# LCR Study Advisory Group: Introduction

CAISO Stakeholder Meeting December 6, 2006

Gary DeShazo – Representing LSAG

# LSAG Group

- Scope
  - Assess CAISO's LCR study assumptions, processes, and criteria
    - Representative cross-section of stakeholders
    - Technically qualified to assess the CAISO's LCR study
  - Review and evaluate the technical components of the LCR study and recommend changes, where needed, that could be implemented into the 2008 study
  - Focus only on technical issues related to LCR analysis
  - Does not supplant stakeholder review of the LSAG's findings and/or recommendations of the final LCR study assumptions, criteria and methodology
- Decision Making
  - Sounding board to advise CAISO on technical issues
  - CAISO retains right of final determination and course of action implement reliability requirements under its MRTU tariff
- Focus
  - Review 2007 LCR analysis and results as a benchmark
  - Identify areas of technical concern, evaluate, and recommend changes

# 2007 Local Capacity Requirement Review

- Study topics
  - Scope
  - Assumptions
  - Definition of Load Pocket
  - Methodology
    - Contingencies
    - Application of planning standards
    - Manual system adjustments
    - Deliverability of generators and imports
    - Applicable ratings
- LSAG Accomplishments
  - Better understanding of the CAISO LCR assumptions, criteria, and process
  - Consensus in application of NERC criteria
  - Shared vision that these discussions should continue and evolve for future year studies

# Future Steps

- Methodology, criteria, and process for 2008 LCR study finalized by mid-December
  - CPUC has determined overall timeline
  - Base case development will start in January 2007
  - Draft study completed by March 9, 2007
  - CAISO Stakeholder meeting March 20, 2007
  - Final report May 2007
- Next LSAG meeting will be December 12, 2006
  - Finalize the 2008 LCR study methodology
- CAISO will continue LCR review throughout 2007
  - Further refine the existing methodology
  - Evaluate "other" methodologies
  - Implement appropriate changes for 2009 analysis
- Long-term LCR evaluations
  - CAISO expansion plan will include evaluations of future LCR needs as well as transmission proposals required in order to reduce reliance on local generation in the most economic way possible
  - PTOs to also include these type of studies in their evaluation of future grid needs

# LCR Study Advisory Group: CAISO Standards including NERC&WECC Standards

CAISO Stakeholder Meeting December 6, 2006

Catalin Micsa – Representing LSAG

#### Resource Adequacy (RA)

- □ FERC required capacity showings in order to:
  - Ensure that capacity exists and is under contract in order for all load to be served by responsible Load Serving Entities (LSEs)
  - Resources are financially viable and have an obligation to make themselves available in the markets
- LSEs must demonstrate that they have secured adequate qualified capacity to serve their peak load plus 15-17 % planning reserve (every month in the month ahead timeframe)
- LSEs must demonstrate, in the year ahead timeframe, they have secured 90% of the peak load needs including planning reserve
- All resources participating in the CAISO markets under an RA contract will have an RA must-offer-obligation to the CAISO

#### FERC Must-Offer-Obligation

- Currently applies to all available units that participate in the CAISO markets (with small exemptions like hydro, QF and nuclear)
- On its own merits does not assure that resources are financially viable
- Will be discontinued after implementation of the MRTU and RA programs

#### CAISO MRTU Tariff

- FERC approved and compliance fillings in progress
- CAISO can impose LSEs minimum resource requirements on LSEs in order to maintained reliability standards
- If LSE procurement falls short of CAISO's identified need, CAISO will engage in back-stop procurement role to assure reliability standards are met

#### Year ahead Resource Adequacy & Reliability Planning

- If a resource is not under an RA type contract or otherwise retained by the CAISO for reliability services it will be considered off-line and will not be available to meet reliability needs of the CAISO because:
  - These resources are not shown as being financially viable and can retire at any time
  - These resources will have no must-offer-obligation to the CAISO, therefore they are not obligated to have bids in the CAISO markets, if needed CAISO could be forced to go out-of-market and these resources may be unavailable or unwilling to respond to the CAISO reliability calls
- As a result all units under RA contract + those retained by the CAISO for reliability reasons can be used to meet the year ahead applicable reliability standards

