Northwest **Power** and **Conservation** Council

April 1, 2025

MEMORANDUM

TO: **Council Members**

FROM: **Dor Hirsh Bar Gai, Power System Analyst**

SUBJECT: **Proposed Final Adequacy Criteria for Ninth Plan**

BACKGROUND:

Presenter: Dor Hirsh Bar Gai

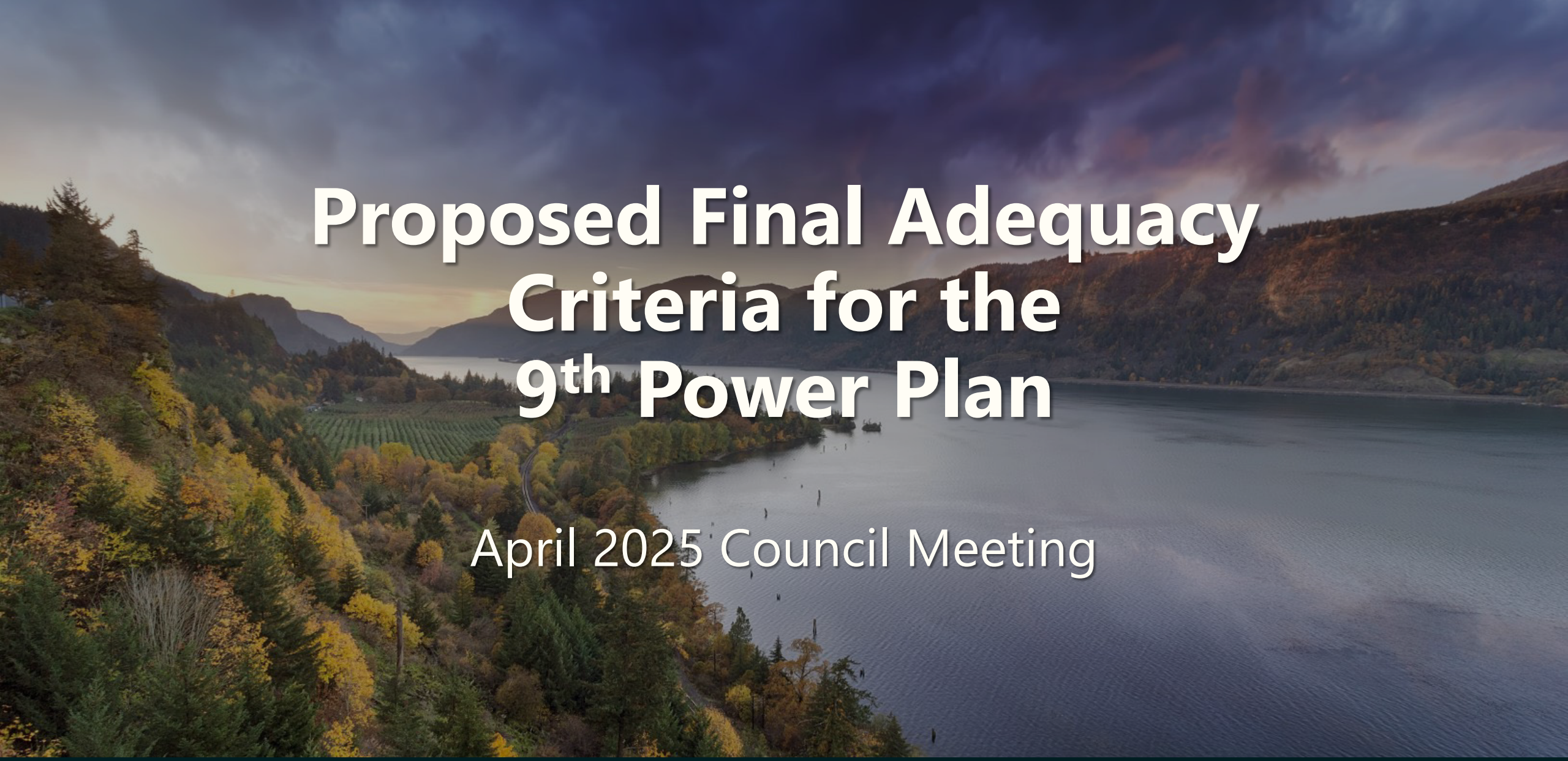
Summary: Staff will review the recommendation for the multi-metric adequacy criteria the for the Ninth Plan. Since releasing the 2029 Adequacy Assessment in July 2024 that utilized interim adequacy thresholds, staff finalized the criteria for the Plan.

Relevance: The Council is required to develop a 20-year power plan that ensures an adequate, economical, efficient, and reliable power supply. While the 2021 Power Plan relied on a single adequacy metric – loss of load probably (LOLP) - since 2022, the Council has been evaluating a transition towards multiple metrics that not only look at frequency, but also the duration and magnitude of shortfall events.

Staff collaborated with regional stakeholders to determine the appropriate level of risk for each metric and evaluated the approach using provisional limits in the 2027 Adequacy Assessment and interim limits in the 2029 Adequacy Assessment.

Workplan: B.3.2 Conduct assessments of regional needs to inform scenario modeling.

Background: In January 2023 the Council approved a transition towards a multi-metric approach for characterizing system adequacy with the completion of the 2027 Adequacy Assessment. The objectives of this new standard include (1) preventing overly frequent use of emergency measures, (2) limiting the risk of long duration shortfall events, (3) limiting the risk of big capacity shortfalls, and (4) limiting the risk of big energy shortfalls. To achieve these objectives, the Council proposed utilizing frequency, duration and magnitude metrics based on a combination of expected and tail-end event statistics, known as value at risk (VaR). Given the evolutionary nature of the metrics, the Council collaborated with regional utilities and stakeholders to evaluate and determine precise and appropriate regional adequacy thresholds.



