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

September 7, 2022

MEMORANDUM

TO: **Power Committee**

FROM: **John Fazio, Senior Power System Analyst**

SUBJECT: **Update on Adequacy Assessment and Relation to other Regional Efforts**

BACKGROUND:

Presenter: John Fazio

Summary: This presentation provides an update on the status of the current resource adequacy assessment scheduled for release later this year. The assessment will test the existing system with no new resources, as well as the 2021 Power Plan strategy across a variety of scenarios. In addition, a proposed method to improve ways in which adequacy is assessed will be presented. It introduces the concept of using multiple metrics to measure adequacy and ways to incorporate economic impacts.

Relevance: Resource adequacy is a critical component of the Council's mandate to develop a regional power plan that "ensures an adequate, efficient, economic and reliable power supply." The Council established a resource adequacy standard in 2011, which is used both as an early warning to gauge whether resource development is keeping up with demand growth and as a guide in developing the Council's resource acquisition strategy.

Background: Power customers expect a reliable and adequate supply that provides electricity at a reasonable cost. The challenge for electric utilities is to assess what level of adequacy its customers are willing to pay for. In general, the higher the level of adequacy, the higher the electricity rates. It is difficult to set a universal adequacy standard because different

customer classes are willing to pay different amounts for different levels of service. But no utility plans for a 100-percent adequate supply because the cost would be unacceptable. Traditionally, providers have planned for a level of adequacy that accommodates a general cross-section of customers. Those that require a higher level of adequacy (e.g., hospitals and data centers) acquire their own supplemental resources.

An adequate power supply meets the electric energy requirements of its customers within acceptable limits, considering a reasonable range of uncertainty in resource availability and in demand. Resource uncertainty includes forced outages, early retirements and variations in wind, solar and market supplies. Demand uncertainty includes variations due to temperature, economic conditions, and other factors. Resource availability and demand are also affected by environmental policies, such as those aimed at reducing greenhouse gas emissions. The Council uses a Monte-Carlo simulation model to assess the likelihood of a future year having one or more disruptions to service, when considering future uncertainties. This metric, referred to as the annual loss of load probability (LOLP), has been instrumental in the development of the Council's power plans since the early 2000s.

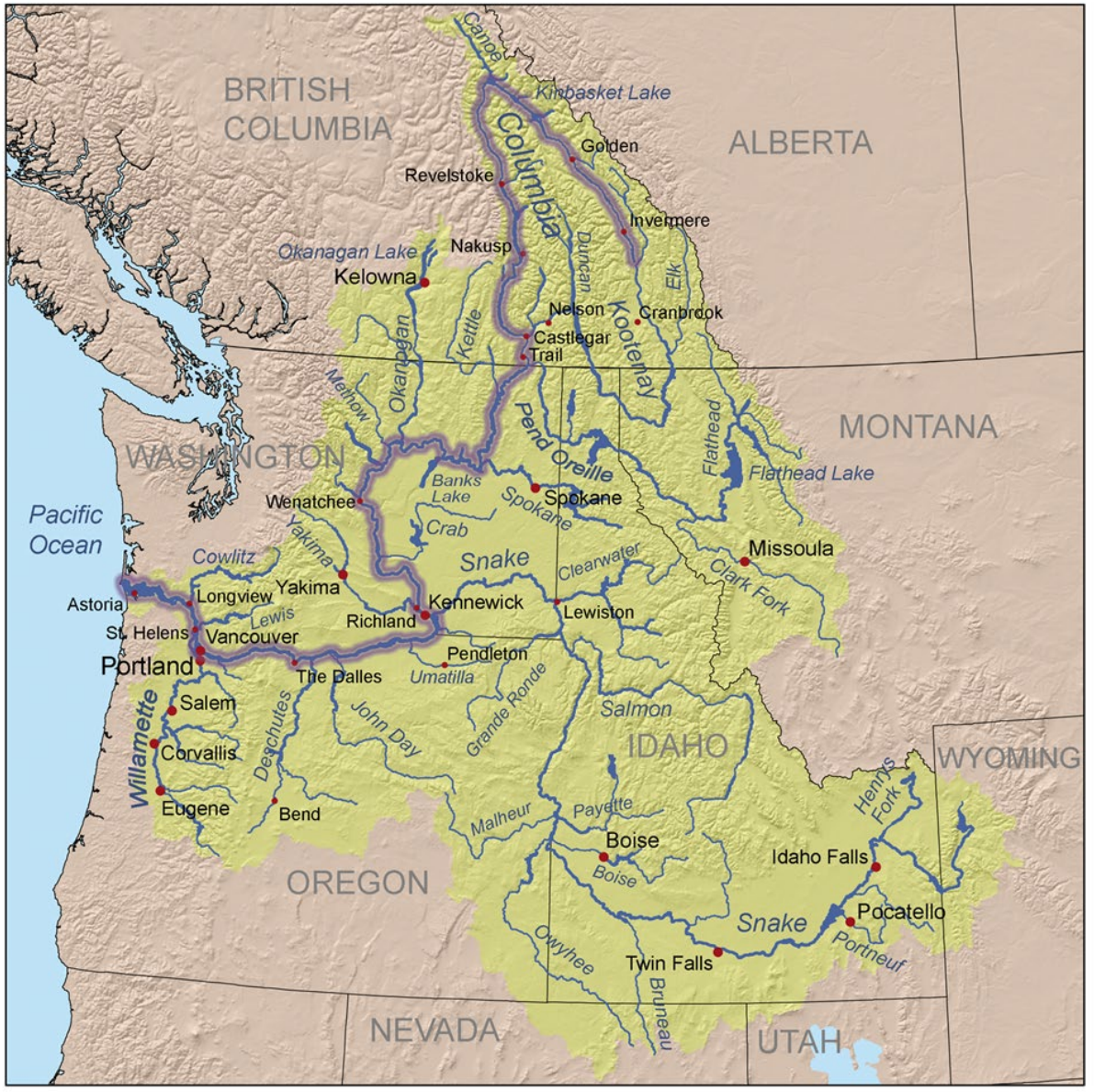
However, due to significant changes in the power industry (e.g., increasing development of renewable and distributed resources, adoption of clean-air laws and a more dynamic market environment), LOLP is no longer sufficient to accurately measure the risk to customers. Thus, staff (in conjunction with the Resource Adequacy Advisory Committee) has developed an enhanced adequacy standard for the Council to consider and test. The proposed standard selects adequacy metrics to:

