California ISO
Your Link to Power

California Independent
System Operator

2007 LCR Study

Prepared By

Planning & Infrastructure Development

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Agenda

- Introduction
- Elements of the CAISO's Analysis
  - Input Assumptions
  - Methodology
- Summary of Findings
- Detailed Summary of Findings
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- Next Steps

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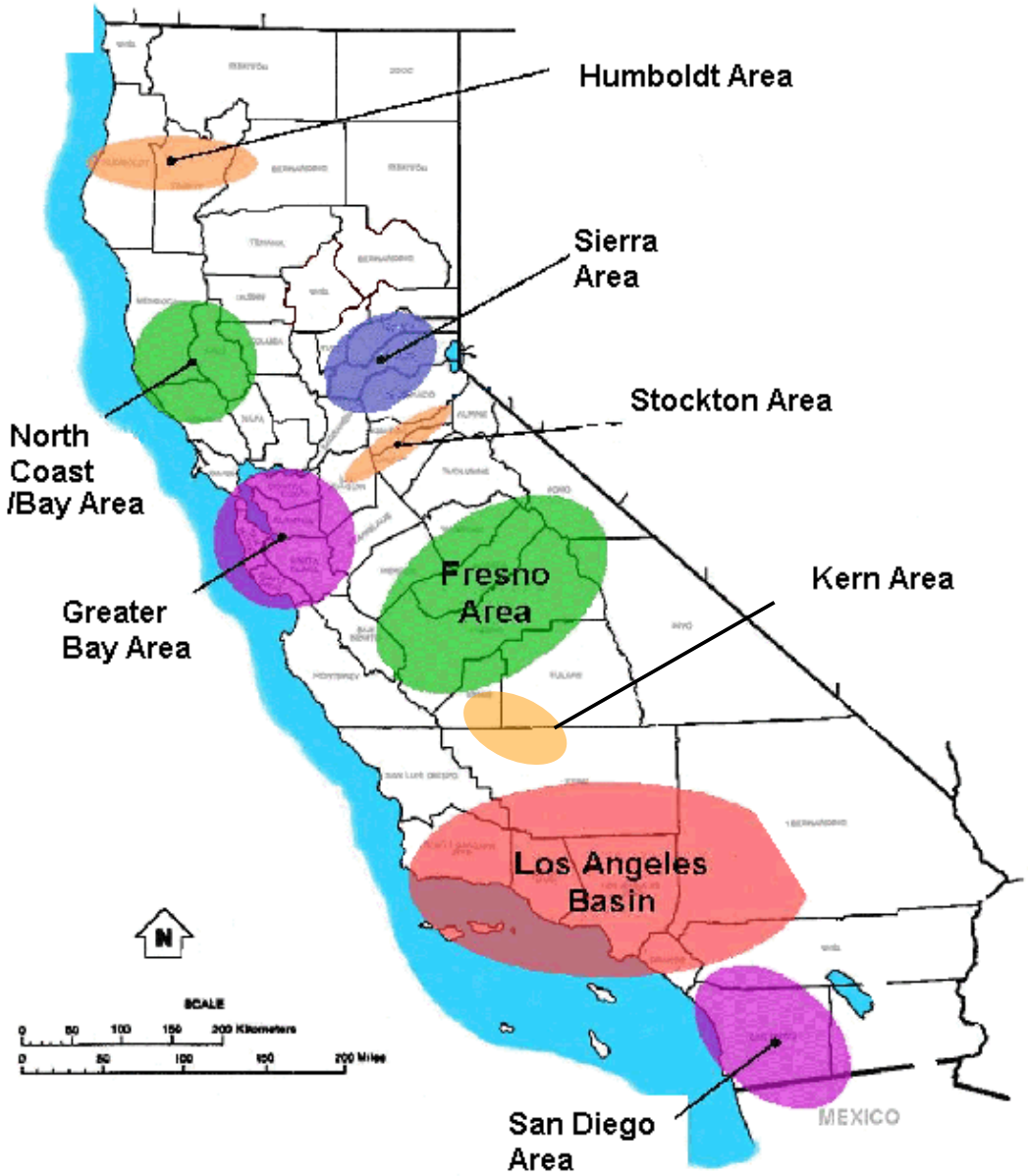
Elements of the CASIO's Analysis
Input Assumptions
Methodology
Summary of Findings


Humboldt Area
Sierra
Area
Stockton Area
North
Coast
/Bay Area
Greater
Bay Area
Fresno
Area
Kern Area
Los Angeles
Basin
San Diego
Area
MEXICO
N
SCALE
0 50 100 150 200 Kilometers
0 50 100 150 200 Miles

Input Assumptions

The input assumptions used were developed from a "meet and confer" session held on February 17, 2006 as well as the errata filing submitted on March 10, 2006. Administrative Law Judge adopted the proposed assumptions. This information was used in the 2007 LCR Study.