Proposed Final Adequacy Criteria for the 9th Power Plan

April 2025 Council Meeting

Northwest **Power** and **Conservation** Council

Agenda

- Adequacy Metrics and Their Role
- Council's Evolution of Adequacy Criteria
- The Adequacy Criteria for the Ninth Plan
- RAAC Feedback

Adequacy Metrics & Their Role

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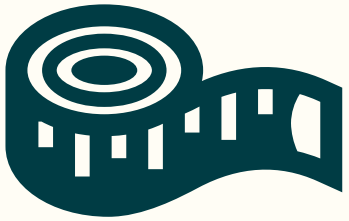
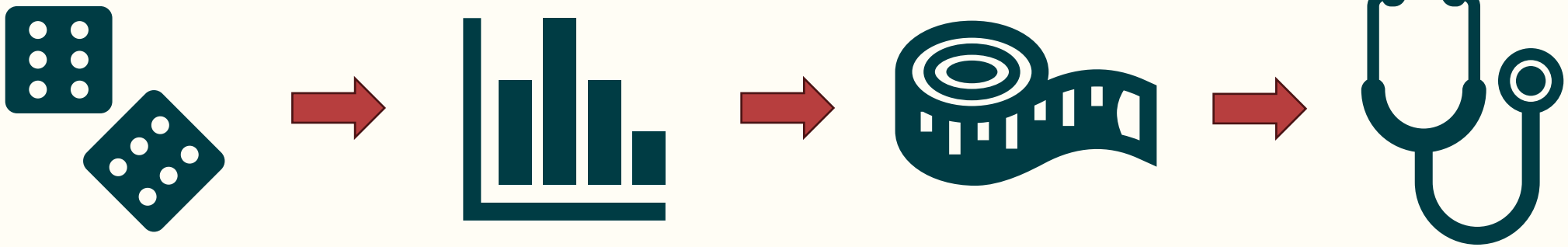
Adequacy Criteria = Metrics + Thresholds



Adequacy Metric =
Measurement of a shortfall quantity
(frequency, duration, magnitude)

Role of adequacy criteria =
Assessment of system risk

How Are Metrics Calculated?



Simulations
(Probabilistic assessment)

180 simulations
per study

Shortfall Record
(Distribution)

180 x 8,760 hourly
deficit output
(0s = no deficit)

Statistical Analysis
(Metric calculation)

Average
and tail-end
statistics

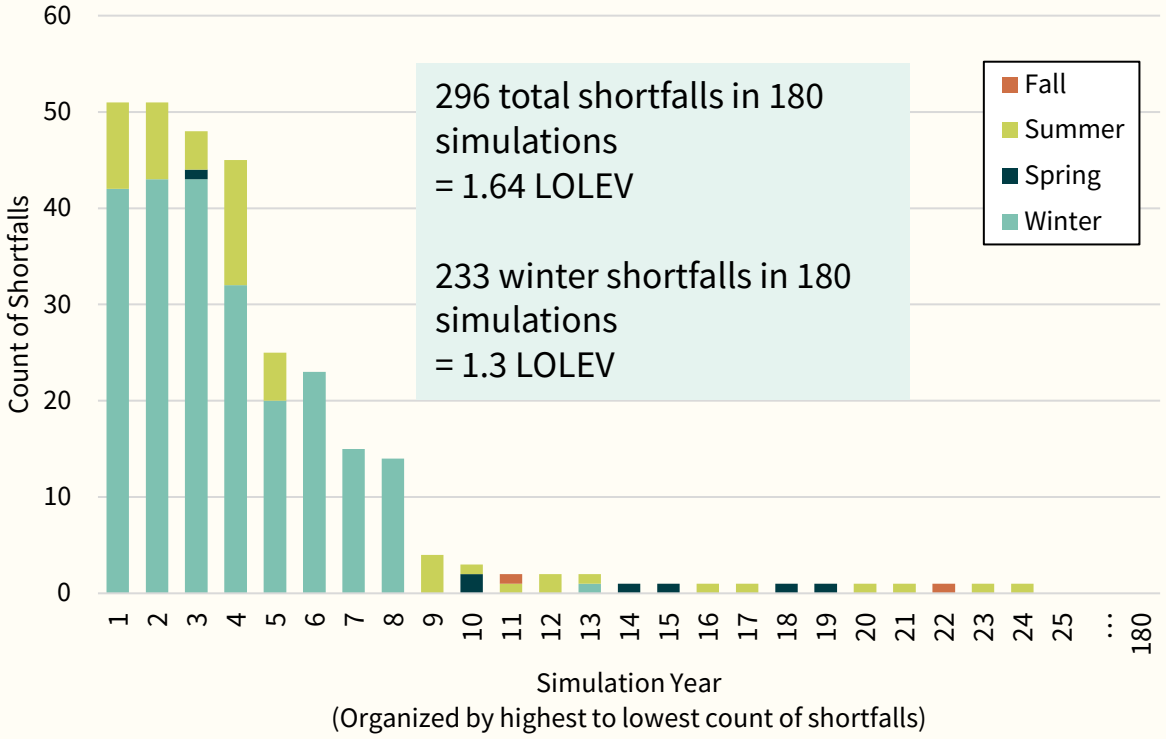
Assessment
(Determining Adequacy)

