Exhibit No.: _________________
Commissioner: Peevey
Administrative Law Judges: Wetzell and Gottstein
Witness: Robert Sparks

**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA**

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| Order Instituting Rulemaking to Promote Policy and Program Coordination and Integration in Electric Utility Resource Planning | R.04-04-003 |

# JOINT REBUTTAL TESTIMONY OF ROBERT SPARKS AND PHILIP PETTINGILL REGARDING THE LONG TERM PROCUREMENT PLANS OF THE INVESTOR OWNED UTILITIES ON BEHALF OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR

**Submitted by the California Independent System Operator**

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August 20, 2004

**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA**

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**Submitted by the California Independent System Operator**

Q. Please state your name, title, and employer.

A. My name is Robert Sparks. I am a Lead Grid Planning Engineer in the Grid Planning Department of the California Independent System Operator Corporation (CA ISO).

A. My name is Philip Pettingill. I am Manager of Policy Development in the Regulatory Policy Department of the California Independent System Operator Corporation (CA ISO).

Q. Are you the same Robert Sparks and Philip Pettingill that submitted opening testimony in this proceeding on behalf of the CA ISO on August 6, 2004?

A. Yes we are.

Q. What is the purpose of your testimony?

A. The purpose of our testimony is to respond to certain comments made in intervenor testimony submitted in this proceeding on August 6, 2004. Consistent with our earlier testimony, our rebuttal comments focus on locational capacity requirements, coordination between the CA ISO Grid Planning Process and the investor owned utilities' (IOUs) long-term procurement plans (LTPP), issues relating to



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reliable operation and efficient expansion of the transmission system and deliverability of resources in the LSE portfolios. In particular, we respond to comments made by The Utility Reform Network (TURN) and the Border Generation Group. Also, rather than supplement the earlier testimony of Robert Sparks, I take this rebuttal opportunity to clarify one aspect of my prior testimony relating to San Diego Gas & Electric Company's (SDG&E) LTPP.

## I. TURN

Q. (Mr. Sparks) At page 13, TURN witness, Kevin Woodruff, confirms that local reliability issues must be addressed as part of the Commission's resource adequacy requirement (RAR), but that none of the current methods for identifying and resolving local reliability issues are satisfactory. Do you agree with TURN's assessment?

A. Yes, to the extent Mr. Woodruff is referring to currently approved or implemented methods. However, to the extent Mr. Woodruff is implying that the current record in this proceeding fails to include satisfactory methods for addressing local reliability issues, the CA ISO would disagree. The CA ISO has proposed a methodology for addressing the combined generation and transmission requirements of load pockets that is based on well-established methodologies that are currently used to plan the PJM, NY ISO, and ISO NE systems. The CA ISO's proposal was detailed in the resource adequacy workshops and included as Appendix D, "Straw Person Deliverability Proposal," to the Workshop Report on Resource Adequacy Issues compiled by Administrative Law Judge Cooke. In response to intervenor comments on the Workshop Report, the CA ISO has modified and enhanced the methodology set forth in its Straw Person Deliverability Proposal. A copy of this modified version of the Straw Person Deliverability Proposal is attached.

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Q. (Mr. Pettingill) TURN also implies that it is not critical for the Commission to address local reliability issues in this phase of the proceeding because of the Commission's "ability to take *ad hoc* action." Do you agree?

A. The CA ISO disagrees with Mr. Woodruff's response where he states that "[c]urrent methods for addressing local reliability issues, combined with the Commission's ability to take *ad hoc* action, appear capable of addressing local reliability issues until the end of 2005." While true that the Commission took proactive steps to address local reliability issues in its *Interim Order Regarding Reliability Issues* (Reliability Order), dated July 8, 2004, the Reliability Order specifically states that its provisions are to remain effective until the earlier of the end of 2005 or other action is taken in this proceeding. In order to have coherent, long-term methods to resolve local reliability issues in place by the end of 2005, the Commission should begin to address these issues in this phase. This is especially true given that this phase is not intended to reach conclusion until approximately December 2004.

Q. (Mr. Sparks) How should the Commission address the issue of local reliability in this proceeding?

A. In this phase, the Commission should address two major implementation issues. First, the Commission must address the threshold issue of establishing load pocket criteria such as 1 day in 10 year LOLP described in the attached Straw Person Deliverability Proposal. Second, the Commission should set-up a schedule through its order on the LTPPs or, preferably in the upcoming order on RAR issues, for performing the analysis necessary to fine-tune the methodology set forth in the CA ISO's proposal.

Q. (Mr. Sparks) At page 18, TURN states that the IOUs' LTPPs are sufficient to meet the RAR obligations, as currently defined, faced by the IOUs in their roles as load-serving entities. Do you believe this statement is accurate?

A. Maybe, depending on what Mr. Woodruff intended. The LTPPs appear to adequately identify overall resource needs for each of the IOUs, but they do not adequately identify their resource needs on a locational basis. The CA ISO notes that there is no final determination on deliverability or local reliability elements to completely define the RAR requirement. However, the CA ISO believes that the current RAR obligations, as defined by the Commission in Decision 04-01-050 and the Reliability Order, clearly impose a deliverability and local reliability obligation on the IOUs. Mr. Woodruff, therefore, appears to ignore that deliverability and local reliability requirements are part of RAR obligations. Much of my prior testimony is dedicated to detailing information gaps in the LTPPs that prevent an accurate assessment of whether the IOUs have adequately addressed, even on a general level, deliverability and local reliability concerns.

Q. (Mr. Pettingill) Also on page 18, Mr. Woodruff states that the current capacity surplus in California should enable the IOUs to meet their residual net short capacity needs through 2008. Do you agree?

A. As an initial matter, it appears that an underlying goal of Mr. Woodruff's testimony is to refute arguments that there is a need to "lock up" capacity now by accelerating the phase-in of the RAR. TURN's view is shortsighted and implicit in Mr. Woodruff's conclusion are several assumptions that the CAISO believes are unwarranted or, at a minimum, imprudent. Although there presently remains some excess capacity under optimal conditions (scenario of base demand and favorable resource availability), it should not be assumed that there will be excess capacity available to serve California load between 2006 and 2008. The CAISO believes the near-term potential for the "mothballing" and/or retirement of 3,000-4,000MW of generating units is very real and cannot be ignored. The CA ISO's Five-Year



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Assessment shows convergence in the supply-demand balance between 2004 and 2008, and does not reflect the possibility that nearly 4,000 MW of aging capacity could retire or be mothballed over the next several years without commitments by LSEs meeting their RAR obligations.

