

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

LC 77

In the Matter of

PACIFICORP dba PACIFIC POWER,

2021 Integrated Resource Plan.

Renewable Northwest's
Comments on Staff Report

March 11, 2022

I. INTRODUCTION

Renewable Northwest is grateful to the Oregon Public Utility Commission (“the Commission” or “PUC”) for the opportunity to comment on the February 11, 2022 Staff Report (“Staff Report”) regarding PacifiCorp’s 2021 Integrated Resource Plan (“IRP”). Overall, Renewable Northwest appreciates Staff’s thorough analysis of the IRP, centering Oregon’s climate and clean energy policy and addressing emerging resources that may be increasingly important to a decarbonizing grid. We identify many of Staff’s Recommendations that we specifically support, offering brief additional thoughts on some topics. We then offer more detailed comments on PacifiCorp’s proposal to convert Jim Bridger units 1 and 2 from coal to gas and its plan to pursue the Natrium demonstration project, ultimately recommending that neither be acknowledged at this time. In each case, the company’s modeling shows that its preferred resources could be replaced by less risky renewable and storage resources, likely at a similar cost. Despite recommending against acknowledgment of these items, overall we continue to appreciate PacifiCorp’s efforts to transition their system from one heavily dependent on greenhouse gas-intensive thermal units to one dominated by clean, non-emitting generation and capacity resources. We look forward to continued engagement with the company, the Commission, and other stakeholders regarding the company’s resource planning efforts.

II. COMMENTS

1. Renewable Northwest generally supports the Staff Report and Staff’s Recommendations regarding PacifiCorp’s IRP.

The Staff Report provides an excellent overview of PacifiCorp’s IRP and how it fits into a dynamic policy and regulatory environment. While we do not agree with every conclusion Staff

reaches in the Report, overall we applaud Staff’s thoughtfulness and thoroughness. In this section of our comments, we highlight several elements of the Report and a number of Staff’s Recommendations that square with our own analysis and that we join Staff in recommending to the Commission. Our failure to include some of Staff’s Recommendations in this section of our comments does not necessarily indicate disagreement with those Recommendations.

First, we once again applaud Staff for leading with the IRP’s greenhouse gas (“GHG”) and clean energy implications from the outset of the Report. In our comments to the Commission regarding utility resource plans, we have previously centered reports and work by the Intergovernmental Panel on Climate Change’s (“IPCC”). The IPCC’s recent AR6 report on Impacts, Adaptation, and Vulnerability continues to provide a key foundation for the importance of centering climate change in the Commission’s assessment of the risks associated with utility resource plans. After walking through the extensive impacts of climate change that are already occurring and are likely to worsen, the AR6 report’s Summary for Policymakers concludes with “very high confidence” that “[a]ny further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.”¹ Following HB 2021’s mandate to the Commission to “ensure that an electric company ... is taking actions as soon as practicable that facilitate rapid reduction of greenhouse gas emissions at reasonable costs to retail electricity consumers,” state electricity policy is now well aligned with climate science.² Staff’s analysis appropriately reflects the Legislature’s direction to the Commission and the scientific consensus that urgent action is needed to reduce GHG emissions and address climate change. Relatedly, we also appreciate Staff’s support for including climate change impacts in the company’s baseline portfolio modeling.

Second, we appreciate Staff’s forward thinking regarding coal unit retirement and additional assessment of emerging clean resources with the potential to offer significant capacity contributions. We support Staff’s efforts to develop greater granularity and transparency into PacifiCorp’s analysis of economically-driven accelerated coal-unit retirement. We similarly support Staff’s recommendations regarding additional analysis of offshore wind, which has a resource profile that is complementary to other economic resources in the region³ and has significant potential as an energy generation resource in a deeply decarbonized future.⁴ We

¹ IPCC, Climate Change 2022 Impacts, Adaptation and Vulnerability - Summary for Policymakers at SPM-35 (Feb. 2022), available at https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_SummaryForPolicymakers.pdf.