If all metric thresholds are not
exceeded, deemed adequate

Expected vs Tail-End (Percentile) Metrics

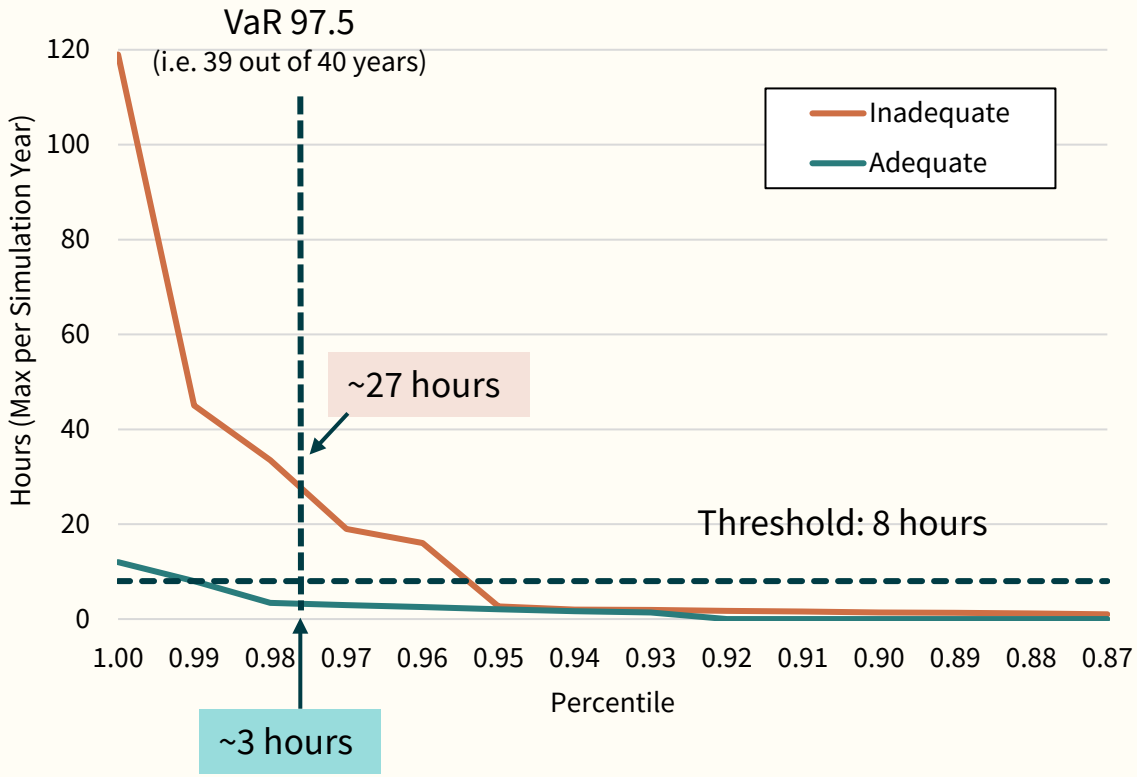
Expected (average) Metric

Example Results for Single Scenario

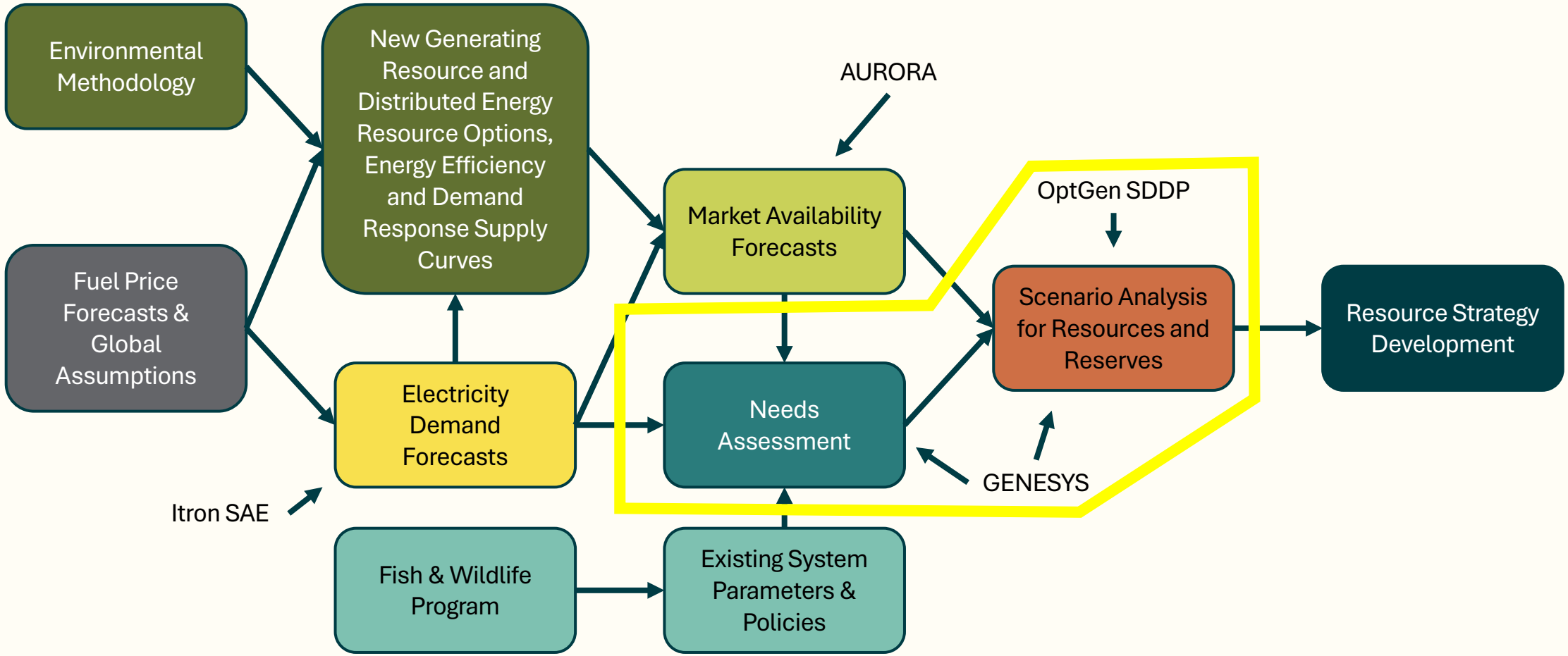


Tail-End Metric

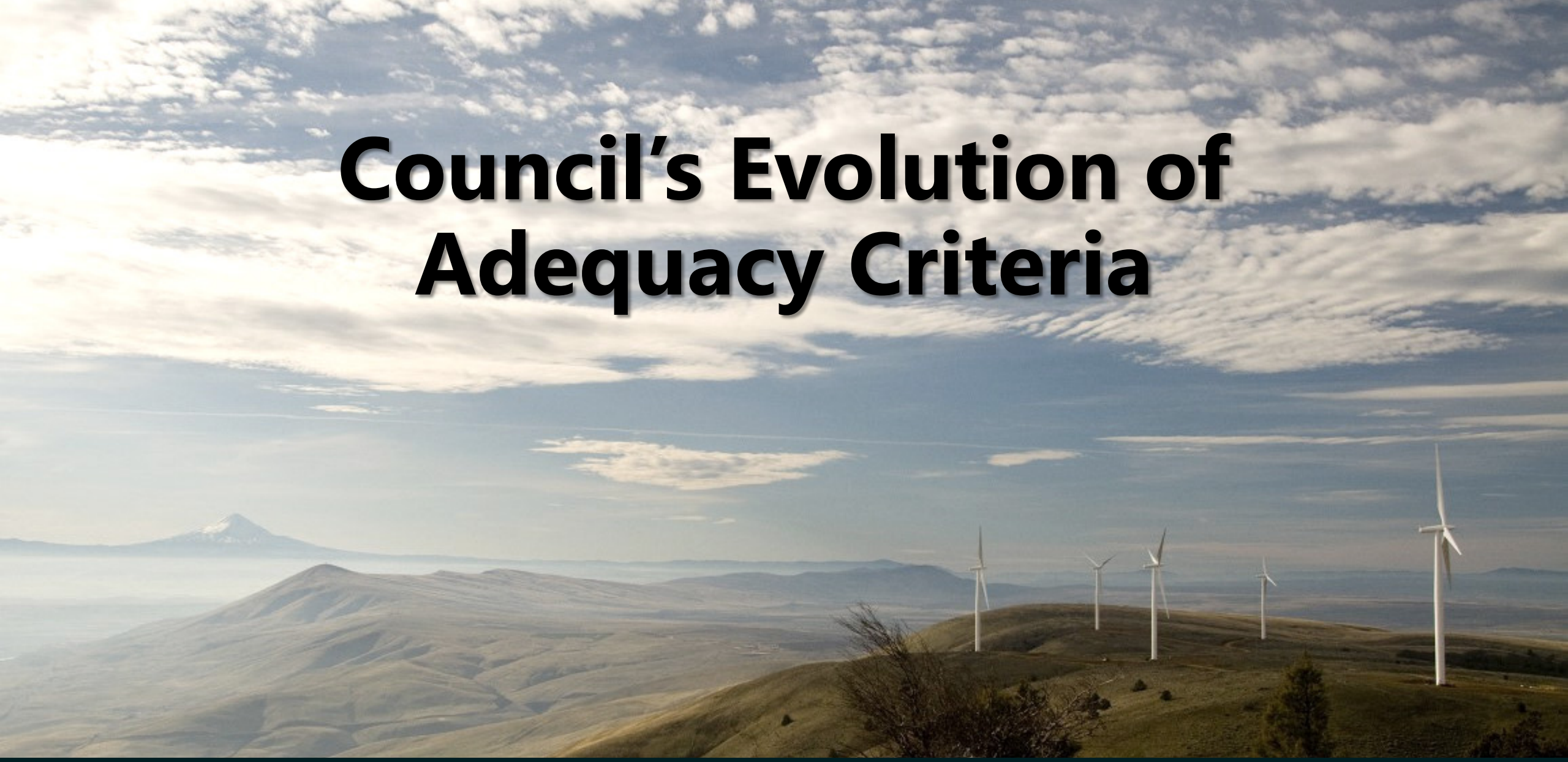