TURN also assumes that simply because there is a capacity surplus today, this capacity will be available to serve California load if it is not committed now. For example, low hydro conditions in upcoming years could turn a capacity surplus into a capacity deficit. Further, load is growing at a rapid pace throughout the West, while the number of potential resource additions planned in California have declined. Many new generation projects that were in progress in 2003 are either on-hold or have been outright cancelled. Increasing load without a corresponding increase in new generation will increase operational dependence on existing resources.

To expand on one point, generation development in California has slowed considerably. As a direct result, load growth in other states will compete with California load for a finite set of supplies in upcoming years. Under these circumstances, there is no guarantee that existing supplies will be available when California needs them, especially if there is a region-wide heat wave and/or a low hydro year. Accordingly, contrary to TURN's testimony, the current capacity surplus does not ensure that IOUs will be able to meet their residual net short needs through 2008 without "locking-up" such supplies. This can best be accomplished by accelerating the full phase-in of the planning reserve margin to summer 2006.

Q. (Mr. Pettingill) In regards to acceleration, doesn't TURN argue that acceleration will do little or nothing to preserve existing resources through 2008?

A. Yes. Mr. Woodruff is correct that, as between acceleration of the RAR phase-in and currently allowing the IOUs to procure capacity for periods of up to five years, the latter would have a more significant effect on keeping existing capacity operating through 2008. However, these points are not mutually exclusive. IOUs need the ability to procure capacity. However, the ability to procure without a concomitant obligation does not ensure that that the necessary commitments will be made to ensure resource adequacy in 2008. Therefore, the level and timing to which they are conducting their procurement activities should be the accelerated phase-in to a planning reserve margin of 15-17% by June 2006.

Moreover, I do not believe the impact of acceleration would be insignificant. Mr. Woodruff calculates that the potential maximum impact of accelerated phase-in is 1,193 MW in 2006, but that retirement of this full amount is unlikely. His conclusion rests on the fact that the failure to secure a contract does not necessarily mean the unit will be unprofitable and because asset owners will not "write off" the remaining value of the asset simply if they are unprofitable for a year or two. However, the CAISO has received formal notification that some large older generators may retire prior to 2005 in the event they do not receive bilateral contracts. Further, Mr. Woodruff is correct that some unprofitable generators may elect to operate units at a loss until market conditions change. But, to the extent suppliers choose to mothball (not retire) an unprofitable unit until needed to satisfy a more gradual phase-in of the RAR, it should be noted that re-commissioning the unit can take from one-to-six months. As such, mothballed units cannot be considered available to meet adverse conditions that may occur in the short term.

Q. (Mr. Sparks) At page 24 of TURN's testimony, Mr. Woodruff implies that the CA ISO's Five-Year Assessment suggests that the state has an additional one or two years after 2008 before it needs to add resources. Do you agree that this is the conclusion reached by the CA ISO's Five-Year Assessment?

A. No for two reasons. First, the Five-Year Assessment did not evaluate 2009 and beyond. Second, Table 1 of the Five-Year Assessment concludes that under the base forecast, system-wide reserves will be 9.7% in 2008. This amount coupled with the CA ISO's operating reserve requirement of 6.6% totals approximately 16% in 2008. This shows that in order to continue to keep pace with load growth while



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maintaining the Commission-mandated 15-17% planning reserve margin, additional resources could be needed in 2009.

**II. The Border Generation Group**

Q. (Mr. Sparks) On Page 11 of Mr. Jim Kritikson's testimony on behalf of the Border Generation Group, he states, "the ISO and other stakeholders have determined that a new 500 kV transmission line will be needed to serve load in the San Diego area." Do you agree with this characterization?

A The CA ISO has performed both economic and reliability analyses[1] of the benefits associated with building either one or two 500 kV lines into San Diego, but it has not made a final determination of need for any new 500 kV lines. The analyses were performed for one possible set of future load and resource assumptions and did show significant benefits for building at least one 500 kV line into San Diego. However, further analysis is required before the CA ISO can make a final determination of need. The CA ISO, through the STEP process, expects to complete this analysis by the second quarter 2005.

**III. Clarification of Mr. Sparks' Opening Testimony Regarding SDG&E**

Q. In your opening testimony, you question whether SDG&E's application of the 2500 MW import limit in the testimony of SDG&E witness, Ms. Linda Brown, at Tables 1, 2, and 3, entitled "Grid Reliability with SDG&E 90/10 Base Forecast," is consistent with the CA ISO Grid Planning Criteria. Do you have anything to add to your testimony?

A. Yes. As shown in the WECC 2004 Path Rating Catalog, the 2500 MW South of San Onofre (Path 44) rating is a WECC approved path rating that "…is applicable only for times when any segment of the Southwest PowerLink is out of service for any reason." As such, per the ISO Grid Planning Standards and operating criteria, SDG&E is obligated to stay within the 2500 MW WECC South of

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[1] http://www1.caiso.com/docs/2004/05/25/2004052512370627763.pdf, http://www1.caiso.com/docs/2004/05/17/2004051710385016456.pdf

SONGS Path Rating following an outage of the Imperial Valley-Miguel 500 kV line and with the largest on-system generating unit off-line.

Q. Does this conclude your rebuttal testimony?

A. Yes. It does.

# ATTACHMENT TO JOINT REBUTTAL TESTIMONY OF ROBERT SPARKS AND PHILIP PETTINGILL REGARDING THE LONG TERM PROCUREMENT PLANS OF THE INVESTOR OWNED UTILITIES ON BEHALF OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR

## "STRAW-PERSON" DELIVERABILITY PROPOSAL
### Executive Summary

Deliverability is an essential element of any resource adequacy requirement. Specifically, Load Serving Entities (LSEs) must be able to show that the supplies they intend to procure to meet their load requirements can be delivered to load when needed. Otherwise, such resources are of little, if any, value for the purposes of resource adequacy.

The California Public Utilities Commission (CPUC) is considering how to require the LSEs to demonstrate the deliverability of the resources they procure in both their annual resource plans and their long-term resource plans. An effective deliverability assessment is essential in short-term resources plans so that the LSEs will be able to "count" their resources to determine whether they satisfy the Commission's planning reserve margin. For long-term procurement planning, such an assessment additionally ensures that LSEs identify locational capacity needs that may be met by transmission, generation, or demand response but which require forward commitment to implement the desired solution. Thus providing for an appropriate coordination between resource planning, transmission planning, and the Commission's demand response initiatives.