- Protect against big shortfalls (very high capacity or energy loss)
- Protect against excessively high use of contingency measures – an indication of an inadequate (and non-cost-effective) supply
- Protect against spending too much for loss-of-load mitigation – limiting expected shortfall hours per year based on the cost of new resource vs. curtailment payments

Council's Upcoming Adequacy Assessment

and

Relationship to Efforts in the West



Council Meeting

September 14, 2022

John Fazio

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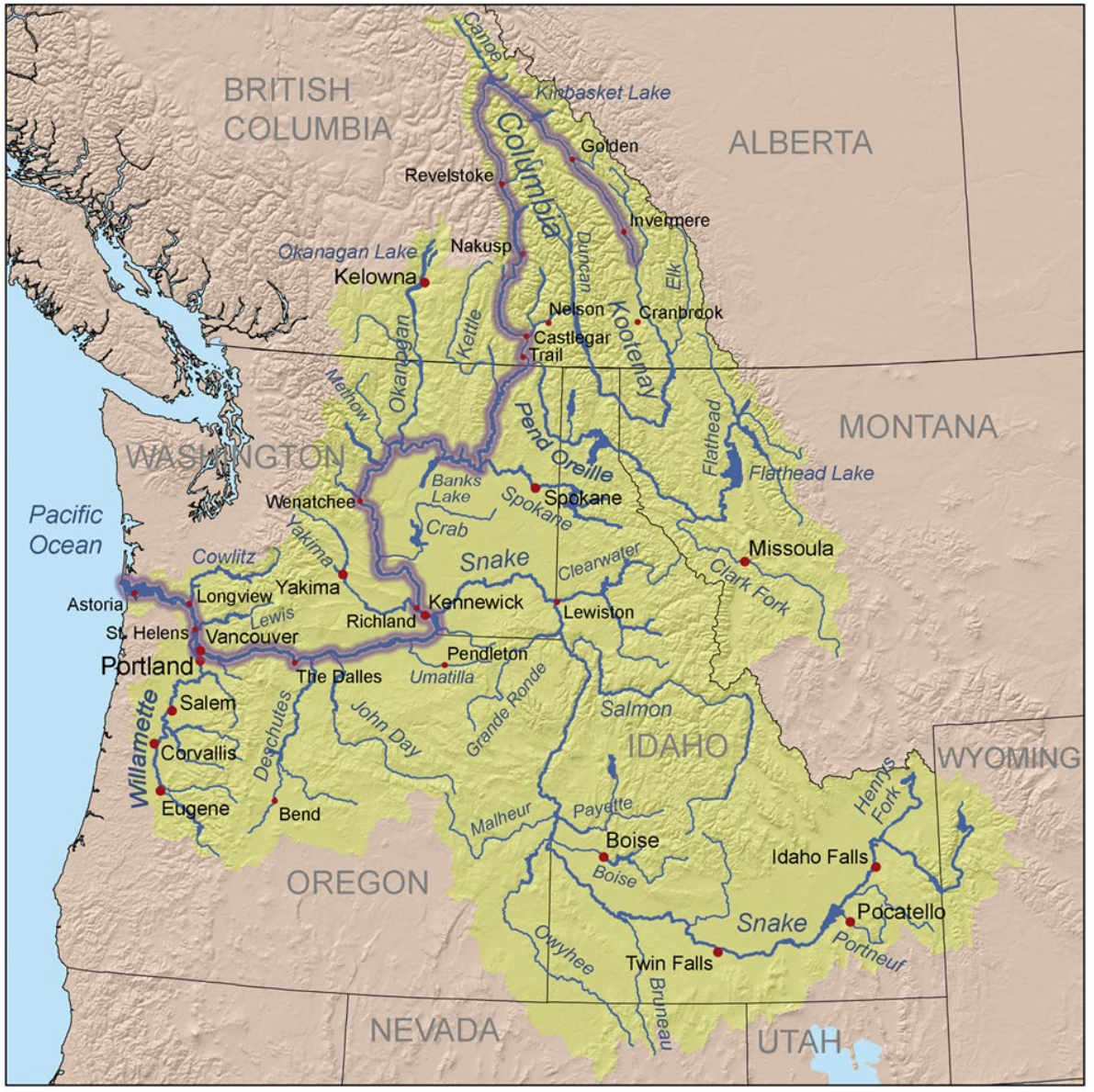

