Resource Adequacy Advisory Committee

Background and Overview

Technical Committee Meeting
November 20, 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

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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

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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

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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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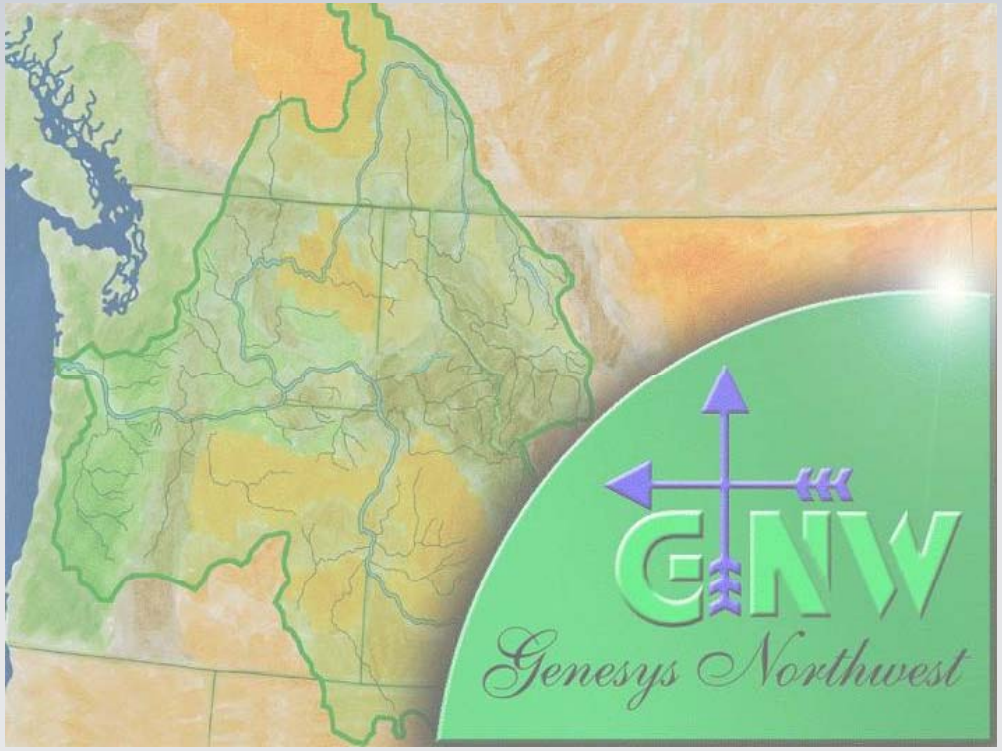
Analytical Tool – GENESYS