² Oregon HB 2021 (2021) at Section 4(6).

³ Travis Douville et al, Pacific Northwest National Laboratory, “Exploring the Grid Value Potential of Offshore Wind Energy in Oregon” at 1 (May 2020), available at https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-29935.pdf.

⁴ See generally Evolved Energy Research, “Oregon Clean Energy Pathways Final Report” (June 15, 2021), available at https://renewablenw.org/sites/default/files/Reports-Fact%20Sheets/OR_CEP_Final%20Report%20.pdf.

similarly support Staff’s recommendations to consider hydrogen resources in the future, with the caveat that the Commission and all stakeholders will need to carefully understand the full GHG ramifications of hydrogen as a fuel. California and Washington have recently adopted definitions of green hydrogen that do not account for the source of electricity used to power hydrogen electrolyzers.⁵ As the company and stakeholders explore hydrogen’s potential in a decarbonized economy, it will be important to understand how electrolyzer load affects system load and emissions, to carefully consider whether co-fired hydrogen and methane gas results in uneconomically extending the life of emitting thermal resources, and to ensure that hydrogen as a fuel for electricity generation does not result in uncounted GHG emissions.

Third, we support Staff’s analysis of the Natrium demonstration project. We offer additional detailed comments on this item below in section 3.

Fourth, we share Staff’s view that storage costs were inflated in the IRP and support Staff’s recommendation that the company’s next Supply Side Table should better reflect the National Renewable Energy Laboratory’s (“NREL”) most recent Annual Technology Baseline (“ATB”) report. This conclusion leads, however, to one point of divergence from the Staff Report: we are concerned that inflated clean resource costs may be a factor in the relative economics of the company’s portfolio modeling with and without coal-to-gas conversion of Jim Bridger units 1 and 2. We discuss this issue further in section 2 of our comments below.

Fifth, we similarly support Staff’s process- and transparency-oriented recommendations, including in particular Staff’s recommendation that the company provide a map of preferred portfolio resources by year and location (and perhaps a similar map for alternative high-performing portfolios). The preferred portfolio map from the 2019 IRP was a uniquely helpful visual complement to the detailed preferred portfolio resource table included in the IRP.

In light of all of the above, we specifically support the following Recommendations from the Staff Report:

⁵ California SB 1369 (2018), *available at* https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB1369;
Washington SB 5910 (2022), *available at* <https://lawfilesex.leg.wa.gov/biennium/2021-22/Pdf/Bills/Senate%20Passed%20Legislature/5910-S.PL.pdf#page=1>

- Recommendation 1: metrics regarding individual coal unit value to PacifiCorp’s system
- Recommendation 2: transparency into relative value of individual coal units
- Recommendation 3: clear breakdown of coal unit cost data
- Recommendation 8: endogenous consideration of Jim Bridger 3 and 4 retirement
- Recommendation 11: sensitivity with 2023 end to Huntington minimum take agreement
- Recommendation 12: acknowledge portfolio consistent with no-Natrium scenario
- Recommendation 13: workshop before 2022 RFP Final Shortlist re: additional supply
- Recommendation 14: pursue Natrium only if indicated by competitive process
- Recommendation 15: analysis re: modeling flexible hydrogen load
- Recommendation 16: stakeholder workshop re: flexible hydrogen load
- Recommendation 17: stakeholder feedback re: offshore wind (“OSW”)
- Recommendation 18: OSW sensitivity as part of 2022 RFP analysis
- Recommendation 19: analysis of upgrades necessary to interconnect OSW
- Recommendation 23: complete and accurate information re: IRP modeling assumptions
- Recommendation 24: update storage costs to align with ATB and RFP Final Shortlist
- Recommendation 25: provide preferred portfolio summary map
- Recommendation 26: provide 12x24 loss of load probability map to RFP bidders
- Recommendation 27: stronger explanation of reliability methodology
- Recommendation 28: provide more granularity into modeled reliability events
- Recommendation 29: re-run modeling with updated cost inputs for pumped hydro storage
- Recommendation 30: compare constraints of different pumped hydro storage projects
- Recommendation 31: detail benefits of pumped hydro storage in decarbonized system
- Recommendation 34: explain how IRP and WRAP planning reserve margins relate
- Recommendation 40: stronger assessment of climate impacts and risks