Draft 1 of this paper was the focus of a six-hour meeting and a two-hour conference call involving approximately 30 participants, as well as written comments from eight participants as of April $5^{th}$, 2004. The current version of this paper is the result of much stakeholder discussion. This paper offers a "Straw-Person" proposal for deliverability with technical details on the proposed methodology.

This deliverability proposal consists of three assessments: Deliverability of Generation to the Aggregate of Load, Deliverability of Imports, and Deliverability to Load Within Transmission Constrained Areas. Each of these tests would be required for the overall deliverability methodology to ensure that resources procured by LSE's would be deliverable to load. An implementation of only the generation and import deliverability tests would be an incomplete implementation of the deliverability methodology, and would not adequately ensure deliverability of resources to load.

Each of these assessments is discussed in greater detail below.

### A. Deliverability Of Generation To The Aggregate Of Load

As part of developing its proposal to comply with FERC's Order No. 2003 regarding the interconnection of new generating facilities, the ISO developed and proposed to FERC a "deliverability" test (but not a requirement). The purpose was to begin to assess the deliverability of new generation to serve load on the ISO's system. Recent experience indicates that while California has added needed new generating capacity to the system over the past few years, not all of that capacity is deliverable to load on the system because of the presence of transmission constraints. Therefore, although not <u>requiring</u> all new generation to be deliverable, the ISO proposed in its Order 2003 compliance filing to assess deliverability so that the sponsors of new generation projects can accurately assess their ability to deliver the output of the new plants to the aggregate of load for resource adequacy counting purposes. This first assessment reflects the deliverability test and the baseline analysis envisioned by the ISO to be conducted as part of this interconnection process.

The ISO recommends that a generating facility deliverability assessment be performed to determine the generating facility's ability to deliver its energy to load on the ISO Controlled Grid under peak load conditions. Such a deliverability assessment will provide necessary information regarding the level of deliverability of such resources with and without Network Upgrades (i.e., major transmission facilities), and thus provide information regarding the required Network Upgrades to enable the generating facility to deliver its full output to load on the ISO Controlled Grid based on specified study assumptions. That is, a generating facility's interconnection should be studied with the ISO Controlled Grid at peak load, under a variety of severely stressed conditions to determine whether, with the generating facility at full output, the aggregate of generation in the local area can be delivered to the aggregate of load on the ISO Controlled Grid, consistent with the ISO's reliability criteria and procedures. (This definition for deliverability comes from the FERC interconnection order, and this methodology for assessing deliverability has been developed from consultation with PJM officials about their already-established practices.)

In addition, the ISO recommends, based on guidance in FERC Order 2003, that the deliverability of a new resource should be assessed on the same basis as all other existing resources interconnected to the ISO Controlled Grid.

Because a deliverability assessment will focus on the deliverability of generation capacity when the need for capacity is the greatest (*i.e.* peak load conditions), it will not ensure that a particular generation facility will not experience congestion during other operating periods. Therefore, other information (*i.e.* congestion cost analysis for all hours of the year) would be required in addition to the deliverability assessment to evaluate the congestion cost risk of energy purchase agreements, such as a take-or-pay contract with a particular generation facility.

**Section I, Generator Deliverability Assessment, contains the technical details of this proposed methodology.**

### B. Deliverability of Imports

California is now, and will likely remain, dependent on imports to satisfy its energy and resource requirements. Therefore, it is likely that as part of fulfilling their obligation to procure sufficient resources (reserves) in the forward market to serve their respective loads, the IOUs will contract with out-of-state resources. This is appropriate and necessary.

The ability to rely on imports to satisfy reserve requirements is entirely dependent on the *deliverability* of such out-of-state resources to and from the intertie points between the ISO's system and the neighboring systems. While the existing system may be able to satisfy the procurement plans of any one LSE, it likely will not be able to transmit the sum of LSEs' needs. Each LSE may well plan to rely on the same potentially constrained transmission paths to deliver their out-of-state resources. Therefore, the transmission system should be checked to make sure that simultaneous imports can be accommodated.

When relying on imports to serve load, each LSE should be required to ensure that they have assessed the deliverability of such resources from the tie point to load on the ISO's system.

At the CPUC's April 12-13, 2004 Deliverability Workshop, an action item was assigned to the California ISO. As requested, the ISO coordinated a detailed technical discussion and development of a proposal for establishing the total import capacity, for each import path, to be allocated to Load Serving Entities (LSEs) for resource adequacy planning purposes. This proposed approach was presented at the Deliverability Workshop on May 5, 2004.

Transmission constraints can impact the simultaneous deliverability of imports and internal generation. As a result, the interaction between the deliverability of imports and the deliverability of generation needs to be examined. The proposed generation deliverability assessment includes, as an input assumption, the amount of imports and existing transmission contract related encumbrances electrically flowing over the ISO Controlled Grid.

Whatever import capacity is available to LSEs for resource adequacy planning purposes should also be the basis for the import assumptions in the internal generation deliverability analysis. Workshop participants proposed that historical import information should be the basis for determining the initial amount of import levels to be allocated to LSEs. In addition to using historical data, existing transmission contract (ETCs) information should also be utilized. It is assumed that the entities that have contracted for the transmission capacity are already relying on this import capability in their resource plans, so this transmission should not be reallocated.

The impact of these total import levels would likely affect the deliverability of some existing generation, and the interplay between the deliverability of these existing generators and imports needs to be addressed during the generation deliverability analysis. If the deliverability analysis determines that the initial import level assumption is reducing the deliverability of internal ISO grid generation, then the initial import levels would be reduced and the deliverability analysis would be re-run. Although it is not anticipated that import levels would have to be reduced significantly from their initial level based on historical data, this issue may need to be reassessed after the analysis is completed. One of the key benefits of this proposed approach is that a clear deliverability benchmark would be established up front, it would be the starting point for future years, and LSEs would have some flexibility within this structure to adjust their resource adequacy plans to find an appropriate balance between imports and existing generation inside California.

**Section II, Deliverability of Imports Assessment, contains the technical details of the deliverability of imports study methodology developed by the subgroup.**

### C. Deliverability To Load Within Transmission Constrained Areas

Load within transmission-constrained areas, known as "load pockets," present unique circumstances for the assessment of deliverability. A load pocket is an electrically cohesive area that is a sub-area of the ISO Control Area, (For example, the San Francisco Bay, San Diego, LA Basin, Fresno, NP15 and SP15 areas are examples of constrained transmission areas.) Load pockets are highly dependent both on the availability of generation within the constrained area and the limited transfer capability of the transmission system. Because the transmission capability within a "load pocket" is so critical, this "Straw person" proposes that special focus be placed on assessing the deliverability of the procured resources to serve load in such locally constrained areas of the transmission system. However, considerable discussion was held among stakeholders on the deliverability of resources outside these designated sub-areas to loads inside these "pockets". This discussion appeared to center on two relevant points.