Example Results for Two Scenarios



Where Do Adequacy Metrics & Thresholds Fit in the Power Plan?



Council's Evolution of Adequacy Criteria



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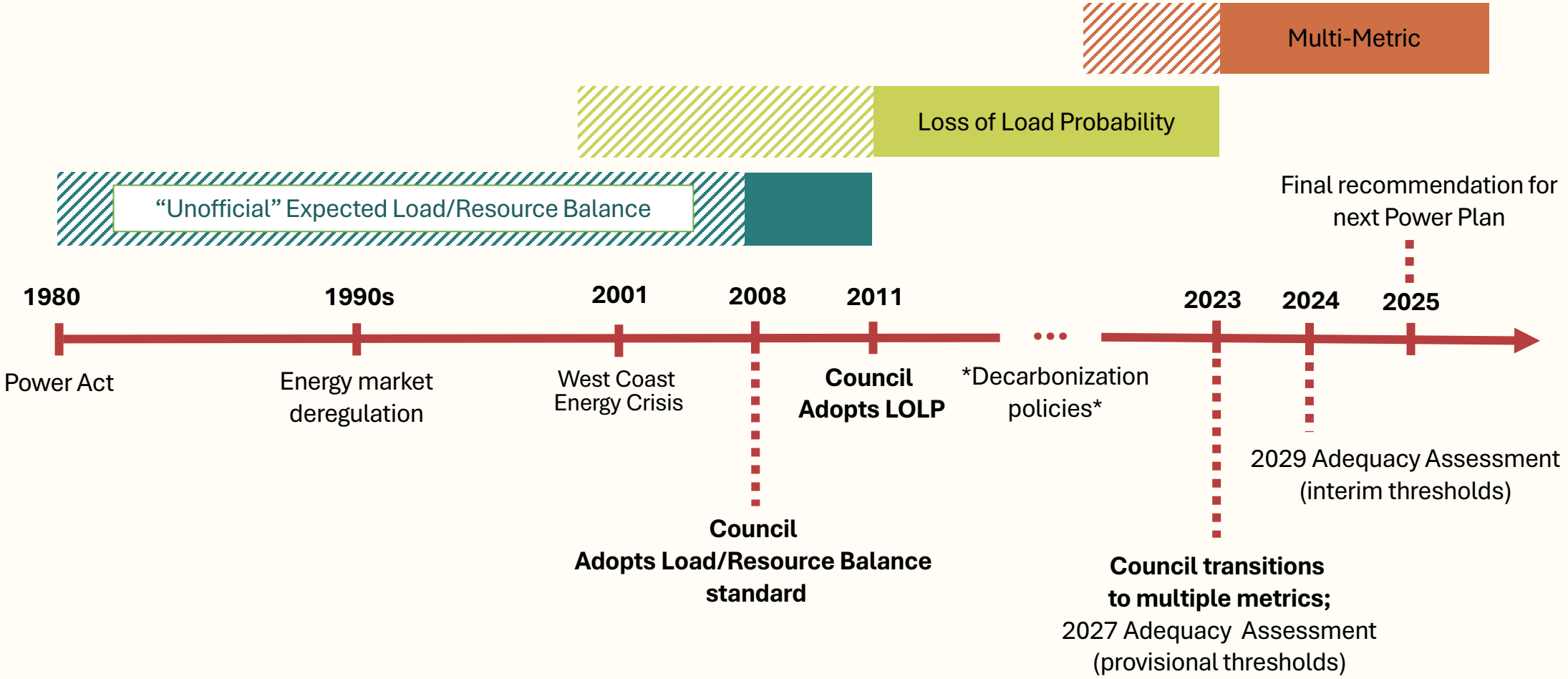
Evolving Approach to Adequacy



