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

February 9, 2022

MEMORANDUM

TO: **Council Members**

FROM: **Ben Kujala**

SUBJECT: **Scoping a workplan for a proposed Lower Snake River dam analysis -- assessing the power system contribution under future conditions and then analyzing possible future options for replacing the power generation and other power system services of the dams.**

BACKGROUND:

Presenter: Ben Kujala

Summary: Public comment on the draft 2021 Northwest Power Plan indicated a significant amount of interest in having the Council analyze power system options in the event that the federal government decides to pursue further study or consideration that would impact the power and hydro system without power generation at the Lower Snake River dams. **The Council is not a decision-maker regarding status of the Lower Snake River dams. That is a decision for Congress and the federal government, which is the owner and operator of those projects.** The Council is not endorsing or taking any position on the removal of the Lower Snake River dams.

In response to that public input and believing that the Council's analytical power system expertise can be of assistance to the decision makers, the Chair requested staff to draft a workplan for the Council's consideration that would outline the work required and a timeline for completing it.

Staff has scoped out a draft workplan exploring what it would take to analyze the regional power system excluding the Lower Snake River Dams and what resources or combination of resources could be added back to the regional power system to achieve a similar level of reliability as a regional power system that includes the dams. This workplan is not comprehensive of all the analysis that would be needed by a decision maker considering these resources. The analysis described does not focus on outcomes for fish and wildlife, the economic viability of the Lower Snake River Dams, irrigation, navigation, or any other non-power-related uses of these projects.

The workplan incorporates several ideas and approaches that staff believes would set apart a study by the Council from previous efforts:

- The Council redeveloped the GENESYS model, our resource adequacy model, for the 2021 Power Plan. No previous analysis of a power system excluding these projects has used this model which has greatly increased the fidelity in understanding the hydro system interaction with the rest of the regional power system and external markets.
- The 2021 Power Plan has a range of scenarios that look to future operations of the regional power system, which we can leverage (or utilize) in this analysis. These scenarios allow us to go beyond looking at the past and estimate the future demands and use of the Lower Snake River Dams. The scenarios explore policy driven trends like aggressive thermal resource retirement, high-penetration renewable grids, and explosive load growth from electrification of transport and other non-electric regional energy use.
- With project-level fidelity and an integrated electricity dispatch and waterflow model, we have the capability to model detailed expert estimates of how the system would operate with and without the services provided by the Lower Snake River Dams and the impact of not having these services available on the hydro system projects.

While staff has scoped out the workplan using our expertise and understanding of our models, there are elements of the workplan that could be refined given the ability to bring in external experts. Particularly items on impacts to power infrastructure, power operations, and direct or indirect impacts on the current hydro-system. Staff proposes taking any input from the Council on the workplan, then incorporating that input into a draft that would be taken to a broad group of regional experts for further refinement.

Staff would then bring back a revised workplan with consideration and discussion of the feedback to the March meeting. At that time, or at a future meeting, a decision to proceed on the workplan will be presented to the Council.

Discussion and Decision to Proceed with Scoping a Draft Workplan for a Proposed Lower Snake River Dams Power Analysis

February 16, 2022

Important Caveat

Understanding this is a sensitive subject, I want to make it extremely clear, the choice of words and manners of expression are solely mine. If there are errors in judgement, inelegant phrasing, or impolitic communication; the fault lies completely with me. This presentation was not reviewed by members of the Council or other Council staff. **It is only intended for discussion purposes.**

It does not imply a decision or commitment of the Council has been made to pursue analysis of the Lower Snake River dams or to even scope that analysis**. Every element discussed in this drafted workplan is open for further consideration by the Council** and having something included or excluded from this presentation does not imply any limitation on future Council work.

Ben Kujala

Purpose of this Presentation

- Give a staff assessment of what the scope of a Lower Snake River Dams (LSRDs) analysis would entail

Discuss the drafted scope including the:

- Objective of the analysis
- Limits on the scope drafted
- Phased approach
- Need for additional external input

OBJECTIVE AND SCOPE LIMITS

Proposed Objective of the Analysis

However, there may be value to the region following the power plan in having the Council analyze what would be the power system effects if the output of the dams were no longer available sometime in the future, including what replacement resources would be needed to achieve similar levels of reliability.