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



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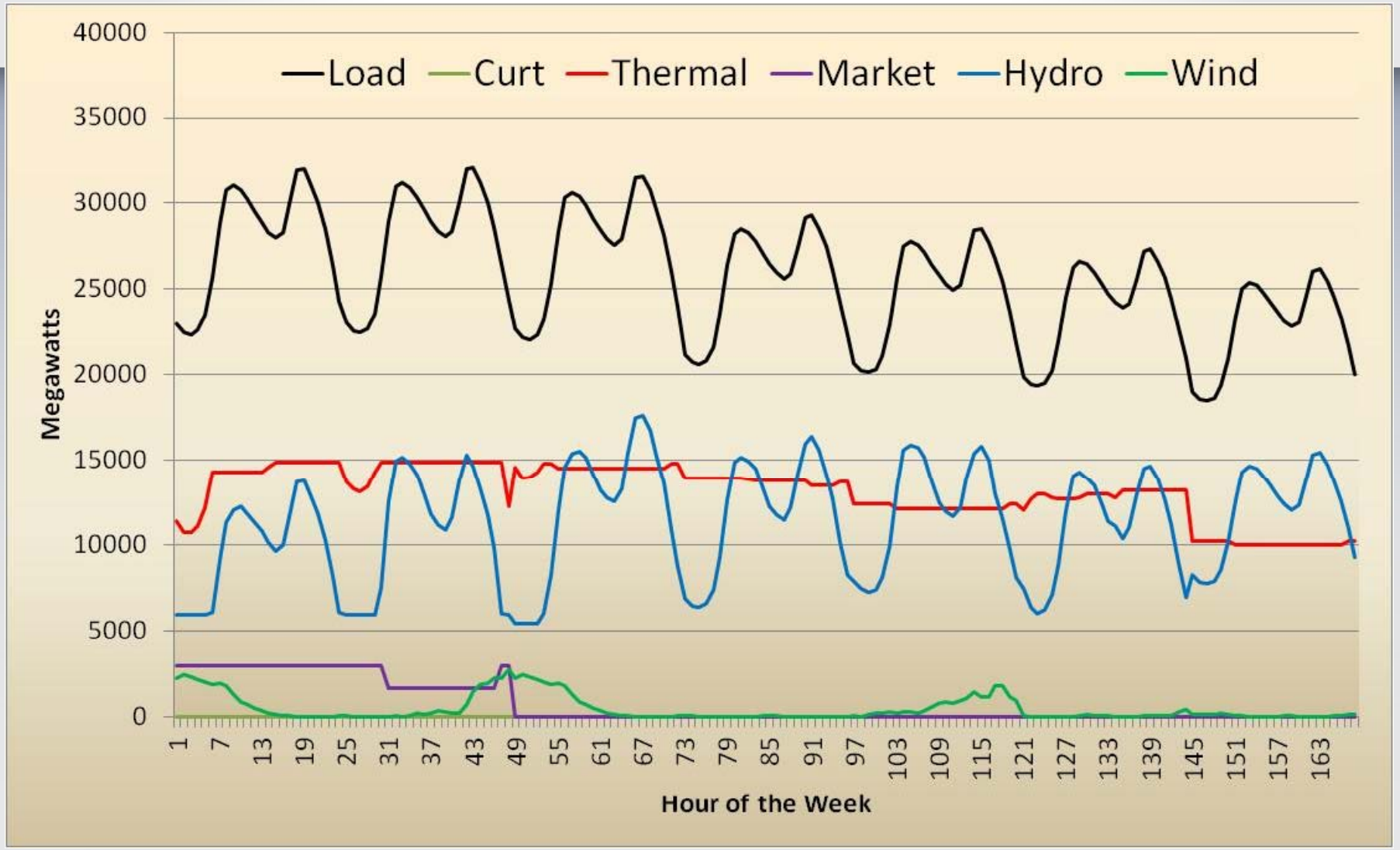
Sample Weekly Dispatch



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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.

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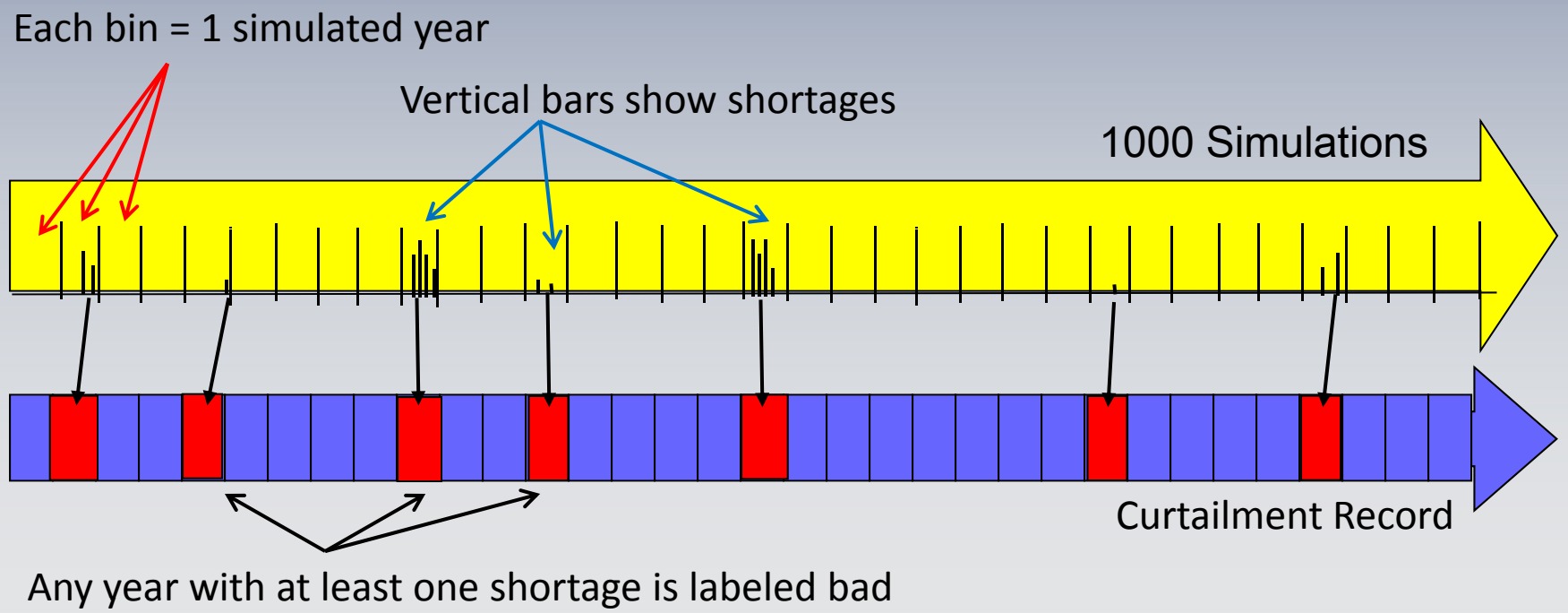
Loss of Load Probability