Drivers of Change

Previously, the main risk we worried about was high loads coincident with low water.

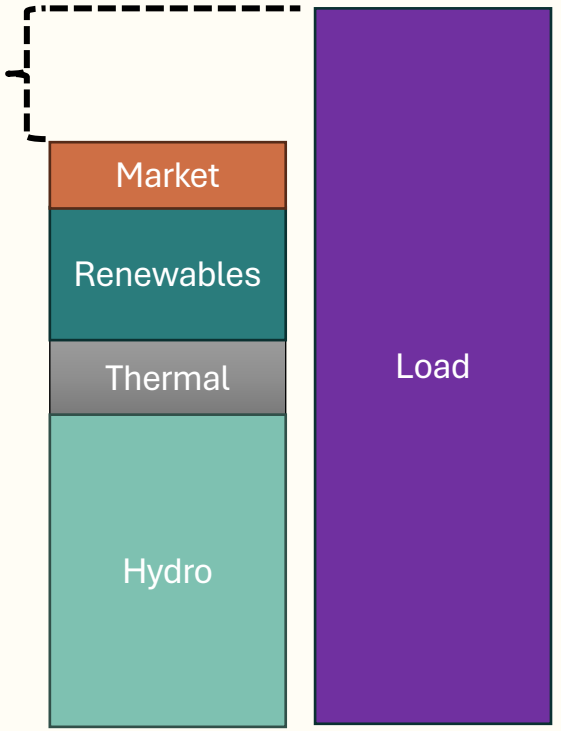
Loss of Load Probability was a sufficient risk representation

Now we have added risks, including coincidence of fuel availability for resources.

Risk is no longer just a question of frequency, but also duration and magnitude

Redefining Risk Approach

Model shortfall; no emergency resources are in the model



- Adequacy studies simulate the NW power system to meet NW load
- In each simulation, representing one year, a simulated model shortfall event occurs over a time period when load cannot be served by resources in the model
- However, a shortfall in the model **does not** necessitate an actual curtailment
  - Rather, it signals non-modeled emergency measures are necessary to avoid curtailment
- Adequacy metrics evaluate shortfalls to inform risk of using emergency measures

What are Emergency Measures?

Within Utility Control (low lift)

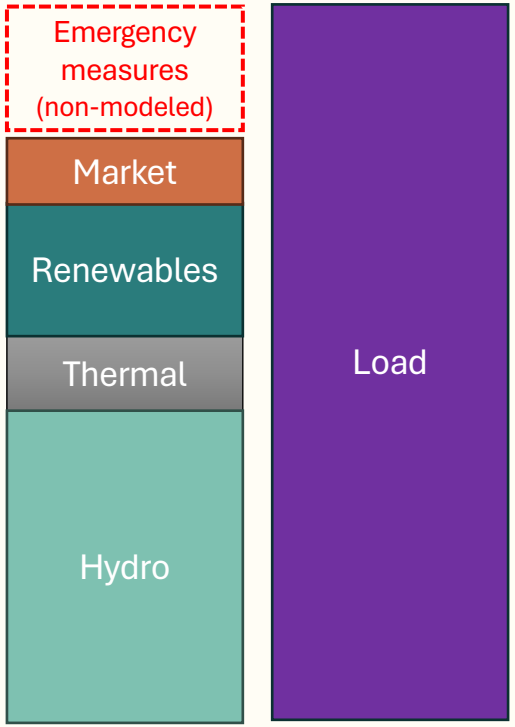
- High operating cost resources not in utility's active portfolio
- High-priced market purchases over max import limits
- Load buy-back provisions
- Industry backup generators

Outside Utility Control (less desirable, heavy lift)

- Official's call for conservation
- Reduce less essential public load (e.g., gov't buildings, streetlights, etc.)
- Utility emergency load reduction protocols
- Curtail F&W hydro operations

None of These Are Modeled in GENESYS

Staff engaged with the RAAC on approximating regional aggregate emergency capabilities to inform adequacy framework.



Philosophical Approach to Thresholds

Emergency Capabilities

Available emergency capabilities for the region based on lower lift measures

Risk Tolerance

What level of risk is the aggregate emergency capabilities of the region able to protect?