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Outline

- Purpose of the Council's Resource Adequacy Assessment
- Role of the Resource Adequacy Advisory Committee
- Next Resource Adequacy Assessment
- Power Plan and RA Assessment vis-à-vis the WRAP
- Timeline

Council's Resource Adequacy Assessment

In 2011 the Council formally adopted a resource adequacy standard for the regional power supply.

The purpose of the RA assessment is twofold:

1. To provide an early warning should resource development fail to keep pace with demand growth and

2. To ensure that the power plan's resource strategy will result in adequate future power supplies

What is an Adequacy Assessment?

A resource adequacy assessment is a measure of the ability of a power system to meet the electric energy requirements of its customers within acceptable limits, considering a reasonable range of uncertainty in resource availability and in demand.

- The Council's current adequacy standard sets a 5% limit for the annual loss of load probability (LOLP).
- The regional power supply is adequate if the likelihood of having one or more shortfalls in a year is less than or equal to 5%.
- *LOLP is not the probability of a blackout – it is more accurately defined as the likelihood of having to take non-modeled emergency actions to meet regional demand.*

Next Resource Adequacy Assessment

Targeted release date is December 2022

Twofold purpose:

- Assess the adequacy of the PNW power supply in 2027 under various load and resource scenarios
- Propose an enhanced resource adequacy standard for the Council to consider

Role of the RAAC

- Review resource, load and other relevant data
- Review methodology and policy assumptions
- Recommend scenarios for the assessment
- Discuss options to enhance the adequacy standard
- Provide feedback to the Council

Review Methodology and Assumptions

- *GENESYS Hydro Operation Review*
  - Reevaluating constraints and priorities for each dam
  - Cataloging modeling choices into a data repository
  - Validating modeling choices with operators and experts

- *Evaluate Market Risk*
  - Input renewable and hydro resources throughout WECC (to capture impacts of greater forecast error and fuel uncertainty)
  - Investigate risks around transmission availability (planned and unplanned outages and congestion)
  - Understand more about thermal unit commitment challenges across the WECC

Proposed Scenarios for RA Assessment

- *Reference cases*
  - 2027, no new EE, no planned resources, baseline WECC buildout
  - Add power plan minimum level planned resources for 2027 w/baseline
- *High demand* (increased electrification in the WECC)
- *Market Risk Cases*
  - Persistent Global Instability
  - Limited Markets (no planning reserve margins)
  - Baseline buildout but under stress (drought, gas issues, transmission)
  - No WECC buildout
- *Early coal plant retirement* in the PNW

Options for an Enhanced Standard

- *Event Based Metrics*
  Shortfall event: magnitude, duration and frequency of undesired event