2. PacifiCorp’s scenario analysis regarding Jim Bridger Coal to Gas conversion is based on inflated capital cost assumptions for renewable and storage resources and overlooks long-term risks associated with gas supply.

Renewable Northwest recommends that the Commission not acknowledge Action Item 1C of PacifiCorp’s IRP Action Plan relating to conversion of Jim Bridger Units 1 & 2 from coal to gas.

In our initial comments, we recommended that PacifiCorp study the long-term costs and benefits of a more aggressive clean energy procurement compared to coal to gas conversion more carefully. In this section of our comments we will further address concerns regarding the capital cost and fuel assumptions that underlie PacifiCorp’s preference to convert Bridger 1 & 2 to gas, including both optimistic assumptions regarding gas availability and inflated cost assumptions regarding capital expenses for competing renewable and storage resources.

While PacifiCorp’s 2021 Roadmap and Preferred Portfolio portray that coal to gas conversion of Jim Bridger Units 1 & 2 is cost-effective in the near-term, that may not be the case in the long run. PacifiCorp estimates the capital cost to undertake the coal to gas conversion at around \$24/kW excluding the variable cost of the fuel to generate electricity. Additionally, PacifiCorp also failed to account for the inherent risks in relying on gas-fired power plants during hours of need since the Company mentions that these units would be run as “peakers” *i.e.* they would deliver electricity only during times when the demand is high. The Preferred Portfolio shows that these converted units would then be retired 10 years post-conversion, *i.e.* in 2034 making these resources a short-term fix instead of pursuing a long-term solution to procure additional MWs of renewable energy and energy storage to meet their capacity needs.

Renewable Northwest is concerned that PacifiCorp’s proposal to convert the Bridger units to gas will delay the procurement of cost-effective clean, non-emitting capacity resources that can completely replace Jim Bridger Units 1 & 2, potentially foregoing the tax incentives available currently.⁶ On this issue, Staff in their Report mention that:

Staff continues to support the coal-to-gas peaker conversion for Jim Bridger 1 and 2. As described later in this section, Staff has found that the GHG savings that would likely result from retiring Bridger 1 and 2 instead of converting them to gas would be relatively expensive and that other, more cost-effective approaches to GHG reduction should be preferred.

⁶ Mentioned on Pg 61, 2021 IRP.

While there are definitely synergies in terms of emission reductions when a coal power plant is converted to gas, there are also other risks associated with the conversion that are not covered in the \$24/kW conversion cost number. As staff correctly mentions, switching fuels could result in a notable drop in plant heat rate and loss of efficiency. For example, when switching from bituminous coal to gas, plant operators could see an approximately four percent degradation in efficiency due to the high moisture content of gas. Coal to gas conversion is also predicated on a firm natural gas supply and distribution infrastructure that is unclear right now at the Jim Bridger Power Plant. Additionally, natural gas as a fuel is prone to spikes⁷ based on production cycles, weather, and geopolitical events which may create more risks for the customers (as seen in Texas and California). These supply risks are not unique to Texas, California, or even cold regions with heavy reliance on gas for both home heating and electricity such as New England; they have also occurred in the Pacific Northwest.⁸ PacifiCorp's IRP does not adequately account for risks associated with potential price spikes or unavailability of gas at Bridger, and its hyperfocus on Texas and broad assertion that "[t]he Company's process to procure natural gas supplies for Jim Bridger units 1 and 2 has not indicated a lack of supply" should not provide significant comfort regarding gas supply risks that the company has not modeled.⁹

We continue to recommend that the company undertake additional analysis with updated capital-cost inputs to help the Commission and stakeholders fully understand the long-term costs and benefits of a more aggressive procurement of capacity resources such as hybrid solar plus storage, standalone storage, and pumped hydro storage to meet the company's needs during

⁷ See, e.g., Pippa Stevens, CNBC (Oct. 8, 2021), available at <https://www.cnbc.com/2021/10/08/natural-gas-prices-are-skyrocketing-globally-what-it-means-for-the-us.html>.