Recap of Jan 2024

Engagement Process

Regional Organizations

- WPP
- PNUCC
- PNGC
- CRITFC

Interviews

Utilities

- BPA
- Idaho Power
- Avista
- Northwestern Energy
- Tacoma Power
- SCL
- PGE
- PSE
- Chelan PUD

Surveys / Interviews

PUCs

- Idaho
- Oregon
- Washington

Interviews

Overall Interpretation of Feedback: Apply Conservative Assumptions

Frequency (LOLEV)

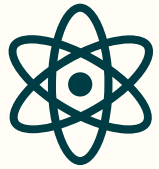
Protect against frequency of events **at least** in alignment with the WRAP

Duration

Shorter longest duration

Peak

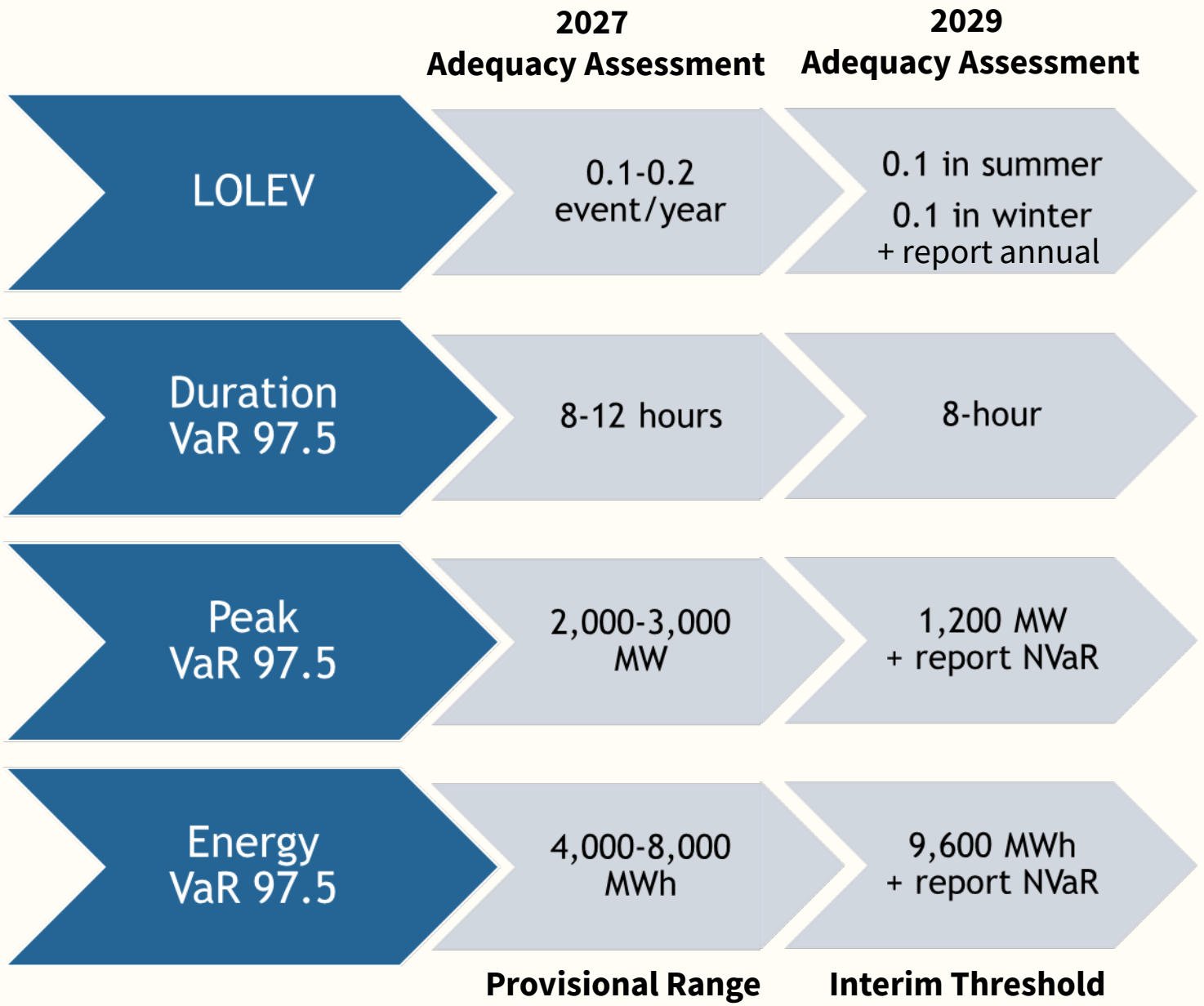
Aggregate peak capability based on **at least** the emergency resource available (per data)



Energy

Aggregate annual energy based on **longest** allowed duration at the **peak** capability

