources such as board package. However, if needed, CAISO may provide summary of this type of project in the next transmission plan report.

No	Entity	Subject	Comment	Responses
S5	SCE	Transmission projects	Generation assumptions for FPL-Blyth and CPV-Ocotillo project	These two generation projects were modeled in the reliability assessment base cases.
S6	SCE	Transmission projects	Impact on the delay of the Devers-Mirage #3 230 kV over the congestion in West of Devers area, Target date for seeking board approval for this project	At this time, the schedule for this project is still to be determine. CAISO will continue to provide the updates on this project once the information become available
S7	SCE	Tehachapi project	Some corrections and suggested write-up for this project	CAISO appreciates the additional information and agrees to make these changes
S8	SCE	Tehachapi project	Tehachapi diagram should be revised	CAISO agrees to make this change in the report
S9	SCE	Conclusions and next steps	More details regarding LCR conclusion	Please see S1-S3

List of Figure

List of Table