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Local Capacity Requirements

Technical Analysis and Procurement Issues

CAISO Stakeholder Meeting

June 29, 2005

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Today's Agenda

- Context for RAR Local Capacity
- Background for Local Capacity study: criteria and assumptions
- Review Local Capacity study results
- Discuss Local Capacity procurement issues, including transition to RAR
- Consider next steps

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Meeting Objectives

- Explain criteria and assumptions for Local Capacity Technical Analysis
- Describe results:
  - Defined Local Capacity Area
  - MW requirements
  - Specific Unit requirements
- Achieve consensus on study methodology
- Receive stakeholder input on Local Capacity procurement issues

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Resource Adequacy Requirement: ***Deliverability***

- Established by October 28, 2004 CPUC decision
- Three types of Deliverability requirement:
  - *Aggregate to load*
  - *Imports*
  - *Load within transmission constrained areas*

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RAR for Local Capacity Areas

- CPUC requires LSEs to procure enough resources within transmission-constrained areas.
- Annual CAISO technical analysis defines areas and MW requirements.
- RAR obligations allocated among LSEs within those Local Capacity Areas.

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(Continued)

RAR for Local Capacity Areas

- LSEs have flexibility to contract for resources, so the capacity that's procured may not fully meet CAISO reliability needs in each area.
- CAISO will develop Local Area Reliability Contract (LARC) for "backstop" reliability role.
- CAISO intends to phase out RMR.

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Local Capacity Technical Analysis

-- The Bottom Line --

- The results of this preliminary study show:
  - MWs requirements within Local Capacity Areas that are higher than current RMR contracts.
  - Additional areas that are identified, due to transmission constraints, beyond those already established in Local Area Reliability Service (LARS) studies.

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(continued)

Local Capacity Technical Analysis

- The Bottom Line –

- Compared to LARS studies, this technical analysis uses different criteria and assumptions to identify and determine the MWs needed in each Local Capacity Area:
  - This study includes simultaneous and overlapping contingencies that require generators inside the load pockets.
  - This study assumes a 1 in 10 summer peak load level.

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Local Capacity Technical Analysis

Mark Willis
CAISO Operations Engineering

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Load Assumptions

1 in 10 year Load Forecast
vs
1 in 5 year Load Forecast

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Criteria:

Performance Level A

- N-0
  - ✓ No normal (steady-state) overloads
  - ✓ All voltages within normal operating limits

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Performance Level B – Part 1

- **N-1**
  - ❑ Loss of single generator (G-1)
  - ❑ Loss of single transmission line (L-1)
  - ❑ Loss of single transformer bank (T-1)
  - ✓ Remain within emergency limits
    - ❖ Able to readjust to normal limits
  - ✓ Remain within acceptable voltage limits
  - ✓ No voltage collapse
  - ✓ No transient instability

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Performance Level B – Part 2

- **G-1 / L-1**
  - Loss of generating unit (G-1), readjust system, then loss of transmission line (L-1)

  ✓ Remain within emergency limits

  ✓ Remain within acceptable voltage limits

  ✓ No voltage collapse

  ✓ No transient instability

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Performance Level C – Part 1

- **N-1 / N-1**
  - ❑ Loss of transmission line (L-1), readjust system, then loss of transmission line (L-1), **OR**
  - ❑ Loss of transmission line (L-1), readjust system, then loss of transformer bank (T-1), **OR**
  - ❑ Loss of generating unit (G-1), readjust system, then loss of transformer bank (T-1)
  - ✓ Remain within emergency limits
  - ✓ Remain within acceptable voltage limits
  - ✓ No voltage collapse
  - ✓ No transient instability

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Performance Level C – Part 2

- **N-2**
  - Simultaneous loss of two transmission lines (L-2) (common mode failure)

OR

  - Simultaneous loss of two generating units (G-2) (common mode failure)

✓ Remain within emergency limits

✓ Remain within acceptable voltage limits

✓ No voltage collapse

✓ No transient instability

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Operating Requirements – Beyond Performance Level C

- **N-1 / N-2**
  - Loss of generating unit (G-1), readjust system, simultaneous loss of two transmission lines (L-2)

    (Common mode failure of two transmission lines)
  - ✓ Criteria required only for voltage collapse / transient instability
  - Loss of transmission line (L-1), readjust system, simultaneous loss of two transmission lines (L-2)

    (Common mode failure of two transmission lines)
  - ✓ Criteria required only for voltage collapse / transient instability

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Local Capacity Technical Analysis For Year 2006

Overview of Preliminary Results

Larry Tobias
CAISO Planning

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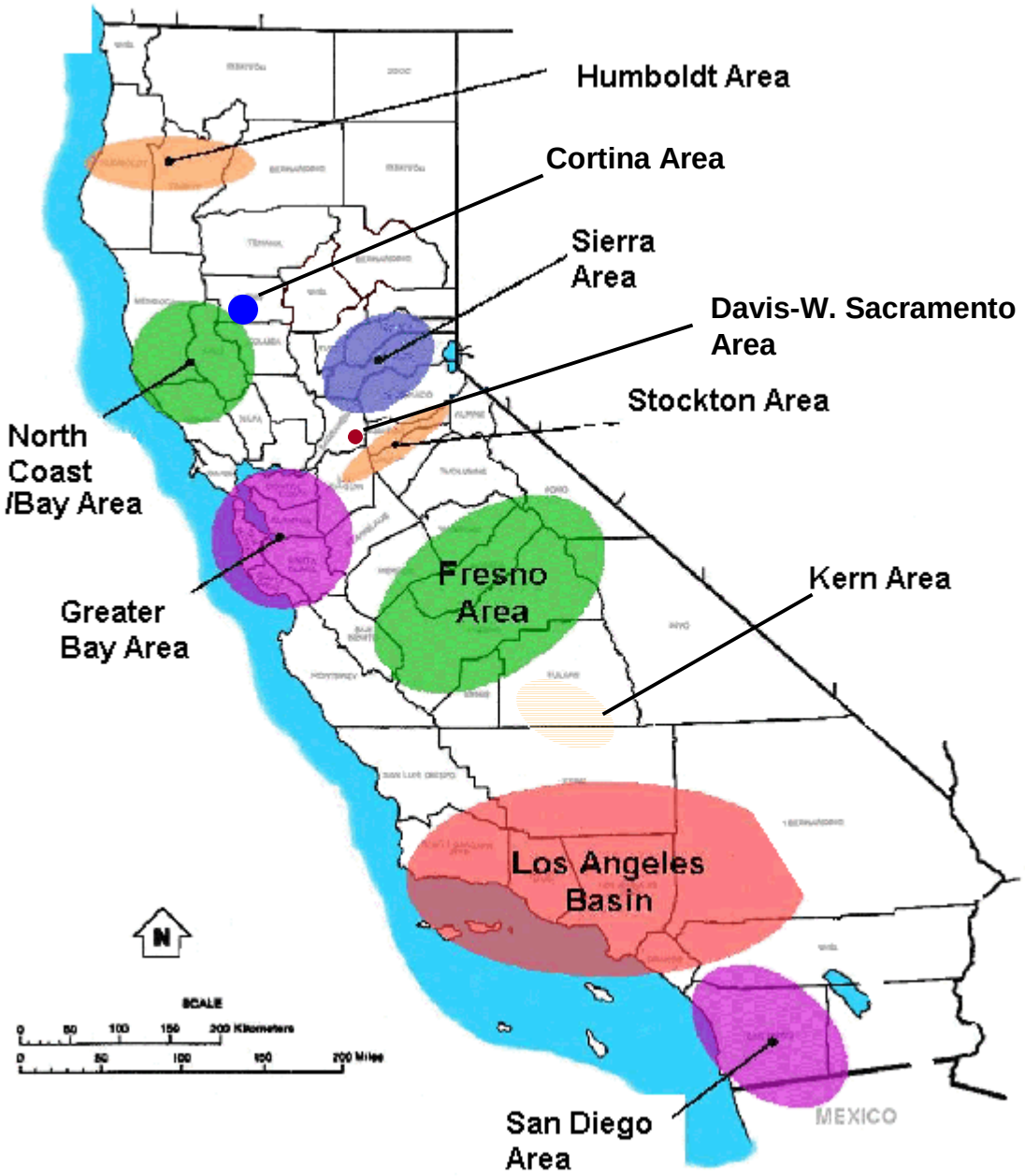

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Area Load Represented For LCR

