Resource Adequacy Advisory Committee

Background and Overview

Steering Committee Meeting
December 6, 2013

Northwest Power and Conservation Council

General Topic Outline

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

Northwest Power and Conservation Council

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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

NERC Definition of Adequacy

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

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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

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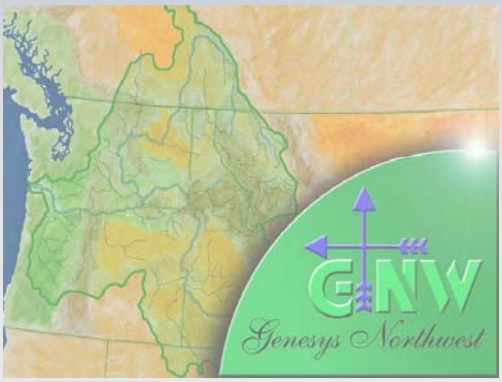
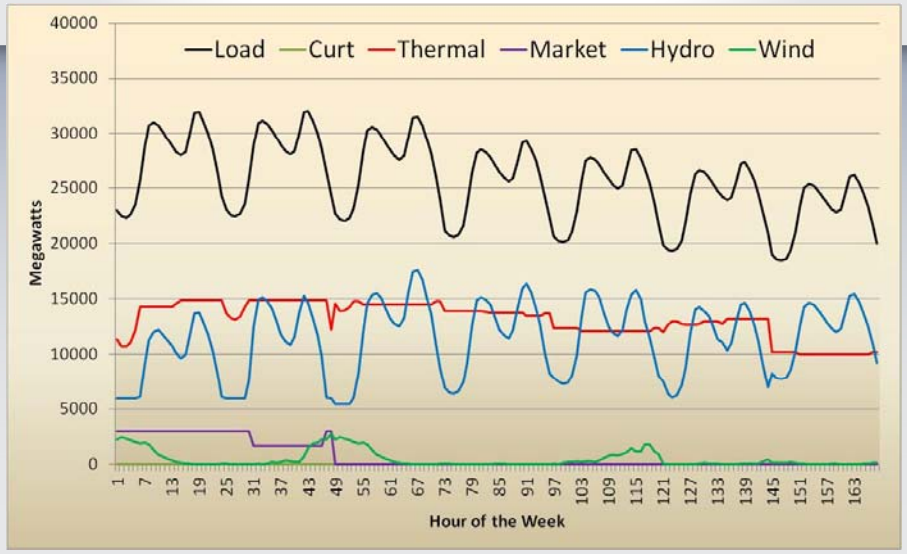
Analytical Tool – GENESYS

- 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



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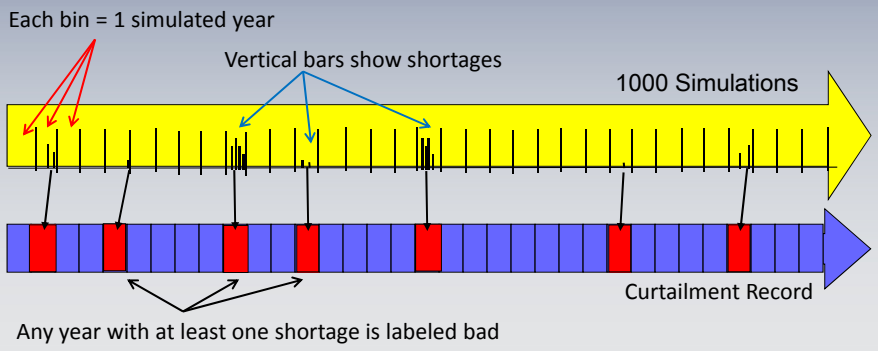
PNW Adequacy Standard

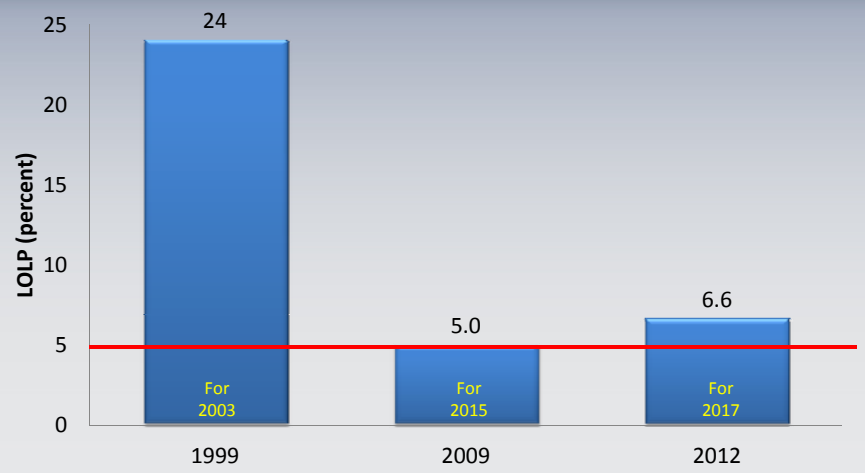
- **Standard includes**
  - Metric
  - Threshold
- **For the PNW**
  - Metric is: **LOLP**
  - Threshold is: **5%** (maximum)
- **Interpretation:**
  If the LOLP is greater than 5%, it means that the likelihood of having to take extraordinary (expensive) measures to serve load exceeds our tolerance for such actions.

