California ISO

LOCAL CAPACITY TECHNICAL ANALYSIS

OVERVIEW OF 2006 LOCAL AREA RELIABILITY NEEDS STUDY REPORT AND UPDATED RESULTS

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Local Capacity Technical Analysis
Overview and Study Results

I. General Background

This write-up represents an updated version of the 2006 Local Capacity Requirement (LCR) report and was requested as part of the RCST settlement.

The parameters of this study were initially presented and discussed with stakeholders at a CPUC workshop conducted in Folsom on January 25, 2005. The proposed methodology and criteria for this Local Capacity Area technical study were published as part of a "Straw Proposal" document that was distributed to the CPUC R.04-04-003 service list of workshop participants. This document has since been posted on the CAISO website at:

http://www.caiso.com/docs/2005/06/22/2005062214371421107.pdf

The preliminary results of this study were presented to stakeholders at a meeting on June 29, 2005. These preliminary results are posted on the CAISO website at:

http://www.caiso.com/docs/2005/06/24/2005062408465116859.pdf

The CAISO also reviewed revisions to this preliminary report with stakeholders during conference calls on July 20 and August 1, 2005. A number of suggestions from these stakeholder discussions are incorporated within this improved overview. This overview also identified the transmission lines into these Local Capacity Areas and the substation facilities that encircle or are included within each Local Capacity Area. The information was used to geographically define each Local Capacity Area and to assign specific local capacity obligations to the LSEs that serve load within these geographic boundaries.

The September 23, 2005 final study results document along with an attachment that lists the generating units that are eligible for meeting the LCR requirements that must be procured within each Local Capacity Area as well as an Addendum with additional explanations regarding the LCR studies and some possible solution to some of the local area requirements have been posted on the CAISO website at:

http://www.caiso.com/1790/17906b35599f0.pdf

II. Summary of Updated 2006 Locational Capacity Requirement Study Results

New Information:

1. *Provide short-term guidance in resource procurement - effectiveness factors.*

Effectiveness factors, if appropriate, have been provided in the detailed write-up of each local area. See chapter IV – Summary of Results by Local Area below.

2. *North Coast/ North Bay Area – validated operating solution.*

Operations solutions to mitigate the most limiting constraint in the Lakeville pocket, as previously described in the LCR report, has been validated in this area in order to reduce the total LCR requirement. The most critical contingency for the Lakeville Sub-area would be outages on Vaca-Dixon-Lakeville 230 kV line #1 and the Crockett-Sobrante 230 kV line #1. The sub-area area limitation is thermal overloading of the Lakeville-Sobrante 230 kV line.
This limiting contingency establishes a Local Capacity Requirement of 460 MW (includes 140 MW of QF and Muni generation) as the minimum capacity necessary for reliable load serving capability within this sub-area. The LCR requirement for Eagle Rock/Fulton sub-area can be counted toward fulfilling the requirement of Lakeville sub-area
.

3. *Greater Bay Area - Increase rating for the Tesla-Newark #2 230 kV line.*

In response to request for PTO to identify any non-generation solutions to the original LCR requirements, the PTO for the Tesla-Newark #2 230 KV line has re-evaluated rating of the Tesla-Neward #2 230 KV line. As a result, there has been an increase in rating for this element which was previously the most limiting element as previously described in the LCR report. The new LCR requirement is about 4948 MW with the market only LCR about 3715 MW and is driven by the loss of the Vaca Dixon 500/230 kV line followed by the loss of the Contra Costa 7 unit (or vice versa) with the limiting element being the Tesla-Delta Switching Yard 230 kV line.

4. *Discussion of RMR vs LCR Load Pocket Requirement Values.*

On January 31, 2006 the CAISO submitted its 2006 LCR Technical Study ("LCR Study") and supporting addendum as its local resource adequacy requirements ("RAR") proposal in accordance with D.05-10-042, the *Order Instituting Rulemaking* (R.05-12-013), filed December 15, 2005 ("OIR"), and the ruling of Administrative Law Judge Wetzell pursuant to Rule 48 of the Commission's Rules of Practice and Procedure, dated January 31, 2006. This document is posted on the CAISO website at:

http://www.caiso.com/1790/17906b35599f0.pdf

The purpose of the CAISO's Local Capacity Technical Analysis was to identify specific areas within the CAISO Controlled Grid that have local reliability problems and to determine the generation capacity (MW) that would be required to mitigate these local reliability problems. The results were documented in the LCR Study and show:

A. The minimum generation capacity (in MWs) that must be available within each Local Capacity Area;
B. Transmission lines and substations that encircle each Local Capacity Area, from which a geographical description can be drawn to identify which load is encompassed within each sub-area;
C. Generating units that are located within each Local Capacity Area that would be eligible to count toward meeting the LCR for that area.

Because of their familiarity with the existing RMR process, the stakeholders have requested that the CAISO present its 2006 LCR results as a comparison to its 2006 RMR results and explain the differences. While there are many similarities between RMR and LCR study methodology and criteria, there are also several key differences between the two studies that yield study results that are unique to those studies. For example, RMR load pocket boundaries are generally drawn around the fleet of generators that are most effective at mitigating the local area reliability constraint. While defining the load boundary in this way will always yield the most "effective" fleet of generators at mitigating local area reliability constraints, the specific generators included in this "fleet" will change as the configuration of the transmission grid is changed (new infrastructure is added or modified, generation interconnected) or local area constraints are "fixed" through transmission infrastructure improvements. This results in a more "fluid" load pocket boundary that may result in a generator being within the load pocket boundary one year, but outside the load pocket boundary the next year. The stakeholders preferred more clarity, well defined and stable load pocket boundaries, as such, for LCR the CAISO "fixed" the boundaries of the local load pockets and defined LCR MWs within those fixed local area boundaries.

The CAISO has become concerned that stakeholders may be comparing RMR and LCR results in a manner that is inconsistent within the underlying assumptions under which the results were developed. An example would be the direct comparison of the RMR and LCR results for the Greater Bay Area. This is an inappropriate comparison because of the way the load boundaries are defined. As presented in the LCR Study, the 2006 LCR study identified the market only LCR requirements for the area to be 3715 MW, where all of the identified generation was located within the fixed load pocket boundary. When compared to the 4000 MW identified for the 2006 RMR requirements for the Greater Bay Area, it should be understood that approximately 3400 MW of the identified RMR generation is located inside of the

"fixed" load pocket boundary identified in the LCR study. See final 2006 LARS designations posted at:

http://www.caiso.com/docs/2005/09/06/2005090614205420012.pdf
and
http://www.caiso.com/docs/2005/09/06/2005090614324622391.pdf

Units outside of the identified boundary fulfill the rest of the RMR requirement. Therefore, to suggest that a transition from RMR to LCR for the Greater Bay Area would decrease the needed generation by 285 MW (3715 MWs – 4000 MWs) would be incorrect because only 3400 MW of the identified RMR generation is located within the LCR defined load pocket. The appropriate comparison is that the transition from 2006 RMR (with units already designated) to 2006 LCR for the Greater Bay Area increases the needed generation by 315 MW, or 3715 MW – 3400 MW.