- Minimize CAISO Backstop Procurement
  - General agreement exists that CAISO reliability back-stop procurement role should be minimized
  - Otherwise LSE will procure 115-117% of peak load and the CAISO could procure additional resources for reliability reasons resulting in over-procurement
  - The CAISO was asked to propose a methodology that met reliability requirements and minimized its backstop procurement
  - CAISO proposed the existing Local Capacity Requirement methodology based on the existing applicable reliability standards used by the CAISO to measure its own compliance
  - Other methodology proposals will be evaluated on their own technical and economic merits

# Total Resource Adequacy procurement



#### Minimum Local Capacity Requirements A (N-0)



#### Terms

- A (N-0) normal system conditions; use normal ratings
- C5 (N-2) common mode (same tower or right-of-way); use emergency ratings
- B (N-1) single contingency conditions; use emergency ratings
- Manual Adjustment any adjustment done by operators (other then load drop) in order to assure that the system is in a safe operating zone and can support the loss of the next most stringent single contingency
- C3 (N-1-1) double contingency conditions (specifically a single (B) followed by manual readjustment and then another single contingency (B); use emergency ratings
- Planned load drop means that the most limiting equipment has a higher short-term emergency rating (example - 30 min.) AND the operators have a operating procedure that clearly describes the actions needed to be taken in order to shed load
- Controlled load drop means the use of an Special Protection Scheme

## Proposed level of minimum reliability needs

- CAISO has an obligation to assure compliance with its Tariff, including CAISO and NERC/WECC standards
- Requirements based on Option 2 (noted LCR Category C on the graph) go along way into meeting this mandate; given that the minimum required resources are fully available at summer peak time
- Option 1 (Noted LCR Category B on the graph) does not take into account Category C contingencies therefore it cannot be used to show compliance. As a result it has a greater probability that additional back-stop procurement for reliability reasons needs to be done by the CAISO
- As a result in order to minimize CAISO back-stop procurement the majority agreed that CAISO will use the Option 2 (noted LCR category C on the graph) as the minimum LCR requirement

LCR Study Advisory Group: What is an Applicable Rating?

> CAISO Stakeholder Meeting December 6, 2006

Gary Chin – Representing LSAG

#### LCR Criteria

- LCR is a planning exercise looking out one year to predict operational needs
- LCR studies rely on both:
  - NERC/WECC Planning Standards
  - WECC Minimum Operating Reliability Criteria (MORC)
- Applicable Rating of Equipment:
  - NERC/WECC Planning Standard Thermal Rating
  - WECC Minimum Operating Reliability Criteria Path Rating

#### Example – South of Lugo



#### Summary

- Traditionally, transmission planning does not incorporate MORC in developing expansion plans
- LCR Criteria includes both NERC/WECC Planning Standards and MORC
- PTO transmission expansion plans will need to recognize MORC in order to propose transmission projects which would reduce LCR
- May be first step in ultimately conforming operational criteria and planning standards

LCR Study Advisory Group: Enforcing Deliverability for LCR

> CAISO Stakeholder Meeting December 6, 2006

Gary Chin – Representing LSAG

#### Deliverability Recap

- Basics
  - A resource must be deemed Deliverable to count for Resource Adequacy
  - Being deemed Deliverable conveys no priority rights when a resource utilizes the CAISO controlled grid.
- Study Methodology
  - Peak load condition.
  - "Generation Pocket" concept. Generation in an area may exceed the transmission capacity available to deliver resource outside the area

#### Resources

- Imports (into the control area) Deliverable amount determined based on average of highest historical usage during summer peak conditions
- Generation Deliverable amount determined based on studies with deliverable imports enforced

#### Local Capacity Requirement Recap

- Basics
  - It is a subset of the System RA requirements and represents the capacity that needs to be procured in local area load pockets
  - Represents the minimum resource capacity needed to be available in a local area in order to safely operate the grid
- Methodology
  - Peak load condition
  - "Load Pocket" concept. Load within an area may exceed the maximum transmission capacity available to deliver resources into the area
- Resources
  - Any resources that are considered Deliverable within the defined local area

#### 2007 LCR – Deliverable Generation Enforced

Deliverability of generator outside the LCR area is enforced under normal A(N-0), single B(N-1) and common mode C.5 (N-2) contingencies. For C.3 (N-1-1), immediately after the first contingency <u>any unit</u> can be decremented as part of the manual adjustment.