Loss of Load Probability



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 Assessment Results



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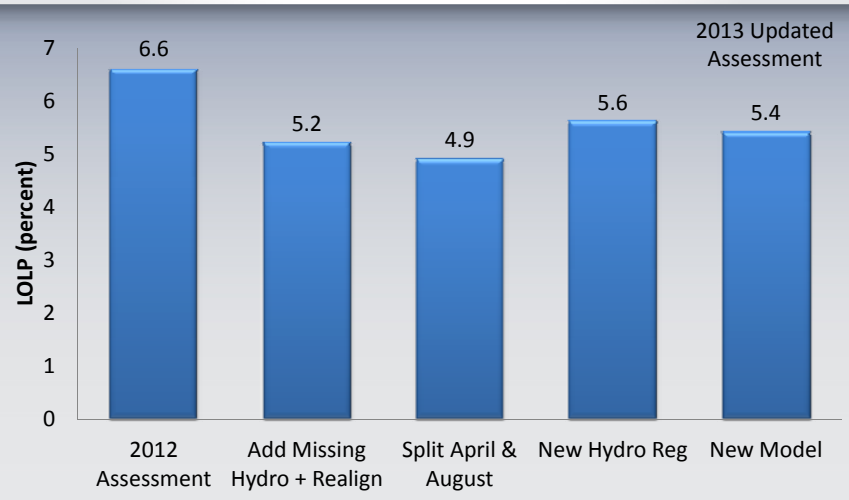
2017 Assessment Updated



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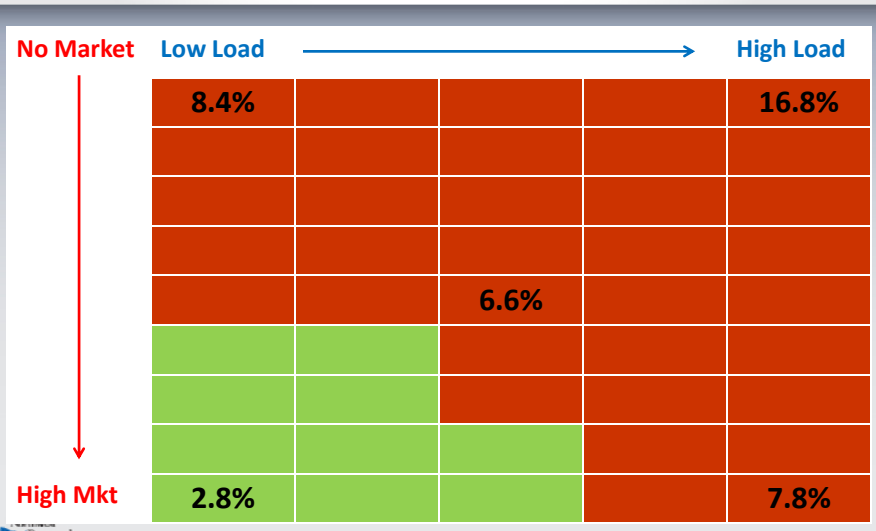
Apparent Precision Overwhelmed by Larger Uncertainties*



*Effects of Market and Economic Load Growth Changes

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Continuing Challenges

- Increasing complexity of power system
- Peaking/capacity issues are growing
- Methodology varies across the industry
- GENESYS originally built for energy but is being enhanced for capacity

- Expect continued volatility in results

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Major Modeling Changes for 2019 Assessment

- NW topography change from 2 to 3 nodes
  - West, East and Southern Idaho
  - Better alignment with other models
- Fine tuned hydro peaking capacities
  - Monthly hydro dispatch done by plant
  - Hourly hydro dispatch done by node
  - Nodal hourly hydro peaking is a function of nodal monthly hydro energy

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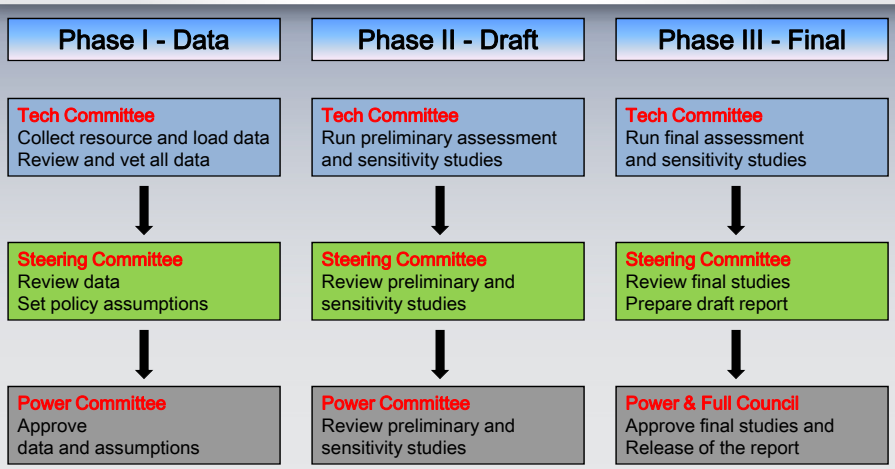
Work Plan for 2019 Assessment



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Schedule for 2019 Assessment