2016 and 2020 Draft LCR Study Results - Fresno

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Regional Transmission Engineer

Stakeholder Conference

March 9, 2015
Greater Fresno Area

Electrical Boundaries and LCR Sub-Areas

Electrical Boundaries:

● Gates – McCall 230 kV line
● Gates – Gregg 230 kV line
● Panoche – Kearney 230 kV line
● Panoche – Helm 230 kV line
● Warnerville – Wilson 230 kV line
● Melones – Wilson 230 kV line
● Panoche 230/115 kV transformer #1
● Panoche 230/115 kV transformer #2
● Smyrna – Alpaugh – Corcoran 115 kV line
● Los Banos #3 230/70 kV transformer
● Los Banos #4 230/70 kV transformer
● San Miguel – Coalinga #1 70 kV line
● Gates 230/70 kV transformer #1
### Fresno Area Load and Resources (MW)

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Load</strong></td>
<td>3275</td>
<td>3515</td>
</tr>
<tr>
<td><strong>AAEE</strong></td>
<td>-35</td>
<td>-93</td>
</tr>
<tr>
<td><strong>Transmission Losses</strong></td>
<td>91</td>
<td>90</td>
</tr>
<tr>
<td><strong>Total Load</strong></td>
<td>3331</td>
<td>3512</td>
</tr>
<tr>
<td><strong>Market Generation</strong></td>
<td>2647</td>
<td>2647</td>
</tr>
<tr>
<td><strong>Muni Generation</strong></td>
<td>136</td>
<td>136</td>
</tr>
<tr>
<td><strong>QF Generation</strong></td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td><strong>Total Qualifying Capacity</strong></td>
<td>2963</td>
<td>2963</td>
</tr>
</tbody>
</table>
New transmission projects modeled:

2. Cressey - Gallo 115 kV Line (2016)
3. Lemoore 70 kV Disconnect Switches Replacement (2016)
7. Reedley-Dinuba 70 kV Line Reconductor (2017)
8. Reedley-Orosi 70 kV Line Reconductor (2017)
9. Helm - Kerman 70 kV Line Reconductor (2017)
New transmission projects modeled: (cont.)

17. Reedley 70 kV Reinforcement (2018)
22. McCall - Reedley #2 115 kV Line (2019)
27. Kerchhoff PH #2 - Oakhurst 115 kV Line (2020)
28. Oro Loma 70 kV Area Reinforcement (2020)
Limiting Contingencies:

Category C:
- L-1/T-1: McCall-Kingsburg #2 115 kV & Henrietta 230/115kV TB #3
- Constraint McCall-Kingsburg #1

Category B: No LCR need

LCR Results (MW):

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCR</td>
<td>91</td>
</tr>
</tbody>
</table>

Including:
- QF: 0
- Muni: 0
- Deficiency: 0
Limiting Contingencies:

Category C:
- T-1/L-2: Gates 230/70kV TB #5 and Panoche-Schindler #1 & #2 115kV common tower lines
- Constraint:
  - Low voltage in the pocket

Category B: No LCR need

LCR Results (MW):

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCR</td>
<td>70</td>
</tr>
</tbody>
</table>

Including:
- QF: 36
- Muni: 0
- Deficiency: 0
Limiting Contingencies:

Category B: No LCR need

Category C:
- L-1/T-1: Friant - Coppermine 70 kV and Borden 230/70 kV # 4
- Constraint: Borden 230/70 kV # 1

LCR Results (MW):

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. B</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCR</td>
<td>0</td>
<td>23</td>
</tr>
</tbody>
</table>

Including:
- QF: 0
- Muni: 0
- Deficiency: 0
Fresno Area LCR
2016 Reedley Sub-Area

Limiting Contingencies:

Category C:
- L-1-1: McCall-Reedley (McCall-Wahtoke) 115 kV & Sanger-Reedley 115 kV
- Constraint: Kings River-Sanger-Reedley 115 kV

Category B: No LCR need

LCR Results (MW):

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCR</td>
<td>60</td>
</tr>
</tbody>
</table>

Including:
- QF: 10
- Muni: 0
- Deficiency: 50
Limiting Contingency:

Category B:
- G-1/L-1: Herndon-Barton 115kV & Kerckhoff 2 PH
- Constraint: Herndon-Manchester 115kV

Category C: Same as Category B

LCR Results (MW):

