

**First Revised
STRAW PROPOSAL**

CPUC Resource Adequacy Requirements

Local Capacity

Study Methodology and Criteria

Prepared by California ISO staff
for the CPUC

January 25, 2005 Resource Adequacy Workshop

I. Executive Summary & Introduction

This document details a straw proposal for a technical study methodology and criteria that could be followed to identify the local capacity requirements for the California ISO (“ISO”) Controlled Grid “ISO Controlled Grid Local Capacity Technical Study” or “Study”. Results obtained from the Study are intended to provide the technical basis for identifying the capacity requirements expressed in mega-Watts (“MW”) that are necessary for the ISO to provide reliable operation of the ISO Controlled Grid and to satisfy both the system and local deliverability requirements established by the CPUC’s orders on Resource Adequacy.

The intent of the proposed Study is to identify, to the greatest extent feasible, a reasonably stable minimum capacity procurement target (MW) for load-serving entities in each identified local area. The Study criteria are designed to determine the minimum amount of capacity necessary to maintain reliable grid operation under certain identified major contingencies in each area. As a general matter, the proposed criteria are focused on the loss of large transmission elements, i.e., high voltage transmission lines and/or transformers, within the local area. Other large contingencies, such as the loss of major generating facilities within the area, are also considered and examined.

Notwithstanding the ISO’s intent to identify the minimum amount of capacity in each area necessary to respond to the large contingencies noted above, it is important to clarify that it is not the ISO’s proposal to identify the minimum amount of capacity in each area that would be necessary to respond to *all* contingencies or possible system conditions. Thus, this approach inherently embraces the understanding that the ISO may in some instances have to commit additional resources and/or take certain operating actions, in the day-ahead and real-time timeframes, in order to address operating conditions that arise on the grid or in the ISO’s markets.

While it is the ISO’s intent and long-term objective to phase out RMR Generation, any such transition must be done prudently over an appropriate timeframe. In the event that additional capacity is required above the amount identified pursuant to the Study and procured by the LSEs, the ISO will have to determine the appropriate timeframe and manner to procure the additional necessary capacity. While the ISO remains confident that the majority of its capacity requirements will be satisfied under the CPUC’s Resource Adequacy Requirements, there may be a need for the ISO to procure resources prior to the day-ahead timeframe in order to ensure that such resources are and remain available to the ISO. It is, of course, the objective of the proposed Study methodology and criteria to determine LSE procurement requirements that will fully satisfy the ISO’s real-time operating needs under most system conditions, and thus to minimize the need for any additional procurement of capacity by the ISO.

To achieve this objective, the ISO believes that it is imperative that the CPUC adopt local capacity requirements that are clear and specific for the coming year and relatively stable over a 3-5 year timeframe, so that economic procurement

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decisions can be made for the longer time horizon rather than only for one year at a time.

The ISO recognizes that to achieve the goal of a stable capacity requirement, transmission planning, both at the ISO and state regulatory agencies, must be coordinated with RAR obligations and processes. Similarly, the effect of changes in load forecasts over time must be addressed and accommodated. To the extent such issues can be reconciled and stable capacity requirements are established, load-serving entities can consider a variety of options to satisfy their local capacity requirements: contract with existing or new supply, build new generation, build/sponsor new transmission, and develop viable demand response. While these are policy issues that are beyond the scope of the Study, these issues are nonetheless important to consider when structuring the technical requirements considered in this straw proposal.

II. Study Scope

The Study Scope includes the study objectives, responsibilities, criteria and methodology. These scope items are discussed below.

A. Objectives

The ISO would perform technical studies across the ISO Controlled Grid to determine the following:

- Total generation capacity requirements in MW for all identified local areas of the grid. ;
- A list of eligible generating units within each identified local area eligible to meet the local requirements. In principle this will include all generating units within the local area that are connected to the ISO grid and available to the ISO in a manner consistent with the Must Offer Obligations specified in the CPUC orders. The list of generation units will be determined in accordance with the ISO Local Reliability Criteria described in Attachment 1.; and
- Generator deficiencies in local areas to highlight areas of the ISO Controlled Grid where the reliability criteria cannot be maintained according to the ISO Local Reliability Criteria.

B. Information Requirements

Generation Information - In order to perform the Study, the ISO will rely on information available to it through existing grid planning studies, generator information available through: each Participating Generator's Schedule 1 to the ISO's Participating Generator Agreement, the ISO's Master File, ISO Outage Coordination, and the California Energy Commission. To the extent that additional information is required from a Participating Generator, the ISO will request such information for the Generating Unit and the Participating Generator will provide the requisite information.