#### 2007 LCR – Deliverable Import (into the control area) Enforced

Deliverability of generator outside the LCR area is enforced under normal A(N-0), single B(N-1) and common mode C.5 (N-2) contingencies. For C.3 (N-1-1), immediately after the first contingency <u>any import</u> can be decremented as part of the manual adjustment.



#### If Deliverability is not enforced for LCR . . .

- Minimum LCR requirements will be reduced or remain the same, depending upon the LCR area and the next critical contingency
- There will be an insufficient amount of LCR to ensure deliverability of import/generation should the specific load/dispatch pattern studied occur
- Could result in less procurement if the "deliverable resources" (imports/generation) are not procured for RA or otherwise extensively used in real-time
- CAISO would NEED to rely on other tools like:
  - Using it's year ahead back stop procurement authority for requirements beyond those published in the LCR requirements – because LSE have made showings with resources outside the local area that would increase the already published minimum LCR requirements within the local area
  - Day ahead and real time use market units without an RA contract located inside LCR area in real time in order to mitigate the same constraints and the same load levels as those listed in the report - with potential of engaging the back-stop procurement authority after a few real time calls have been made to the same resources
  - Load shedding if local area uncontracted units retire and are needed

#### Actual Examples . . .

- Local areas most impacted are Sierra and Fresno
- For Sierra the impact is driven by COI imports as well as PG&E owned Northern Hydro River System and the State Water Projects
- For the most part there will be rather large decreases in import allocations and generation deliverability for rather small decreases in local area LCR requirements
- There is a great chance that showings will be made with the above mentioned resources as such the CAISO year ahead back-stop procurement would need to account for their full RA allocations

#### Summary

Mainly for the above reasons the majority LSAG members agree that for 2008 studies deliverability of allocated imports as well as all deliverable generation should be maintained under normal A(N-0), single contingency B(N-1) and common mode C5 (N-2) contingency conditions

# LCR Study Advisory Group: Definition of Load Pockets

CAISO Stakeholder Meeting December 6, 2006

Chifong Thomas and Brad Bentley – Representing LSAG

#### From LSAG Issues Table

- The CAISO has developed a methodology for defining load pockets
- LSAG will need to objectively frame the technical issues around the CAISO's current methodology
- CAISO must address these technical issues
- Decision 06-06-064 (P.28): decide to the extent that load pocket boundary should change and the time frame to change it

## Technical versus Commercial Issues

- Technical definition of load pocket:
  - Based on a transmission constraint(s), which will change as the system changes => different physical needs and different boundaries
  - Results in more frequent changes in LCR requirements, resources as well as loads responsible in meeting them
  - Hard to achieve in local areas where more then one contingency drive the total requirement
- Commercial definition of load pocket:
  - Based on a fixed transmission boundary
  - Desire to enter into LT contracts where resources and load responsible for meeting LCR requirements are more stable
  - Need assurance that those contracts will continue to count towards local RA obligation for the life of the contract (even though physical needs may not be met)

## There is no "right" answer

- Whether to fix or not fix the load pocket boundary
- The cost vs. benefit of the technical requirements must be factored into the final decision
- Whether boundaries should be fixed or not may depend on the specific resource and transmission situation

## Transmission Reinforcements

- Changes in transmission network will change:
  - The boundary of Load Pockets
  - The effectiveness of generators and/or loads to relieve the potential transmission constraint(s)
  - Relieving the existing transmission constraint may shift the transmission constraint outside the Load Pocket
    - Thus enlarging the Load Pocket resulting in larger number of generators to meet LCR (more generators may increase competition leading to lower power prices)
- Partially relieve existing transmission constraints leading to lower number of generators required for LCR (final number also depending on load growth and available resources)

## If Load Pocket Boundaries - **NOT** Fixed

- In general, the probability of long term Local RA contracts becoming a "stranded cost" is greater
- Given that Local Capacity also meets the System RA requirement – the stranded amount would be the price differential between system and local generation over 10-20 year contract terms
- Hard to implement in local areas where more then one contingency drives the total LCR requirement
- When the transmission system changes, so would the transmission constraint(s), local area resources and loads responsible for LCR procurement

