



California ISO
Your Link to Power

California Independent
System Operator

Year 2007 LCR Study

Sierra Area in PG&E System

Summary of Findings

Prepared By

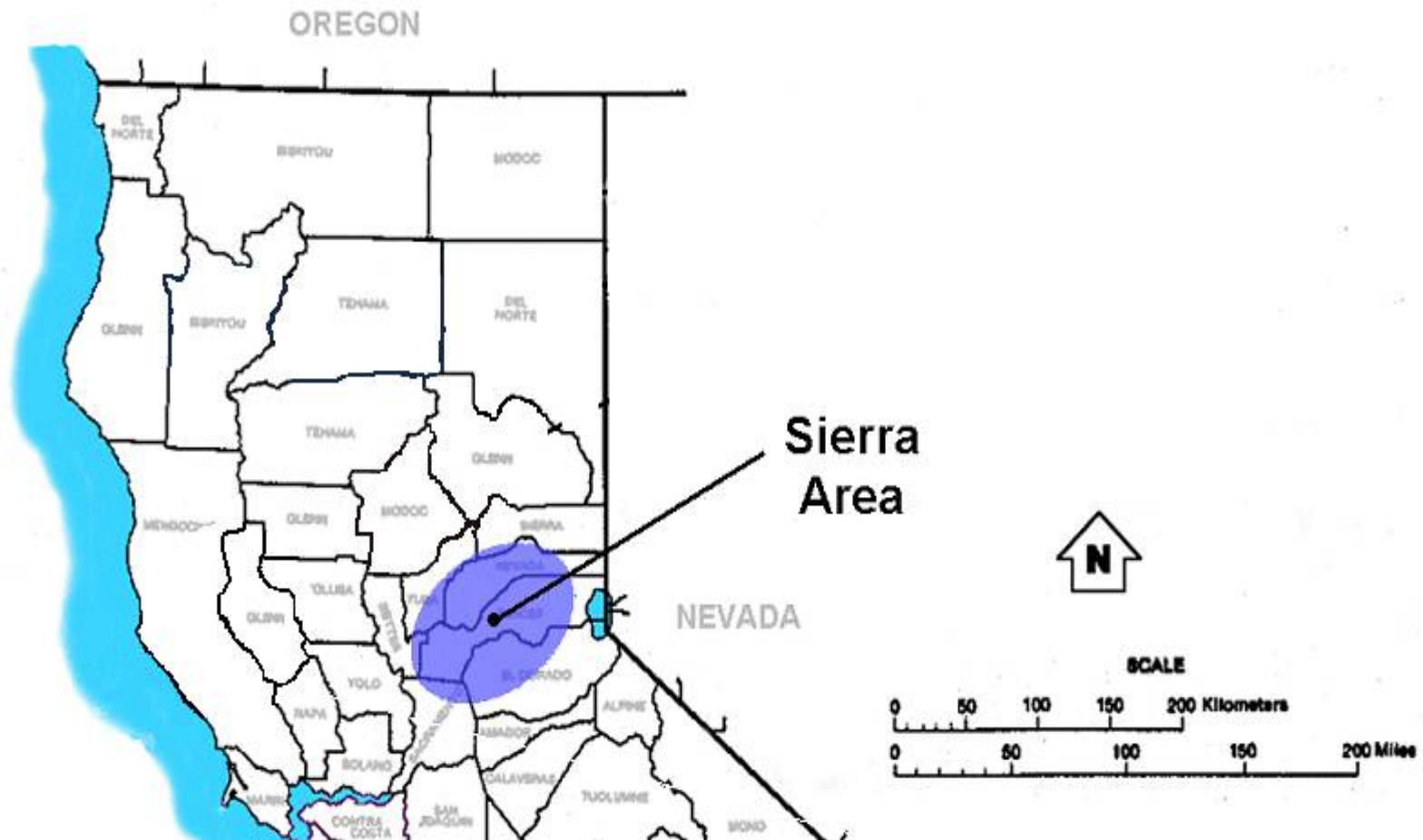
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Regional Transmission North - California ISO

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Northern California RMR Areas