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Transmission Information – All Participating Transmission Owners (“PTOs”) will be responsible for providing accurate system configuration information and accurate representation of their transmission systems for the season and year being studied. The ISO will obtain the applicable system configuration information for neighboring Control Areas through existing grid planning processes and sources such as the WECC.

Load Information – Based on existing practice, the PTOs will provide to the ISO the accurate local area representations with a defined relationship to the applicable system forecast. Alternatively, the ISO suggests that it might use the LSE load forecast data provided to the PTO/CEC and adjusted as the CEC finds necessary for resource adequacy purposes, or that other ways could be developed to ensure that accurate load information is used.

It is understood that the ISO will keep all market-sensitive information confidential, subject to the appropriate protections.

C. Criteria and Methodology

The objective of the study is to identify the minimum capacity requirement for each identified local area while maximizing the utilization of area transmission facilities to access capacity external to the local area for local area reliability needs. To the extent that the local area transmission capability is insufficient to meet the local area reliability needs, local capacity will be needed to provide for operation of the ISO Controlled Grid in accordance with applicable reliability standards.

For purposes of the Study, the applicable reliability standards include both the ISO’s established planning and operating standards. The Planning and Operations Criteria used in performing the Study are consistent with NERC/WECC/ISO planning standards, as they may be modified, and will address system performance levels A, B and C.¹ In addition, the study methodology for determining the local area requirements conforms to any operations procedures specific to each local area as well as the methodology used in the ISO/PTO’s regular planning studies.

The ISO’s existing Planning Standards require each PTO to plan their systems to the ISO Planning Standards. In addition, ISO Operations identifies additional requirements necessary to address certain operational contingencies required to meet real time reliability.

III. Key Study Assumptions (Base Cases and Local Area Cases)

The ISO will conduct the Study using the GE PSLF power flow/stability program. A summer peak ISO Controlled Grid base case will be modified to accurately

¹ Performance Levels A, B and C are defined in the NERC Planning Standards to address steady-state overloads, N-1 contingencies and N-2 contingencies, respectively.

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represent the year being studied. The ISO will endeavor to develop a comprehensive modified base case that represents all network configuration and generation additions or modifications expected to be in service for each year studied. If the in-service date of any transmission or generation facility is uncertain, such facilities will be modeled in the base case with a status of "off". In such cases and if deemed necessary by the ISO, the ISO will perform sensitivity studies as part of the overall Study effort to determine how the inclusion of such facilities impacts the Study results.

The ISO will use the following assumptions for preparation of the base cases to be used in the Study:

A. Network Related Assumptions

- The power flow base cases used in the Study will incorporate the PTO's most recent Ten Year Annual Expansion Plan configuration modeling for the Study-year;
- New projects and/or changes to each PTO's network configuration must be approved through the ISO's Grid Planning Process before they will be included in the base cases.
- The PTOs will be responsible for assuring that their system network configuration is consistent with the year being studied. If modifications to the base-case representation are required, the PTO's will identify and tabulate them, by year, for inclusion in the Study representation.

B. Load Related Assumptions

- For the years being studied, the ISO will study the number of local areas required to meet the applicable reliability requirements of the ISO Controlled Grid. The power flow base case used in the Study will be adjusted to reflect a one-in-ten-year peak load forecast for each local area studied.² Any neighboring local areas will be modeled at coincident load levels expected to be achieved when the main local area peaks. The rest of the areas will be adjusted to the latest California Energy Commission's coincident peak demand for the corresponding year(s) being studied.
- To assure a reasonable representation of loads across the California system, loads on systems within California that are not located within a

² The peak load to be used in the analysis would be consistent with the methodology used in the ISO Grid Expansion Planning process: 1 in 2-year for system wide load, 1 in 5-year for zonal load and 1 in 10-year for areas smaller than a zone. The more stringent 1 in 10-year requirement for studies of local load serving areas is necessary because fewer options exist during actual operation to mitigate performance concerns. In addition, there is less diversity and thus less certainty in load compared to regional load forecast. Having this standard for local areas will be consistent with the grid expansion plan (all transmission expansion projects are evaluated and approved based on these 1 in 10-year load levels) so that evaluation of proposed generation and transmission projects would be on a level playing field.

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PTO's system will be adjusted in proportion to the nearest PTO system load.

- Reactive load will be represented to reflect reasonable values for the operating conditions being studied as demonstrated by recorded data and/or PTO reactive planning programs.