1-in-10 Year Peak Load

North Coast / North Bay	1529
Sierra	1224
Cortina	69
Davis/W. Sac.	229
Stockton	1496
Greater Bay	9485
Fresno	3117
Kern	1541
LA Basin	23919
San Diego	4578
Total	**47391**

* Values shown in MW and includes transmission system losses

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Comparison of MW Requirement for 2006 RMR and LCR

Local Area Name	2005 RMR/ MO	2006 RMR/MO	2006 LCR without Muni & QFs	2006 LCR
Humboldt	124	125	126	162
North Coast / North Bay	517	273	518	658
Sierra	384	468	662	1587*
Cortina	N/A	N/A	0	25
Davis/W. Sac.	N/A	N/A	0	25*
Stockton	57	100	154	449
Greater Bay	4000	4000	4600	5769
Fresno	3220	2522	3672	4325*
Kern	N/A	N/A	797	797*
LA Basin	1390 4700	2120** 2930	5300***	 8627
San Diego	2019	2369	2434	2620
Total	**16411**	**17429**	**18263**	**25044**

All Values shown in MW

* Generation deficient areas

** Exact amount to be determined through LARS

*** Without San Onofre NPP

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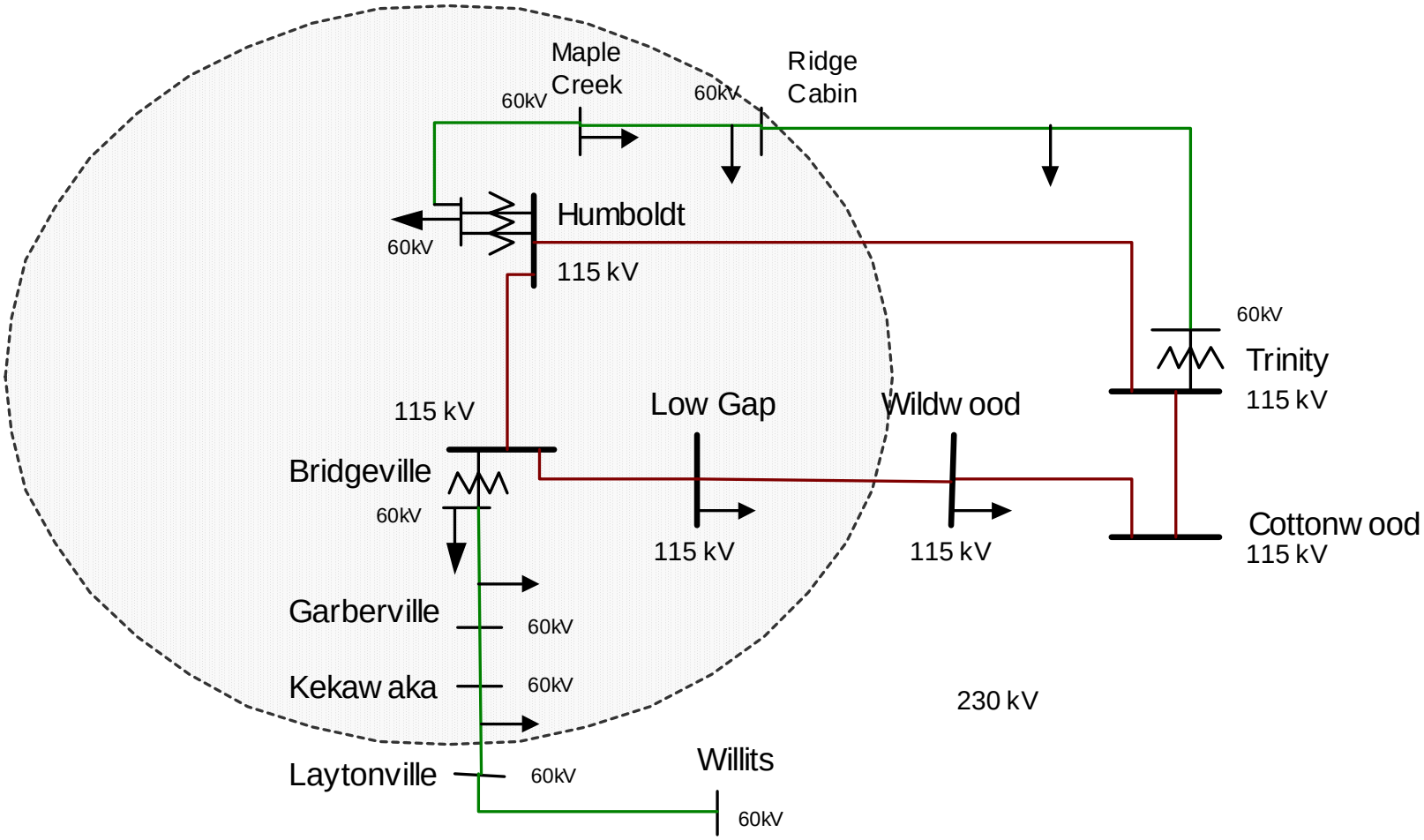
Humboldt



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Humboldt Area

Critical Contingency

Contingency of Cottonwood-Bridgeville 115 kV line and one of Humboldt Bay Power Plant.

Limitation

Limited by reactive margin in the area

Local Capacity Requirement

LCR of 126 MW (QF and Muni generation 36 MW)

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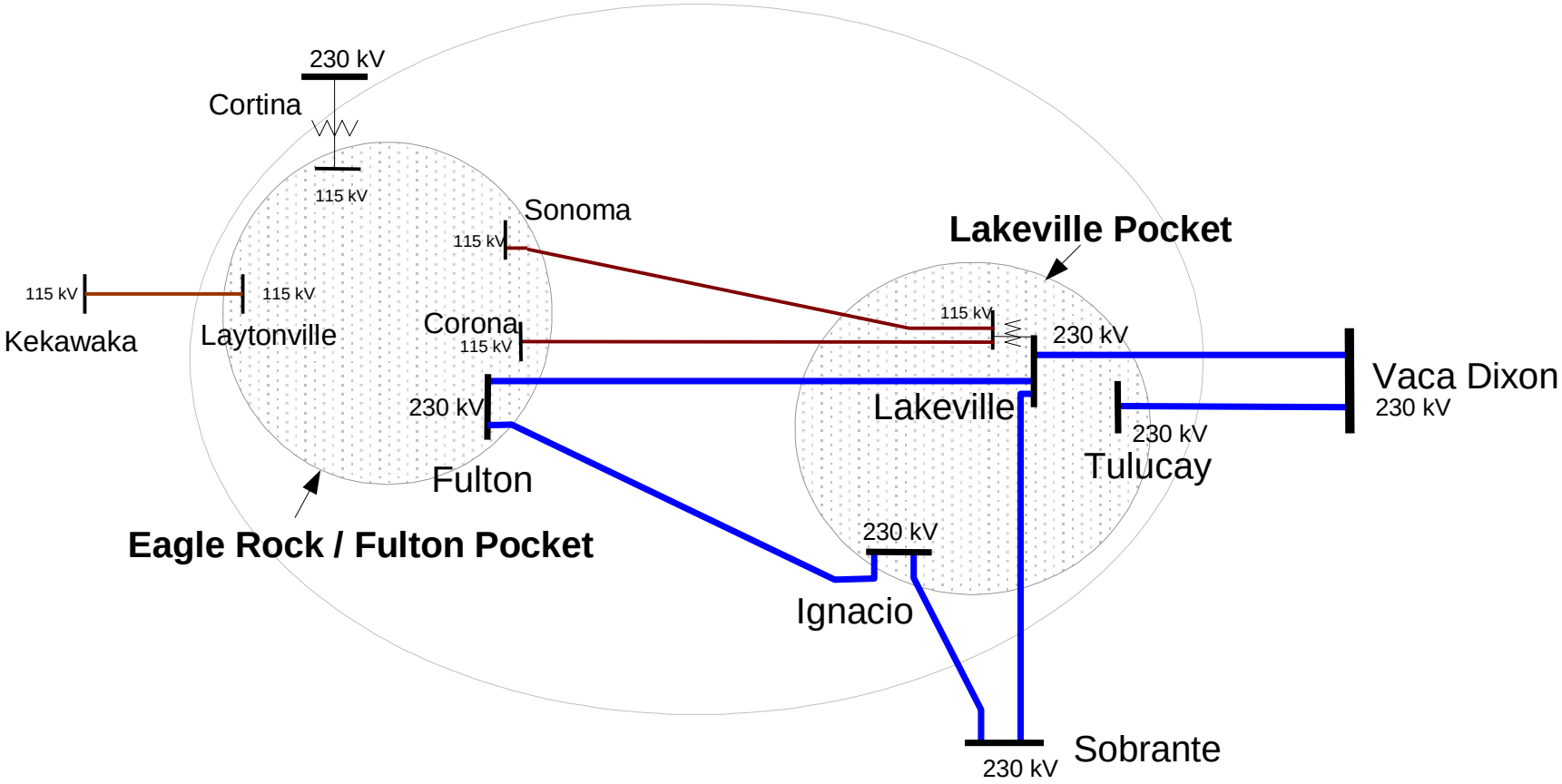
North Coast / North Bay