5. *Updated LCR requirement table.*

Local Area Name	2006 market only LCR (MW)	2006 Total LCR (MW)
Humboldt	126	162
North Coast / North Bay	320[2]	460[2]
Sierra	808	1770[1]
Stockton	244	440[1]
Greater Bay	3715[3]	4948[3]
Greater Fresno	2529	2837[1]
Kern	171	797[1]
LA Basin	4800	8127
San Diego	2434	2620
Total	**15147**	**22161**

[1] Generation deficient areas (or with sub-area that are deficient) – deficiency included in LCR
[2] Change due to accepted operating procedure.
[3] Change due to new equipment rating. And it represents an increase over RMR see discussion above.

III. The Study

A. Objectives

The purpose of the CAISO's Local Capacity Technical Analysis was to identify specific areas within the CAISO Controlled Grid that have local reliability problems

and to determine the generation capacity (MW) that would be required to mitigate these local reliability problems. The results of this overview show:

A. The minimum generation capacity (in MWs) that must be available within each Local Capacity Area;

B. Transmission lines and substations that encircle each Local Capacity Area, from which a geographical description can be drawn to identify which load is encompassed within each sub-area;

C. Generating units that are located within each Local Capacity Area that would be eligible to count toward meeting the LCR for that area.

In some of the Local Capacity Areas, there are insufficient generation resources to mitigate the reliability criteria violations that occur. These Local Capacity Areas are highlighted in the Overview to provide guidance on where new transmission infrastructure or new generation resources could be added.

B. Key Study Assumptions

Many of the assumptions related to generation adopted for this study are similar to the assumptions made for RMR studies, including the availability of "Must Take" resources at their contract ratings, the dispatch of hydro generation and the explicit representation of municipal, state, federal and QF generating units in the power flow base cases.

The CAISO utilized the "2006 CAISO Controlled Grid – Summer Peak" as the starting base case for the local area power flows. To complete the local area component of this study, this base case was adjusted to reflect a one-in-ten-year peak load forecast for each local area as provided to the ISO by the Participating Transmission Owners ("PTOs"). To complete the zonal component of this study, the base case was adjusted to reflect a one-in-five-year peak load forecast for each zone. The lower forecast is acceptable on a zonal level due to higher diversity of load and temperature at peak time and consistent with the transmission expansion plans provided by the PTOs. Electronic contingency files provided by the PTOs were utilized to perform the numerous contingencies required to identify the LCR needs. These contingency files include remedial action and special protection schemes that are expected to be in operation during 2006.

C. Methodology and Criteria

The CAISO's study followed the proposed methodology and criteria that were published as part of a "Straw Proposal" document that was distributed to the CPUC R.04-04-003 service list of workshop participants. A comparison of the proposed LCR criteria to the existing RMR and WECC/NERC criteria is shown in Table 1. As can be seen from this table, the proposed LCR criteria, while more extensive than

the existing RMR criteria, is consistent with the CAISO Grid Planning criteria. A brief description of how the CAISO applied the criteria in its study is provided below.

Performance Level A
This a normal operating condition with no overloads and all voltages within their normal operating limits.

Performance Level B
This performance level incorporates N-1 contingencies that could include the loss of a single generator, a single transmission line or a single transformer bank. This standard requires enough generation so that the system avoids voltage collapse or transient instability as a result of these potential N-1 scenarios. The transmission system also should remain within emergency thermal limits and acceptable voltage limits. Following this N-1 contingency the generation must be sufficient to allow for operators to bring the system back to within acceptable (normal) operating range (voltage and loading) and/or appropriate OTC.

Performance Level C
This performance level requires sufficient generation for the system to absorb the loss of a generating unit or transmission facility, readjust to a normal operating state, and then suffer the loss of another transmission facility. This standard requires a MW amount within that Local Capacity Area sufficient to keep the system within emergency thermal limits and acceptable voltage limits, as well as avoiding voltage collapse and transient instability.

Performance Level C also incorporates common mode failure N-2 contingencies that could include the simultaneous loss of two transmission lines or two generating units. This standard requires enough generation so that the system avoids voltage collapse or transient instability as a result of these potential N-2 scenarios. The transmission system also should remain within emergency thermal limits and acceptable voltage limits.

Operating Requirements
This study also incorporated specific operating requirements, needed in order to prevent voltage collapse or transient instability for "N-1, followed by N-2" contingencies. This would include contingencies where the system suffers the loss of a single generating unit or transmission line, the system is readjusted and then the simultaneous loss (common mode failure)[1] of two transmission lines occurs.

Consistent with NERC standards, after the second N-1 or immediately after the common mode N-2 load shedding is allowed as long as all criteria (thermal, voltage, transient, reactive margin) are respected. However, while the CAISO criteria generally allows for load shedding for the N-1, N-2 contingencies, the CAISO has also maintained the level of reliability that existed prior to its formation. As such, to

[1] These failures include a double circuit tower and the loss of two 500kv lines that are located in the same corridor.

the extent a PTO's pre-CAISO standards did not allow for load shedding for common corridor and/or double circuit tower line outages, the CAISO has maintained that practice to assure that the level of reliability that prevailed before the CAISO was formed would be maintained.

D. Table 1: Criteria Comparison

Table 1
Criteria Comparison

Contingency Component(s)	ISO Grid Planning Criteria	Existing RMR Criteria	Locational Capacity Criteria
A – No Contingencies	X	X	X
B – Loss of a single element			X[1]
1. Generator (G-1)	X	X	
2. Transmission Circuit (L-1)	X	X	X[1]
3. Transformer (T-1)	X	X[2]	
4. Single Pole (dc) Line	X		X[1,2]
5. G-1 system readjusted L-1	X	X	X[1]
		X	
			X
C – Loss of two or more elements	X		
1. Bus Section	X		
2. Breaker (failure or internal fault)	X		X
3. L-1 system readjusted G-1	X		X
3. G-1 system readjusted T-1 or T-1 system readjusted G-1	X		X
3. L-1 system readjusted T-1 or T-1 system readjusted L-1	X		X
3. G-1 system readjusted G-1	X		X
3. L-1 system readjusted L-1	X		
3. T-1 system readjusted T-1	X		
4. Bipolar (dc) Line	X		X
5. Two circuits (Common Mode) L-2	X		X
6. SLG fault (stuck breaker or protection failure) for G-1	X		
7. SLG fault (stuck breaker or protection failure) for L-1	X		
8. SLG fault (stuck breaker or protection failure) for T-1	X[3]		
9. SLG fault (stuck breaker or protection failure) for Bus section			
WECC-S3. Two generators (Common Mode) G-2			X

D – Extreme event – loss of two or more elements Any B1-4 system readjusted (Common Mode) L-2 All other extreme combinations D1-14.	**X4** **X4**		**X3**
1 System must be able to readjust to normal limits. 2 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. 3 Evaluate for risks and consequence, per NERC standards. No voltage collapse or dynamic instability allowed. 4 Evaluate for risks and consequence, per NERC standards.			