First, the CPUC current decisions only require aggregate capacity and do not impose locational requirements. However, the CAISO believes the Commission appreciates the need for locational requirements and will therefore make the necessary clarifications to its previous decisions. This proposal will establish the technical methodology to determine the necessary resource commitments and/or future generation/transmission development to be resource adequate within the load pocket.

Second, the load pockets are a direct result of insufficient transmission capacity and therefore should be handled within the CAISO grid planning process, and not be part of this deliverability test. To inform further discussion, an understanding of the ISO's Grid Planning process and its similarity and differences to this proposed "Deliverability to Load" assessment may be useful.

The ISO Grid Planning process is designed to ensure the ISO Controlled Grid meets NERC/WECC Planning Standards, as well as some ISO-specific Grid Planning Standards. Currently the NERC/WECC Planning Standards do not address resource adequacy and deliverability issues (such as the deliverability of resources to load pockets,) while one of the more stringent standards that are specific to the ISO partly addresses the availability of resources in a particular area.

The San Francisco Greater Bay Area Generation Outage Standard effectively requires that three or four specific generation units are deemed out of service in the power system base case for analyzing transmission line contingencies. This Standard was developed after a June 14, 2000 localized resource shortage in the San Francisco Bay Area resulted in rolling blackouts that were necessary to ensure compliance with the WECC Minimum Operating Reliability Criteria (MORC.)

Because the San Francisco Greater Bay Area Generation Outage Standard specifically considers the availability of resources, this facet of the ISO Grid Planning Process falls into a category where both Transmission Adequacy and Resource Adequacy overlap. The ISO Grid Planning Standards Committee periodically reviews other areas of the ISO Grid to determine if additional specific standards are necessary upon review of generation availability data within those other areas. If other special Standards were approved for other transmission constrained areas, presumably the Transmission and Resource Adequacy assessment methodologies would overlap for the areas covered by these Standards.

To further underscore the distinction between grid planning and resource adequacy standards, it should be noted that the CPUC's rulemaking on transmission assessment practices anticipates a resource planning process that considers the economic trade-off between Load, Transmission, Generation and possibly RMR contracts. The ISO Grid Planning process would be limited to considering only transmission projects after the other alternatives have been considered. "Staff suggests that the Commission's transmission determination made as part of its review of the IOUs long-term procurement plans should be reflected in the CAISO's transmission planning process."[1]

Finally, some participants within this Deliverability workgroup raised questions related to RMR criteria. This "Strawperson" proposal assumes that RMR criteria would be an insufficient test for deliverability *in the long-term* because RMR is a year-ahead process. The options for providing local area reliability service are limited to signing RMR contracts or capital projects that can be completed within one year. Because of these limited options, the RMR criteria are not likely to identify the long-term infrastructure improvements that are typically driven by the ISO Grid Planning Standards or this proposed Deliverability to Load assessment. These latter two assessments are applicable for long-term planning purposes when long-lead time new transmission or generation projects are possible options.

The ISO initially proposed this "Deliverability to Load" standard to ensure that the CPUC and the ISO have a common methodology, from both a Transmission Adequacy and Resource Adequacy perspective, for assessing adequacy to serve large load pockets like the San Francisco Bay area. The ISO believes this is a critical issue to be resolved in the context of the utilities' procurement activities, so that each load-serving entity can make a meaningful assessment of the trade-off between procuring local generation,

[1] Page 6, CPUC Rulemaking 04-01-026; Order Instituting Rulemaking on policies and practices for the Commission's transmission assessment process.

building new transmission to serve load in the constrained area, or developing demand response.

In summary, the focus of this proposed assessment is to determine, within an established probability, whether the load contained by constrained transmission areas will have sufficient transmission so that an adequate amount of generation from resources located outside the local area can be delivered to serve the local load. If insufficient transmission exists, then LSEs must show they have contracted with adequate resources within the load pocket to meet the load serving probability. Over the long-term, new transmission may be constructed and therefore remove the obligation for specific generation resources to be contracted. Specifically, the probability of load within the local area, exceeding the available capacity resources located in the local area and imported into the local area, should be equivalent to the probability of control area load exceeding the amount of capacity resources available to the overall control area. This methodology ensures a consistent level of resource adequacy across the ISO Controlled Grid.

**Section III, Deliverability to Load in Transmission Constrained Areas, contains the technical details of this deliverability to load study methodology.**

### D. Summary

Several entities reviewing this "Strawperson" proposal questioned how the ISO might tie together these three suggested "buckets" of Deliverability, and when individual resources might be determined or categorized as "deliverable" based on these proposed tests.

The Generation Deliverability Assessment would be performed in the annual baseline analysis and in every new System Impact Study as part of the generation interconnection process. Resources that pass the deliverability assessment could be counted to meet reserve margin requirements and resources that don't pass could not.

Total import capacity to be allocated for resource adequacy purposes would be an input to the generation deliverability assessments. The deliverability of the total import capacity would be assessed during the initial and annual baseline analyses. LSE's could propose additional imports in their long-term resource plans beyond the amounts allocated and these additional imports would tested using the generator deliverability methodology to ensure that the additional imports do not impact the deliverability of generation that has already passed the generation deliverability test. Once the resource plans are approved, the import assumptions for future generation deliverability assessment would be updated as needed.

The Deliverability to Load test would be performed so that the results would be available during the development of the *long term* resource plans. Solutions for resolving resource deficient load pockets could include the construction of resources needed to meet reserve margin requirements but located in the deficient load pocket to mitigate the deliverability to load deficiency. The construction of resources within the load pocket could be by any developer of generation—a procurement contract with that new generator should ensure that it is actually built.

# Section I
# Generator Deliverability Assessment

## 1.0 Introduction

A generator deliverability test is applied to ensure that capacity is not "bottled" from a resource adequacy perspective. This would require that each electrical area be able to accommodate the full output of all of its capacity resources and export, at a minimum, whatever power is not consumed by local loads during periods of peak system load.

Export capabilities at lower load levels can affect the economics of both the system and area generation, but generally they do not affect resource adequacy. Therefore, export capabilities at lower system load levels are not assessed in this deliverability test procedure.