C. Generation Related Assumptions

For the purpose of this Study, the following assumptions shall be used to determine whether or not generation will normally be expected to be on-line and available. Such resources are assumed to have: an assured revenue stream, an obligation to be on-line in order to serve their constituents or contract party, or a bilateral contract between Transmission Owners that obligate each-other to provide help during times of reliability need.

Regulatory Must Take

- Regulatory "Must Take" resources (i.e. generating units from Nuclear, QF, and Public Power Utilities sources) will be dispatched at their contract ratings; otherwise the CPUC RAR counting conventions will be used.

Hydro-Electric

- Hydro generation located within the ISO Controlled Grid will be dispatched according to CPUC RAR counting conventions.

Qualifying Facility

- The QF generation levels modeled in the Study shall be provided by the entity under contract with each facility and shall represent the expected operating level during the peak.
- All QF generation connected to busses rated 230 kV and above will be explicitly represented in the power flow and stability base cases.
- All QF generation connected to busses rated below 230 kV to 60 kV inclusive, will be explicitly represented in the power flow base cases and may be load netted for stability analyses. If multiple QF generating units are connected to the same bus, they may be aggregated at that bus and represented as an equivalent representation in the power flow base cases and for stability analyses if stability data is not available.
- Most QF generation connected to busses rated below 60 kV will be netted with the nearest load that is electrically tied to the respective generating unit.
- All QF generation explicitly represented in the power flow base cases will have their reactive power capabilities modeled according to contractual requirements, otherwise RAR qualified capacity will be used to determine their reactive representation. If available, actual

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reactive power capabilities from manufacturers' or field test data will be represented.

Non-jurisdictional

- MUNI, state and federal owned generating units or units under any availability-type contract with an LSE is assumed "on".

Miscellaneous

- Before the studies are initiated, the base cases should have enough generation on-line in order to maintain all the inter-regional 500 kV path flows below their operating transfer capability ratings for the season being studied.³ The CPUC Resource Adequacy requirements should ensure that a sufficient number of generation resources will be available to maintain the inter-regional 500 kV path flows within limits, and this generation will be operated in the study in a manner that maximizes the generation resource needs in a specific local area. For example, when assessing the generation requirements for a specific local area, the generation units outside of that local area will be committed and dispatched before units inside the local area to maintain inter-regional 500 kV path flows.
- All base cases will be developed to represent a minimum operating reserve within the ISO Controlled Grid as established by WECC MORC. Based on actual operations, this requirement is typically between 5-7 percent and it must meet the requirements specified by WECC MORC on the level that the ISO commits its operating reserve.⁴
- All existing generating resources within California that are anticipated to be available for service by May 1st of the following year of study and beyond will be represented in the base case per reports published by the CEC for the year studied.

D. Transmission Related Assumptions

- To maximize transmission import capability, any remaining capacity on interconnected transmission lines will be used to import economy power from outside the local area under study.

³ It is not anticipated that local area requirements will be identified by the ISO in order to maintain flows on the following inter-regional paths: COI, Path 15, Path 26, PDCI, Path 61, EOR, WOR, and SCIT along with all inter-control area ties. These paths are the subject of the zonal and system studies and should be enforced strictly in the resource adequacy requirements; if they are not, a local area may be identified to address potential constraints on these paths.

⁴ MORC specifies that 50 percent of the operating reserve can be off-line and generating facilities that do not respond with governor action should be modeled as blocked.

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- Imports into the ISO Controlled Grid will adhere to all established operating limitations. By example, this means that flows on the California Oregon Intertie (COI) path will be represented no higher than the maximum level in the season being studied in accordance with the seasonal operating capabilities determined by the WECC Operating Transfer Capability Policy Committee (OTCPC). The flows on the Arizona to California path will be represented no higher than the maximum level allowable based on the Southern California Import Transmission (SCIT) and East-of-River (EOR) nomogram. The imports into Miguel will be limited by the Miguel Import Nomogram.

E. Local Area Cases

Local area base cases are required to assess the requirements for each local area. Local areas will be pre-identified through a stakeholder process and may be modified from time to time. The local area base cases will be developed in accordance with the assumptions discussed in sections A through D above. The forecasted local area load level will be developed by the PTO or CEC or another entity in a manner that is consistent with the assumption discussed in Section B above and will represent the 1 in 10 year local area peak load conditions (more specifically e.g. local area “coincident” peak).