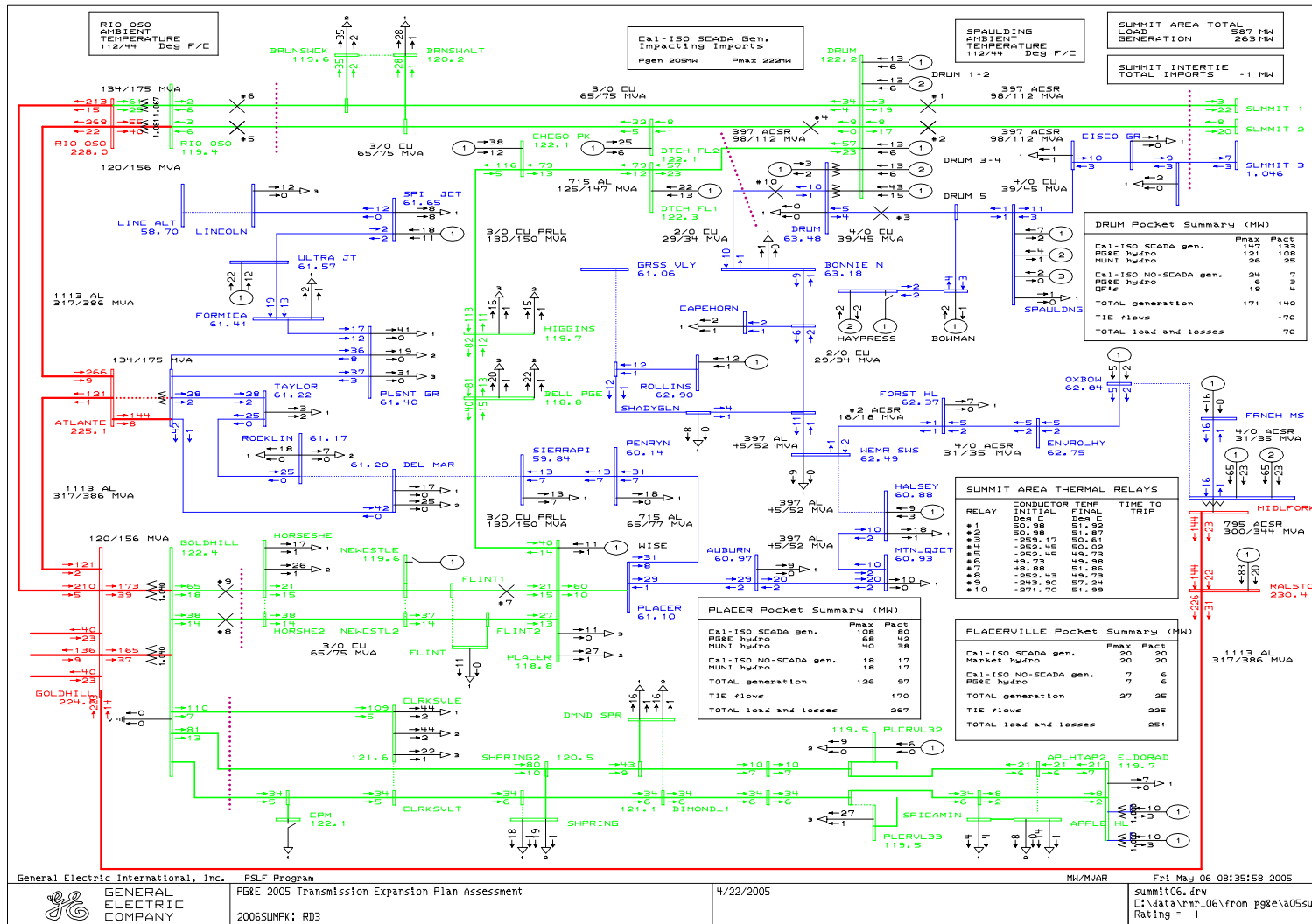


Sierra Area Load and Resources

(MW)

		2007
Load	=	1742
Transmission Losses	=	99
Total Load	=	1841
Market Generation	=	776
Muni Generation	=	805
QF Generation	=	267
Total Qualifying Capacity	=	1848

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Critical Sierra Area Contingencies South of Table Mountain & Colgate

South of Table Mountain Sub-area

Contingency: Table Mountain-Rio Oso 230 kV line with one of the Colgate Units out of service

LCR requirement: 1630 MW (includes 1072 MW of QF and Muni generation)

Limiting component: Thermal overload on the Table Mt-Palermo 230 kV line

Colgate Sub-area

Contingency: Colgate-Smartville #1 60 kV line with one of the Narrows #2 (or Camp far West) units out of service

LCR requirement: 17 MW (includes 17 MW of QF and Muni generation)

Limiting component: Thermal overload on the Colgate-Smartville #2 60 kV line



Critical Sierra Area Contingencies

Pease & Bogue

Pease Sub-area

Contingency: Palermo-East Nicolaus 115 kV line with one of the Greenleaf #2 (or Yuba City) units out of service

LCR requirement: 111 MW (includes 100 MW of QF and Muni generation)

Limiting component: Thermal overload on the Palermo-Pease 115 kV line

Bogue Sub-area

Contingency: Pease-Rio Oso 115 kV line with one of the Greenleaf #1 (or Feather River EC) units out of service

LCR requirement: 101 MW (includes 61 MW of QF and Muni generation)

Limiting component: Thermal overload on the Palermo-Bogue 115 kV line



Critical Sierra Area Contingencies South of Palermo

South Of Palermo Sub-area

Contingency: Double Circuit Tower Line Table Mountain-Rio Oso and Colgate-Rio Oso 230 kV lines