Deliverability, from the perspective of individual generator resources, ensures that, under normal transmission system conditions, if capacity resources are available and called on, their ability to provide energy to the system at peak load will not be limited by the dispatch of other capacity resources in the vicinity. This test does not guarantee that a given resource will be chosen to produce energy at any given system load condition. Rather, its purpose is to demonstrate that the installed capacity in any electrical area can be run simultaneously, at peak load, and that the excess energy above load in that electrical area can be exported to the remainder of the control area, subject to contingency testing.

In short, the test ensures that bottled capacity conditions will not exist at peak load, limiting the availability and usefulness of capacity resources for meeting resource adequacy requirements.

In actual operating conditions energy-only resources may displace capacity resources in the economic dispatch that serves load. This test would demonstrate that the existing and proposed certified capacity in any given electrical area could simultaneously deliver full energy output to the control area.

The electrical regions, from which generation must be deliverable, range from individual buses to all of the generation in the vicinity of the generator under study. The premise of the test is that all capacity in the vicinity of the generator under study is required, hence the remainder of the system is experiencing a significant reduction in available capacity. However, since localized capacity deficiencies should be tested when evaluating deliverability from the load perspective, the dispatch pattern in the remainder of the system is appropriately distributed as proposed in Table 1.

Failure of the generator deliverability test when evaluating a new resource in the System Impact Study brings about the following possible consequences. If the addition of the resource will cause a deliverability deficiency then the resource should not be fully counted towards resource adequacy reserve requirements until transmission system upgrades are completed to correct the deficiency.

A generator that meets this deliverability test may still experience substantial congestion in the local area. To adequately analyze the potential for congestion, various stressed conditions (i.e., besides the system peak load conditions) will be studied as part of the overall System Impact Study for the new generation project. Depending on the results of these other studies, a new generator may wish to fund transmission reinforcements beyond those needed to pass the deliverability test to further mitigate potential congestion—or relocate to a less congested location.

The procedure proposed for testing generator deliverability follows.

## 2.0 Study Objectives

The goal of the proposed ISO Generator deliverability study methodology is to determine if the aggregate of generators in a given area can be simultaneously transferred to the remainder of ISO Control Area. Any generators requesting interconnection to the ISO Controlled Grid will be analyzed for "deliverability" in order to establish the amount of deliverable capacity to be associated with the resource.

The ISO deliverability test methodology is designed to ensure that facility enhancements and cost responsibilities can be identified in a fair and nondiscriminatory manner.

## 3.0 Baseline analysis

**Deliverability Test Validation**: This procedure was derived from the deliverability test procedure currently used by PJM. Adaptations to the PJM procedure were necessary due to the considerable physical differences between the PJM system and the ISO-Controlled Grid. During the initial implementation of this procedure, it will be a tested, and evaluated on existing resources to ensure that the results are reasonable, equitable, and consistent with engineering judgment. Stakeholders will review the results of this validation process. The deliverability test procedure will be refined as needed.

In order to ensure that existing resources can pass this deliverability assessment, an annual baseline analysis, with the most up-to-date system parameters, must first be performed by applying the same methodology described below on the existing transmission system and existing resources. Identified deliverability problems associated with generation that exist prior to the implementation of this deliverability test may be mitigated by transmission expansion projects if the capacity is needed and/or the project is economically justifiable. Deliverability limitations on currently existing generation can be allocated among multiple generators contributing to the same problem by first giving a lower priority to generation that elected to not finance transmission upgrades identified in their interconnection study for deliverability purposes. Then, for units with the same priority, allocation of deliverability limitations would be based on the incremental flow impact that each generator would contribute to the problem. The deliverability of both existing and new generators that are certified as deliverable would be maintained by the annual baseline analysis and the transmission expansion planning process.

## 4.0 General Procedures and Assumptions

**Step 1:** Build an initial powerflow base case modeling ISO resources as shown in Table 1. This base case will be used for two purposes: (1) it will be analyzed using a DC transfer capability/contingency analysis tool to screen for potential deliverability problems, (2) it will be used to verify the problems identified during the screening test, using an AC power flow analysis tool. All new generation applicants in the interconnection queue ahead of the unit under study are set at 0 MW (but available to be turned on for the screening analysis but not for the AC power flow analysis). Unused Existing Transmission Contracts (ETC's) crossing control area boundaries will also be modeled as zero MW injections at the tie point, but available to be turned on at remaining contract amounts for screening analysis. Then the capacity resource units in the queue electrically closest to the unit being studied are turned on at 90% of Dependable Capacity until the net ISO Control Area interchange equals the interchange target (see deliverability of imports section). Generation applicants after the queue position under study are not modeled in the analysis.

**Step 2:** Using the screening tool, the ISO transmission system is essentially analyzed facility by facility to determine if normal or contingency overloads can occur. For each analyzed facility, an electrical circle is drawn which includes all units (including unused ETC injections) that have 5% or greater distribution factor (DFAX) on the facility being analyzed. Then load flow simulations are performed, which study the worst-case combination of generator output within each 5% DFAX circle. The 5% DFAX circle can also be referred to as the Study Area for the particular facility being analyzed.

**Step 3:** Using an AC power flow analysis tool and post processing software, verify and refine the analysis of the overload scenarios identified in the screening analysis.

The outputs of capacity units in the 5% circle are increased starting with units with the largest impact on the transmission facility. No more than twenty[2] units are increased to their maximum output. In addition, no more than 1500 MW of generation is increased. All remaining generation within the Control Area is proportionally displaced, to maintain a load and resource balance. The number of units to be increased within a local area is limited because the likelihood of all of the units within a local area being available at the same time becomes smaller as the number of units in the local area increases. The amount of generation increased also needs to be limited because decreasing the remaining generation can cause problems that are more closely related to a deficiency in local generation rather than a generation deliverability problem.

For Study Areas where the 20 units with the highest impact on the facility can be increased more than 1500 MW, the impact of the remaining amount of generation to be increased will be considered using a Facility Loading Adder. The Facility Loading Adder is calculated by

[2] The cumulative availability of twenty units with a 7.5% forced outage rate would be 21%--the ISO proposes that this is a reasonable cutoff that should be consistently applied in the analysis of large study areas with more than 20 units. Hydro units that are operated on a coordinated basis because of the hydrological dependencies should be moved together, even if some of the units are outside the study area, and could result in moving more than 20 units.

taking the remaining MW amount available from the 20 units with the highest impact times the DFAX for each unit. An equivalent MW amount of generation with negative DFAXs will also be included in the Facility Loading Adder, up to 20 units. Negative Facility Loading Adders should be set to zero.