A significant number of simulations were run to determine the most critical contingencies within each Local Capacity Area. Using power flow, post-transient load flow, and stability assessment tools, the system performance results of all the contingencies that were studied were measured against the system performance requirements defined by the criteria shown in Table 1. Where the specific system performance requirements were not met, generation was adjusted such that the minimum amount of generation required to meet the criteria was determined in the Local Capacity Area. The following describes how the criteria were tested for the specific type of analysis performed.

Power Flow Assessment:

Contingencies	Thermal Criteria[3]	Voltage Criteria[4]
Generating unit [1, 6]	Applicable Rating	Applicable Rating
Transmission line [1, 6]	Applicable Rating	Applicable Rating
Transformer [1, 6]	Applicable Rating[5]	Applicable Rating[5]
(G-1)(L-1) [2, 6]	Applicable Rating	Applicable Rating
Overlapping [6, 7]	Applicable Rating	Applicable Rating

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 over-lapping outage is considered a single contingency within the ISO Grid Planning Criteria. Therefore, load dropping for an overlapping G-1, L-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 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:

Contingencies	Reactive Margin Criteria [2]
Selected [1]	*Applicable Rating*

[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:

Contingencies	Stability Criteria [2]
Selected [1]	*Applicable Rating*

[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.

IV. Summary of Results by Local Area

A. Humboldt Area

The most critical contingency for the Humboldt area is the outage of the Bridgeville-Cottonwood 115 kV line over-lapping with an outage of one Humboldt Bay Power Plant. The local area limitation is low voltage and reactive power margin. This multiple contingency establishes a Local Capacity Requirement of 162 MW (includes 36 MW of QF and Muni generation) as the minimum capacity necessary for reliable load serving capability within this area.

The transmission tie lines into the area include:

1) Bridgeville-Cottonwood 115 kV line #1
2) Humboldt-Trinity 115 kV line #1
3) Willits-Garberville 60 kV line #1
4) Trinity-Maple Creek 60 kV line #1

The substations that delineate the Humboldt Area are:

1) Bridgeville 115 kV
2) Humboldt 115 kV
3) Kekawaka 60 kV
4) Ridge Cabin 60 kV

Effectiveness factors:

All units within this area have the same effectiveness factor. Units outside of this area are not effective.

B. North Coast / North Bay Area

The North Coast/North Bay Area is composed of two sub-areas and the generation requirements within them. The most critical contingency for the Eagle Rock-Fulton Sub-area is described by the outage of the Fulton-Ignacio 230 kV line #1 and the Fulton-Lakeville 230 kV line #1. The sub-area area limitation is thermal overloading of the Corona-Penngrove section of the Corona-Lakeville 115 kV line #1.
This limiting contingency establishes a Local Capacity Requirement of 319 MW (includes 79 MW of QF and Muni generation) as the minimum capacity necessary for reliable load serving capability within this sub-area.

Effectiveness factors:

The following table has units within the Eagle Rock-Fulton pocket as well as units outside the pocket that are at least 5% effective to the above-mentioned constraint.

Gen Bus	Gen Name	Gen ID	MW Eff Fctr	Rel Effectiveness	Location
31404	WEST FOR	2	63	100	Fulton
31402	BEAR CAN	1	63	100	Fulton
31402	BEAR CAN	2	63	100	Fulton
31404	WEST FOR	1	63	100	Fulton
31414	GEYSER12	1	63	100	Fulton
31418	GEYSER14	1	63	100	Fulton
31420	GEYSER16	1	63	100	Fulton
31422	GEYSER17	1	63	100	Fulton
38112	NCPA2GY2	1	63	100	Fulton
38110	NCPA2GY1	1	62	98	Fulton
31408	GEYSER78	1	38	60	Eagle Rock
31408	GEYSER78	2	38	60	Eagle Rock
31406	GEYSR5-6	1	37	59	Eagle Rock
31406	GEYSR5-6	2	37	59	Eagle Rock
31412	GEYSER11	1	37	59	Eagle Rock
31435	GEO.ENGY	1	37	59	Eagle Rock
31435	GEO.ENGY	2	37	59	Eagle Rock
32154	WADHAM	1	8	13	Outside

The transmission tie facilities coming into this sub-area are:

1) Fulton-Lakeville 230 kV line #1
2) Fulton-Ignacio 230kV line #1
3) Cortina 230/115 kV Transformer #1
4) Lakeville-Sonoma 115 kV line #1
5) Corona-Lakeville 115 kV line #1
6) Willits-Garberville 60 kV line #1

The substations that delineate the Eagle Rock-Fulton sub-area are:

1) Fulton 230 kV
2) Corona 115 kV
3) Sonoma 115 kV
4) Cortina 115 kV
5) Laytonville 60 kV

Operations solutions to mitigate the most limiting constraint in the Lakeville pocket, as previously described in the LCR report, has been validated in this area in order to reduce the total LCR requirement. The most critical contingency for the Lakeville Sub-area would be outages on Vaca-Dixon-Lakeville 230 kV line #1 and the Crockett-Sobrante 230 kV line #1. The sub-area area limitation is thermal overloading of the Lakeville-Sobrante 230 kV line.
This limiting contingency establishes a Local Capacity Requirement of 460 MW (includes 140 MW of QF and Muni generation) as the minimum capacity necessary for reliable load serving capability within this sub-area. The LCR requirement for Eagle Rock/Fulton sub-area can be counted toward fulfilling the requirement of Lakeville sub-area

.

Effectiveness factors:

The following table has units at least 5% effective to the above-mentioned constraint.