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

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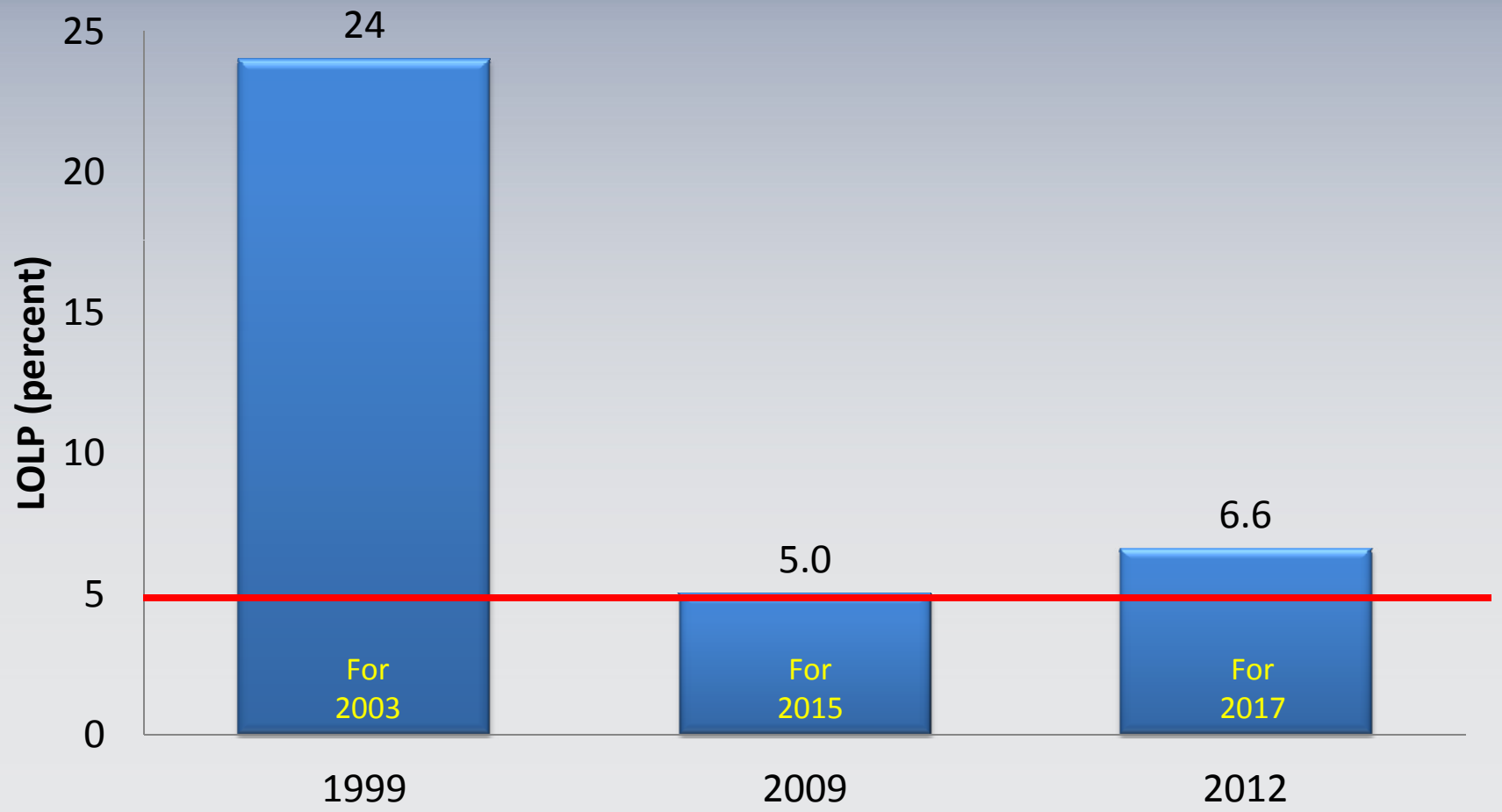
History of NW Assessments



