

March 21, 2022

Never in the 40-year history of the Northwest Power and Conservation Council have we seen such dramatic changes in the future power supply than what the draft 2021 Power Plan outlines.¹

Pacific Northwest Power Supply and The Lower Snake River Dams²

In accordance with the 1980 Pacific Northwest Electric. Power Planning and Conservation Act, the Northwest Power and Conservation Council (Council) forecasts the power needs of the Pacific Northwest and identifies the means by which that load demand can most economically be met. Toward this end the Council prepares a twenty-year plan, which it updates every five years.

The 7th Northwest Power Plan: Business as Usual.

In its 7th Northwest Power Plan, (2015-2035) the Council identified three sources of least-cost energy for the Pacific Northwest: energy efficiency, demand response and power generation from natural gas.

1. *Energy efficiency* refers to electricity savings through more efficient appliances, light bulbs, furnaces, etc. Over the years, many power providers have incentivized the installation of such equipment in homes and factories. The 7th Northwest Power Plan (7th NPP) states that in more than 90 percent of future conditions “cost-effective efficiency met all electricity load growth through 2030, and in more than half of the futures, all load growth for the next 20 years.”³ The 7th NPP calls for efficiency-based power savings of 4,000 average MegaWatts (aMW) by 2030. Combined with past efficiency gains, the 7th NPP notes that “...the energy efficiency resource could approach the size of the region’s hydroelectric system’s firm energy output.”⁴
2. *Demand Response* refers to electricity users voluntarily and temporarily reducing their use of power during times of system stress. The 7th NPP identified up to 4,300 aMW of power savings that could be gained over the next ten years with the implementation of a demand response strategy. According to the Council,

¹ This statement appeared in the Draft 2021 Northwest Power Plan but went missing in the final plan. Draft 2021 Northwest Power Plan, Summary, page 1 <https://www.nwcouncil.org/sites/default/files/2021-6.pdf>

² This review examines the potential replacement of the lower Snake River dams as sources of energy based largely on information provided by the Northwest Power and Conservation Council and the Bonneville Power Administration.

³ 7th Northwest Power Plan, Chapter 1 Executive Summary, p. 1

⁴ See footnote 3, 7th Northwest Power Plan, Executive Summary, p. 1

1,500 of those Megawatts could be acquired at low cost.⁵ As with increased efficiency, demand response would also contribute significantly to expanded peaking capacity during times of greatest demand.

3. *Natural Gas* was the third best source of additional power identified in the 7th NPP. Natural gas generation makes its greatest contribution as a resource that can be brought on line quickly to help meet peak demands.

The 7th NPP predicts modest growth on the demand side and accounts for the loss of power from several coal plant closures scheduled during the first ten years of the Plan. The Council forecasts that by 2035 the price of wholesale electricity will be somewhere in a range from \$25 to \$68 per Megawatt hour (MWh), depending largely on the price of natural gas.⁶

2021 Northwest Power Plan: Significant Changes in the Power Supply⁷

In the fall of 2021, the Council circulated for public comment a draft 5-year update to its 7th NPP, dubbed the *Draft 2021 Northwest Power Plan* (draft 2021 NPP). In a prior press release, a Council spokesperson wrote “Modeling for the next Northwest Power Plan indicates *revolutionary* changes in the future power supply.”⁸ [emphasis added] In the final 2021 NPP those revolutionary changes are described as “a time when the region is undergoing significant changes and uncertain futures.”⁹

Among those significant changes are the following:

1. Wind and solar are now the least expensive sources of energy, cheaper even than energy efficiency. States the Council, “Solar and wind power have become so inexpensive that they are beating practically every other type of power in the wholesale market, making many inefficient thermal plants uneconomical to operate.”¹⁰

⁵ 7th NPP, Chapter 1, page 1-10

⁶ 7th NPP, Chapter 1, page 1-5

⁷ The adopted 2021 Northwest Power Plan at times blurs the specificity included in the draft 2021 NPP, perhaps in response to parties during the review process that found such specificity objectionable. This review includes information from the draft plan when such can help readers gain a greater understanding of the Council’s intent. Any information gleaned from the draft 2021 NPP will be so noted in the footnotes.