⁸ For Texas, see Joshua Busby et al, "Cascading risks: Understanding the 2021 winter blackout in Texas," *Energy Research & Social Science* (July 2021), available at

<https://www.sciencedirect.com/science/article/pii/S2214629621001997> (noting that "8000 MW of gas power plants shut down because of fuel shortages or freezing equipment");

For California, see CAISO, Final Root Cause Analysis Mid-August 2020 Extreme Heat Wave at section 4.2.3.1 (Jan. 13, 2021), available at

<http://www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf> ("The 1,000 MW difference between shown RA requirements and bid from RA resources is attributed largely to forced outages and derates due, at least in part, to the extreme heat.");

For New England, see ISO New England, "Markets," available at <https://www.iso-ne.com/about/key-stats/markets/> ("Higher real-time power prices in 2013, 2014, and 2018 were largely due to spikes in natural gas prices during wintertime natural gas delivery constraints.");

For the Pacific Northwest, see Fred Heutte, Northwest Energy Coalition, "Double Squeeze: How the Arctic Express and natural gas constraints are turning the West Coast gas and power markets upside down" (Mar. 6, 2019), available at <https://nwenergy.org/wp-content/uploads/2019/03/double-squeeze-final.pdf>

Wyoming is not immune from gas price spikes either. See Carrie Haderlie, Wyoming Times, "Wyoming customers surprised by high natural gas bills" (Feb. 4, 2022), available at

https://www.wyomingnews.com/news/local_news/wyoming-customers-surprised-by-high-natural-gas-bills/article_91ce22c0-d738-5248-a2a2-e25d80097fae.html (addressing retail gas costs).

⁹ PacifiCorp's Reply Comments at 25, Docket No. LC 77 (December 23, 2021).

times when the Bridger peakers would operate to ensure that PacifiCorp customers are not left with uneconomic assets in the long run. In the portfolio modeling, without the gas conversion, the model optimizes the next-best selection and indicates that Jim Bridger Units 1 and 2 retire at the end of 2023 and an additional 700 MW of solar co-located with storage is added in 2024. Over 600 MW of non-emitting peakers displace a similar amount of solar co-located with storage over the 2031-2037 timeframe leading to lower overall emissions (1-2% lower) compared to the preferred portfolio (P02-MM-CETA). The higher NPVRR for this variant portfolio is partially caused by inflated capital, fixed operation & maintenance and demolition cost estimates inputted into the PLEXOS model as well as other related factors related to operational characteristics of storage resources discussed in our previous comments. For example, solar plus storage resources were assigned a capital cost of more than \$2800/kW which is at least 25% over the capex numbers seen in recent RFPs in the region.

Inflated capital costs are particularly concerning because, in practice, capital costs for photovoltaics, wind turbines, and battery storage resources have continued to fall rapidly in recent years as shown in the recent NREL's Annual Technology Baseline 2021.¹⁰ Another recent report,¹¹ which details installed costs for PV systems as of the first quarter of 2021, states that costs continue to fall for residential, commercial rooftop, and utility-scale PV systems by 3%, 11%, and 12%, respectively, compared to last year, with a 19% reduction in module cost, causing overall costs to continue their decade-long decline. PacifiCorp's capital cost assumption coming out of a Burns & McDonnell report in the 2021 IRP for 1:1 solar plus storage hybrid resource is \$2890/kW which is extremely high and does not square with recent RFPs or public cost data out of National Renewable Energy Laboratory (NREL). Additionally, adding demolition cost estimates of over \$200/kW into portfolio modeling for projects *without adding salvage value* (value from recycling solar panels, battery packs and wind turbine materials) is speculative and artificially increases the capital costs of resources that are critical to achieve deep decarbonization. Thus, we agree with Staff's recommendation that, in the 2023 IRP, PacifiCorp's storage capital and O&M costs should be in line with the most recent NREL ATB report and most recent RFP Final Shortlist before publishing the Supply Side Table.