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Eagle Rock/Fulton Pocket

Critical Contingency:

Contingency of Fulton-Ignacio 230 kV line #1 and Fulton-Lakeville 230 kV line #1

Limitation

Limited by Thermal overload on Corona-Penngrove 115 kV line #1

Local Capacity Requirement

LCR of 319 MW (QF and Muni generation 79 MW)

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Lakeville Pocket

(LCR requirement for the overall North Coast/North Bay area[1])

Critical Contingency:

Contingency of Vaca Dixon-Lakeville 230 kV line #1 and Crockett-Sobrante 230 kV line #1

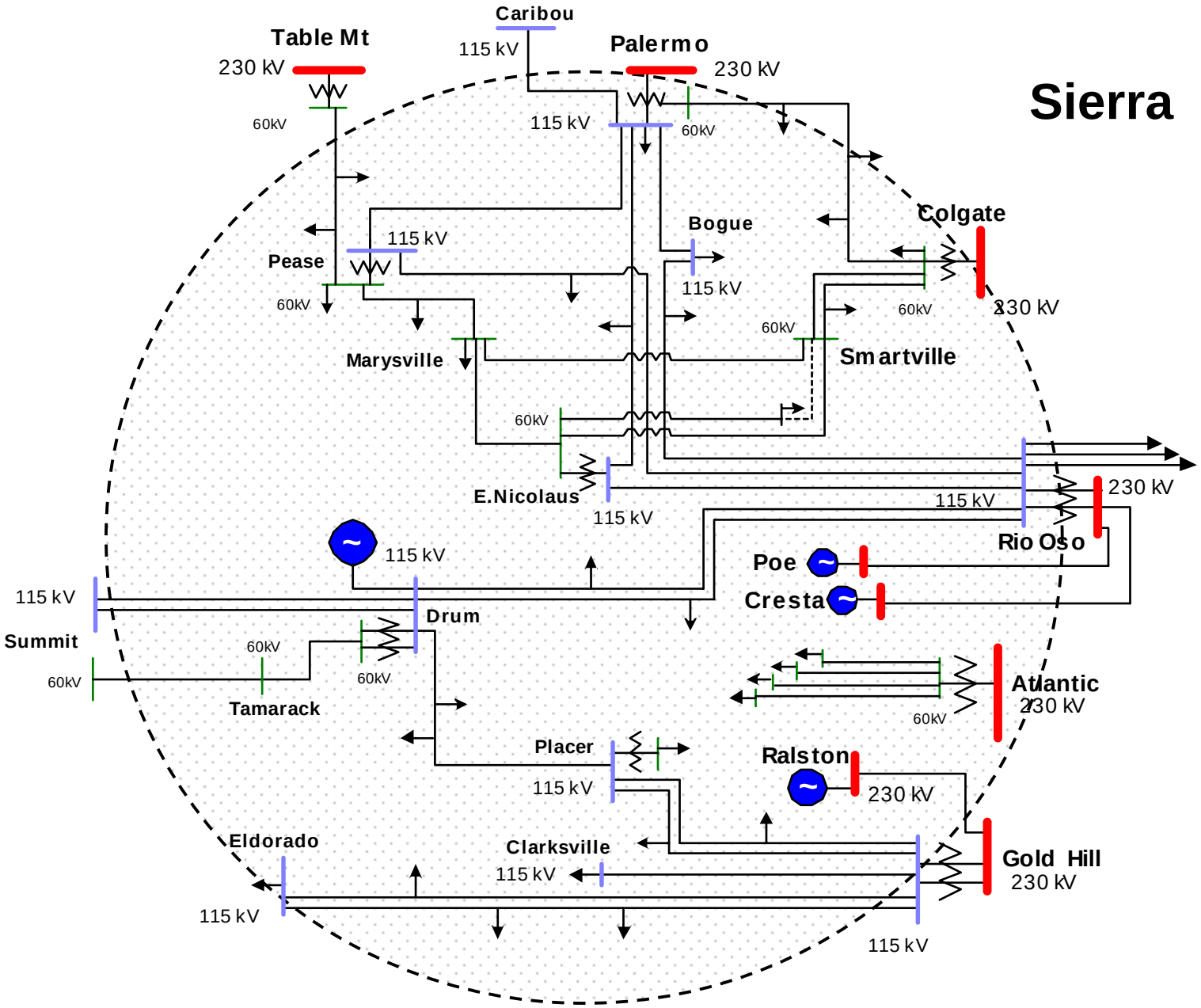
Limitation

Limited by Thermal overload on Tulucay-Vaca Dixon 230 kV line #1

Local Capacity Requirement

LCR of 658 MW (QF and Muni generation 140 MW)

[1] LCR requirement for Eagle Rock/Fulton pocket can be counted toward the requirement of Lakeville pocket


Sierra
Table Mt
230 kV
60kV
Caribou
115 kV
Palermo
230 kV
115 kV
60kV
Bogue
115 kV
Pease
115 kV
60kV
Marysville
60kV
Colgate
60kV
230 kV
60kV
Smartville
60kV
E.Nicolaus
115 kV
115 kV
230 kV
Rio Oso
115 kV
Poe
Cresta
115 kV
Summit
60kV
Drum
60kV
60kV
Tamarack
Atlantic
230 kV
60kV
Placer
115 kV
Ralston
230 kV
Eldorado
115 kV
Clarksville
115 kV
Gold Hill
230 kV
115 kV

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Sierra Area

Critical Contingency

1) Poe-Rio Oso 230 kV line #1 and Colgate - Rio Oso 230 kV line #1
2) Cresta-Rio Oso 230 kV line #1 and Colgate - Rio Oso 230 kV line #1

Limitation

Limited by Thermal overload on Table Mt-Rio Oso 230 kV line #1

Local Capacity Requirement

LCR of 1587 MW (QF and Muni generation 922 MW)
LCR Deficiency of 143 MW

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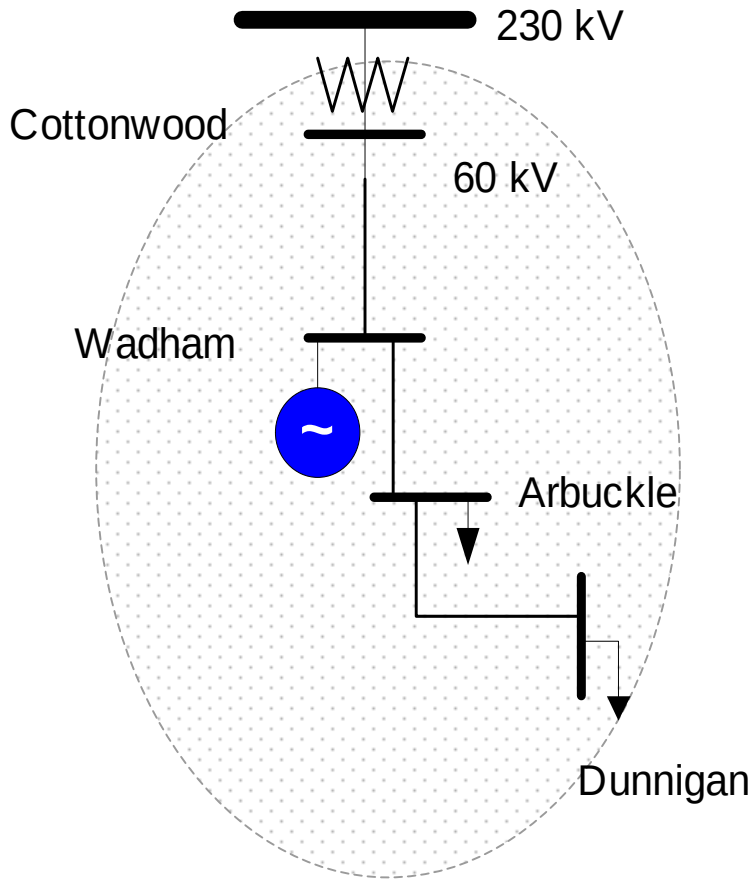
Cortina Area