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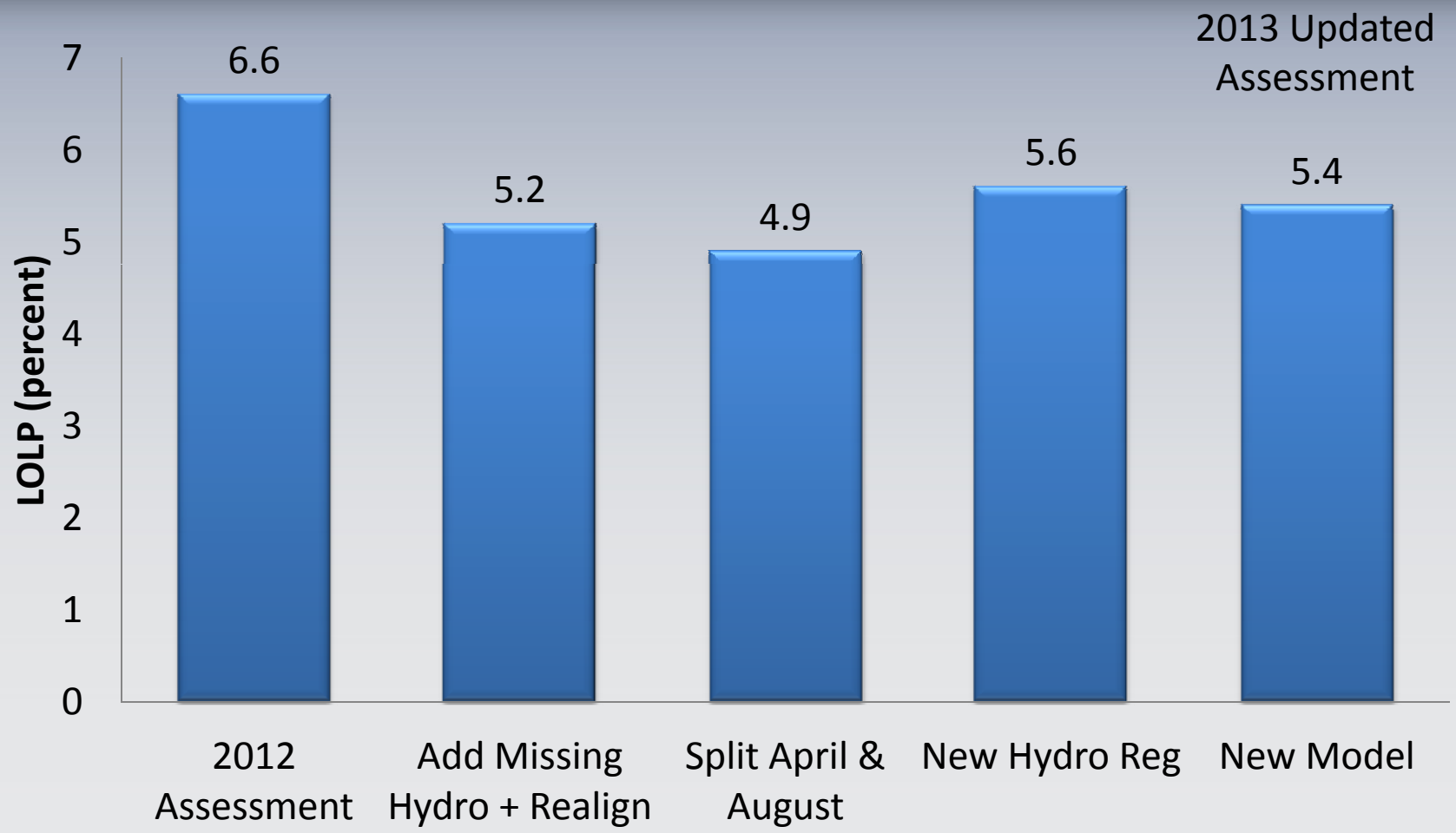
2017 Assessment Updated