LCR requirement: 1037 MW (includes 142 MW of QF and Muni generation as well as 250 MW of Deficiency)

Limiting component: Thermal overload on the Palermo-East Nicolaus 115 kV line

South Of Palermo Sub-area – Category B

Contingency: Palermo-Pease 115 kV line with Belden unit out of service

LCR requirement: 980 MW (includes 142 MW of QF and Muni generation as well as 193 MW of Deficiency)

Limiting component: Thermal overload on the Palermo-East Nicolaus 115 kV line



Critical Sierra Area Contingencies

Drum-Rio Oso

Drum-Rio Oso Sub-area

Contingency: Rio Oso #2 230/115 transformer followed by loss of the Rio Oso-Brighton 230 kV line

LCR requirement: 701 MW (includes 413 MW of QF and Muni generation as well as 45 MW of Deficiency)

Limiting component: Thermal overload on the Rio Oso #1 230/115 kV transformer

Drum-Rio Oso Sub-area – Category B

Contingency: Rio Oso #2 230/115 transformer

LCR requirement: 352 MW (includes 413 MW of QF and Muni generation)

Limiting component: Thermal overload on the Rio Oso #1 230/115 kV transformer



Critical Sierra Area Contingencies South of Rio Oso

South of Rio Oso Sub-area

Contingency: Rio Oso-Gold Hill 230 line followed by loss of the Gold Hill-Ralston 230 kV line or vice versa

LCR requirement: 230 MW (includes 80 MW of QF and Muni generation as well as 95 MW of Deficiency)

Limiting component: Thermal overload on the Rio Oso-Atlantic 230 kV line

South of Rio Oso Sub-area – Category B

Contingency: Rio Oso-Gold Hill 230 line with the Ralston unit out of service

LCR requirement: 132 MW (includes 80 MW of QF and Muni generation)

Limiting component: Thermal overload on the Rio Oso-Atlantic 230 kV line



Critical Sierra Area Contingencies Placer

Placer Sub-area

Contingency: Drum-Higgins 115 kV line followed by loss of the Gold Hill-Placer #2 115 kV line

LCR requirement: 123 MW (includes 0 MW of QF and Muni generation as well as 95 MW of Deficiency)

Limiting component: Thermal overload on the Gold Hill-Placer #1 115 kV line

Placer Sub-area – Category B

Contingency: Drum-Higgins 115 kV line with the Wise #1 unit out of service

LCR requirement: 52 MW (includes 0 MW of QF and Muni generation as well as 24 MW of Deficiency)

Limiting component: Thermal overload on the Gold Hill-Placer #1 115 kV line



Critical Sierra Area Contingencies Placerville

Placerville Sub-area

Contingency: Gold Hill-Clarksville 115 kV line followed by loss of the Gold Hill-Missouri Flat #2 115 kV line

LCR requirement: 83 MW (includes 0 MW of QF and Muni generation as well as 56 MW of Deficiency)

Limiting component: Thermal overload on the Gold Hill-Missouri Flat #1 115 kV line

Placerville Sub-area – Category B

Contingency: None

LCR requirement: 0 MW

Limiting component: None



Critical Sierra Area Contingencies Aggregate

	QF (MW)	Muni (MW)	Market (MW)	Max. Qualifying Capacity (MW)
Available generation	267	805	776	1848

	Existing Generation Capacity Needed (MW)	Deficiency (MW)	Total MW Requirement
Category B (Single)	1833	205	2038
Category C (Multiple)	1833	328	2161

Each unit is only counted once, regardless in how many sub-areas it is needed.

In order to come up with an aggregate deficiency, where applicable the deficiencies in each smaller sub-area has been accounted for (based on their effectiveness factors) toward the deficiency of a much larger sub-area.



Changes since the 2006 LCR study

2006 Study

One major “overall area requirement” that required the capacity from all units be made available and had a small deficiency. No additional sub-area analysis has been presented, however reference to many sub-areas (related to RMR study) has been made.

Driver of requirements was the emergency rating of the Table Mountain-Rio Oso 230 kV line.

2007 Study

New rating for the Table Mountain-Rio Oso 230 kV line. Requirements have been decrease therefore not all units may be needed. Resulting in more detailed analysis.

Spell out the requirements for nine sub-areas within Sierra in order to come out with the correct set of unit capacity needed in order to maintain the technical requirements.

The capacity needed can be bigger then the load in the area. In Sierra a single contingency (Poe-Rio Oso 230 kV with one of the Colgate units out of service) can take out about 456 MW of Qualifying Capacity or ~25% of this area Qualifying Capacity, and the load still needs to be served. This statement is especially true when area deficiency is added to the existing units in order to come up with the total requirement.