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Cortina Area

Critical Contingency

Loss of Wadham Generator #1

Limitation

Thermal overload on Cortina-Wadham Jt 60 kV line #1

Local Capacity Requirement

25 MW (from QF)

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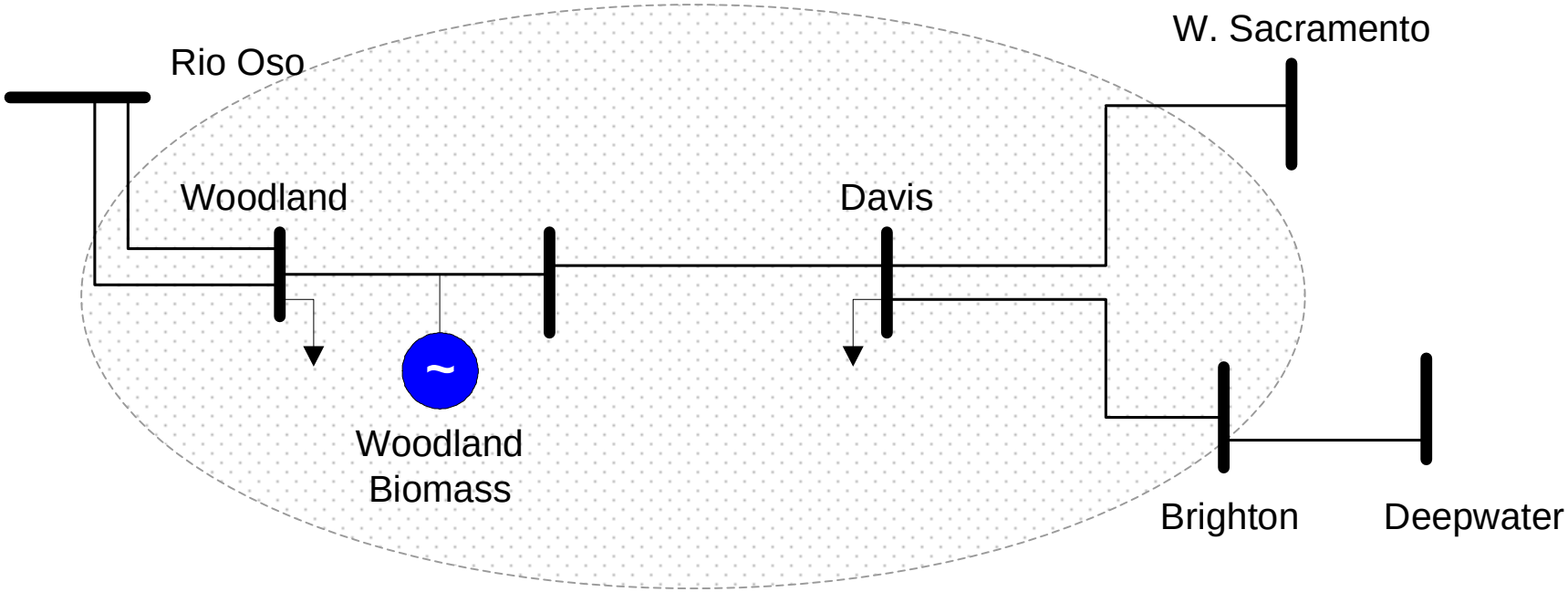
Davis-West Sacramento Area



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Davis-West Sacramento Area

Critical Contingency

Loss of Rio Oso-Woodland 115 kV line #2 and Davis-Brighton 115 kV line #1

Limitation

Thermal overload on Brighton-Deepwater tap2 (Davis-West Sacramento) 115 kV line #1

Local Capacity Requirement

LCR for the Area is 25 MW (25 MW available from QF)
LCR Deficiency for the Area is 40 MW

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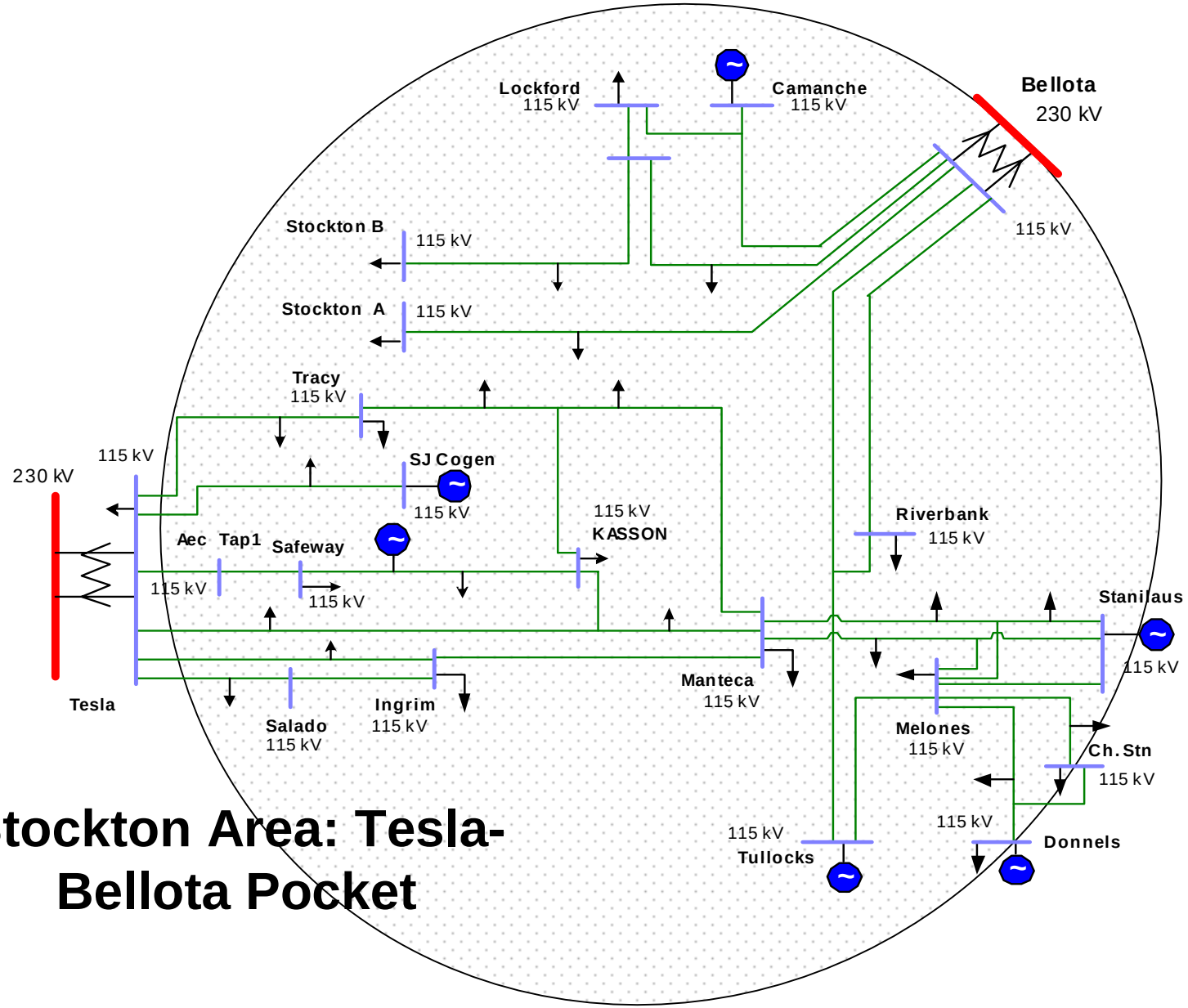

Stockton Area: Tesla-Bellota Pocket

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Tesla-Bellota Pocket

Critical Contingency

Tesla-Tracy 115 kV #1 and Tesla-Safeway 115 kV #1

Limitation

Limited by Thermal overload on Tesla-AEC section of Tesla-Schulte 115 kV line #1

Local Capacity Requirement

LCR of 449 MW (QF and Muni generation 229 MW)