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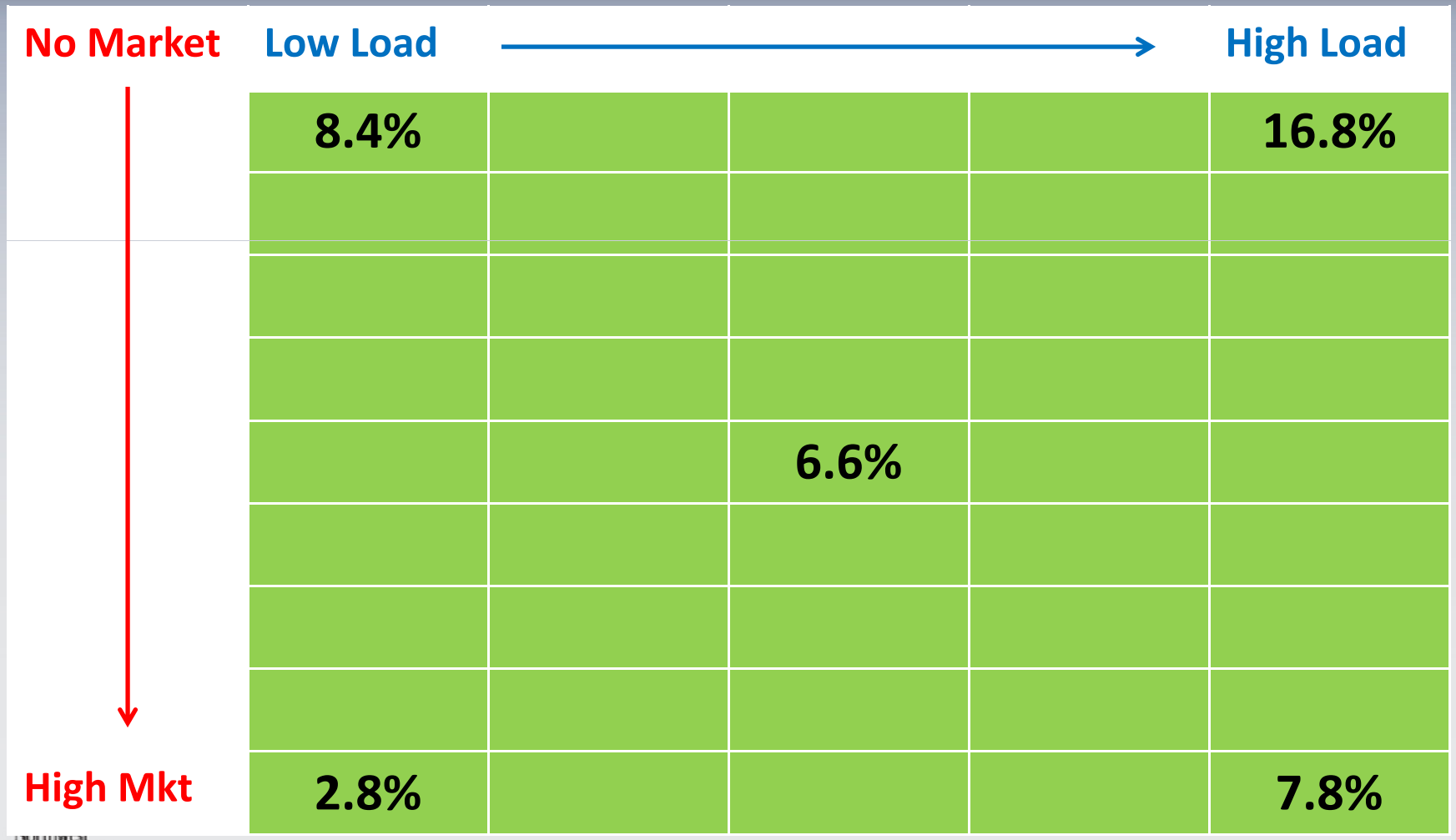
Apparent Precision Overwhelmed by Larger Uncertainties*



