WESTERN ASSESSMENT of Resource Adequacy
Western Assessment of Resource Adequacy

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Travis English
Training and Outreach Specialist
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ERO 101—This new package leads an organization through the process of becoming a NERC registered entity and includes what to do after the organization has completed the registration process.

Reliability | Resilience | Security
Because nearly 400 million citizens in North America are counting on us
DISCUSS
The Western Interconnection's Reliability Risks

2022 | WECC
RISK PRIORITIES WORKSHOP
Western Assessment of Resource Adequacy

- Executive Summary
- Chapter 1—Energy-Based Resource Adequacy*
- Chapter 2—Probabilistic Analysis Findings
- Chapter 3—System Condition Scenarios*
- Chapter 4—Supplemental Subregion Results
- Appendices

*New this year
Findings

- Increasing variability and the need for urgency
  - Risks to resource adequacy in the Western Interconnection are likely to increase over the next 10 years as variability increases
  - If long-term resource adequacy issues are not addressed immediately, they may be insurmountable when they become near-term issues

- Changes in system strain
  - Times when the system is most strained no longer align with the peak hour
  - Variability is driving strain on the system
  - Planning Reserve Margins (PRM) are not adequately accounting for variability

- Change in reliance on imports
  - Changes on the system are affecting how and when entities can rely on imports
Recommendations

- Entities need to act now to address long-term issues
- Entities should change the way they approach PRMs
  1. Calculate PRMs based on energy, not capacity
  2. Evaluate the most strained times on the system, not necessarily the peak hour
  3. Recalibrate PRMs when changes to demand or resources increase variability on the system
- Industry needs to change how it counts imports
WECC’s Approach

- **Energy-based**
  - Capacity-based approaches only estimate variability (% of capacity)
  - To fully account for variability, need to look at energy output

- **Probabilistic**
  - Probabilistic analysis allows us to evaluate a range of potential resource and demand scenarios
  - Helps to fully account for variability

- **Hourly**
  - Examining every hour ensures the analysis sees the times of greatest strain
Loss of Load Probability

Planning Reserve Margin = 20 MW/20%

Possible unserved load

Demand

Resource Availability

MW

90 100 110 120 130

50th Percentile 50th Percentile
Loss of Load Probability

Planning Reserve Margin = 10 MW

Possible unserved load
Increasing Variability: Demand

- Demand is analyzed on a probability curve
  - Shows the range of possible demand levels
Increasing Variability: Demand

- Demand variability curves for the next 10 years
  - Expected peak of ~179 GW by 2031
  - 3% probability to be ~208 GW
Increasing Variability: Resources

- Difference between expected and low availability
  - Baseload — 12% loss
  - Hydro — 40% loss
  - Solar — 42% loss
  - Wind — 94% loss
Increasing Variability: Resource Mix

- Variable energy resources expected to increase
  - Baseload—7.1 GW increase (4.5%)
  - Hydro—3.0 GW increase (4.2%)
  - Solar—29.7 GW increase (101.7%)
  - Wind—8.7 GW increase (25.4%)
Loss of Load Probability

Demand

Resource Availability

Planning Reserve Margin = 20 MW/20%

Possible unserved load

50th Percentile

90 100 110 120 130 MW
Planning Reserve Margins

- **Peak Demand PRM:** the PRM needed to ensure the peak demand hour each year is 99.98% reliable. Based on applying peak demand PRM to all hours of the year
- **Fixed PRM:** A 15% PRM applied to all hours
- **Total Reliability PRM:** The PRM needed to account for the demand and resource variability and ensure all hours of the year are 99.98% reliable. This PRM is calculated independently for each hour using the probabilistic, energy-based approach
Planning Reserve Margins

2022 Hours at Risk Given Different PRMs

Energy Reserves Needed

27,750 ~16.9% of Peak Demand Hour
0 Hours

24,700 ~15.0% of Peak Demand Hour
89 Hours

22,400 ~13.6% of Peak Demand Hour
598 Hours

Hours

1 51 101 151 201 251 301 351 401 451 501 551 601 651 701 751
Planning Reserve Margins

2022 Western Interconnection Potential Loss-of-Load Hours with Peak Demand PRM (13.6%) -

2022 Western Interconnection Potential Loss-of-Load Hours with Fixed PRM (15%) -
## Planning Reserve Margins

### 2022 Subregional Planning Reserve Margins

<table>
<thead>
<tr>
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<th>Peak Demand PRM</th>
<th>Fixed PRM</th>
<th>Total Reliability PRM</th>
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<td>NWPP-NW</td>
<td>13.9%</td>
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<td>NWPP-E</td>
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<td>15%</td>
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<tr>
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<td>18.4%</td>
<td>15%</td>
<td>21.6%</td>
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<tr>
<td>DSW</td>
<td>12.5%</td>
<td>15%</td>
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Planning Reserve Margins

- Subregional Total Reliability PRMs are expected to grow over the next 10 years
- By 2031, PRMs needed to maintain total reliability range from ~19.3% to ~28.1%
- All subregions will be unable to meet the Total Reliability PRM even with all planned resources in service and imports

<table>
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<th></th>
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<th>2023</th>
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<td>NWPP-NE</td>
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<tr>
<td>DSW</td>
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<td>17.7%</td>
<td>18.7%</td>
<td>18.5%</td>
<td>19.3%</td>
</tr>
</tbody>
</table>
Imports: Demand at Risk

NWPP-Central demand at risk before imports (hours)

NWPP-Central demand at risk after imports (hours)

NWPP-Central demand at risk before imports (GWh)

NWPP-Central demand at risk after imports (GWh)
Deterministic Analysis of System Condition Scenarios

Expected Case
Deterministic Analysis of System Condition Scenarios

High Demand
Deterministic Analysis of System Condition Scenarios

Low Hydro
Contact:
Matthew Elkins
melkins@wecc.org
Victoria Ravenscroft
vraevenscroft@wecc.org