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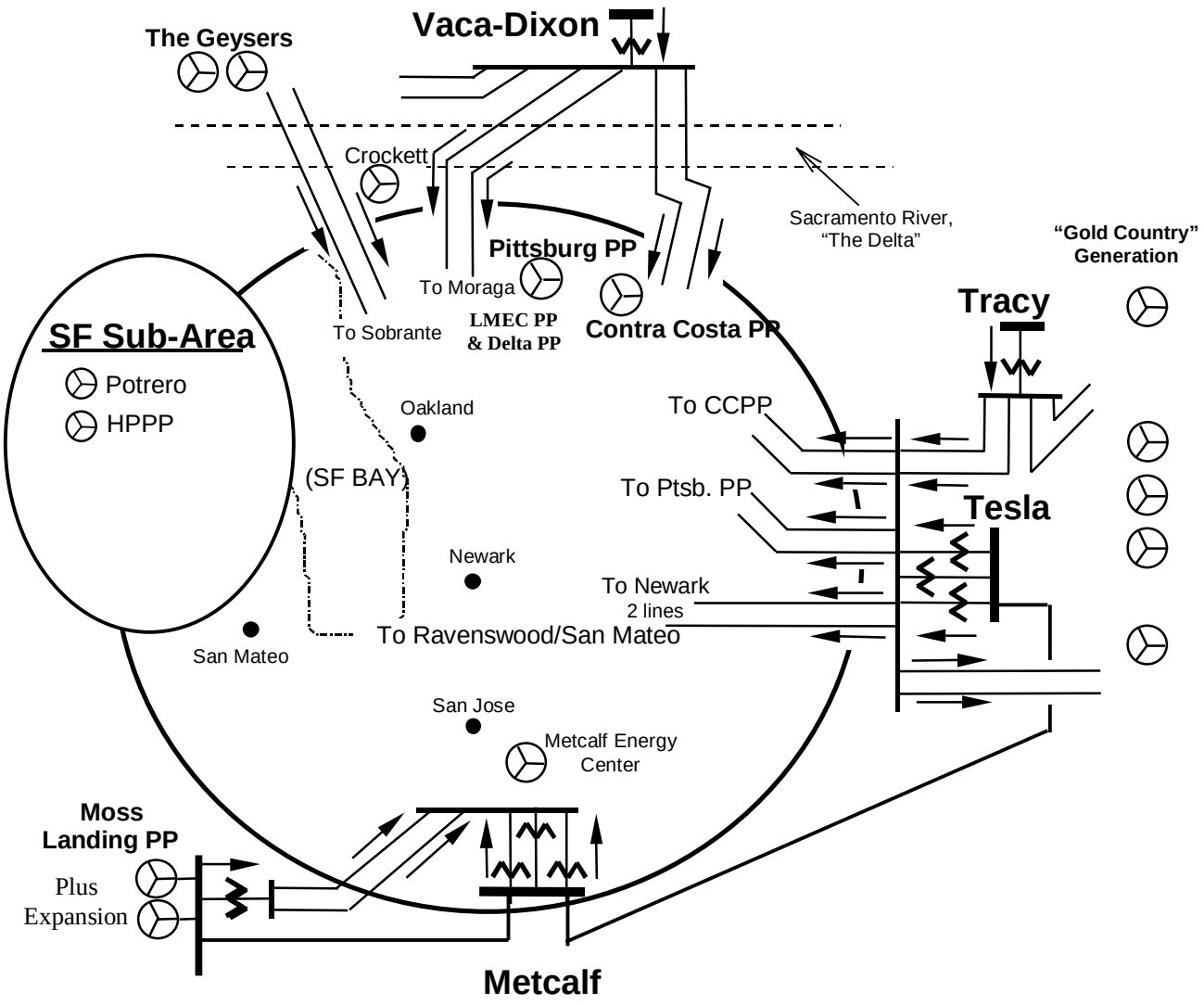
Greater Bay Area Transmission System



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Greater Bay Area

Critical Contingency

Limiting L-1/L-1 contingency is an over-lapping outage of the Tesla-Metcalf 500 kV line with the Tesla-Newark #1 230 kV line.

Limitation

Limited by the emergency rating of the Tesla-Newark #2 230 kV line.

Local Capacity Requirement

LCR of 5769 MW (QF and Muni generation 1169 MW)

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San Francisco Pocket

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

This requirement includes adherence to the following reliability criteria:

- NERC/WECC Planning Standards
- CAISO Grid Planning Standards
  - Combined Line and Generator Outage Standard
  - New Transmission versus Involuntary Load Interruption Standard
  - San Francisco Greater Bay Area Generation Outage Standard

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Oakland Pocket

Critical Contingency

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)

Limitation

Overload of either the C-X 115 kV cable or the D-l 115 kV cable .

Local Capacity Requirement

To mitigate the overload on this line, approximately 100 MW of Oakland & Alameda generation plus QF and Muni generation is required.

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San Jose Pocket

Critical Contingency

Limiting contingency is an outage between Metcalf and Morgan Hill 115 kV (with one of the Gilroy Peaker off-line.

Limitation

Overloads 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.

Local Capacity Requirement

To mitigate the overload on this line, approximately 90 MW of Gilroy Peaker generation plus QF and Muni generation is required.

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Pittsburg Pocket

Critical Contingency

Outage of the Pitsburg-Tesla #1 or #2 230 kV line (with Delta Energy Center off-line)

Limitation

Overload of the the parallel Pittsburg-Tesla 230 kV line.

Local Capacity Requirement

To mitigate the overload on this line, approximately 1600 MW of market generation in the Pittsburg area plus QF and Muni generation is required.

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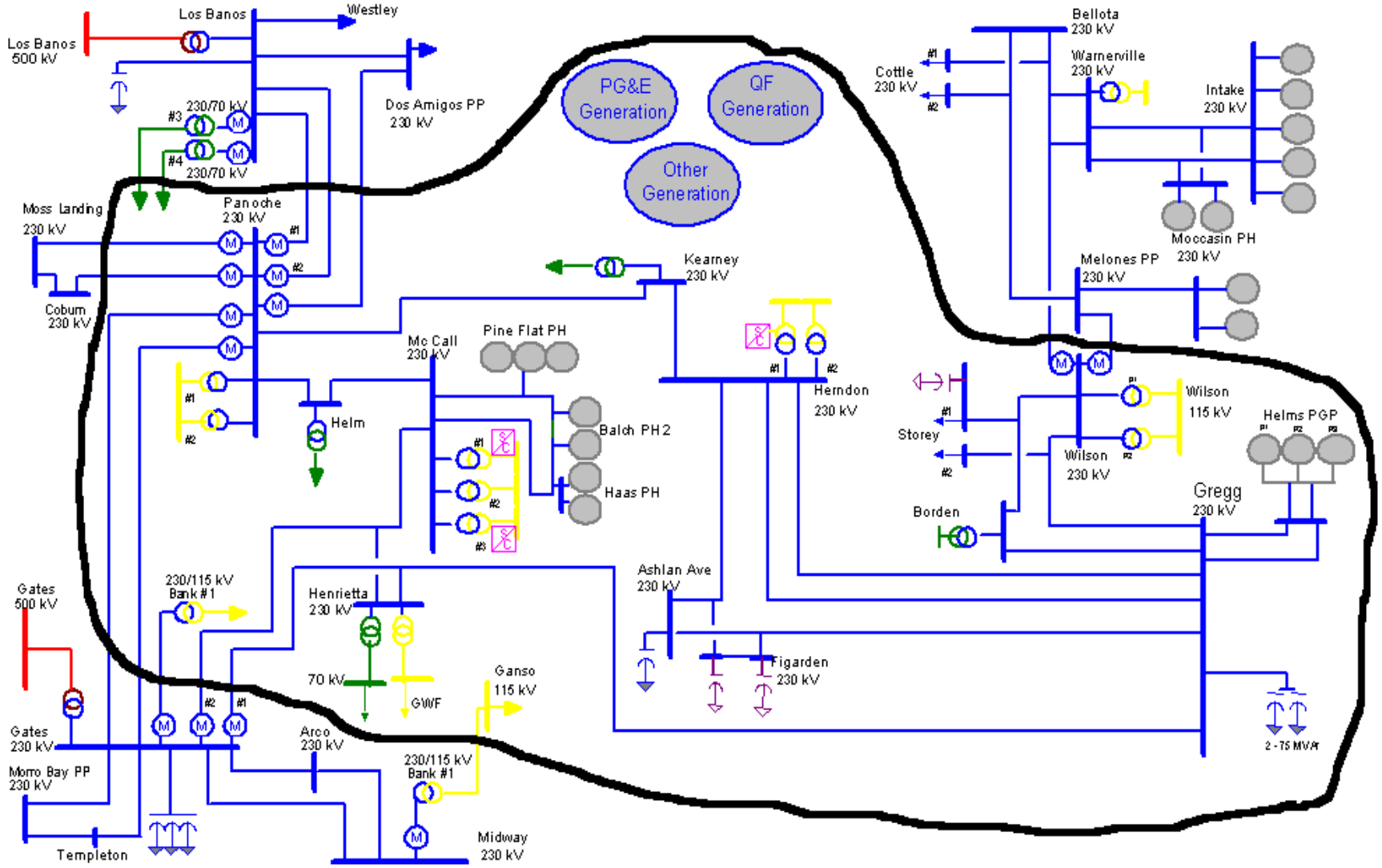
Greater Fresno Area Transmission