Input Assumptions:	
• Transmission System Configuration	The existing transmission system has been modeled, including all projects operational on or before June 1, 2007 and all other feasible operational solutions brought forth by the PTOs and as agreed to by the CAISO.
• Generation Modeled	The existing generation resources has been modeled and also includes all projects that will be on-line and commercial on or before June 1, 2007
• Load Forecast	Uses a 1-in-10 year summer peak load forecast

Methodology

Methodology:	
• **Maximize Import Capability**	Import capability into the load pocket has been maximized, thus minimizing the generation required in the load pocket to meet applicable reliability requirements.
• **QF/Nuclear/State/Federal Units**	Regulatory Must-take and similarly situated units like QF/Nuclear/State/Federal resources have been modeled on-line at historical output values for purposes of the 2007 LCR Study.
• **Maintaining Path Flows**	Path flows have been maintained below all established path ratings into the load pockets, including the 500 kV. For clarification, given the existing transmission system configuration, the only 500 kV path that flows directly into a load pocket and will, therefore, be considered in the 2007 LCR Study is the South of Lugo transfer path flowing into the LA Basin.

Performance level

Performance Criteria:	
• **Performance Level B & C, including incorporation of PTO operational solutions**	The 2007 LCR Study is being published based on Performance Level B and Performance Level C criterion, yielding the low and high range LCR scenarios. In addition, the CAISO will incorporate all new projects and other feasible and CAISO-approved operational solutions brought forth by the PTOs that can be operational on or before June 1, 2007. Any such solutions that can reduce the need for procurement to meet the Performance Level C criteria will be incorporated into the LCR Study and the resulting LCR published for this third scenario.

Load pocket & Effectiveness factors

Load Pocket:	
• **Fixed Boundary, including limited reference to published effectiveness factors**	The 2007 LCR Study has been produced based on load pockets defined by a fixed boundary. The CAISO was initially planning to publish the effectiveness factors of the generating resources within the defined load pocket as well as the effectiveness factors of the generating resources residing outside the load pocket that had a relative effectiveness factor of no less than 5% or affect the flow on the limiting equipment by more than 5% of the equipment's applicable rating. . However, after subsequent discussions with the Commission and stakeholders, and given the comments in the CPUC Staff Report regarding the limited usefulness of effectiveness factors, the CAISO plans to only publish effectiveness factors where they are useful in facilitating procurement where excess capacity exists within a load pocket. If stakeholders want additional effectiveness factor published, the CAISO will defer to the Commission as to what further effectiveness factor data it would like the CAISO to publish.

Definition of Effectiveness Factor

Effectiveness factor of a generator is calculated from the MW decrease is flow on the most limiting element (after the contingency has been taken) for a corresponding 100 MW increase in generation from that generator

Major Changes from last year's study

The introduction of Resource Adequacy Qualifying Capacity data

With the exception of the Bay Area study, the 2006 LCR Study utilized the historical output values of the available generation [based on the average generation output (between 2-5 pm) during the three hottest days in the summer] as the total dependable generation available. Given what the CAISO knows today, the historical output values utilized in the 2006 LCR study were lower when compared to the RA Qualifying Capacity data the CAISO utilized in the 2007 LCR Study. This difference was especially significant for areas with significant amounts of QF and hydro generation (i.e., Sierra and Humboldt). For the Bay Area study, the 2006 LCR study utilized the P max values which, when compared to the 2007 LCR study, were larger than the RA Qualifying Capacity data, especially due to QF and wind generation (see Bay Area study).

Total area requirement compared with sub-area requirements

The purpose of this report is to provide detailed local procurement information, as such each local area's overall requirement has to be procured in a fashion that satisfies all of the sub-area requirements as well.

The role of sub-area requirements:

Because each individual sub-area is a part of the interconnected electric system, the total for each local area is not simply a summation of the sub-area requirements (i.e., the sum of the parts does not necessarily equal the sum of the whole). For example, some sub-areas may overlap and therefore the same units can be counted toward both sub-area requirements. Of course some sub-areas requirements are directly counted toward the total requirements of a bigger local sub-area or the overall area. Other times the area has an overall requirement that exceeds the sum of the sub-area requirements. Each area is unique and detail analysis is provided in the report and each area's presentation.