## If Load Pocket Boundaries - Fixed

- When the transmission system changes, so would the transmission constraint(s) and resources outside the old pocket boundary that may effectively relieve the new constraint(s) would not be counted towards the local requirement this could increase the total procurement cost
- Generation that LSEs do procure in an old pocket boundary may not meet the local area need
- Long-term "Misprocurement" could increase the chance of ISO back-stop procurement potentially resulting in increase cost

## Multi-year LCR Studies

- Multi-year LCR Studies can provide guidance on local generation procurement and transmission reinforcement
- But, timing and study period of the Grid Planning Studies and the LCR Studies will need to be closely coordinated
  - For example, power contracts signed for 20 years, but Transmission planning study results beyond 10 years may contain too much uncertainty to be accurate
- Generation contracted to meet Local RA can also count towards System RAR, therefore, such generation would still be needed after addition of transmission reinforcement(s) into the local area

# Need for Flexibility

- Given that the LSE's are proposing 10-20 year contracts, the "stranded cost" issue may be significant, especially if these are procured above the system resource cost
- Backstop procurement cost can also be significant
- There needs to be flexibility in the procurement contracts to protect the customers

Summary

 General agreement that for 2008 studies the existing methodology - fix transmission boundary - will be used because no major transmission or generation project be on line in 2008

# LCR Study Advisory Group: Transparency in Operational Solutions

CAISO Stakeholder Meeting December 6, 2006

Les Pereira – Representing LSAG

#### Group consensus:

- If "manual" operational adjustments are used by CAISO in its studies as proposed by the PTO, CAISO or market participants, these should be fully transparent so that a stakeholder based on this information can perform studies of the limiting contingency.
- Any operational solution must be validated and implemented in real time by CAISO through the Regional Transmission engineering group. The operational solution should not be just a theoretical exercise to reduce the LCR requirements for the most limiting contingency.
  - After MRTU is operational these manual operational solutions should be implemented by market engineering group as best as possible by using either the built in contingency processor, modeling change, flow limits or operational nomogram; in order to assure that the solution could be run by MRTU's SCOPF (Security Constrained Optimal Power Flow).

# LCR Study Advisory Group: Load Forecast

CAISO Stakeholder Meeting December 6, 2006

Mark Hesters - Representing LSAG

## Load Forecast to be used and document locator

- CPUC Order Instituting Rulemaking to Integrate Procurement Policies and Consider Long-Term Procurement Plans Scoping Order Attachment A (9-25-06) requires the use of the CEC June 2006 revised demand forecast for 2007 escalated at the rates adopted in the CEC 2005 forecast for years beyond 2007.
- The same forecast and escalation rates should be used in the 2008 LCR analysis.
- http://www.energy.ca.gov/2006publications/CEC-400-2006-008/CEC-400-2006-008-SF.PDF
- <u>http://energy.ca.gov/2005\_energypolicy/documents/reports\_pub\_number.html</u> (Publication Number:CEC-400-2005-034-SF-ED2)

# 2008 Planning Area Forecast Normal and Adverse Weather Scenarios (2005 IEPR Staff Forecast Form 1.5 & June 2006 Revised Forecast)

Planning Area	1-2	1-10
PG&E	22,675	23,521
SMUD	3,136	3,451
SCE	23,457	25,098
LADWP	5,819	6,210
BGP	881	941
SDG&E	4,531	5,117
Other	1,215	1,215
DWR	915	915
Statewide Non-coincident Peak	62, 629	66, 469

# LCR Study Advisory Group: Zonal Requirements

CAISO Stakeholder Meeting December 6, 2006

Katie Kaplan and Ali Amirali – Representing LSAG

# 2007 CAISO Proposed Methodology

#### Methodology

- 1 in 5 zonal Load forecast + Historical generation outage data + Recovery from single worst contingency – Import Capability = Zonal Requirement
- Forecasted Load: consistent with CAISO Planning Standards, the CAISO proposes a forecasted zonal load level that represents the 1-in-5-year peak conditions
- Import Capability: the maximum MW amount that is assumed can be imported into a zone. This can be calculated based on the maximum historical imports into a zone, plus the anticipated increase in import capability due to transmission upgrades in effect for the time period being analyzed
- Outages: the amount of generation that may be unavailable within a zone due to unforeseen circumstances that require immediate maintenance
- Recovery from a Single Worst Contingency: enough operating reserve to recover from the most severe single contingency without relying on firm load shedding