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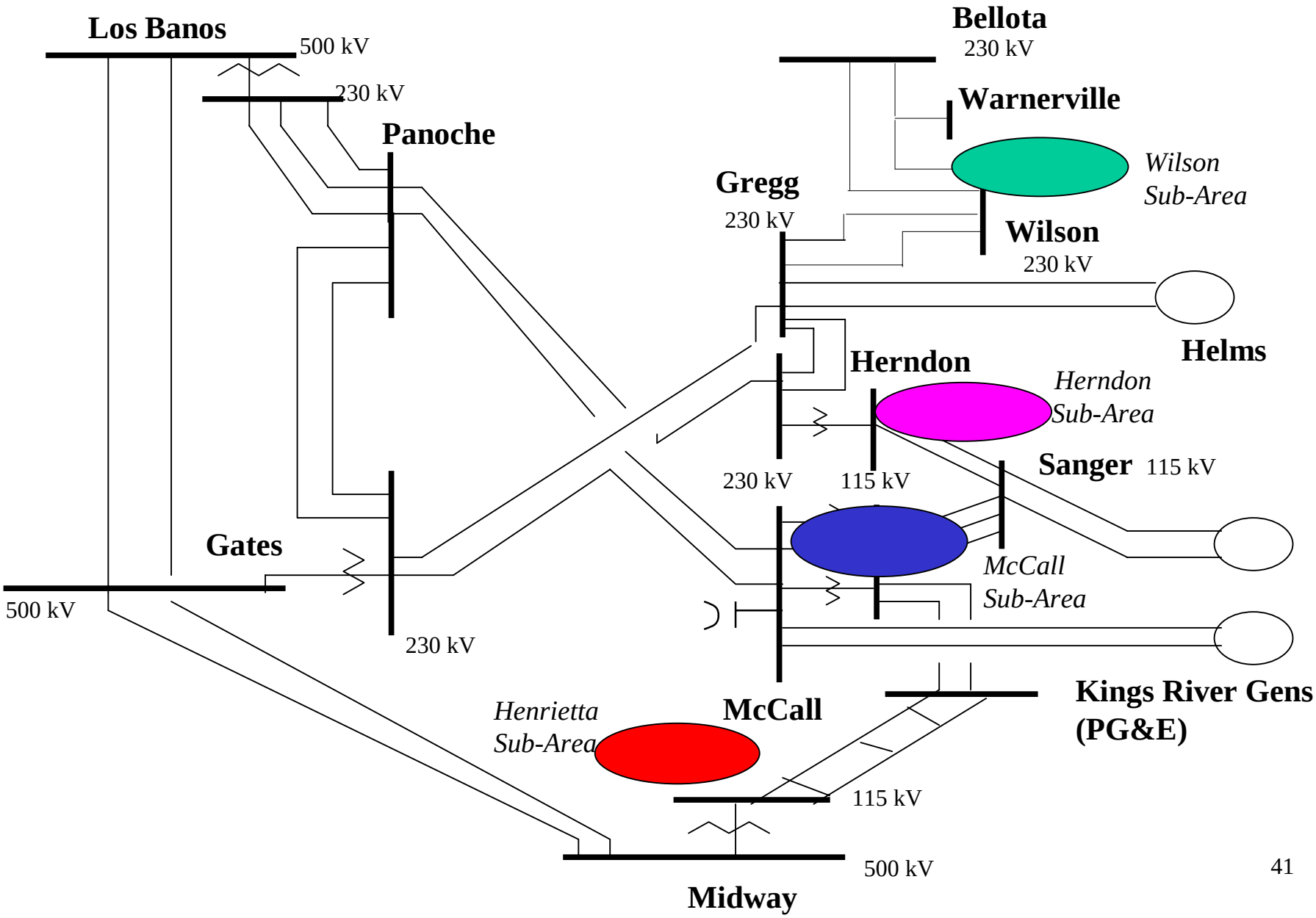
Greater Fresno Area Transmission System



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Herndon Pocket

Critical Contingency

Outage of the Herndon 230/115 kV bank 1 outage

Limitation

Herndon 230/115 kV bank bank 2 would have 103% loading based on the summer normal rating of 403 MVA.

Local Capacity Requirement

2006 LCR for the Pocket is 1207 MW

2006 LCR Deficiency for the Pocket is 50 MW

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Wilson Pocket

Critical Contingency

Outage of the Wilson – Melone 230 kV line.

Limitation

Loading on the Wilson – Warnerville 230 kV line by 113%

Local Capacity Requirement

2006 LCR for the Pocket is 1560 MW
With at least 120 MW from Helms.

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McCall Pocket

Critical Contingency

Outage of the Kings River – Sanger – Reedley 115 kV line

Limitation

Loading of the McCall – Wahtoke 115 kV line by 113%

Local Capacity Requirement

2006 LCR for the Pocket is 1346 MW
2006 LCR Deficiency for the Pocket is 36 MW

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Henrietta Pocket

Critical Contingency

Normal overload on the Henrietta 230/70 kV bank or an outage of the Henrietta 230/70 kV bank .

Limitation

Loading of the Henrietta 230/70 kV bank by 110%

Local Capacity Requirement

2006 LCR for the Pocket is 40 MW.

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Merced Pocket

Critical Contingency

Outage of the Wilson – Atwater 115 kV #1 and #2 lines, the Wilson – Merced 115 kV #1 and #2 lines