Gen Bus	Gen Name	Gen ID	MW	Eff Fctr	Rel Effectiveness	Location
38106	NCPA1GY1	1	88		100	Lakeville
38108	NCPA1GY2	1	88		100	Lakeville
31400	SANTA FE	2	87		99	Lakeville
31430	SMUDGEO1	1	87		99	Lakeville
31400	SANTA FE	1	87		99	Lakeville
31416	GEYSER13	1	87		99	Lakeville
31424	GEYSER18	1	87		99	Lakeville
31426	GEYSER20	1	87		99	Lakeville
31404	WEST FOR	2	86		98	Fulton
31402	BEAR CAN	1	86		98	Fulton
31402	BEAR CAN	2	86		98	Fulton
31404	WEST FOR	1	86		98	Fulton
31414	GEYSER12	1	86		98	Fulton
31418	GEYSER14	1	86		98	Fulton
31420	GEYSER16	1	86		98	Fulton
31422	GEYSER17	1	86		98	Fulton
38110	NCPA2GY1	1	85		97	Fulton
38112	NCPA2GY2	1	85		97	Fulton
31406	GEYSR5-6	1	52		59	Eagle Rock
31406	GEYSR5-6	2	52		59	Eagle Rock
31408	GEYSER78	1	52		59	Eagle Rock
31408	GEYSER78	2	52		59	Eagle Rock
31412	GEYSER11	1	52		59	Eagle Rock
31435	GEO.ENGY	1	52		59	Eagle Rock
31435	GEO.ENGY	2	52		59	Eagle Rock
32154	WADHAM	1	12		14	Outside

The transmission tie lines into this sub-area are:

1) Vaca Dixon-Lakeville 230 kV line #1
2) Tulucay-Vaca Dixon 230 kV line #1
3) Lakeville-Sobrante 230 kV line #1
4) Ignacio-Sobrante 230 kV line #1
5) Ignacio-Fulton 230 kV line #1
6) Lakeville-Fulton 230 kV line #1
7) Lakeville-Corona 115 kV line #1
8) Lakeville-Sonoma 115 kV line #1

The substations that delineate the Lakeville sub-area are:

1) Lakeville 230 kV
2) Ignacio 230 kV
3) Tulucay 230 kV
4) Lakeville 115 kV

C. Sierra Area

The most critical contingencies in the Sierra Area are 1) the loss of the Poe-Rio Oso 230 kV line #1 and the Colgate – Rio Oso 230 kV line #1, and 2) the loss of the Cresta-Rio Oso 230 kV line #1 and the Colgate – Rio Oso 230 kV line #1. The area limitation is thermal overloading of the Table Mt-Rio Oso 230 kV line #1.
This limiting contingency establishes a Local Capacity Requirement of 1770 MW (includes 962 MW of QF and Muni generation and an LCR Deficiency of 143 MW) as the minimum capacity necessary for reliable load serving capability within this area.

This area has numerous sub-areas (minimum six – see RMR report), however since all units are needed to maintain the overall requirement, no additional detailed sub-area analysis is needed at this time.

The transmission tie lines into the Sierra Area are:

1) Table Mountain-Rio Oso 230 kV line
2) Table Mountain-Palermo 230 kV line
3) Table Mt-Pease 60 kV line
4) Caribou-Palermo 115 kV line
5) Drum-Summit 115 kV line #1
6) Drum-Summit 115 kV line #2
7) Spaulding-Summit 60 kV line
8) Brighton-Bellota 230 kV line
9) Rio Oso-Lockeford 230 kV line
10) Gold Hill-Eight Mile Road 230 kV line
11) Gold Hill-Lodi Stig 230 kV line
12) Gold Hill-Lake 230 kV line

The substations that delineate the Sierra Area are:

1) Table Mountain 60 kV
2) Table Mountain 230 kV
3) Big Bend 115 kV
4) Drum 115 kV
5) Tamarack 60 kV
6) Brighton 230 kV
7) Rio Oso 230 kV
8) Gold Hill 230 kV

Effectiveness factors:
All units within this area are needed therefore no effectiveness factor is required.

D. Stockton Area

The requirement for this area is driven by the requirement for the Tesla-Bellota Sub-area and Lockeford Sub-area.

The critical contingency for the Tesla-Bellota Sub-area is the loss of Tesla-Tracy 115 kV and Tesla-Schulte 115 kV #1. The capacity needed for this sub-area is 449 MWs. The area limitation is thermal overloading of the Tesla-AEC section of Tesla-Kasson-Manteca 115 kV line
.
This limiting contingency establishes a Local Capacity Requirement of 449 MW (includes 229 MW of QF and Muni generation)
as the minimum capacity necessary for reliable load serving capability within this area.

The transmission facilities that establish the boundary of the Tesla-Bellota Sub-area are:

1) Bellota 230/115 kV Transformer #1
2) Bellota 230/115 kV Transformer #2
3) Tesla-Tracy 115 kV Line
4) Tesla-Salado 115 kV Line
5) Tesla-Salado-Manteca 115 kV line
6) Tesla-Shulte 115 kV Line
7) Tesla-Manteca 115 kV Line

The substations that delineate the Tesla-Bellota Sub-area are:

1) Tesla 115 kV
2) Bellota 115 kV

Effectiveness factors:
All units within this sub-area are needed therefore no effectiveness factor is required.

The critical contingency for the Lockeford Sub-area is the loss of Lockeford-Industrial 60 kV and Lockeford-Lodi #2 60 kV. The capacity needed for this sub-area is 92 MWs. The area limitation is thermal overloading of the Lockeford-Colony section of the Lockeford-Lodi #1 60 kV line
.

This limiting contingency establishes a Local Capacity Requirement of 92 MW (includes 2 MW of QF generation)
as the minimum capacity necessary for reliable load serving capability within this area.

The transmission facilities that establish the boundary of the Lockeford Sub-area are:

1) Lockeford-Industrial 60 kV line
2) Lockeford-Lodi #1 60 kV line
3) Lockeford-Lodi #2 60 kV line
4) Lockeford-Lodi #3 60 kV line

The substations that delineate the Lockeford Sub-area is:

1) Lockeford 60 kV

Effectiveness factors:
All units within this sub-area are needed therefore no effectiveness factor is required.

E. Greater Bay Area

The new LCR requirement is about 4948 MW with the market only LCR about 3715 MW and is driven by the loss of the Vaca Dixon 500/230 kV line followed by the loss of the Contra Costa 7 unit (or vice versa) with the limiting element being the Tesla-Delta Switching Yard 230 kV line.

Effectiveness factors:
For most helpful procurement information please read procedure T-133Z effectiveness factors – Bay Area at:
http://www.caiso.com/docs/2004/11/01/2004110116234011719.pdf

There are four sub-areas within this area where there is dependence on specific generation facilities to mitigate a reliability problem. These areas are:

San Francisco Sub-area - Per the CAISO Revised Action Plan for SF, all Potrero units (365 MW) will continued to be required until completion of the plan as it is presently described.

Effectiveness factors:
All units within this sub-area are needed therefore no effectiveness factor is required.

Oakland Sub-area - The most critical contingency is an outage of either the C-X 115 kV cable or the D-L 115 kV cable (with one of the Oakland CT's off-line)
. The sub-area area limitation is thermal overloading of either the C-X 115 kV cable or the D-L 115 kV cable
.
This limiting contingency establishes a Local Capacity Requirement of 100 MW (includes 50 MW of Muni generation) as the minimum capacity necessary for reliable load serving capability within this sub-area.