*Effects of Market and Economic Load Growth Changes

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

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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

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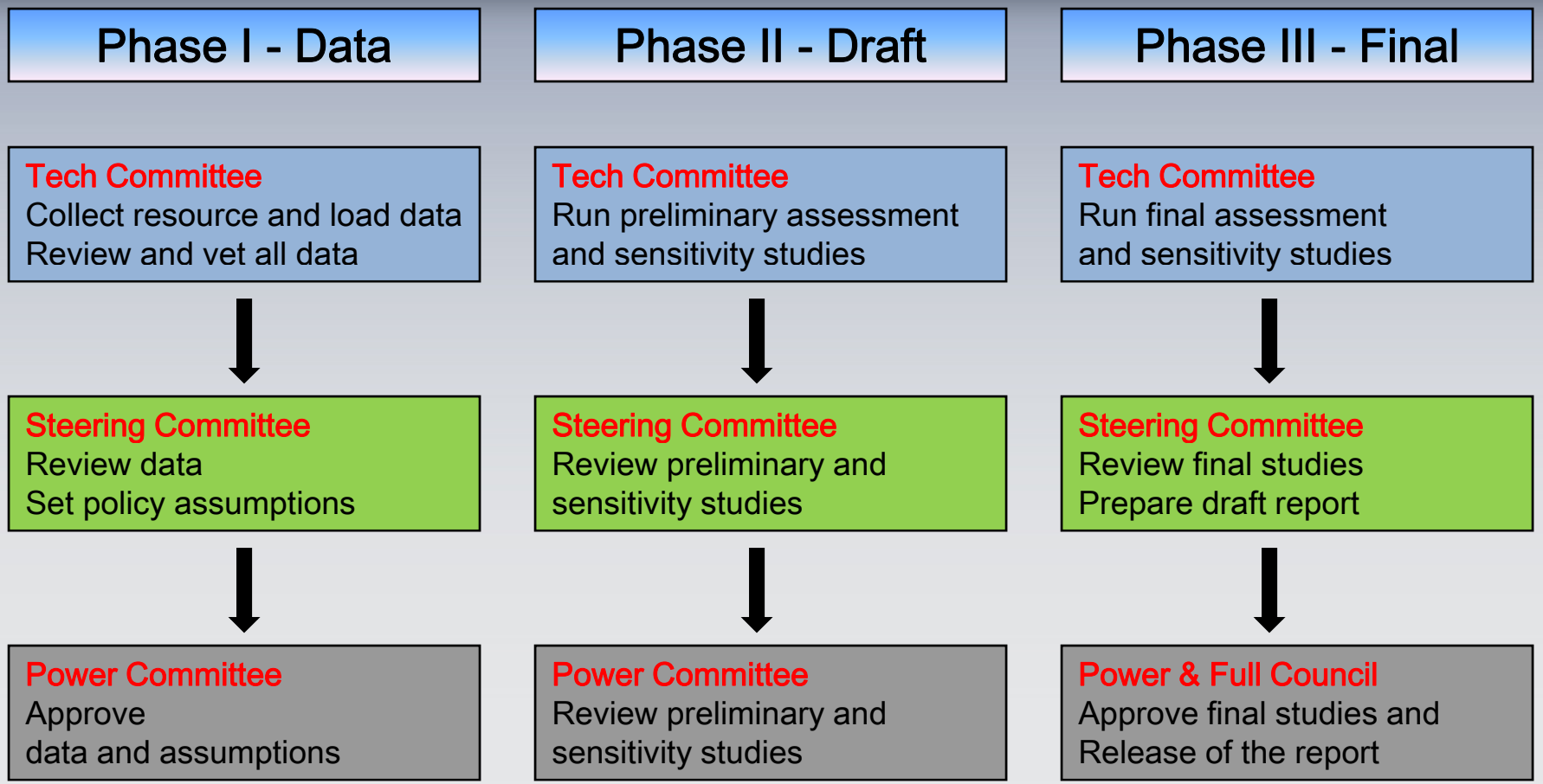
Shortened Work Plan for 2019 Assessment