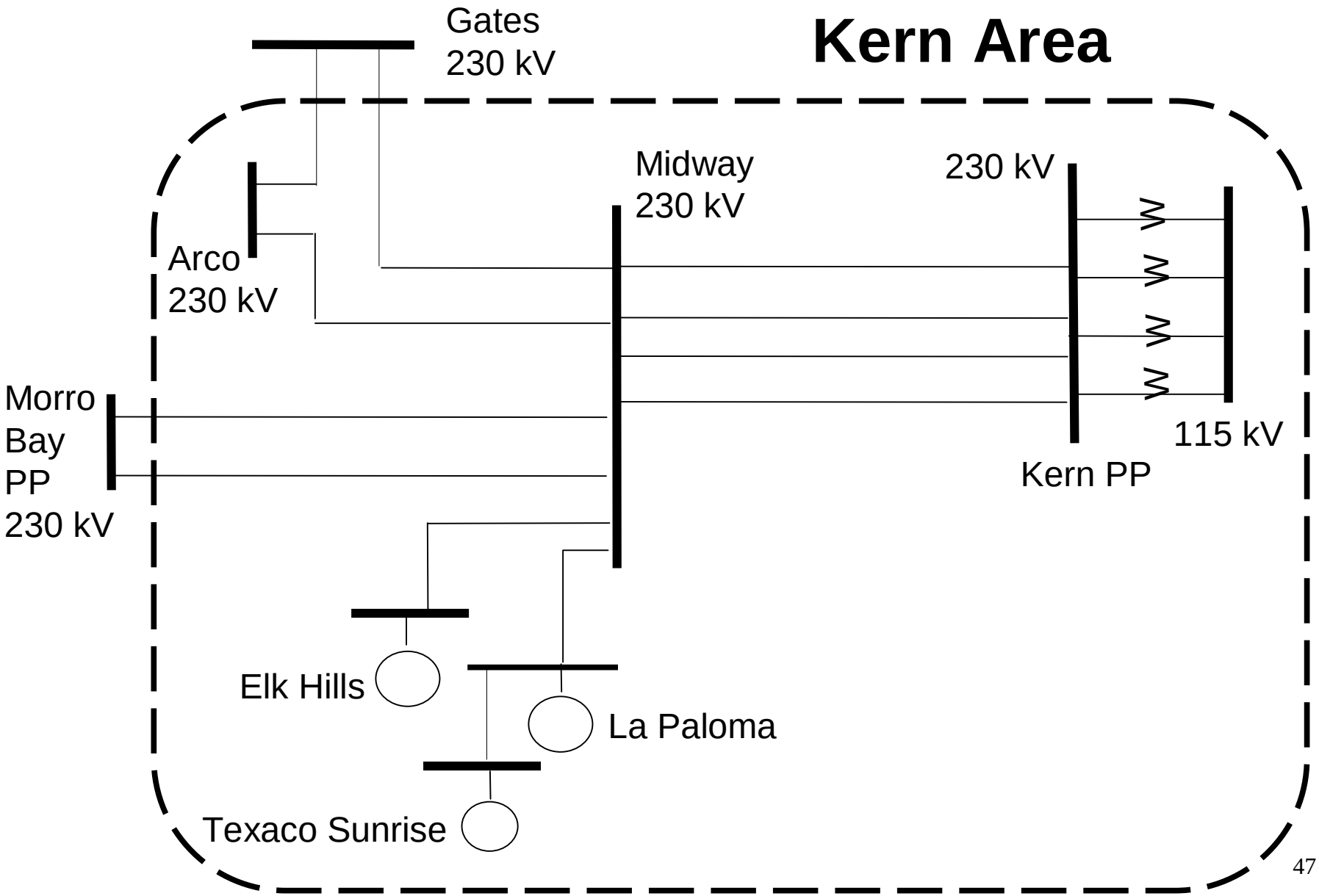
Limitation

Loading of the Wilson – Merced 115 kV #1 and #2 lines by 130% & 117% respectively

Local Capacity Requirement

2006 LCR for the Pocket is 172 MW

2006 LCR Deficiency for the Pocket is 60 MW


Kern Area
Gates
230 kV
Midway
230 kV
230 kV
Arco
230 kV
Morro
Bay
PP
230 kV
115 kV
Kern PP
Elk Hills
La Paloma
Texaco Sunrise

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Kern PP Pocket

Critical Contingency

Outage of the Kern PP 230/115 kV transformer Bank 5 and the Kern PP – Kern Front 115 kV line

Limitation

Loading of the The Kern PP 230/115 kV transformer Bank 3 & 3a by 133% & 112% respectively

Local Capacity Requirement

2006 LCR for the Pocket is 771 MW
2006 LCR Deficiency for the Pocket is 132 MW

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Weedpatch Pocket

Critical Contingency

Outage of the Wheeler Ridge – San Bernard 70 kV line and the Wheeler Ridge – Tejon 70 kV line

Limitation

Loading of the Wheeler Ridge – Weedparch 70 kV line by 117% and low voltage in the local 70 kV area

Local Capacity Requirement

2006 LCR for the Pocket is 26 MW
2006 LCR Deficiency for the Pocket is 10 MW

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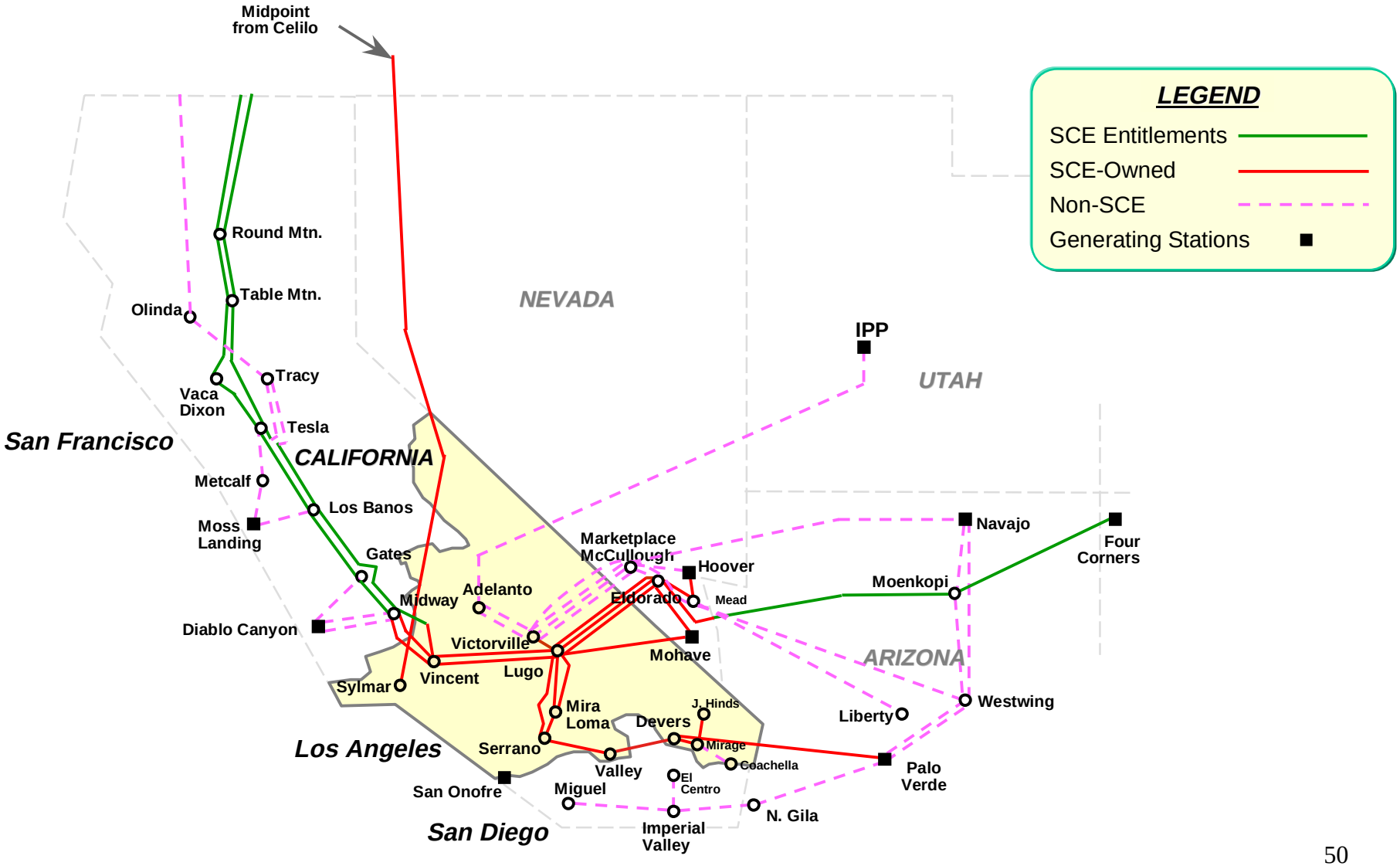
SCE Major Transmission Lines