⁸ Harrison, John <https://www.nwcouncil.org/news/energy-experts-efficiency-remains-critical-electricity-resource-northwest>

⁹ 2021 Northwest Power Plan, p. 4

¹⁰ Draft 2021 NPP Summary, p. 3 <https://www.nwcouncil.org/sites/default/files/2021-6.pdf> p.3

2. Coal-fired generation is disappearing as a Pacific Northwest power source. The Council reports that between 2018-2028, coal-fired power nameplate capacity¹¹ serving the PNW will decline from 7,000 aMW to around 2,400 aMW.¹² Two major reasons account for coal plant closures— new local, state and national government emission standards, and the fact that coal is no longer cost-competitive with other sources of energy.
3. In the draft 2021 NPP the Council predicted mid-Columbia-C prices for power in 2021 will range from \$18 to \$30 per Megawatt hour (MWh). By 2026, the Council's projected range is \$12 to \$17 per MWh, and by 2041 around \$10 per MWh. The 2021 NPP notes that "Ongoing construction of inexpensive renewable resources is influencing the wholesale electricity market, with low prices, particularly in the middle of the day when solar PV is producing at its peak. In light of the construction of renewable resources anticipated in the plan, these low prices are likely to become increasingly negative¹³ through time..."¹⁴
4. Over the past decade the cost of utility-scale lithium-ion batteries has declined by up to 87%.¹⁵ Additional forms of long-duration power storage are entering the marketplace, such as underground compressed air, pumped hydroelectric storage, hydrogen energy storage, and pumped thermal electricity storage.
5. The region will experience an increased need to curtail power production during various times of the year and parts of the day. According to the Council in the 2021 NPP, "We project there will be times that market conditions will result in substantial generation curtailment of both these new renewable resources [wind and solar] and the existing renewable resources in the region."¹⁶

The Pacific Northwest's Power Supply and the Lower Snake River Dams

The 1980 Power Act requires the Council to ensure the Pacific Northwest will have a power supply that is adequate, efficient, *economical* and reliable.¹⁷ [emphasis added] The requirement that the energy supply be economical has resulted in the Council recommending a significantly different mix of power resources in its 2021 NPP.

¹¹ For a description of the difference between nameplate capacity and actual capability, see footnote 41 in the draft NPP section 6, page 44

¹² 2021 NPP, Section 6, p. 64

¹³ The term "negative pricing" refers to conditions when the power supply is too large for the demand, even if prices are \$zero. Under those conditions, power producers sometimes must pay customers to take power off the grid.

¹⁴ 2021 Northwest Power Plan. Section 6, page 43

¹⁵ Bloomberg NEF, <https://twitter.com/bloombergnef/status/1201788202274709505>

¹⁶ 2021 Northwest Power Plan, Section 6, page 43

¹⁷ 2021 NPP, Section 1 page 1; see also footnote 73, page 87 in the 2021 NPP

1. As noted above, the 7th NPP identified potential energy efficiency savings of 4,000 aMW by 2030. In the 2021 NPP, the Council reduced this amount to between 750 aMW and 1,000 aMW by the end of 2027. The remaining 3,000 aMW of energy efficiency got sidelined because this source is no longer cost competitive with wind and solar.¹⁸ **Those 3,000 aMW, still potentially available, are equivalent to the average annual output of 12.6 lower Snake River dams.**
2. In the 7th NPP, the Council called for between 1,500 aMW and 4,300 aMW of energy savings resulting from the implementation of demand response over the next ten years, and that 1,500 of those aMW could be acquired at low cost. In the 2021 NPP the Council recommends capturing only 720 aMW of energy savings through demand response, less than one-half the potential “low-cost” demand response savings previously identified. Once again, those remaining demand-response power savings are still potentially available, but no longer at a price competitive with wind and solar generation. **The additional 3,580 aMW of potential demand response savings are equivalent to the average annual power output of 15 lower Snake River dams.**
3. In preparing its power plan, the Council relied on information provided by power suppliers located within, or that serve, the Pacific Northwest. The largest of those sources, Bonneville Power Administration, includes two major assumptions in its projected power supply that consistently lead to an understatement of the region’s actual available power. Here is the first:

*Under critical water conditions, the PNW region is projected to have annual energy surpluses as large as 2,974 aMW in OY [operating year] 2021, slowly decreasing to 698 aMW by OY 2030.*¹⁹

BPA assumes the hydropower it will market each year from its 31 dams in the Columbia Basin will be the amount that would be generated by water levels in operating year (OY) 1936-1937 (“critical water conditions”), the lowest river flows dating back over 80 years. States BPA, “Under average water conditions, the PNW region would see even larger energy surpluses over the study horizon.”²⁰ How much larger? An estimated 3,585 aMW in 2022— **the average annual**

¹⁸ This review uses the average power produced by the four lower Snake River dams over the past 18 years (951 aMW) as a reasonable estimate of future production. Each individual dam is assigned one-fourth of this output, or 238 aMW. In the 2019 Pacific Northwest Loads and Resources study (aka the 2019 White Book) BPA uses an average output of 933 aMW for the four lower Snake River dams combined.