Threshold development

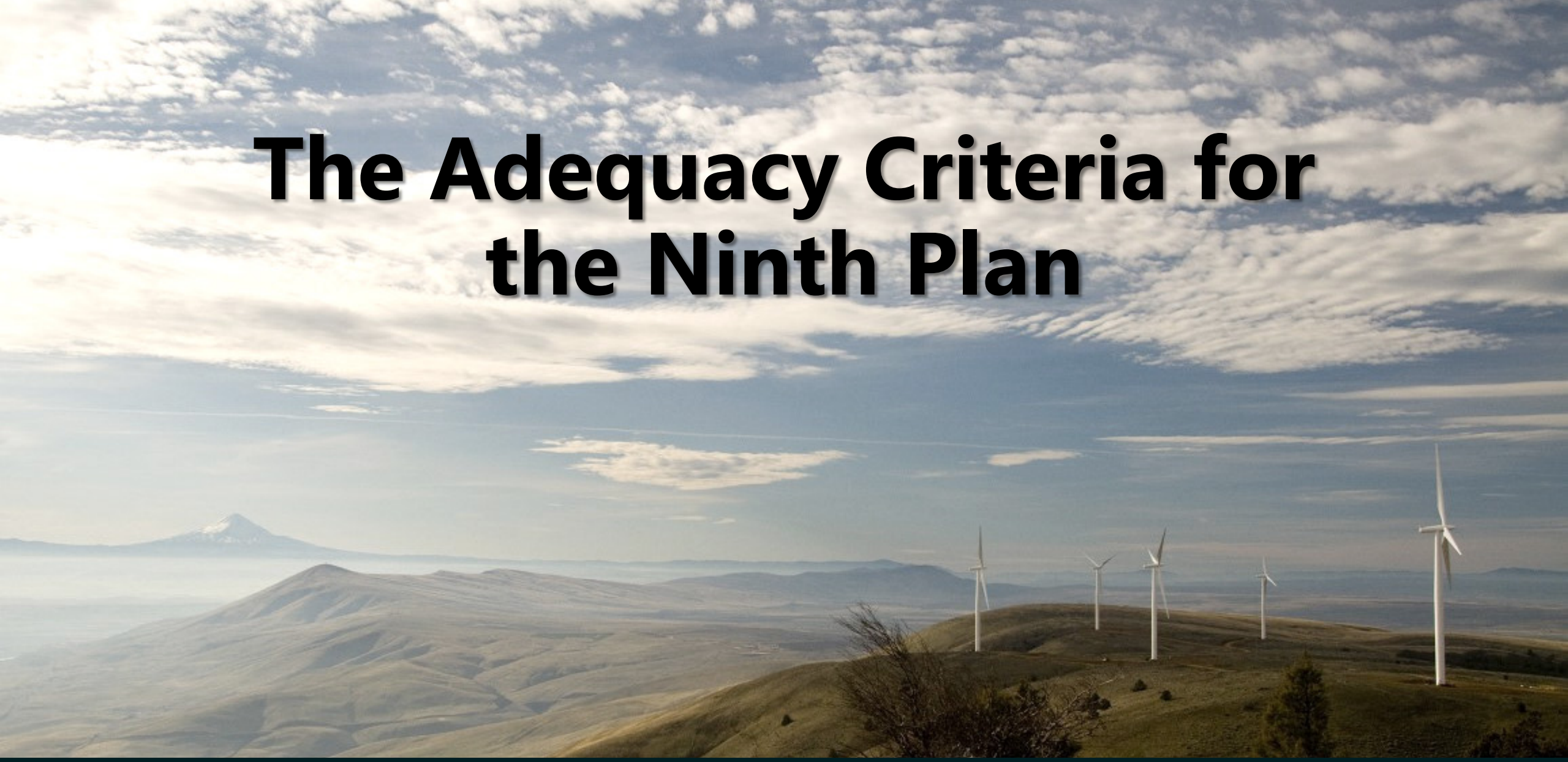


Recap of Jan 2024

For upcoming Power Plan

1. Revisit thresholds post 2029 adequacy assessment
2. Provide final metric and threshold recommendation for the next Power Plan

The Adequacy Criteria for the Ninth Plan



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Adequacy Criteria for 9th Power Plan

Protection against frequent deficits

Protection against extreme (tail-end) deficits

Frequency (LOLEV)

0.1 in summer
0.1 in winter
0.2 annual

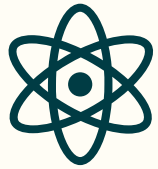
Limit to 1 in 10 years summer and winter events, Limit to 1 in 5 years overall