Can an area have a higher LCR requirement then load?

Yes.

There should be no load drop for a category B condition. Take, for example, an area such as Sierra or Humboldt with has a limited import capability. Sierra has more ties, however some of them are exporting power therefore the net import is relatively small. Humboldt has few ties and 100% of the load must be served when one generator or a generator and a line are out of service. In both cases these contingencies (Rio Oso-Poe 230 kV with one of the Colgate units out or Cottonwood-Bridgeville with one of the Humboldt units out) account for the loss of ~25% of Qualifying Capacity in that area. One can see that if there were no ties the requirement would need to be at least 125% of load in the area.

This is particularly true for areas where deficiencies in some sub-area have been added to the total existing generation in order to come up with the Total Area Requirement.

Local load can NOT be subtracted from total LCR in order to come up with "Import Capability" into any one area. The LCR requirement represents the total "Capacity" needed in that area in order to respond to a large number of contingencies (including sub-area requirements). Not all of this capacity needs to be on-line simultaneously, some of it can be called upon after the first contingency has happened (especially in area with a lot of fast start units.

Zonal Requirements

The ISO performed an assessment of the Zonal Capacity needs for year 2007. These results refer to the ISO control area only, they do not include requirements for other control areas like: LADWP, IID, SMUD-WAPA, TID or MID. Units need in order to comply with the Local Area Capacity Requirements fully count toward the Zonal Requirements. San Diego and LA Basin are situated in SP26, Kern in ZP26 and the rest in NP15.

Zone	Load Forecast (MW)	Generator Outages (MW)	Single Worst Contingency (MW)	(-)Import Capability (MW)	Total Requirement (MW)
SP26	28,778	1,500	2,000	10,100	**22,178**
NP26=NP15+ZP26	21,518	2,500	1,160	5,348	**19,830**
NP15	Path 15 is not a binding constraint at this time				

Load forecast = 1-in-5

Generator outages = average historical data

Single worst contingency = ISO share of PDCI in the South, Diablo unit in the north

Import Capability = ISO maximum historical import capability

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How do I read this table ?

	Qualifying Capacity			2007 LCR Requirement Based on Category B (Option 1)			2007 LCR Requirement Based on Category C with operating procedure (Option 2)			2006 Total LCR Req.
Local Area Name	**QF/ Muni (MW)**	**Market (MW)**	**Total (MW)**	**Existing Capacity Needed**	**Deficiency**	**Total (MW)**	**Existing Capacity Needed**	**Deficiency**	**Total (MW)**	**(MW)**
Humboldt	73	133	206	202	0	**202**	202	0	**202**	162
North Coast / North Bay	158	861	1019	766**	0	**766****	766**	0	**766****	658
Sierra	1072	776	1848	1833	205	**2038**	1833	328	**2161**	1770*
Stockton	314	257	571	348	0	**348**	506	53	**559**	440*
Greater Bay	1314	5231	6545	4771	0	**4771**	5341	0	**5341**	6009
Greater Fresno	727	2185	2912	2760	0	**2760**	2797	4	**2797**	2837 *
Kern										797*
LA Basin	3425	7033	10458	8843	0	**8843**	8843	0	**8843**	8127
San Diego	191	2741	2933	2781	0	**2781**	2781	0	**2781**	2620
Total	**7274**	**19217**	**26492**	**22304**	**205**	**22509**	**23069**	**385**	**23450**	**23420**

* Generation deficient areas (or with sub-area that are deficient) – deficiency included in LCR
** The North Coast/North Bay area requirement would have been higher by 80 MW, however a new operating procedure has been received, validated and implemented by PG&E and the CAISO.

Table interpretation

Category C numbers are identical with Category B numbers

This area or sub-area requirement is driven by a Category B contingency, there is no Category C contingency with a higher requirement.

QF/Muni (MW) – Qualifying Capacity

Includes QF's, Self-gen, Muni, State, Federal, nuclear and Wind generation.

Existing Capacity Needed

This represents the amount of capacity needed to be procured from the existing units in the area.

Deficiency

This represents a proxy amount of extra capacity needed in order to comply with that category of the criteria by increasing the output of the most effective unit in the area (or sub-area) beyond it's qualifying capacity until the problem has been solved.

What does it mean to be deficient in one area?

Load drop needs to be implemented. For most category B contingencies there may be an existing scheme that drops load after the first contingency. For most category C contingencies the load most likely needs to be dropped at some reasonable time after the first contingency in order get the system into a safe operating zone and be able to support the loss of the next contingency and be within the existing applicable ratings.