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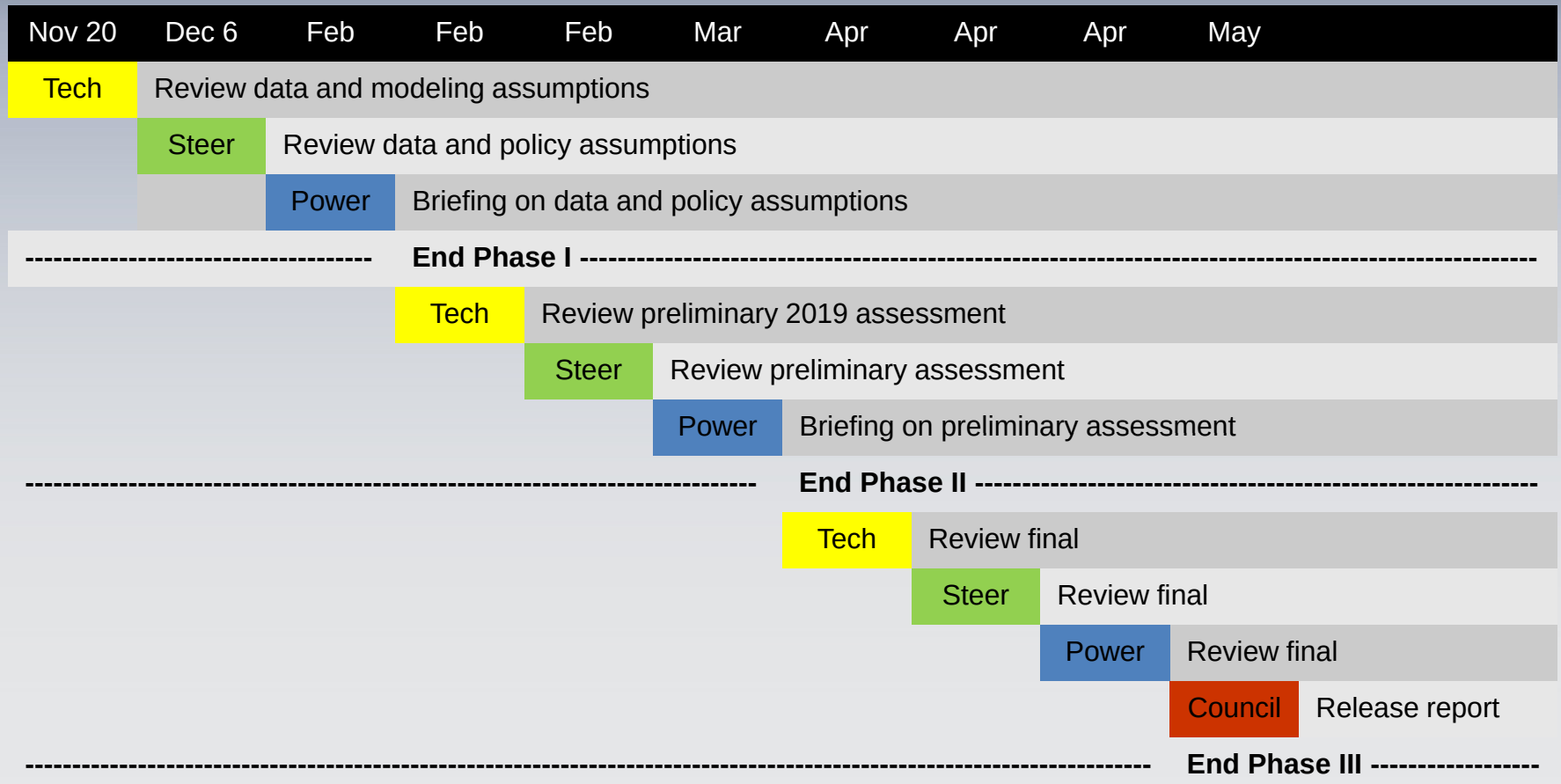
Schedule for 2019 Assessment



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