Duration

8-hour

Peak

1,200 MW



Energy

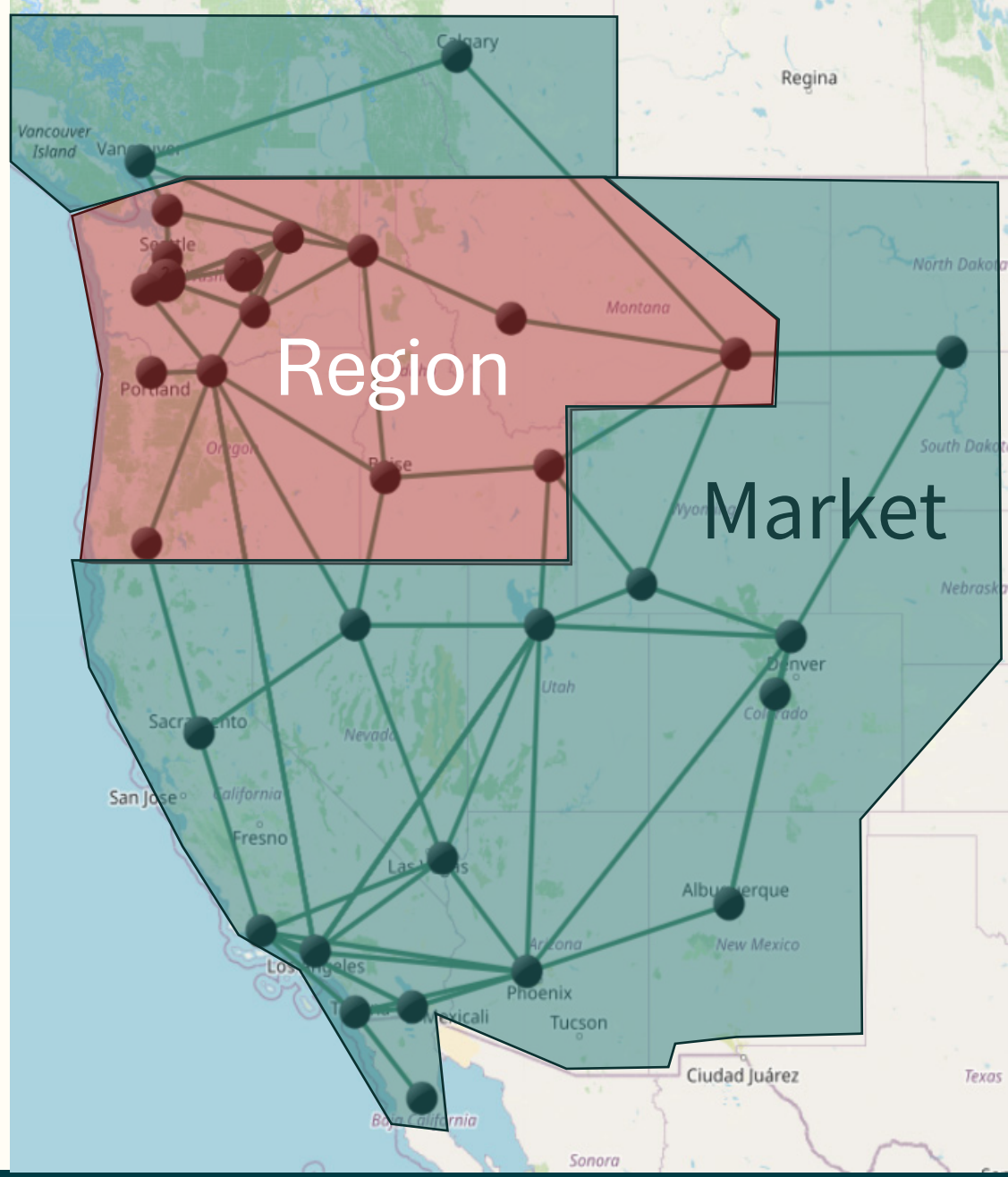
9,600 MWh

39 out of 40 years, protecting against events that are too big or too long

Role of Market Reliance

- Adequacy results are informed by market fundamentals (capability and price) per outside the region market resources
- Council uses a market (import) reliance limit in the winter (2,500 MW) and summer (1,250 MW) to limit market exposure risk
  - These limits are well below transmission transfer capability into the region
  - Historically used due to more limited information about supply and demand outside-the region
    - Average loads and generation instead of stochastic

Changing the Market Reliance Limit will influence the Adequacy Signal



RAAC Steering Feedback

- Broad support for multiple metrics, especially capturing duration and magnitude
  - Questions about temporal focus of 1-in-10 frequency, but 1-in-40 tail-end risk for duration and magnitude
    - Discussed approach and RAAC was generally satisfied
- For **frequency**, no challenges to include both **annual** and **seasonal** criteria
  - Protect against the **same risk level** from **WRAP perspective** of winter and summer
  - Protect against the risk of frequent **shortfalls in spring and fall**
- Role of market reliance was up for discussion
  - There are considerations for both increasing and maintaining the current market reliance limit
    - Reason for increasing: recent changes in import dynamics (region relying on imports more frequently)
    - Reason for maintaining/reducing: utilities opt for greater self-sufficiency/reduced reliance on the market

Given diverse RAAC perspectives on market reliance, alongside existing modeling assumptions, recommend maintaining market reliance limit

Questions?

Dor Hirsh Bar Gai
dhirshbargai@nwcouncil.org

Appendix

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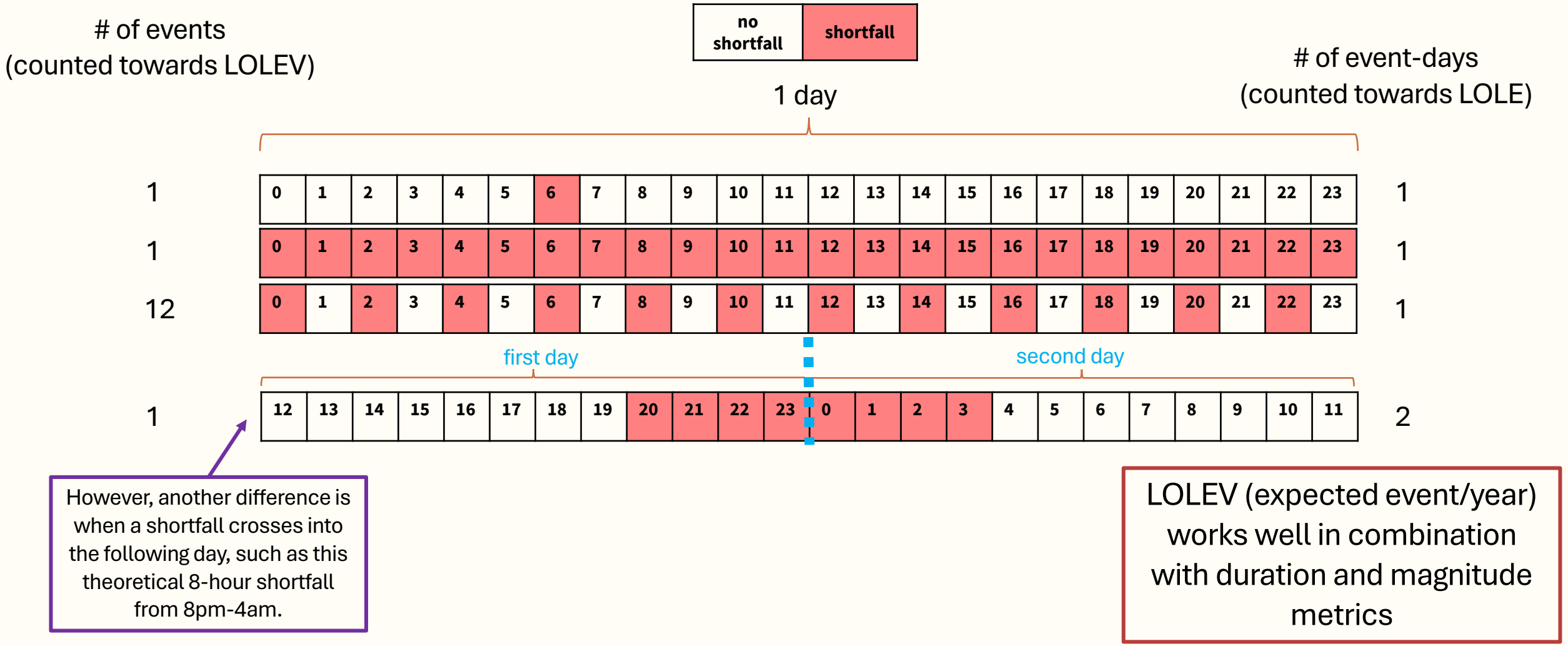
LOLEV vs LOLE

Recap of Jan 2024



However, another difference is when a shortfall crosses into the following day, such as this theoretical 8-hour shortfall from 8pm-4am.

LOLEV (expected event/year) works well in combination with duration and magnitude metrics

Metric Decision-Making Process

- **Ask about adequacy goals – what do we want to protect against?**
  - Excessively frequent use of emergency measures
  - Long duration shortfalls
  - Big capacity shortfalls
  - Big energy shortfalls

- **User-friendliness**
  - Easily calculated using adequacy models
  - Easily implemented into system expansion models