**Step 4:** Verified overloaded facilities with a DFAX from the new unit greater than 5% would need to be mitigated for the new unit to pass the deliverability test.

**Table 1: Resource Dispatch Assumptions**

| Resource Type | Base Case Dispatch | Available to Selectively Increase Output for Worst-Case Dispatch? | Available to Scale Down Output Proportionally with all Control Area Capacity Resources? |
|---|---|---|---|
| Certified Capacity Resources* | 90% of Dependable Capacity | Y | Y |
| Energy Resources* | Minimum commitment and dispatch to balance load and maintain expected imports | N | Y |
| Imports | As determined in deliverability of imports section | | |
| Load | | | |
| • Non-pump load | 90% to 100% of maximum load. | N | N |
| • Pump load | Within expected range for Summer peak load hours**. | N | N |

* The initial baseline analysis would identify the initial set of Certified Capacity Resources and Energy Resources. See section 3.0 Baseline analysis.
** Summer peak load hours are the 50 to 100 hours in the months of August and September when Control Area load is between 90% and 100% of maximum annual load.

**Distribution Factor (DFAX)**
Percentage of a particular generation unit's incremental increase in output that flows on a particular transmission line or transformer when the displaced generation is spread proportionally, across all dispatched resources "available to scale down output proportionally with all control area capacity resources in the Control Area", shown in Table 1. Generation units are scaled down in proportion to the dispatch level of the unit.

**G-1 Sensitivity**
A single generator may be modeled off-line entirely to represent a forced outage of that unit. This is consistent with the ISO Grid Planning Standards that analyze a single transmission circuit outage with one generator already out of service and system adjusted as a NERC level B contingency. System adjustments could include increasing generation outside the study area. The number of generators increased outside the study area should not exceed the number of generators increased inside the study area.

**Municipal Units**
Treat like all other Capacity Resources unless existing system analysis identifies problems.

**Energy Resources**
If it is necessary to dispatch Energy Resources to balance load and maintain expected import levels, these units should not contribute to any facility overloads with a DFAX of greater than 5%. Energy Resource units should also not mitigate any overloads with a DFAX of greater than 5%.

**WECC Path Ratings**
All WECC Path ratings (e.g. Path 15 and Path 26) must be observed during the deliverability test.

**Pmax* DFAX Impact**
Generators that have a (DFAX*Generation Capacity) > 5% of applicable facility rating or OTC will also be included in the Study Area.

# Section II
# Deliverability of Imports Assessment

## Background

At the CPUC's April 12-13, 2004 Deliverability Workshop, an action item was assigned to the California ISO. As requested, the ISO coordinated a detailed technical discussion and development of a proposal for establishing the total import capacity, for each import path, to be allocated to Load Serving Entities (LSEs) for resource adequacy planning purposes. This proposed approach was presented at the Deliverability Workshop on May 5, 2004.

Transmission constraints can impact the simultaneous deliverability of imports and internal generation. As a result, the interaction between the deliverability of imports and the deliverability of generation needs to be examined. The proposed generation deliverability assessment includes, as an input assumption, the amount of imports and existing transmission contract related encumbrances electrically flowing over the ISO Controlled Grid.

One of the observations from the Workshop was that LSEs needed to have results of the deliverability assessments in advance of submitting their resource plans to the CPUC for the year-ahead review. The generation deliverability assessment would provide results in advance. However, the deliverability of imports assessment initially described was an after-the-fact review of all of the LSE resource plans combined.

Because of the need for up-front information the ALJ assigned the ISO to lead a smaller group of Workshop participants to develop a methodology for determining the total amount of import capacity, by import path, which could be available to LSEs.[3] This document describes a proposal for a methodology developed by the subgroup.

## Discussion of Proposed Approach

Whatever import capacity is available to LSEs for resource adequacy planning purposes should also be the basis for the import assumptions in the internal generation deliverability analysis. Because of the interaction between the deliverability of imports and the deliverability of internal generation, one should not simply determine the maximum import capability under favorable conditions and make that import capability available to LSEs for developing their resource plans. This approach assumes that all the import capability is needed and will be used for resource adequacy planning purposes, an assumption that could result in impairment of deliverability of internal generation. (This would be inconsistent with the consensus from previous workshops that the deliverability of generation internal to the ISO grid should be preserved.) Furthermore, it is likely that,

[3] Determining a methodology for allocating import capability to LSEs was not an assignment of this working group.

compared to a more reasonable import allocation, more of the allocated import capability might remain unused by an LSE to meet its resource adequacy requirement at the expense of more internal generation being available to meet an LSE's resource adequacy requirement.

Workshop participants proposed that historical import information should be the basis for determining the initial amount of import levels to be allocated to LSEs. Following this suggestion, the ISO reviewed actual import flows and schedules during peak load hours in 2003. After initial review of the data, it appears that 2003 saw the highest import levels in the last five years during peak load periods.

In addition to using historical data, existing transmission contract (ETCs) information should also be utilized. It is assumed that the entities that have contracted for the transmission capacity are already relying on this import capability in their resource plans, so this transmission should not be reallocated.

The impact of these total import levels would likely affect the deliverability of some existing generation, and the interplay between the deliverability of these existing generators and imports needs to be addressed. One of the key benefits of this proposed approach is that a clear deliverability benchmark would be established up front, it would be the starting point for future years, and LSEs would have some flexibility within this structure to adjust their resource adequacy plans to find an appropriate balance between imports and existing generation inside California.

## Proposed Methodology

**Initial Import Level**
The proposed approach for combining both historical information and contractual information is to add final transmission net import schedules (day-ahead, hour ahead, and real-time) not associated with ETCs, to ETC reservations on a path by path basis. One could then verify that this sum would not have exceeded the historical Operational Transfer Capabilities (OTCs) and make the appropriate adjustments. This methodology could be applied using several historical high load, high import hours and then taking the average total net import as the initial net import level.

**Generation Deliverability Analysis**
Using the initial import level as an input assumption, a baseline analysis of the deliverability of generation to the aggregate of load would be performed as described in the Generation Deliverability Assessment Attachment. This benchmarking analysis would establish the deliverability of internal generation.

**Deliverability Priority**
If the baseline deliverability analysis for existing generation determines that the initial import level assumption is reducing the deliverability of internal ISO grid generation, then the initial import levels will be reduced and the baseline deliverability analysis will be re-run. Although it is not anticipated that import levels will have to be reduced

significantly from their initial level, this issue may need to be reassessed after the analysis is completed, consistent with the "Review of Results" paragraph (below.)