#### Summary

- The CAISO's methodology for determining the minimum zonal capacity requirements is designed so the operating reserves within each zone meet the WECC Minimum Operating Reliability Criteria (MORC) for operating reserves
- Any new zonal methodology will be evaluated on it's own technical and economic merits
- Trying to achieve the right balance between annual revenue requirements for available resources and the required expectations that the unit will be made available in the CAISO markets in order to meet minimum zonal reliability requirements
- This issue has not been vetted enough in the LSAG group in order to achieve a reasonable level of agreement

# LCR Study Advisory Group: Temporal and Seasonal Nature of LCR Requirements

CAISO Stakeholder Meeting December 6, 2006

Bob Tang – Representing LSAG

2007 LCR Assumptions and Methodology in order to establish the minimum local area resources for CPUC Jurisdictional LSEs

- Transmission and generation modeled if on-line before June 1, 2007
- 1-in-10 peak load in defined load pockets
- Maximize import capability into local area
- Maintain established path flow limits
- Performance criteria includes normal, single as well as double contingency conditions in order to establish the LCR requirements in local area

# 2007 Enforcement of LCR Requirements for CPUC Jurisdictional LSEs

- LCR requirements imposed on CPUC jurisdictional entities on an annual round basis
- At lower load conditions or when resources are not needed to meet reliability standards the CAISO would grant RA Must-offerwaiver the same way the existing FERC Must-offer-waiver is implemented today. MRTU will eliminate the current Must-offerwaiver process and replace it with RA Must-offer into the IFM, RUC, HASP and real time markets
- Resources get to count towards meeting LSE local requirement even when they are out-of-service for maintenance etc.
- Reliability is assured through the Outage Coordination group at the CAISO (they balance the need for transmission and generation outage scheduled through the existing systems at the CAISO)

#### Concerns with the Current Methodology

- Does not recognize the temporal/seasonal nature of the LCR requirement
- It is widely accepted that LCR requirement is a function of load level, local resources, and load pockets import/export capabilities
- Causes over-procurement of capacity when there is no need from reliability perspective
- Existing product does not allow LSEs to trade this local capacity when load migrates within the same year

# General interrelationship of load and LCR requirement for the LA Basin load pocket

LCR Generation Requirements vs. LCR Area Load



<sup>%</sup> of 2007 1-in-10 Load (100% = 19055 MW)

# Issues that need to be addressed in a seasonal LCR study

- Granularity: monthly/seasonal, peak/off peak, etc.
- Consideration for scheduled transmission and/or generation maintenance outages: explicit modeling in the LCR process; treat them as RA resource performance issue with penalties; etc.
- Trying to achieve the right balance between granularity of local area requirements and study/regulatory expectations
- Trying to achieve the right balance between annual revenue requirements for available resources and the required expectations that the unit will be made available in the CAISO markets when needed to meet local area reliability requirements

## Summary

 This issue has not been vetted enough in the LSAG group in order to achieve a reasonable level of agreement

# LCR Study Advisory Group: 2008 CAISO Back Stop Procurement

CAISO Stakeholder Meeting December 6, 2006

Grant Rosenblum and Catalin Micsa – Representing CAISO

# 2007 CAISO Reliability Back Stop Procurement

#### RCST

- FERC decision on settlement and tariff sheets pending
- Allows CPUC and LRA to establish LCR criteria
- To expire at the end of 2007 or implementation of MRTU whichever comes first

#### RMR

- FERC approved Tariff
- Criteria approved by the CAISO Board (August 1999)
- Does not follow the LCR criteria
- Does not assure CAISO compliance with NERC/WECC standards nor does it meet the day to day local area operational needs (supplemented with FERC MOO)
- No expiration date

## 2008 CAISO Reliability Back Stop Procurement

#### New Procurement Mechanism

- Work needs to be started in early 2007
- Needs to be approved by FERC in order to be enforced before the end of 2007
- If not approved in time CAISO could be left without a back stop procurement to cover LCR criteria

#### Change RMR criteria to be equal with LCR criteria

- Use the existing RMR contract only if the new mechanism is not agreed upon or otherwise approved by FERC
- There is no reason to have two reliability driven back stop procurement criteria for the same local area needs
- There is no reason to have RMR type studies done if they don't cover mandatory NERC standards or operational needs
- Take this issue up at the January Board Meeting
- Please provide written comments by December 15, 2006