Effectiveness factors:
All units within this sub-area have the same effectiveness factor. Units outside of this sub-area are not effective.

San Jose Sub-area - The most critical contingency is an outage between Metcalf and Morgan Hill 115 kV (with one of the Gilroy Peaker off-line).
The sub-area area limitation is thermal overloading of the Metcalf-Llagas 115 kV line. As documented within an CAISO Operating Procedure, this limitation is dependent on power flowing in the direction from Metcalf to Llagas/Morgan Hill. This limiting contingency establishes a Local Capacity Requirement of 100 MW as the minimum capacity necessary for reliable load serving capability within this sub-area.

Effectiveness factors:
All units within this sub-area have the same effectiveness factor. Units outside of this sub-area are not effective.

Pittsburg Sub-area - The most critical contingency is an outage of the Pittsburg-Tesla #1 or #2 230 kV line (with Delta Energy Center off-line)
. The sub-area area limitation is thermal overloading of the parallel Pittsburg-Tesla 230 kV line
.
This limiting contingency establishes a Local Capacity Requirement of 2363 MW (includes 763 MW of QF generation) as the minimum capacity necessary for reliable load serving capability within this sub-area.

Effectiveness factors:
The following table has units within the Pittsburg pocket as well as units outside the pocket that are at least 5% effective to the above-mentioned constraint.

Gen Bus	Gen Name	Gen ID	MW Eff Fctr	Rel effectiveness
33840	FLOWD3-6	1	86	100
33840	FLOWD3-6	2	86	100
33840	FLOWD3-6	3	86	100
33840	FLOWD3-6	4	86	100
33171	TRSVQ+NW	2	26	30
33171	TRSVQ+NW	1	26	30
33105	PTSB 5	1	26	30

33106	PTSB 6	1	26	30
30000	PTSB 7	1	26	30
33110	DEC CTG3	1	25	29
33109	DEC CTG2	1	25	29
33108	DEC CTG1	1	25	29
33107	DEC STG1	1	25	29
33113	LMECST1	1	24	28
33112	LMECCT1	1	24	28
33111	LMECCT2	1	24	28
33132	GWF #2	1	24	28
33161	DOWCHEM1	1	24	28
33162	DOWCHEM2	1	24	28
33163	DOWCHEM3	1	24	28
33151	FOSTER W	1	23	27
33151	FOSTER W	2	23	27
33151	FOSTER W	3	23	27
33141	SHELL 1	1	21	24
33143	SHELL 3	1	21	24
33142	SHELL 2	1	21	24
32900	CRCKTCOG	1	19	22
32910	UNOCAL	1	19	22
32910	UNOCAL	2	19	22
32910	UNOCAL	3	19	22
32920	UNION CH	1	19	22
32922	ChevGen2	1	18	21
32921	ChevGen1	1	18	21
32740	HILLSIDE	1	18	21
33135	GWF #5	1	18	21
38119	ALMDACT2	1	16	19
32903	OAKLND 3	1	16	19
32902	OAKLND 2	1	16	19
32901	OAKLND 1	1	16	19
38118	ALMDACT1	1	16	19
31404	WEST FOR	2	14	16
31402	BEAR CAN	1	14	16
31402	BEAR CAN	2	14	16
31404	WEST FOR	1	14	16
31414	GEYSER12	1	14	16
31416	GEYSER13	1	14	16
31418	GEYSER14	1	14	16
31420	GEYSER16	1	14	16
31422	GEYSER17	1	14	16
31424	GEYSER18	1	14	16
31426	GEYSER20	1	14	16
38110	NCPA2GY1	1	14	16
38112	NCPA2GY2	1	14	16
31400	SANTA FE	2	13	15
31430	SMUDGEO1	1	13	15

31400	SANTA FE	1	13	15
38106	NCPA1GY1	1	13	15
38108	NCPA1GY2	1	13	15
31406	GEYSR5-6	1	10	12
31406	GEYSR5-6	2	10	12
31408	GEYSER78	1	10	12
31408	GEYSER78	2	10	12
31412	GEYSER11	1	10	12
31435	GEO.ENGY	1	10	12
31435	GEO.ENGY	2	10	12
30464	EXXON_BH	1	9	10
33252	POTRERO3	1	7	8
33271	HNTRS P1	1	7	8
33270	HNTRS P4	1	7	8
33253	POTRERO4	1	7	8
33254	POTRERO5	1	7	8
33255	POTRERO6	1	7	8
33466	UNTED CO	1	7	8
35312	SEAWESTF	1	7	8
35316	ZOND SYS	1	7	8
35320	USW FRIC	1	7	8
32176	SHILOH	1	5	6
36865	DVRPPSTA	1	5	6
36864	DVRPPCT2	1	5	6
36863	DVRPPCT1	1	5	6
32185	WOLFSKIL	1	5	6
33178	RVEC_GEN	1	5	6
32175	CREEDGT1	3	5	6
32174	GOOSEHGT	2	5	6
32173	LAMBGT1	1	5	6
32150	DG_VADIX	1	5	6
32172	HIGHWNDS	1	5	6
33134	GWF #4	1	5	6
33116	C.COS 6	1	5	6
33117	C.COS 7	1	5	6
32154	WADHAM	1	5	6
33133	GWF #3	1	5	6
33145	CROWN.Z.	1	5	6
33145	CROWN.Z.	2	5	6
33131	GWF #1	1	5	6
36856	CSC_CCA	1	5	6
33463	CARDINAL	1	5	6
33463	CARDINAL	2	5	6
32168	USWINDPW	1	5	6
32168	USWINDPW	2	5	6
33838	USWP_#3	1	5	6

The transmission tie lines into the Greater Bay Area are:

1) Lakeville-Sobrante 230 kV
2) Ignacio-Sobrante 230 kV
3) Parkway-Moraga 230 kV
4) Bahia-Moraga 230 kV
5) Lambie SW Sta-Contra Costa Sub 230 kV
6) Peabody-Contra Costa P.P. 230 kV
7) Kelso-Brentwood 230 kV
8) Tesla-Delta Switching Yard 230 kV
9) Tesla-Pittsburg #1 230 kV
10) Tesla-Pittsburg #2 230 kV
11) Tesla-Newark #1 230 kV
12) Tesla-Newark #2 230 kV
13) Tesla-Tracy #1 230 kV
14) Tesla-Tracy #2 230 kV
15) Tesla-Ravenswood 230 kV
16) Tesla-Metcalf 500 kV
17) Moss Landing-Metcalf 500 kV
18) Moss Landing-Metcalf #1 230 kV
19) Moss Landing-Metcalf #2 230 kV
20) Green Valley-Morgan Hill #1 115 kV
21) Green Valley-Morgan Hill #2 115 kV
22) Oakdale TID-Newark #1 115 kV
23) Oakdale TID-Newark #2 115 kV

The substations that delineate the Greater Bay Area are:

1) Lakeville 230 kV
2) Ignacio 230 kV
3) Moraga 230 kV
4) Lambie SW Sta 230 kV
5) Kelso 230 kV
6) Contra Costa P.P. 230 kV
7) Pittsburg 230 kV
8) Tesla 230 kV
9) Metcalf 500 kV
10) Moss Landing 500 kV
11) Morgan Hill 115 kV
12) Newark 115 kV

F. Greater Fresno Area

Wilson Sub-area: The most critical contingency for the Wilson sub-area is the loss of the Wilson - Melones 230 kV line, which would thermally overload the Wilson - Warnerville 230 kV line

.