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. B</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCR</td>
<td>503</td>
</tr>
</tbody>
</table>

Including:
- QF 51
- Muni 65
- Deficiency 0
Fresno Area LCR
2016 Wilson Sub-Area

Limiting Contingencies:

Category B:
- G-1/L-1: Melones – Wilson 230 kV with one Helms unit out of service
- Constraint: Warnerville-Wilson 230 kV

Category C:
- See next page

LCR Results (MW):

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. B</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCR</td>
<td>2445</td>
</tr>
<tr>
<td>Including:</td>
<td></td>
</tr>
<tr>
<td>QF</td>
<td>180</td>
</tr>
<tr>
<td>Muni</td>
<td>136</td>
</tr>
<tr>
<td>Deficiency</td>
<td>0</td>
</tr>
</tbody>
</table>

Slide 12
Fresno Area LCR
2016 Wilson Sub-Area

Limiting Contingencies:

Category C: - Contingency 1
- L-1/G-1: Melones – Wilson 230 kV followed by one Helms unit out
- Constraint: Warnerville-Wilson 230 kV
- LCR: 2445 MW

Category C: - Contingency 2
- L-2: Gregg-Helms #1 & #2 230 kV
- Constraint: Warnerville-Wilson 230 kV
- LCR: 2445 MW

LCR Results (MW):

<table>
<thead>
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<th>Contingency</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCR</td>
<td>2445</td>
</tr>
</tbody>
</table>

Including:
- QF 180
- Muni 136
- Deficiency 0
Fresno Area LCR
2020 Hanford Sub-Area

Limiting Contingencies:

Category B: No LCR need

Category C:

- L-1/T-1: McCall-Kingsburg #2 115 kV & Henrietta 230/115 kV T/F
- Constraint: McCall-Kingsburg # 1 115 kV

LCR Results (MW):

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. B</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020 LCR</td>
<td>0</td>
<td>67</td>
</tr>
</tbody>
</table>

Including:

- QF       | 0      | 0      |
- Muni     | 0      | 0      |
- Deficiency | 0     | 0      |
**Limiting Contingencies:**

**Category C:**
- T-1/L-2: Gates 230/70kV TB #5 and Panoche-Schindler #1 & #2 115kV common tower lines
- Constraint:
  - Low voltage in the pocket

**Category B:** No LCR need

**LCR Results (MW):**

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020 LCR</td>
<td>67</td>
</tr>
</tbody>
</table>

Including:
- QF: 36
- Muni: 0
- Deficiency: 0
Fresno Area LCR
2020 Borden Sub-Area

Limiting Contingencies:

Category B: No LCR need

Category C:
- L-1/T-1: Friant - Coppermine 70 kV and Borden 230/70 kV # 4
- Constraint: Borden 230/70 kV # 1

LCR Results (MW):

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. B</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020 LCR</td>
<td>0</td>
<td>34</td>
</tr>
</tbody>
</table>

Including:

<table>
<thead>
<tr>
<th></th>
<th>Cat. B</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>QF</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Muni</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Deficiency</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>
Fresno Area LCR
2020 Reedley Sub-Area

Eliminated due to McCall-Reedley # 2 115 kV line project.

Fresno Area LCR
2020 Herndon Sub-Area

Eliminated due to Northern Fresno 115 kV area reinforcement project.
Fresno Area LCR
2020 Wilson Sub-Area

Limiting Contingencies:

Category B:
- L-1: Panoche-Mendota 115 kV line & one Helms unit out
- Constraint: Panoche-Oro Loma 115 kV- (From Panoche Jn To Hammonds)

Category C:
- L-2: Gates-Gregg 230kV line (drops Helms Unit #3) & Panoche-Kearney 230kV common tower lines
- Constraint: Panoche-Oro Loma 115 kV- (From Panoche Jn To Hammonds)

LCR Results (MW):

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Cat. B</th>
<th>Cat. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020 LCR</td>
<td>1471</td>
<td>1867</td>
</tr>
</tbody>
</table>

Including:
- QF: 180
- Muni: 136
Changes

Since last year:

1) 2016 load increased by 116 MW vs. 2015
2) LCR has increased by 56 MW due to load increase
3) 2020 load increased by 253 MW vs. 2019
4) LCR has increased by 286 MW mostly due to load increase and new identified worse contingency

Your comments and questions are welcome.

For written comments, please send to: RegionalTransmission@caiso.com