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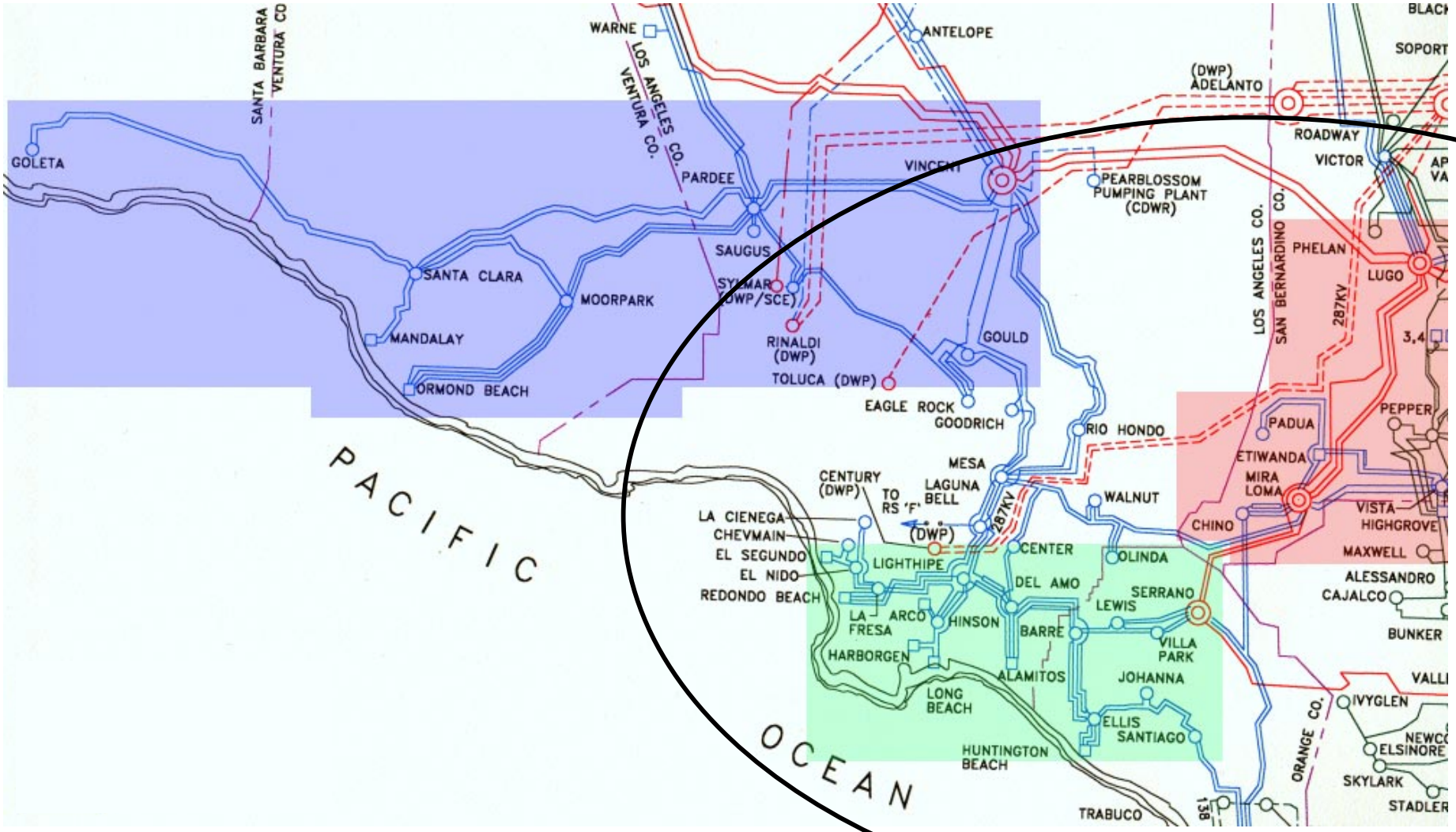
LA Basin Area



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Western & Eastern LA Basin

Western LA Basin Critical Contingency

Outage of the Vincent - Riohondo 230 kV line #2, followed by loss of Mesa - Vincent 230 kV line

Limitation

Emergency overload on Vincent - Riohondo 230 kV line # 1

Eastern LA Basin Critical Contingency

Outage of the Devers - Valley 500 kV line, followed by loss of two Lugo – Miraloma 230 kV lines # 2 & # 3

Limitation

Voltage violation

Local Capacity Requirement

8627 MW of total generation (including market, QF, munis, & SONGS) is needed in the Western & Eastern LA Basin to resolve criteria violations. 7473 MW of this total generation is required from the Western LA Basin &1154 MW from the Eastern LA Basin.

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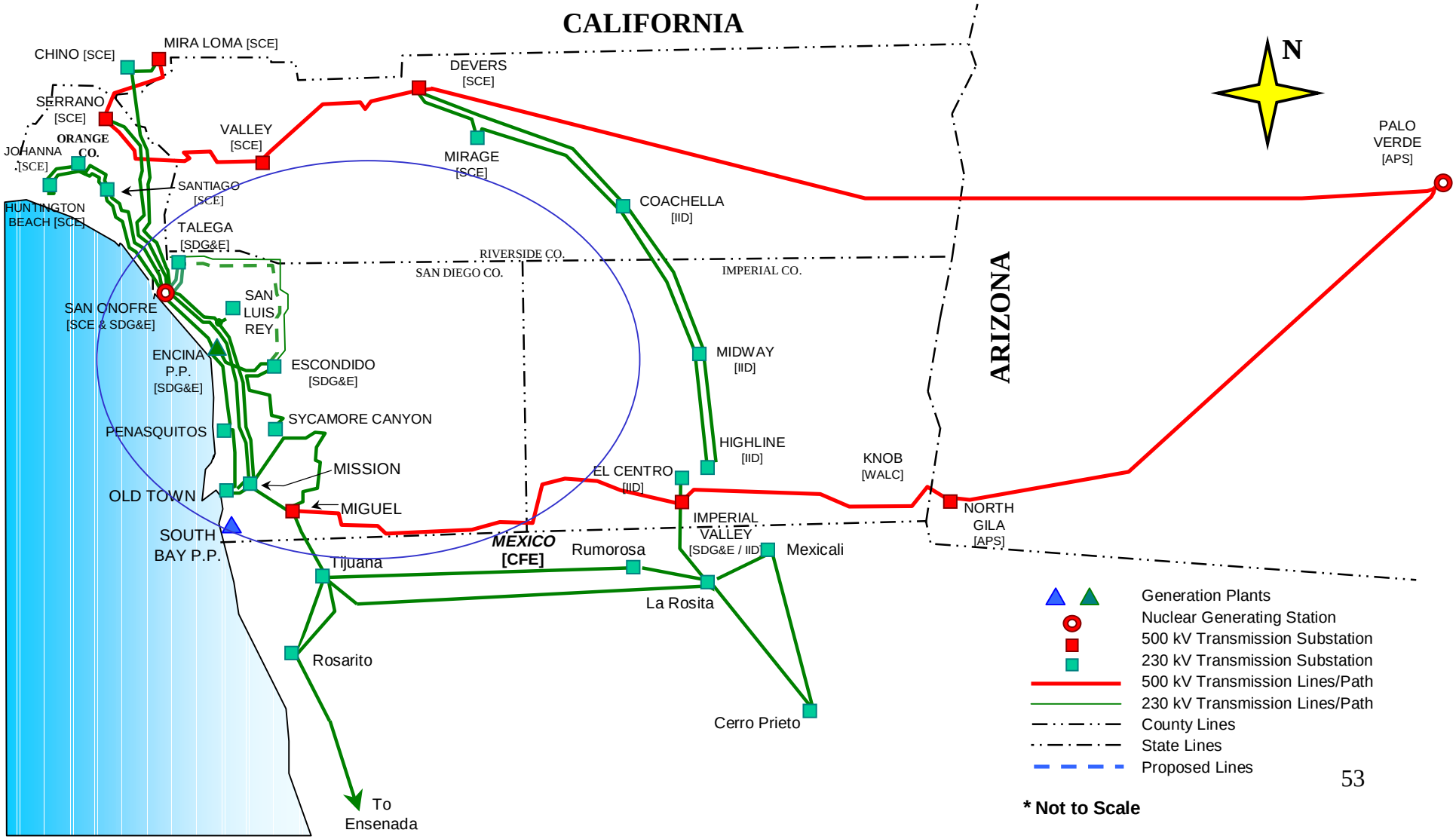
San Diego LCR Area



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San Diego Area

Critical Contingency

Outage of 500 kV Southwest Power Link between Imperial Valley and Miguel Substations.

Limitation

The non-simultaneous SDG&E import capability of 2500 MW North-South on WECC Path 44 from San Onofre Nuclear Power Plant.

Local Capacity Requirement

2006 LCR is 2620 MW (includes 186 MW QF)

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CPUC Resource Adequacy Local Capacity Procurement

Robert Kott
CAISO/Contracts

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Introduction

- Review of Procurement Straw Proposal
  - Transition
  - Operational Characteristics
  - Dispatch Requirements
- Stakeholder Input
  - Resource Limitations?
  - Dispatch Mechanism?
  - Standard Contract Language?
- Next Steps Discussion
  - Feedback now and written comments

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Transition

- Definition of Periods
  - Before RAR (“Period 1”)
  - RAR before MRTU (“Period 2”)
  - RAR and MRTU (“Period 3”)
- CAISO Local Area Reliability Contract (a.k.a. the “LARC”)
- 2006 LARS to June 2006 RAR Local Capacity

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Operational Characteristics

- Issues:
  - Access to Full Resource Capabilities
  - Use-Limited Resources
  - Common Operational Limitations/Values
  - Compliance Incentives

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Dispatch Requirements

- Dispatch for All Reliability Requirements
- Day-Ahead Commitment
  - Before RAR
  - RAR before MRTU
  - RAR and MRTU
- Real Time Dispatch

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Next Steps

- July 8, 2005 - Initial comments due on CPUC workshop report.
- July 12, 2005 – Stakeholder comments on Local Capacity Areas to CAISO.
- July 20, 2005 Second stakeholder meeting on Local Capacity Areas?
- July 29, 2005 - CAISO posts final Local Capacity Technical Analysis, as well as Phase I Baseline Deliverability Study.
- July, 2005 - Begin Phase II Baseline Deliverability Study.