This limiting contingency establishes a Local Capacity Requirement of 1560 MW (which includes 105 MW of muni generation and 203 MW of QF generation) as the minimum generation capacity necessary for reliable load serving capability within this sub-area.

At least 120 MWs of the 1560 MW must come from the Helms generating units.

Effectiveness factors:

The following table has units within Fresno that are at least 5% effective to the above-mentioned constraint. All units in Fresno not listed or units outside of this area have smaller effectiveness factors.

Gen Bus	Gen Name	Gen ID	MW Eff Fctr	Relative effectiveness
34332	JRWCOGEN	1	40	100
34322	MERCEDFL	1	33	82.5
34320	MCSWAIN	1	32	80
34306	EXCHQUER	1	31	77.5
34600	HELMS 1	1	31	77.5
34602	HELMS 2	1	31	77.5
34604	HELMS 3	1	31	77.5
34301	CHOWCOGN	1	29	72.5
34636	FRIANTDM	1	25	62.5
34485	FRESNOWW	1	24	60
34658	WISHON	1	24	60
34658	WISHON	2	24	60
34658	WISHON	3	24	60
34658	WISHON	4	24	60
34631	SJ2GEN	1	24	60
34633	SJ3GEN	1	23	57.5
34344	KERCKHOF	1	22	55
34344	KERCKHOF	2	22	55
34344	KERCKHOF	3	22	55
34308	KERCKHOF	1	22	55
34179	MADERA_G	1	20	50
34648	DINUBA E	1	19	47.5
34672	KRCDPCT2	1	18	45
34671	KRCDPCT1	1	18	45
34624	BALCH 1	1	18	45
34640	ULTR.PWR	1	18	45
34646	SANGERCO	1	18	45
38720	PINE FLT	1	17	42.5
38720	PINE FLT	2	17	42.5

38720	PINE FLT	3	17	42.5
34616	KINGSRIV	1	17	42.5
34642	KINGSBUR	1	17	42.5
34433	GWF_HEP2	1	14	35
34431	GWF_HEP1	1	14	35
34610	HAAS	1	14	35
34610	HAAS	2	14	35
34612	BLCH 2-2	1	14	35
34614	BLCH 2-3	1	14	35
34539	GWF_GT1	1	13	32.5
34334	BIO PWR	1	13	32.5
34541	GWF_GT2	1	12	30
34650	GWF-PWR.	1	12	30
34142	WHD_PAN2	1	11	27.5
34186	DG_PAN1	1	11	27.5
34608	AGRICO	2	10	25
34608	AGRICO	3	10	25
34608	AGRICO	4	10	25
34553	WHD_GAT2	1	8	20
34652	CHV.COAL	1	8	20
34652	CHV.COAL	2	8	20
34654	COLNGAGN	1	8	20
34342	INT.TURB	1	6	15
34316	ONEILPMP	1	6	15

Herndon Sub-area: The most critical contingency for the Herndon sub-area is the loss of the Herndon 230/115 kV bank 1, which would thermally overload the parallel Herndon 230/115 kV bank 2. This limiting contingency establishes a Local Capacity Requirement of 1,207 MW (which includes 153 MW of QF generation and 50 MW of area deficiency) as the minimum generation capacity necessary for reliable load serving capability within this sub-area.

Effectiveness factors:

The following table has units within Fresno area that have at least 5% relative effectiveness to the above-mentioned constraint. All units in Fresno not listed or units outside of this area have smaller effectiveness factors.

Gen Bus	Gen Name	Gen ID	MW Eff Fctr	Rel Effectiveness
34308	KERCKHOF	1	36	100.00
34344	KERCKHOF	1	35	97.22
34344	KERCKHOF	2	35	97.22
34344	KERCKHOF	3	35	97.22
34624	BALCH 1	1	33	91.67
34646	SANGERCO	1	32	88.89
34672	KRCDPCT2	1	31	86.11
34671	KRCDPCT1	1	31	86.11

34616	KINGSRIV	1	31	86.11
34640	ULTR.PWR	1	31	86.11
34648	DINUBA E	1	29	80.56
34642	KINGSBUR	1	26	72.22
38720	PINE FLT	1	22	61.11
38720	PINE FLT	2	22	61.11
38720	PINE FLT	3	22	61.11
34612	BLCH 2-2	1	22	61.11
34610	HAAS	1	21	58.33
34610	HAAS	2	21	58.33
34614	BLCH 2-3	1	21	58.33
34433	GWF_HEP2	1	14	38.89
34431	GWF_HEP1	1	14	38.89
34301	CHOWCOGN	1	9	25.00
34608	AGRICO	2	7	19.44
34608	AGRICO	3	7	19.44
34608	AGRICO	4	7	19.44
34334	BIO PWR	1	3	8.33
34652	CHV.COAL	1	3	8.33
34652	CHV.COAL	2	3	8.33
34553	WHD_GAT2	1	2	5.56
34179	MADERA_G	1	2	5.56
34654	COLNGAGN	1	2	5.56
34332	JRWCOGEN	1	-5	-13.89
34485	FRESNOWW	1	-13	-36.11
34600	HELMS 1	1	-15	-41.67
34602	HELMS 2	1	-15	-41.67
34604	HELMS 3	1	-15	-41.67

McCall Sub-area: The most critical contingency for the McCall sub-area is the loss of Kings River – Sanger – Reedley 115 kV line, which would thermally overload the McCall – Wahtoke 115 kV line. This limiting contingency establishes a Local Capacity Requirement of 1,346 MW (which includes 60 MW of QF generation and 36 MW of area deficiency) as the minimum generation capacity necessary for reliable load serving capability within this sub-area.

Effectiveness factors:

All units within the sub-area are needed therefore no effectiveness factor is required.

Henrietta Sub-area: Within the Henrietta sub-area a minimum 40 MW generation capacity is needed to mitigate the Henrietta 230/70 kV bank overload.