**Make Results of Deliverability Assessment Available for Use**
Once the deliverability assessment is completed the results will be provided for use in developing year-ahead LSE resource procurement plans for resource adequacy purposes.[4] The total import capacity, by path, determined to be deliverable would need to be allocated to LSEs using some allocation methodology that has yet to be defined.

**(Optional Step) Modify Results of Deliverability Assessment based on Economic Tradeoff between Import Capacity and Internal Generation Capacity**
This step assumes that the deliverability of existing resources may not necessarily be preserved, and could be reduced as needed to increase the deliverability of imports, if it is determined that more economic capacity can be obtained from import levels that exceed the total import capability allocated to LSEs. Some sub-group participants had concerns regarding the logistics of implementing this step, and there is no consensus whether or not this step should be included in this general methodology.

**Review of Results of Generation and Import Deliverability Assessment Methodology**
As part of the initial implementation of this analysis, the test results for generation and import deliverability should be evaluated to ensure they are reasonable, equitable, and consistent with engineering judgment. Stakeholders would help review the reasonableness of these initial test results, and, if necessary, the deliverability test procedure could be refined.

[4] Operational requirements of the various local areas (i.e., RMR areas) would need to be addressed so LSEs have the necessary information to develop their resource procurement plans. This includes operational requirements such as the amounts and locations of generation needed to be on line and the potential generation retirements that could increase local area requirements. The deliverability to load methodology should focus on these requirements.

# Section III
# Deliverability to Load in Transmission Constrained Areas

This deliverability assessment focuses on the delivery of energy from the aggregate of capacity resources to an electrical area experiencing a capacity deficiency. It can be discussed in the context of demonstrating the "deliverability to the load" as opposed to the "deliverability of individual generation resources". This ensures that, within accepted probabilities, energy can be delivered to Control Area load, regardless of cost, from the aggregate of capacity resources available to the Control Area.

The determination of the reserve requirement is based on the assumption that the delivery of energy from the aggregate of capacity resources to control area load will not be limited by transmission capability. This assumption depends on the existence of a balance between the distribution of generation throughout the control area and the ability of the transmission system to reliably deliver energy to portions of the control area experiencing capacity deficiencies.

The specific procedures utilized to test deliverability from the load perspective involve the calculation of a Capacity Emergency Transfer Objectives (CETO) and Capacity Transfer Limits (CTL) for various electrical sub-areas of the ISO Control Area. A CETO represents the amount of MWs that a given sub-area must be able to import in order to remain within the CPUC resource adequacy framework requiring that the probability of occurrence of load exceeding the available capacity resources is consistent across the Control Area.

To analyze the deliverability to load, electrically cohesive load areas must first be defined. These areas are sub-areas of the ISO Control Area (e.g. San Francisco Bay area, San Diego area, LA Basin area, Fresno area, NP15, SP15, etc). These sub-areas are defined based on the impact of generators, potentially within the sub-area, on the contingencies known to limit operations in the sub-area. Sub-area boundaries could be drawn to include generators based on the calculated impacts on those contingencies. Load buses are similarly assigned to these sub-areas based on their impact on the same contingencies.

Once a sub-area is defined, the CETO for that sub-area must be calculated using a reliability simulation tool such as Henwood RiskSym, or GE MARS. Using the simulation tool, determine the import capability of the load area necessary to ensure the LOLP inside the area is consistent with the rest of the control area (i.e. no more than one day in ten years)—this value is the CETO for that sub-area. Figure 1 shows how increasing import capability into the load pocket will reduce the LOLP for the local area, assuming that the resources and load within the load pocket remain constant.

The next step in the analysis is to calculate a generation forced outage target (GFOT). The GFOT will be equal to the internal area generation (G) plus the CETO minus the internal sub-area peak load and losses (L) or GFOT = G + CETO – L. An example of this concept is shown in Figure 2.

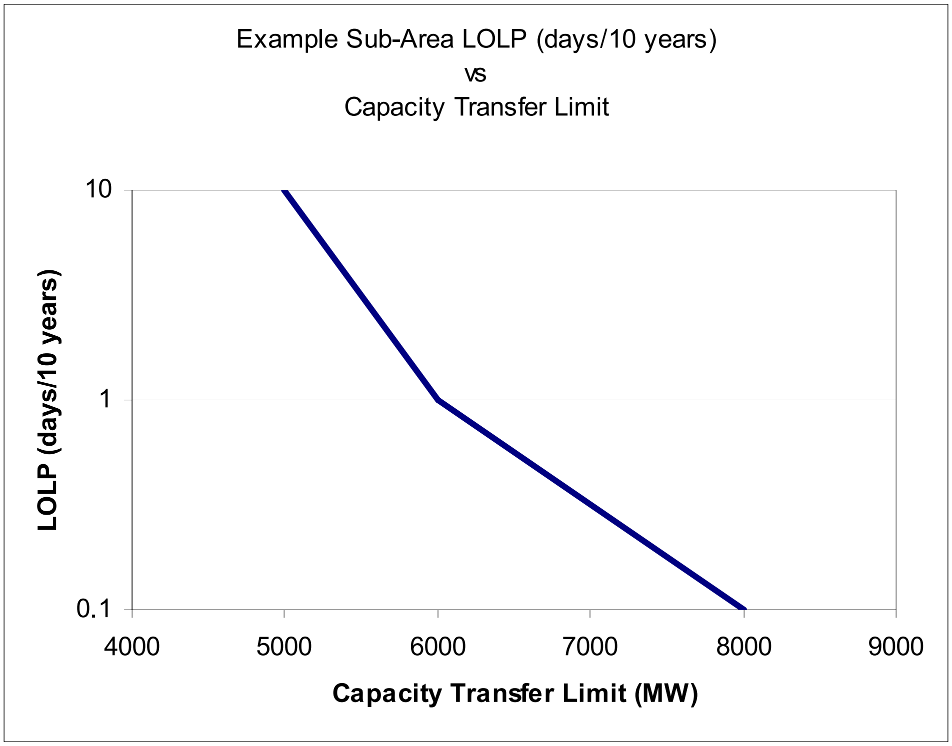
Once the GFOT is determined, specific unit forced outage scenarios need to be developed for modeling within a power flow base case model. Using the individual generator forced outage rates, develop a base generator outage scenario by selecting the units with highest outage rates until the GFOT is satisfied. Variations of the base generator outage scenario should also be developed by removing the most critical units from the model that result in adversely impacting the import capability of the sub-area. At least half of the generation in the outage scenario should be from the base outage scenario, and the amount of generation forced out in the scenario should not exceed the GFOT. Power flow base cases will be developed for each of the generation outage scenarios.

