Resource Adequacy Advisory Committee

Background and Overview

Technical Committee Meeting
November 20, 2013
General Topic Outline

- Scope and Role of RAAC
- Defining and Measuring Adequacy
- History of NW Assessments
- Continuing Challenges
- Work Plan
- Schedule
Scope and Role

- Federal Advisory Committee Act
- Advise Council:
  - Adequacy standard
  - Adequacy assessments
  - Other adequacy issues
  - Adequacy in the power plan
- Authority
  - Advisory only
  - Members do not vote
- Open Meetings with published minutes
Scope and Role

- **Structure**
  - Technical committee
  - Steering committee

- **Organization**
  - Management officer: Power Division Director
  - Committee co-chairs: Council and BPA

- **Members**
  Utilities, commissions, states, trade associations, transmission groups, public interest groups
Adequacy is the ability of the electric system to supply the aggregate electric power and energy requirements of the electricity consumers at all times, taking into account scheduled and reasonably expected unscheduled outages of system components.

No utility plans for a 100% adequate supply because the cost would be prohibitive.
Adequacy Measurements
Frequency, Duration and Magnitude of Shortages

- **LOLP = loss of load probability**
  Likelihood of having at least one shortage in a future year

- **LOLE = loss of load expectation**
  Expected number of shortage events per year

- **LOLH = loss of load hours**
  Expected number of shortage hours per year

- **EUE = expected unserved energy**
  Average amount of unserved load

- **CVaR95 = conditional value at risk**
  Average magnitude of the worst 5% of shortage events
Analytical Tool – GENESYS

- Chronological hourly simulation
- Monte Carlo method
- Random Variables
  - Water Conditions
  - Temperature/Loads
  - Resource Forced Outage
  - Wind
- Curtailment record
- Metrics derived from curtailment record
Sample Weekly Dispatch

![Graph showing electricity dispatch distribution over the week with different energy sources such as Load, Curt, Thermal, Market, Hydro, and Wind.](image)

- **Load**: The highest energy demand shown by a curved line peaking at around 40,000 Megawatts.
- **Curt**: A line showing the energy cutters, with minimal fluctuations, ranging from about 0 to 10,000 Megawatts.
- **Thermal**: A slightly wavy line indicating thermal energy, with values ranging from 10,000 to just below 25,000 Megawatts.
- **Market**: A line with minor fluctuations, mostly under 5,000 Megawatts.
- **Hydro**: A line showing hydroelectric energy, fluctuating between 0 and 5,000 Megawatts.
- **Wind**: A line with the least significant variance, ranging from 0 to just above 500 Megawatts.

**Hour of the Week** and **Megawatts** are the axes indicating the time and energy measurement respectively. The graph provides a visual representation of how different energy sources are dispatched throughout the week.
PNW Adequacy Standard

- **Standard includes**
  - Metric
  - Threshold

- **For the PNW**
  - Metric is: LOLP
  - Threshold is: 5% (maximum)

- **Interpretation:**
  If the LOLP is greater than 5%, it means that the likelihood of having to take extraordinary (expensive) measures to serve load exceeds our tolerance for such actions.
Loss of Load Probability

Each bin = 1 simulated year

Vertical bars show shortages

Any year with at least one shortage is labeled bad

LOLP = number of bad simulations/total number of simulations

In this example 50 simulations out of 1000 were bad, thus

LOLP = 50/1000 = 5 percent
History of NW Assessments

- 1999: 24% (LOLP)
- 2009: 5.0% (LOLP)
- 2012: 6.6% (LOLP)

2017 Assessment Updated

<table>
<thead>
<tr>
<th>Year</th>
<th>LOP (%)</th>
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<tbody>
<tr>
<td>2012 Assessment</td>
<td>6.6</td>
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<tr>
<td>Add Missing Hydro + Realign</td>
<td>5.2</td>
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<tr>
<td>Split April &amp; August</td>
<td>4.9</td>
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<tr>
<td>New Hydro Reg</td>
<td>5.6</td>
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<tr>
<td>New Model</td>
<td>5.4</td>
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2013 Updated Assessment
Apparent Precision Overwhelmed by Larger Uncertainties*

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<tr>
<th></th>
<th>No Market</th>
<th>Low Load</th>
<th>High Load</th>
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<tbody>
<tr>
<td><em>Effects of Market and Economic Load Growth Changes</em></td>
<td>8.4%</td>
<td>6.6%</td>
<td>16.8%</td>
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<td>2.8%</td>
<td>6.6%</td>
<td>7.8%</td>
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*Effects of Market and Economic Load Growth Changes*
Continuing Challenges

- Increasing complexity of power system
- Peaking/capacity issues growing
- Methodology not settled down
  - NERC uses LOLH and EUE
  - CVaR95 may be better for optimization
- GENESYS originally built for energy but is being enhanced for capacity
- Expect continued volatility in results
Major Modeling Changes

- NW topography change from 2 to 3 nodes
  - Separating out southern Idaho
  - More constraints generally increase LOLP

- Fine tuned hydro peaking capacities

- Improved hourly hydro dispatch
Shortened Work Plan for 2019 Assessment

Phase I - Data
- Tech Committee: Collect resource and load data, Review and vet all data
- Steering Committee: Review data, Set policy assumptions
- Power Committee: Approve data and assumptions

Phase II - Draft
- Tech Committee: Run preliminary assessment and sensitivity studies
- Steering Committee: Review preliminary and sensitivity studies
- Power Committee: Review preliminary and sensitivity studies

Phase III - Final
- Tech Committee: Run final assessment and sensitivity studies
- Steering Committee: Review final studies, Prepare draft report
- Power & Full Council: Approve final studies and Release of the report
### Schedule for 2019 Assessment

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<tr>
<th>Nov 20</th>
<th>Dec 6</th>
<th>Feb</th>
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<th>Mar</th>
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- **Nov 20**: Review data and modeling assumptions
- **Dec 6**: Review data and policy assumptions
- **Feb**: Briefing on data and policy assumptions

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