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

July 9, 2019

MEMORANDUM

TO: **Power Committee Members**

FROM: **Ben Kujala**

SUBJECT: **Discussion of Scenarios for the 2021 Power Plan**

BACKGROUND:

Presenter: Ben Kujala

Summary: This presentation will provide background on the current state of the region and a discussion of what has changed since the last plan. Additionally, we will walk through how a scenario for the power plan is defined, created, and then used as part of our analysis.

We will cover at a high level the staff's proposed set of scenarios to include in the 2021 Power Plan and the process we went through to develop these recommendations for Council consideration.

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

Discussion of Scenarios for the 2021 Power Plan

THE 2021 NORTHWEST POWER PLAN
FOR A SECURE & AFFORDABLE ENERGY FUTURE

Current & future landscape of the western electric grid

- Coal retirement
- Cheap renewables
- Legislative pressures against building natural gas generation
- Rising concern about adequacy
- Recent winter price spikes

What has changed in the region since the 7th Plan?

- Coal retirements:
  - Colstrip 1 & 2 retired by end of 2019
  - Valmy 1 retired by end of 2019
  - Discussion of retirement of Bridger 1 & 2 in Idaho Power and PacifiCorp draft IRPs
  - Oregon SB1547 no coal by wire 2030 provisions
  - Washington utility exit from coal by 2025 has an uncertain impact on Colstrip 3 & 4 in addition to uncertainty about fuel supply
- Clean Energy Targets & RPS:
  - California moved to 60% RPS and 100% clean
  - **California**, **Colorado**, Maine, **Nevada**, **New Mexico**, New York and **Washington** have all passed laws aimed at getting 100 percent of their electricity from carbon-free sources by midcentury[1]
  - Oregon increased RPS to 50%

1. Plumber, B. (2019, June 26). As Coal Fades in the U.S., Natural Gas Becomes the Climate Battleground. Retrieved from https://www.nytimes.com/2019/06/26/climate/natural-gas-renewables-fight.html.

THE 2021 NORTHWEST POWER PLAN

3

What has changed in the region since the 7th Plan?

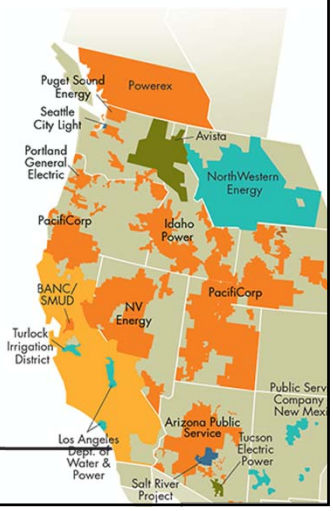
- Natural gas fired generation:
  - Enbridge pipeline + Jackson Prairie maintenance + Unusually cold March + DC scheduled maintenance lead to price spikes
  - Unlikely to expand in Washington
  - Corporate goals make it less likely to be pursued as a resource by Idaho Power and Avista
  - Portland General does not indicate in drafting IRP that natural gas generation is being pursued
  - California unlikely to expand natural gas fired generation after SB 100

THE 2021 NORTHWEST POWER PLAN

4

What has changed in the region since the 7th Plan?

- Bonneville contracts:
  - Concerns about Bonneville competitiveness have subsided a bit after market prices hit $1000 but still remains a topic of discussion
  - Capacity and flexibility from the hydro system likely to be critical to a future without many natural gas fired generation additions
- Markets:
  - Expansion of the EIM has been rapid
  - Bonneville exploring entry in 2022
- Better understanding of climate change on hydro generation



What are the high-level themes?

- GHG Emissions
- Resource Adequacy
- Market Expansion
- Bonneville Contracts and Competitiveness

Why do we develop scenarios?

- 4(e)(2) The plan shall set forth a general scheme for implementing conservation measures and developing resources
- "Certainty about the future does not come from the technical sophistication of the methods used to create a forecast. Instead, it comes from the flexibility and confidence one has in the number and types of resources available to meet any given condition. As times and conditions change, so must the region's plans." – First Power Plan (1983)

What is a scenario in the Council's Power Plan?

High-level questions help build a future landscape which we examine and compare to alternative outlooks to learn and create a narrative that informs the audience for the Power Plan

How do we create a scenario?

1. Ask what conditions and processes would change
2. Alter inputs and logic in the models and analyses to consistently implement those changes
3. Look at downstream processes and determine if those changes have material impacts
4. Compare the outcome to alternative outlooks

How do scenarios get used?

Scenarios provide the Council with analysis to inform decision-making when developing a final resource strategy for the region and Bonneville

Where we anticipate describing scenarios

Section 1: Executive Summary and Introduction

Section 2: Demand Forecast

Section 3: Forecast of Regional Reserve and Reliability Requirements

Section 4: Energy Conservation Program

Section 5: Resource Development Plan

- Resource strategy (generation and conservation)
- **Analysis of Alternative Resource Strategies**
- Input and Analysis:
  - Existing resources and retirements
  - Economic and Financial Assumptions
  - Electricity and Fuel Price Forecasts
  - Transportation forecast
  - End-use natural gas forecast
  - Conservation resources (supply curves)
  - New generating resources potential
  - New demand response resources potential