- Analyze the power system with and without the power-system-related output of the dams
  - Energy Produced
  - Flexibility / Capacity Provided
  - Various Reserves Provided
- Estimate Replacement Resources that would achieve a similar level of reliability when the power-system-related output of the dams is not available

Proposed Limits of the Scope

The scope is limited by:

- Not intended to determine the outcomes for fish and wildlife
- Not intended to ascertain the economic viability of the dams
- Not exploring other project / system purposes outside the regional power system
- Not analyzing different potential schedules or sequences of the dams' output becoming unavailable

STAFF-DRAFTED WORKPLAN PHASES

Proposed Phased Approach

Seven phases included in staff-drafted scope:

1. Estimate operation of the LSRDs under uncertain future conditions
2. Examine hydro-system impacts to remaining hydro projects in a power system excluding the LSRDs
3. Estimate incremental reliability needs of a system excluding the LSRDs
4. Identify different resources or combinations of resources to test as strategies for returning the power system to a similar level of reliability
5. Estimate the impacts or range of impacts on the region's total power system cost
6. Examine the reliability outcomes
7. Collect findings into a white paper

Estimate operation of the LSRDs under uncertain future conditions

- Estimate how the LSRDs operate under different future conditions/markets
  - Use select scenarios from the plan – Limited Markets, Early Coal Retirement, Partial Decarbonization, etc.
  - Identify key outputs – generation, spill, reserves, etc.

Examine hydro-system impacts to remaining hydro projects in a power system excluding the LSRDs

- Estimate impacts of a system without the LSRDs that could change operational restrictions and thus affect power generation at the remaining hydro projects, for example:
  - Do operations at the Lower Columbia dams change?
  - What about treaty operations?
  - Do operational changes work with climate-change-based flows?
  - And many more questions…

Estimate incremental reliability needs of a system excluding the LSRDs

- Describe incremental need identified in our model of a system excluding the LSRDs compared to a system with the LSRDs
- Consider changed hydro constraints from phase 2 for other projects under different markets/conditions

Identify different resources or combinations of resources to test as strategies for returning the power system to a similar level of reliability

- Scope out reasonable portfolios that could augment a system without the LSRDs output to return to a similar level of reliability
  - Work with stakeholders to identify different augmenting portfolios using traditional and emerging generation resources, demand side management options, storage, etc.
  - Explore implications of different strategies to cost and greenhouse gas emissions

Estimate the impacts or range of impacts on the region's total power system cost

Estimate impacts on system costs / operations including:

- Resource costs based on power plan data
- Potential transmission path rating changes
- Transmission reinforcement costs
- Reduction in power-based O&M needed to support the projects
- And many more power-system-specific cost and operational considerations…

Examine the reliability outcomes

- Run analysis with different market scenarios / conditions and different portfolios augmenting a system without the LSRDs output and report on resource adequacy outcomes

Collect findings into a white paper

- Create a consolidated report and capture other considerations
- Could follow previous Council white paper procedures – issue a draft for a comment period and finalize with consideration for comments received

FURTHER CONSIDERATIONS

How is the Scope Different from Previous Studies?

- Redeveloped GENESYS model has greatly increased the fidelity in understanding the hydro system interaction with the rest of the regional power system
- The 2021 Plan has a range of scenarios to leverage that explore policy-driven trends like aggressive thermal resource retirement, high-penetration renewable grids, and explosive load growth from electrification
- With project-level fidelity and an integrated electricity dispatch and waterflow model, we can model detailed expert estimates on how the system would operate with and without the services provided by the LSRDs

Estimated Timeline

Total estimated timeline 12 to 27 months

- Phase 1: 1 to 3 months
- Phase 2: 3 to 6 months
  - Some elements can be run concurrently with phase 1
- Phase 3: 1 to 3 months
- Phase 4: 1 to 3 months
- Phase 5: 3 to 6 months
- Phase 6: 3 to 6 months
- Phase 7: 1 to 3 months

External Expertise

While staff used our expertise to scope the problem, there are subjects where we could improve the understanding of the scope consulting with external experts, including:

- Power infrastructure
- Power operations
- Direct or indirect impact to the hydro system
- Etc.

Potential Next Steps

- Consult with external experts and advisory committees to get feedback on scope of work
- Bring fleshed out scope of work back for a decision on whether the Council will undertake the study

ADDITIONAL QUESTIONS AND GUIDANCE?