¹⁹ Bonneville Power Administration, 2019 Pacific Northwest Loads and Resources Study, introductory statement

²⁰ See #19 above

equivalent output of 14 lower Snake River dams. A high water year would add an estimated 6,690 aMW more power than that from a critical water year.²¹

4. BPA appears to take a similar approach with wind energy.

*The Federal system [BPA] and PNW regional capacity analyses assume zero capacity contribution from wind resources.*²²

Wind energy has undergone dramatic growth in the PNW over the past decade. For example, in 2005 wind energy contributed just 114 aMW to the Pacific Northwest power supply; in 2011, 1,668 aMW. In 2020, 3,129 aMW.²³ Even if one assumes future wind energy would be only 50% of the level of production in 2020, **that output would be equivalent to the power produced by 6.6 lower Snake River dams.**

5. Here's one final look at the projected PNW power supply. As noted above, under critical water conditions and absent any wind power, BPA projects a PNW power surplus of 2,974 aMW in 2021. This is the equivalent output of **12.5 lower SR dams.** By 2026, advises BPA, this surplus will have declined to around 1,150 aMW, still the equivalent of **4.8 lower Snake River dams.** These surpluses are projected in spite of the significant generation losses resulting from the closure of a majority of the coal plants that serve the region.

The 2021 Power Plan thus identifies possible sources of energy equivalent to the average annual output of **53 to 60 lower Snake River dams.** If only 10 percent of these potential resources were tapped, the power saved and/or produced would be enough to replace the average power output of all four LSR dams.

Final Remarks

The Northwest Power and Conservation Council asserts that “significant changes and uncertain futures” are underway across the West, changes that will result in abundant power, lower greenhouse gas emissions, and cheaper wholesale power prices. According to the Council's analysis, these changes will include vastly expanded wind and solar energy. Most or all thermal generation will become economically non-competitive. Long-term energy storage will be an increasingly important part of the energy mix, and Pacific Northwest energy will be sourced from a wider geographic network of suppliers.

²¹ 2019 White Book p. 30

²² Bonneville Power Administration, 2019 Pacific Northwest Loads and Resources Study, p. 6

²³ See <https://www.nwcouncil.org/energy/energy-topics/power-supply/> Historical Energy Production

This review does not address the 120-Hour Capacity surplus/deficit issue, that is, the ability of PNW power resources to handle an unusual winter cold snap or August heat wave. At issue is whether a major energy source such as BPA should maintain its own capability to meet high load demand under any and all circumstances, or whether it plans to purchase energy from outside the region. In the draft 2021 Power Plan the Council makes clear its recommendation to BPA:

In the draft 2021 NPP the Council acknowledged “infrequent circumstances” where BPA demand could exceed available supply. Over the next ten years the draft plan projected this shortage will be under 7 aMW, and for the following decade under 28 aMW. We recommend that Bonneville, when it has needs beyond the recommended energy efficiency and demand response resources, look to mid-term and long-term market resources for additional energy.²⁴

The 2021 NPP identifies power savings and new generation sources that could replace the average annual power production of an estimated 53 to 60 lower Snake River dams. Unless the Power Council’s assessment of the Pacific Northwest’s future power supply is completely wrong, finding alternative sources for around 950 aMW—typically produced each year by the four lower Snake River dams—should not be difficult. That amount of energy savings and/or generation could be acquired at low cost from fewer than 10 percent of the potential energy sources identified by the Council.

A quote sometimes attributed to Winston Churchill sums up the present situation with respect to dams and fish on the lower Snake River: “You can always trust Americans to do the right thing, after they have tried everything else.”

We have tried everything else. It’s time to do the right thing.

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²⁴ 2021 Northwest Power Plan, Chapter 8, page 92