IV. Study Process

The Study process will include an investigation into potential related reliability impacts in areas that are internal to the ISO Controlled Grid. Information from previous year’s results will be utilized in the current year Study to assure each Study is performed in a manner that is consistent with historical results. However, for the first year of the Study, the local area identified in the ISO Local Area Reliability Service (“LARS”) studies from the previous year will be utilized. This first-year Study will focus on all areas that have generation units starting with areas identified in previous LARS studies. As required, additional studies will be conducted to address other reliability concerns within the ISO Controlled Grid. The following outline gives a general description of the Study process.

A. Base Case Development

The ISO will develop California ISO Controlled Grid base cases for the applicable year(s) being studied. These “first cut” base cases will be made available to stakeholders that are WECC members, or that have executed the necessary WECC confidentiality agreement, for review and comment. For those stakeholders who do not meet these requirements, it is the ISO’s and PTO’s responsibility to work with all stakeholders to assure that their comments and/or concerns are appropriately identified and documented.

The PTOs will be responsible for developing the “revised first cut” base cases by following the key base case development and modeling assumptions identified in Section III above. The preparation of the “revised first cut” base

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cases will be needed to ensure that the most up to date representation of the PTOs transmission system is incorporated into the base cases that will be used in the Study. As such, the PTOs will be responsible for, among other things:

- Removing incorrect or out-of-date system representation;
- Providing equipment ratings that are consistent with the ISO Transmission Register;
- Ensuring that their system representation is consistent with the PTOs latest Annual Expansion Plan that has been approved by the ISO Board of Governors.

The PTOs will provide the ISO the completed “revised first cut” base cases along with their associated dynamic data. The PTOs will be responsible for properly working base cases from which power flow and dynamic simulation analysis can be performed. Based on the PTOs “revised first cut” base cases and all stakeholder comments received, the ISO will develop the “second cut” base cases. As done for the “first cut” base cases, the “second cut” base cases will be provided to the stakeholders for their review and comment. Based on the “second cut” base cases and all appropriate stakeholder comments received, the ISO will develop the “Final” base cases for the study.

The LSEs will provide load data for Local Area Study cases. This load data will be incorporated into the “Final” base case to evaluate each local area and will create “Local Area” study cases for all of the pre-determined local areas. In each local-area case the ISO total load will remain the same as in the “Final” base case by adjusting the load in areas that are far from the local area of interest up or down as needed until total system load equals that represented in the Final base case. These Local Area Study cases will be used by the ISO to perform all technical analysis needed to determine the generation resource requirements in all of the predetermined local areas of the ISO Controlled Grid.⁵

For the years being studied, the ISO will also study a three-zone power flow base case. The three zonal areas studied will be: NP15, NP15+ZP26, and south of Path 26. The forecasted zonal load level will represent the 1 in 5 year area peak conditions (more specifically e.g. zonal area “coincident” peak). The surrounding area loads would be adjusted to maintain the Control Area total load. These studies will focus on the 500 kV system and will use the complete ISO Criteria for power flow, post-transient load flow and stability studies.

⁵ This methodology would be revisited if considering large “load pockets”.

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B. Reliability Evaluation of Base Case Minimum Load Conditions

While minimum load concerns (high voltage conditions and/or possible thermal loading) are not expected to be a determining factor for identifying local reliability capacity, each year the ISO will check the validity of this assumption to determine if LSE obligations (both in the aggregate as well as on a local level) should be adjusted address reliability problems that may arise under minimum load conditions.

C. Local Capacity Requirement Determination

Each limiting contingency will be subject to power flow, post-transient, and/or transient stability analysis as deemed necessary by the ISO. The overall objective of the study will be to determine the minimum generating capacity (MW) requirement for each particular local area. The required amount of local generating capacity (MW) will be determined through a procedure in which units will be individually and successively “turned off” in the base case until the criteria are no longer being met.

D. Post LSE Procurement Process

After the LSEs make their annual showing identifying the resources they have procured, the ISO will perform further analyses to determine if any additional capacity is needed in each local area, based on the contingencies and other system conditions that were not considered in the initial assessment of the minimum local area MW requirements. The ISO will document and provide the results of these analyses to the Participating Stakeholders for their review and comment. At this time the ISO will also identify any generating units the ISO believes should be procured under RMR Contracts. As noted earlier, the minimum local MW requirements for LSE procurement will be specified so as to substantially reduce the need for RMR compared to today, but at least for a transitional period may not totally eliminate that need. A stakeholder meeting will be held to provide all Participating Stakeholders the opportunity to provide their comments and concerns to the ISO prior to the Final Report being prepared. **[stakeholders to define schedule and further define the process: tier 2]**

E. Final Report

The final draft Study report will be prepared by the ISO and will contain all criteria, assumptions, methodologies, simulation results, conclusions, the LSE procured capacity, recommendations for RMR designations, and any other pertinent information that has been deemed necessary by the ISO. The schedule for conducting and releasing the Study will be determined after further discussion in the CPUC workshops intended to address RAR procurement responsibilities.

