WESTERN ASSESSMENT
of Resource Adequacy
Western Assessment of Resource Adequacy

January 19, 2022

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Training and Outreach Specialist
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DISCUSS
The Western Interconnection's Reliability Risks

2022 | WECC
RISK PRIORITIES WORKSHOP
Grid Fundamentals

February 22 & 23
1:00 - 5:00 P.M. MT
Western Assessment of Resource Adequacy

January 19, 2022

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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
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%)
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

Total Reliability PRM (16.9%)

89 Hours at Risk

Fixed PRM (15%)

598 Hours at Risk

Peak Demand PRM (13.6%)
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>
<th></th>
<th>Peak Demand PRM</th>
<th>Fixed PRM</th>
<th>Total Reliability PRM</th>
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<tbody>
<tr>
<td>NWPP-NW</td>
<td>13.9%</td>
<td>15%</td>
<td>23.9%</td>
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<tr>
<td>NWPP-E</td>
<td>12.1%</td>
<td>15%</td>
<td>16.1%</td>
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<tr>
<td>NWPP-C</td>
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<td>15%</td>
<td>17.8%</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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</table>
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>
<thead>
<tr>
<th></th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
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<td>NWPP-NE</td>
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<tr>
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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
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