Effectiveness factors:

All units within this sub-area have the same effectiveness factor. Units outside of this sub-area are not effective.

Merced Sub-area: The most critical contingencies for the Merced sub-area is the double line outage of the Wilson – Atwater 115 kV #1 and #2 lines, which would thermally overload the Wilson – Merced 115 kV #1 and #2 lines. This limiting contingency establishes a Local Capacity Requirement of 172 MW (which includes 105 MW of muni generation, 4 MW of QF generation and 60 MW of area deficiency) as the minimum generation capacity necessary for reliable load serving capability within this sub-area.

Effectiveness factors:

All units within the sub-area are needed therefore no effectiveness factor is required.

In conclusion for the Greater Fresno Area, the total accumulative Local Capacity Requirement for the five sub-areas is 4323 MW. Because of the overlapping LCR MWs requirements among the sub-areas, the total aggregate LCR requirement for the Greater Fresno Area is 2837 MW (includes 105 MW of muni generation, 203 MW of QF generation and 146 MW of total three sub-area deficiency).

Additional helpful effectiveness factors for Fresno area:

Please read procedure T-129Z effectiveness factors - Fresno Area at: http://www.caiso.com/docs/2005/07/13/2005071314483315210.pdf

The transmission facilities coming into the Greater Fresno area are:

1) Gates-Henrietta Tap 1 230 kV
2) Gates-Henrietta Tap 2 230 kV
3) Gates #1 230/115 kV Transformer Bank
4) Los Banos #3 230/70 Transformer Bank
5) Los Banos #4 230/70 Transformer Bank
6) Panoche-Gates #1 230 kV
7) Panoche-Gates #2 230 kV
8) Panoche-Coburn 230 kV
9) Panoche-Moss Landing 230 kV
10) Panoche-Los Banos #1 230 kV
11) Panoche-Los Banos #2 230 kV
12) Panoche-Dos Amigos 230 kV
13) Warnerville-Wilson 230 kV
14) Wilson-Melones 230 kV
15) Corcoran – Alpaugh - Smyrna 115 kV
16) Coalinga #1-San Miguel 70 kV

The substations that delineate the Greater Fresno area are:

1) Los Banos 230 kV
2) Gates 230 kV
3) Panoche 230 kV
4) Wilson 230 kV
5) Alpaugh 115 kV
6) Coalinga 70 kV

G. Kern Area

Kern PP Sub-area: The most critical contingency for the Kern PP sub-area is the outage of the Kern PP 230/115 kV transformer Bank 5 and the Kern PP – Kern Front 115 kV line, which would thermally overload the parallel Kern PP 230/115 kV Bank 3 and Bank 3a. This limiting contingency establishes a Local Capacity Requirement of 771 MW (which includes 618 MW of QF generation and 132 MW of area deficiency) as the minimum generation capacity necessary for reliable load serving capability within this sub-area.

Effectiveness factors:
All units within the sub-area are needed therefore no effectiveness factor is required.

Weedpatch Sub-area: The most critical contingency is the loss of the Wheeler Ridge – San Bernard 70 kV line and the Wheeler Ridge – Tejon 70 kV line, which would thermally overload the Wheeler Ridge – Weedparch 70 kV line and cause low voltage problem at the local 70 kV transmission system. This limiting contingency establishes a Local Capacity Requirement of 26 MW (which includes 8 MW of QF generation and 10 MW of area deficiency) as the minimum generation capacity necessary for reliable load serving capability within this sub-area.

Effectiveness factors:
All units within the sub-area are needed therefore no effectiveness factor is required.

In conclusion, for the Kern Area, the total accumulative and aggregate Local Capacity Requirement for the two sub-areas is 797 MW (which includes 626 MW of QF generation and 142 MW of total two sub-area deficiency).

The transmission facilities coming into the Kern PP sub-area are:

1) Wheeler Ridge-Lamont 115 kV line
2) Kern PP 230/115 kV Bank # 3 & 3A
3) Kern PP 230/115 kV Bank # 4
4) Kern PP 230/115 kV Bank # 5
5) Midway 230/115 Bank # 1

6) Midway 230/115 Bank # 2 & 2a
7) Temblor – San Luis Obispo 115 kV line

These sub-stations form the boundary surrounding the Kern PP sub-area:

1) Midway 115 kV
2) Kern PP 115 kV
3) Wheeler Ridge 115 kV
4) Temblor 115 kV

The transmission facilities coming into the Weedpatch sub-area are:

1) Wheeler Ridge 115/60 kV Bank
2) Wheeler Ridge 230/60 kV Bank

These sub-stations form the boundary surrounding the Weedpatch sub-area:

1) Wheeler Ridge 60 kV

H. LA Basin Area

The total market generation requirement for the LA Basin is 4,800 MW. This area's generation requirement is defined by two sub-areas (the Western and Eastern Sub-areas). The combined Local Area Requirement is 8127 MW of which 3327 MW includes the San Onofre Nuclear Power Plant and QF and Muni generation.

The critical contingency for the in the Western Sub-area is the loss of Vincent - Rio Hondo 230 kV line #2, followed by loss of Mesa - Vincent 230 kV line. The sub-area area limitation is thermal overloading of the Vincent-Rio Hondo 230 kV line #1 230 kV line
.

Effectiveness factors:
The following table has units that have at least 5% effectiveness to the above-mentioned constraint. All units in LA Basin area not listed or units outside of this area have smaller effectiveness factors.

Gen Bus	Gen Name	Gen ID	MW Eff Fctr	Rel Effectiveness
24923	MNTV-ST1	1	18	100
24926	MNTV-ST2	1	18	100
24075	LAGUBELL	1	17	94
24027	COLDGEN	1	17	94
24060	GROWGEN	1	17	94

24120	PULPGEN	1	17	94
24209	MESA CAL	1	15	83
24073	LA FRESA	1	15	83
24208	LCIENEGA	1	15	83
24011	ARCO 1G	1	15	83
24012	ARCO 2G	2	15	83
24013	ARCO 3G	3	15	83
24014	ARCO 4G	4	15	83
24163	ARCO 5G	5	15	83
24164	ARCO 6G	6	15	83
24022	CHEVGEN1	1	15	83
24023	CHEVGEN2	2	15	83
24047	ELSEG3 G	3	15	83
24048	ELSEG4 G	4	15	83
24094	MOBGEN	1	15	83
24121	REDON5 G	5	15	83
24122	REDON6 G	6	15	83
24123	REDON7 G	7	15	83
24124	REDON8 G	8	15	83
24018	BRIGEN	1	14	78
24020	CARBOGEN	1	14	78
24064	HINSON	1	14	78
24070	ICEGEN	1	14	78
24139	SERRFGEN	1	14	78
24062	HARBOR G	1	14	78
25510	HARBORG4	LP	14	78
24062	HARBOR G	HP	14	78
28005	PASADNA1	1	14	78
28006	PASADNA2	1	14	78
28007	BRODWYSC	1	14	78
24203	CENTER S	1	13	72
24921	MNTV-CT1	1	13	72
24922	MNTV-CT2	1	13	72
24924	MNTV-CT3	1	13	72
24925	MNTV-CT4	1	13	72
24157	WALNUT	1	12	67
24001	ALAMT1 G	1	12	67
24002	ALAMT2 G	2	12	67
24003	ALAMT3 G	3	12	67
24004	ALAMT4 G	4	12	67
24005	ALAMT5 G	5	12	67
24161	ALAMT6 G	6	12	67
24063	HILLGEN	1	12	67
24211	OLINDA	1	11	61
24197	ELLIS	1	10	56
24066	HUNT1 G	1	10	56
24067	HUNT2 G	2	10	56