Once all appropriate stakeholder comments and concerns have been addressed, the ISO will prepare a final report entitled the “[year of study]

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Local Capacity Study of the ISO Controlled Grid Report” (“Final Report”) and distribute it to the Participating Stakeholders.

V. Reliability Dispatch via LSE Resources

The LSEs will procure the MW requirements through bilateral contracts that shall include provisions consistent with the Must Offer Obligations specified in the final CPUC Resource Adequacy orders. The ISO will develop appropriate language in its Tariff to implement such Must Offer Obligations, to enable the ISO to issue dispatch notices to the resources procured by the LSEs to meet the Local Capacity requirements for all hours such resources are necessary to maintain the reliability of the ISO Controlled Grid.

Power Flow Assessment:

<u>Contingencies</u>	<u>Thermal Criteria</u> ³	<u>Voltage Criteria</u> ⁴
Generating unit ^{1, 6}	A/R	A/R
Transmission line ^{1, 6}	A/R	A/R
Transformer ^{1, 6}	A/R ⁵	A/R ⁵
(G-1)(L-1) ^{2, 6}	A/R	A/R
Overlapping ^{6, 7}	A/R	A/R

- ¹ All single contingency outages (i.e. generating unit, transmission line or transformer) will be simulated on Participating Transmission Owners' local area systems.
- ² Key generating unit out, system readjusted, followed by a line outage. This overlapping outage is considered a single contingency within the ISO Grid Planning Criteria. Therefore, load dropping for an overlapping G-1, N-1 scenario is not permitted.
- ³ Applicable Rating – Based on ISO Transmission Register or facility upgrade plans.
- ⁴ Applicable Rating – ISO Grid Planning Criteria or facility owner criteria as appropriate.
- ⁵ Based on the judgment of the ISO and the facility owner, a thermal or voltage criterion violation resulting from a transformer outage may not be cause for a local area reliability requirement if the violation is considered marginal (e.g. acceptable loss of facility life or low voltage), otherwise, such a violation will necessitate creation of a requirement.
- ⁶ Following the first contingency (N-1), the generation must be sufficient to allow the operators to bring the system back to within acceptable (normal) operating range (voltage and loading) and/or appropriate OTC following the studied outage conditions.
- ⁷ During normal operation or following the first contingency (N-1), the generation must be sufficient to allow the operators to prepare for the next worst N-1 or common mode N-2 without pre-contingency interruptible or firm load shedding. SPS/RAS/Safety Nets may be utilized to satisfy the criteria after the second N-1 or common mode N-2 except if the problem is of a thermal nature such that short-term ratings could be utilized to provide the operators time to shed either interruptible or firm load. T-2s (two transformer bank outages) would be excluded from the criteria.

Post Transient Load Flow Assessment:

<u>Contingencies</u>	<u>Reactive Margin Criteria</u> ²
Selected ¹	A/R

- ¹ If power flow results indicate significant low voltages for a given power flow contingency, simulate that outage using the post transient load flow program. The post-transient assessment will develop appropriate Q/V and/or P/V curves.
- ² Applicable Rating – positive margin based on the higher of imports or load increase by 5% for N-1 contingencies, and 2.5% for N-2 contingencies.

Stability Assessment:

<u>Contingencies</u>	<u>Stability Criteria</u> ²
Selected ¹	A/R

- ¹ Base on historical information, engineering judgment and/or if power flow or post transient study results indicate significant low voltages or marginal reactive margin for a given contingency.
- ² Applicable Rating – ISO Grid Planning Criteria or facility owner criteria as appropriate.

Loss of Load Probability:

Loss of Load Probability (“LOLP”) is a study methodology that can be used to establish the level of capacity required in each local area by performing a probabilistic analysis to achieve a specified probability for loss of load. In the established Eastern markets a one-event in ten years LOLP methodology is used to determine LSE capacity obligations. The LOLP approach provides a potentially more uniform reliability result than the proposed deterministic approach. In the future, if the LOLP approach is determined to be a more desirable approach, then the LOLP analysis will be incorporated into the criteria if and when a criteria and methodology for applying it has been developed. Any LOLP criteria and methodology will need to be reviewed by stakeholders and approved by the CPUC. Until such time, the LOLP approach will not be used to establish LSE capacity requirements, and the deterministic approach defined above will be used.