In general, all single element transmission contingencies should be tested on each of the power flow base cases developed. Multiple element contingencies that have a sufficiently high likelihood of occurring or could result in voltage collapse or system instability may also be tested. System performance for each of the contingencies should be measured against NERC Category B System Limits or Impacts for single transmission element outages and NERC Category C System Limits or Impacts for multiple transmission element outages, in the ISO Grid Planning Criteria. If any of the applicable performance limits are violated then the local area does not pass the deliverability to load assessment and should be mitigated as soon as practicable in the resource and transmission plans.

After testing to ensure that the transmission system can accommodate imports at or above CETO levels, a Capacity Transfer Limit is developed to establish target procurement levels for resources located in the local area. In the long term, economically procuring resources within the sub-area as part of the resource plan will tend to reduce RMR costs, and mitigate local market power. A Capacity Transfer Limit (CTL) for the area is developed by starting with the worst case generation scenario in the CETO test and then removing generators with the highest effectiveness factors that do not already have procurement contracts and performing contingency analysis until a performance limit is violated.

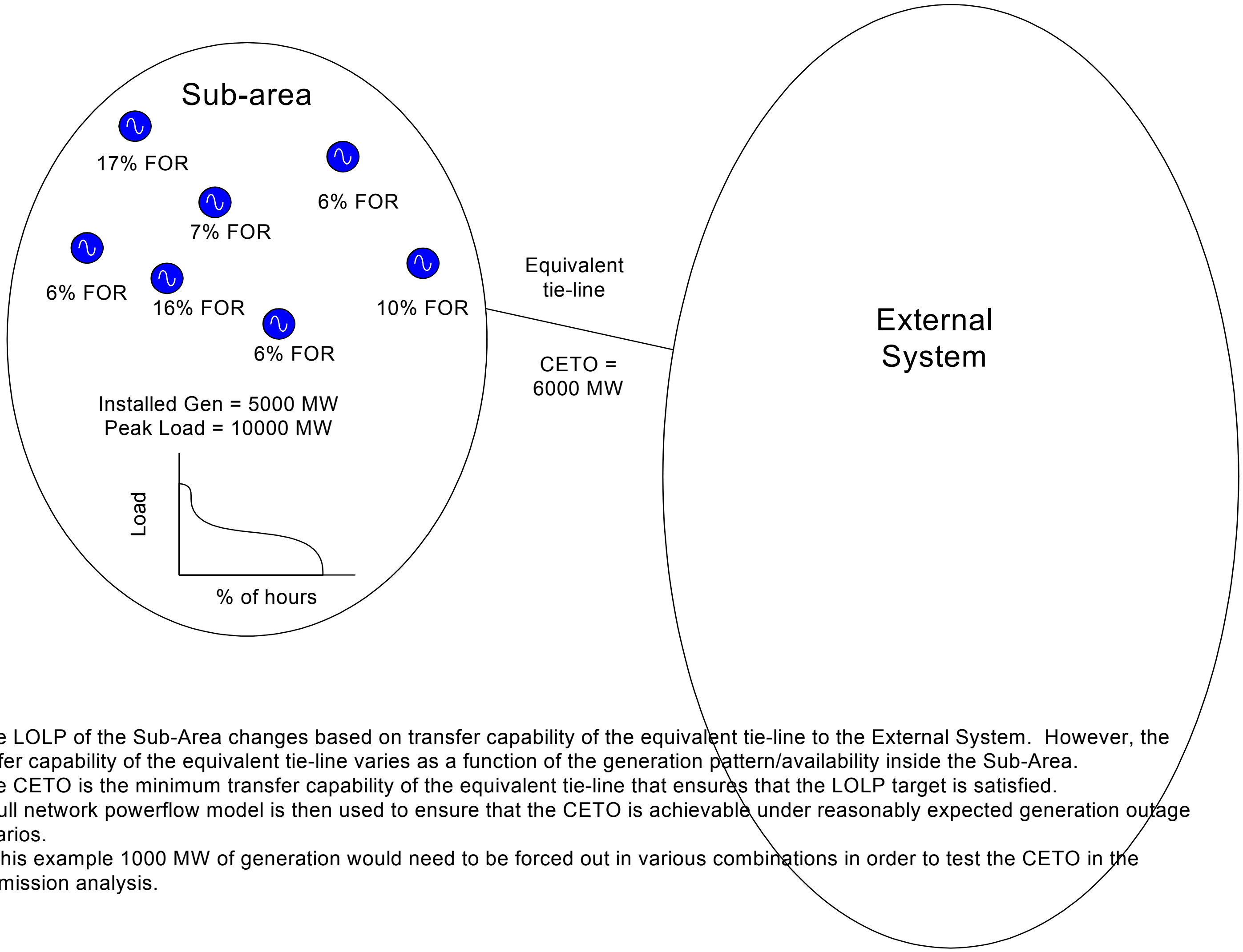
Load serving entities with load in the sub-area should include existing or new resources, located in the sub-area, in their procurement plans so that 100% of their load in the area minus their proportion of the CTL can be served by resources in the local area. An LSEs proportion of the CTL should be calculated as a pro rata share in proportion to their percentage of the load in the area once existing transmission contractual obligations have been removed from the CTL.

# Figure 1


Example Sub-Area LOLP (days/10 years)
vs
Capacity Transfer Limit
LOLP (days/10 years)
10
1
0.1
4000
5000
6000
7000
8000
9000
Capacity Transfer Limit (MW)

# Deliverability to Load in Transmission Constrained Areas

Figure 2




* The LOLP of the Sub-Area changes based on transfer capability of the equivalent tie-line to the External System. However, the transfer capability of the equivalent tie-line varies as a function of the generation pattern/availability inside the Sub-Area.
* The CETO is the minimum transfer capability of the equivalent tie-line that ensures that the LOLP target is satisfied.
* A full network powerflow model is then used to ensure that the CETO is achievable under reasonably expected generation outage scenarios.
* In this example 1000 MW of generation would need to be forced out in various combinations in order to test the CETO in the transmission analysis.

**CERTIFICATE OF SERVICE**

I hereby certify that I have served, by electronic mail, a copy of the foregoing Rebuttal Testimony of Robert Sparks and Philip Pettingill Regarding the Long Term Procurement Plans of the Investor Owned Utilities on Behalf of the California Independent System Operator to each party in Docket No. R.04-04-003.

Executed on August 20, 2004, at Folsom, California.

Charity N. Wilson

Charity N. Wilson
An Employee of the California
Independent System Operator