24167	HUNT3 G	3	10	56
24168	HUNT4 G	4	10	56
24133	SANTIAGO	1	9	50
25203	ANAHEIMG	1	8	44
24111	PADUA	2	7	39
24111	PADUA	1	7	39
24024	CHINO	1	7	39
24129	S.ONOFR2	2	7	39
24130	S.ONOFR3	3	7	39
24902	VSTA	2	6	33
24210	MIRALOMA	1	6	33
24055	ETIWANDA	2	6	33
24026	CIMGEN	1	6	33
24030	DELGEN	1	6	33
25648	DVLCYN1G	1	6	33
25649	DVLCYN2G	2	6	33
25603	DVLCYN3G	3	6	33
25604	DVLCYN4G	4	6	33
24052	MTNVIST3	3	6	33
24053	MTNVIST4	4	6	33
24905	RVCANAL1	1	6	33
24906	RVCANAL2	2	6	33
24907	RVCANAL3	3	6	33
24908	RVCANAL4	4	6	33
24071	INLAND	1	6	33
24140	SIMPSON	1	6	33
25422	ETI MWDG	1	6	33
25424	ESRP P1	1	6	33
25424	ESRP P1	2	6	33
25424	ESRP P1	3	6	33
25424	ESRP P1	4	6	33
25425	ESRP P2	5	6	33
25425	ESRP P2	6	6	33
25425	ESRP P2	7	6	33
25425	ESRP P2	8	6	33
25426	ESRP P3	9	6	33
25426	ESRP P3	10	6	33
25426	ESRP P3	11	6	33
25426	ESRP P3	12	6	33
25633	CAPWIND	1	6	33
25635	ALTWIND	1	6	33
25639	SEAWIND	1	6	33
25640	PANAERO	1	6	33
28060	SEAWEST	1	6	33
28060	SEAWEST	2	6	33
28260	ALTAMSA4	1	6	33
24160	VALLEYSC	1	6	33

2020	CENTURY	1	6	33
2021	DREWS	1	6	33
25632	TERAWND	1	5	28
25634	BUCKWND	1	5	28
25636	RENWIND	1	5	28
25637	TRANWND	1	5	28
25645	VENWIND	1	5	28
25646	SANWIND	1	5	28
24826	INDIGO	1	5	28
28190	WINTECX2	1	5	28
28191	WINTECX1	1	5	28
28180	WINTEC8	1	5	28
24815	GARNET	1	5	28
24815	GARNET	2	5	28
28020	WINTEC6	1	5	28
28061	WHITEWTR	1	5	28
28280	CABAZON	1	5	28

The two critical contingencies in the Eastern Sub-area are: (1) Loss of Devers – Valley 500 kV line, followed by the loss of two Lugo – Mira Loma 500 kV lines #2 and #3, and (2) Loss of one San Onofre Nuclear Generator, followed by the loss of two Lugo – Mira Loma 500 kV lines #2 and #3. The sub-area area limitation is low area post-transient voltage associated with voltage collapse.

Effectiveness factors:

The area limitation is low area post-transient voltage associated with voltage collapse.

The Western and Eastern sub-area contingencies require 4800 MW as the minimum amount of generating capacity necessary for reliable load serving capability within these sub-areas. 1925 MW of this capacity is needed in the Eastern sub-area, and the rest (2875 MW) is needed in the Western sub-area.

The transmission tie lines into the LA Basin Area are:

1) San Onofre - San Luis Rey #1, #2, & #3 230 kV Lines
2) San Onofre - Talega #1 & #2 230 kV Lines
3) Lugo - Mira Loma #1, #2 & #3 500 kV Lines
4) Sylmar LA - Sylmar S #1, #2 & #3 230/230 kV Transformers
5) Sylmar S - Pardee #1 & #2 230 kV Lines
6) Vincent - Mesa Cal #1 230 kV Line
7) Antelope - Mesa Cal #1 230 kV Line
8) Vincent - Rio Hondo #1 & #2 230 kV Lines
9) Eagle Rock - Pardee #1 230 kV Line
10) Devers - Valley #1 500 kV Line
11) Devers #1 & #2 500/230 kV Transformers
12) Devers - Coachelv # 1 230 kV Line

13) Mirage - Ramon # 1 230 kV Line
14) Julian Hinds-Eagle Mountain 230 kV

These sub-stations form the boundary surrounding the LA Basin area:

1) Devers 500 kV
2) Mirage 230 kV
3) Vincent 230 kV
4) San Onofre 230 kV
5) Sylmar 230 kV
6) Lugo 500 kV

I. *San Diego Area*

The most limiting contingency in the San Diego area is described by the outage of 500 kV Southwest Power Link (SWPL) between Imperial Valley and Miguel Substations over-lapping with an outage of the new Palomar Combined-Cycle Power plant (542 MW) while staying within the South of San Onofre (WECC Path 44) non-simultaneous import capability rating of 2,500 MW. Therefore the 2,620 MW (includes 186 MW of QF generation) of capacity required within this area is predicated on having sufficient generation in the San Diego Area to reduce Path 44 to its non-simultaneous rating of 2500 MW within 30 minutes.

The transmission tie lines forming a boundary around San Diego include:

1) Imperial Valley – Miguel 500 kV Line
2) Miguel – Tijuana 230 kV Line
3) San Onofre - San Luis Rey #1 230 kV Line
4) San Onofre - San Luis Rey #2 230 kV Line
5) San Onofre - San Luis Rey #3 230 kV Line
6) San Onofre – Talega #1 230 kV Line
7) San Onofre – Talega #2 230 kV Line

The boundaries for the San Diego Area can be defined by the following sub-stations:

1) Miguel 230 kV
2) San Luis Rey 230 kV
3) Talega 230 kV

Effectiveness factors:

All units within this area have the same effectiveness factor. Units outside of this area are not effective.