Section 6: Forecasts of Power Resources Required to meet BPA's Obligations

Section 7: Recommendation for Amount of Power BPA Should Acquire

Section 8: Analysis of Cost-Effective Methods for Providing Reserves

Section 9: Recommendations for Research and Development

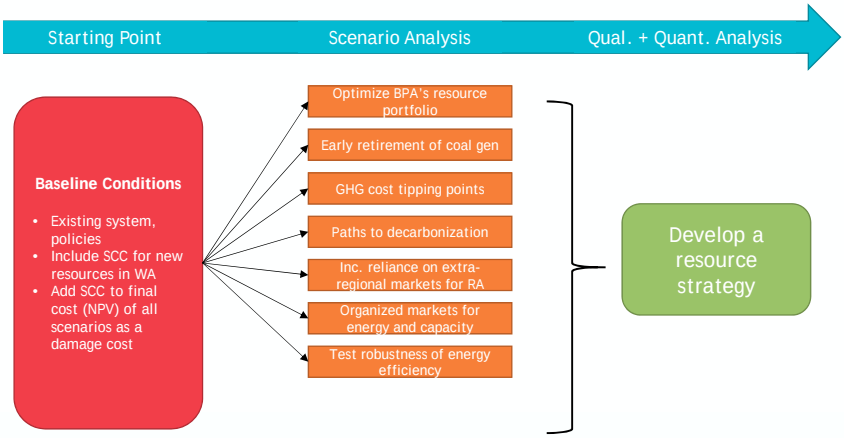
Section 10: Methodology for Determining Quantifiable Environmental Costs and Benefits for Cost Effectiveness

Section 11: Fish and Wildlife Program

THE 2021 NORTHWEST POWER PLAN

11

Building the 2021 Power Plan



THE 2021 NORTHWEST POWER PLAN

12

Staff Recommended Scenarios

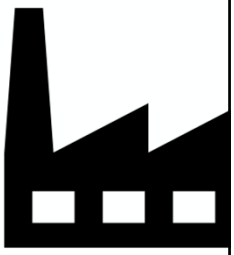
13

Optimize Bonneville's resource portfolio

- Study Bonneville competitiveness
- Examine changes in how Bonneville might acquire resources and sell power
- Look for strategies that benefit Bonneville and its customers

Early retirement of coal generation

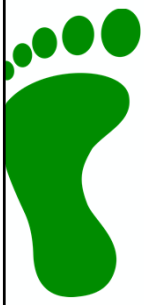
- Examine implications of early retirement of all regional coal plants – and to some extent the rest of the West
- Study resulting greenhouse gas emissions and reliability



Greenhouse gas cost tipping points

- Look at adding a regional price for greenhouse gas emissions in addition to existing policies
- Explore thresholds where the resource strategy changes based on responding to the carbon price

Paths to decarbonization



- Look at potential approaches to reducing greenhouse gas emissions both in the electric sector and in other economic sectors
- Quantify how emissions in the electric sector can be reduced and how that will net out with emissions in the other economic sectors like transportation and end-use of natural gas
- Explore the practical limits of how far emissions can be reduced, e.g. a percentage relative to 1990 emissions, and how quickly that reduction can be achieved

Increasing our reliance on extra-regional markets

- Test relying more on resources outside our region being available when the region has an adequacy need
- Examine the depth of the supply as well as the ability to deliver the power to the region

Organized markets for energy and capacity

- Look at the impact on the cost of new resources
- Estimate changes to adequacy and reserve requirements

19

Test robustness of energy efficiency

- Test increasing and decreasing the supply and uptake of energy efficiency
- Examine impacts on regional cost and risk

20

Primary connection to high-Level themes

GHG Emissions	Resource Adequacy	Market Expansion	Bonneville
Early retirement of coal generation	Increase reliance on extra-regional markets	Organized markets for capacity and energy	Optimize Bonneville's resource portfolio
Greenhouse gas cost tipping points	Early retirement of coal generation	Optimize Bonneville's resource portfolio	Test robustness of energy efficiency
Paths to decarbonization	Organized markets for energy and capacity		
Optimize Bonneville's resource portfolio	Test robustness of energy efficiency		
	Optimize Bonneville's resource portfolio		

How we created the recommendation

1. Brainstorm all staff created ideas in small groups
2. Combined similar ideas into 37 different potential scenarios
3. Staff voted with 6 yes and 2 no dots at offsite meeting
4. The following week, staff reviewed transcription of brainstorm and eliminated 13 scenarios
5. The remaining 24 scenarios were then ranked based on difficulty
6. Scenarios that were determined to be too difficult to complete were dropped and scenarios with substantial overlap were combined to get to 16
7. Each staff selected 5 scenarios in priority order from the 16 and 6 scenarios were clearly at the top, the 7th (Increasing our reliance on extra-regional markets for resource adequacy) was marginal but after discussion was included

Scenarios we do not recommend

We have provided a document to describe:

- When were they eliminated or combined
- Final scenarios overlap, if applicable
- Summary of the discussion on reasoning to exclude

Baseline condition for greenhouse gas emissions

Staff determined scenarios based on the following treatment of greenhouse gas emissions:

- Baseline captures existing policy, no explicit carbon price elsewhere
  - Existing RPS
  - WA Clean Energy
  - CARB forecast for CA
- Damage cost or social cost of carbon is added to system cost based on emissions – carbon tax is backed out. This creates equal comparison of scenario costs.

Example: retire coal early scenario

- Analysis is performed with baseline conditions giving best information of coal retirement dates both in the region and external to the region
- Look for IRP or policy reasons to move the retirement date up – makes an informed early retirement assumption where possible
- Select a date which the remaining plants retire