- *Annualized Adequacy Metrics*
  Annual average: shortfall hours, unserved energy, events/year for all events

- *Tail-end Metrics*
  Worst case: 5th percentile worst year, average of the worst 5% of years

- *Economic Based Metric*
  Curtailment cost: relative to resource cost sets maximum shortfall hours/year

Proposed New Standard

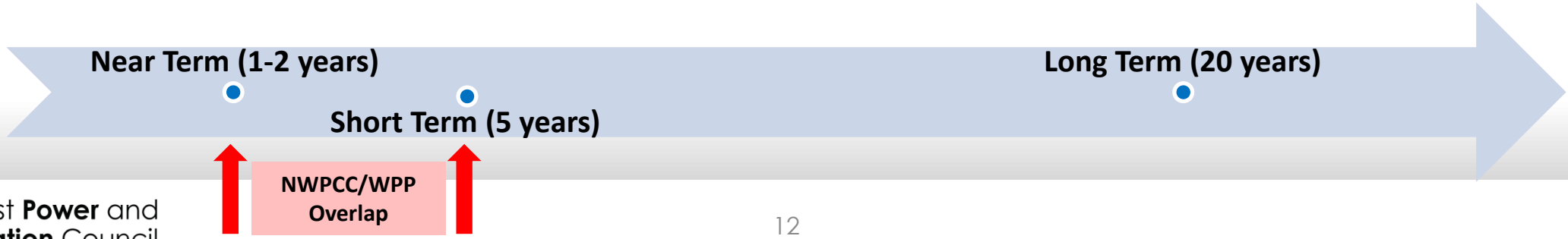
- A hybrid approach was used to select metrics from the options that:
  - *Protect against big shortfalls (very high capacity and/or energy loss)*
  - *Protect against excessively high use of contingency measures – an indication of an inadequate (and non-cost-effective) supply*
  - *Protect against spending too much for loss of load mitigation – limiting expected shortfall hours per year based on the cost of new resource vs. curtailment payments*
- Threshold limits for the adequacy metrics will be set after completion of the GENESYS operation review and will be evaluated by the RAAC
- The new standard should be considered provisional until sufficient testing is completed to ensure confidence in the results

Power Plan & RA Assessment vis-à-vis the WRAP

- *Power Plan and RA assessment*
  - *Long-term* (20-year) PNW resource plan to ensure an adequate future supply
  - *Short-term* (5-year) assessment and determination if planned resources are sufficient

- *WRAP*
  - *Short-term* (5-year) informative look at adequacy status
  - *Near-term* (20 month) binding period
  - *7 months* prior to winter and summer – forward showing of status
  - *90-day* period to cure resource deficiencies

WRAP does not replace long-term resource planning processes used by states, utilities, and the Council – WRAP identifies near-term gaps in resource needs, but long-term resource strategies determine how those gaps are filled



Power Plan and WRAP are Complementary

- *Near-term vs. Long-term*
  - Proper long-term planning ensures that the near-term supply is adequate.
  - But acquiring (building) new resources can take a significant amount of time.
  - Therefore, if the near-term aggregate power supply is not adequate, the WRAP may not be able to help utilities that are short.
  - However, the WPP believes the high cost of noncompliance will incentivize utilities to participate only if they are in a relatively secure position.
  - Unfortunately, this does not help utilities that are currently very short.

- *Operational Considerations*
  - By providing standardized and transparent resource and load data, potential operational limitations (e.g., unit commitment issues) can be avoided or at least minimized.
  - This is part of the power plan's cost-effective resource strategy.

- *Ensuring a Consistent Adequacy Standard*
  - The WRAP's resource adequacy standard must be consistent with resource adequacy standards used to develop long-term resource acquisition plans.
  - For example, issues can arise if the WRAP's planning reserve margin is higher than the planning reserve margins derived from utility, PUC or Council adequacy standards.

Timeline for the RA Assessment

Aug-Sept 2022

Staff reviews hydro operating constraints and market fundamentals, engages with system experts to refine GENESYS simulation.

Sept-Oct 2022

Advisory committees review preliminary RA assessment and discuss proposal to revise the Council's adequacy standard.

Nov 2022

Power committee reviews RA assessment and RAAC comments. Prepares recommendation for full Council. Considers proposal for revised adequacy standard metrics (not the limits).

Dec 2022

Council reviews power committee's recommendation and approves release of RA assessment. Considers proposal for revised adequacy standard metrics, with the intention of finalizing the revised standard in 2023.