We also strongly recommend that for the 2023 IRP cycle, PacifiCorp utilizes publicly available and comprehensive capital and O&M cost data in the inputs and assumptions for the portfolio modeling instead of relying on third-party vendor data which is calculated in a black-box setting.

¹⁰ NREL Annual Technology Baseline 2021, available at <https://atb.nrel.gov/>.
<https://atb.nrel.gov/electricity/2021/data>

¹¹ U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark: Q1 2021. NREL.
<https://www.nrel.gov/docs/fy22osti/80694.pdf>

Portland General Electric, in their current IRP cycle, has committed to relying on public data sources¹²; we recommend PacifiCorp follow a similar practice.

3. PacifiCorp’s should analyze the acquisition of additional resources in order to align with the P02e-NoNUC or a suitable variant.

In previous comments, Renewable Northwest offered some positive comments regarding the company’s Preferred Portfolio (P02-MM-CETA) and the Action Plan associated with the 2021 IRP and commended PacifiCorp for implementing a tiered modeling framework in PLEXOS but also raised concerns on the inclusion of the 500 MW Natrium project in the preferred portfolio. Based on an internal analysis and updated information coming out of recent workshops,¹³ it has become increasingly clear that it would be extremely ambitious for the Natrium project to come online by the summer 2028 timeframe. Additionally, regarding the project economics, staff noted in their report that “PacifiCorp provided no evidence or reasoning to support the cost data provided by TerraPower that assumes that the Company will be able to acquire the Natrium plant.”

We encourage PacifiCorp to analyze the acquisition of additional capacity resources in the 2022 AS RFP to ensure that the company is well positioned to secure a least-cost, least-risk portfolio of resources to achieve their reliability needs and state policy targets. In fact, one of the preferred portfolio variants, P-02e-No NUC -- which excludes the Natrium project -- shows that procuring hybrid solar plus storage and standalone storage resources provides sufficient reliability, albeit with slightly higher costs but with low to zero risk of projects¹⁴ not coming online. Permitting and development constitute a major risk in relying on a nuclear power plant in the current climate.

Thus, we support Staff Recommendations 12 and 13 and recommend that PacifiCorp consider acquisition of additional capacity resources based on a CETA-compliant variant of the P02e-NoNUC portfolio as their preferred portfolio. Additionally, we recommend that any additional MWs that come out as a result of the new preferred portfolio be folded into the 2022 AS RFP.

¹² Additional information is available in the slides and recording from PGE’s November 18, 2021 IRP meeting, available at <https://portlandgeneral.com/about/who-we-are/resource-planning/irp-public-meetings>.

¹³ TerraPower Vendor Webinar. Held on Feb. 9, 2022.

¹⁴ Without the Natrium demonstration project, 348 MW of solar co-located with storage is added to the portfolio in 2026 and an additional 240 MW is added in 2030.

III. CONCLUSION

Renewable Northwest again thanks the Commission for this opportunity to comment on Staff's Report regarding PacifiCorp's 2021 IRP. We reiterate our appreciation to PacifiCorp for its stakeholder process and our support for this important step in the company's transition from a carbon-intensive thermal portfolio to a modern system powered by renewables balanced with other non-emitting resources. We look forward to continued collaboration with the Commission, PacifiCorp, stakeholders, and Commission Staff throughout this IRP proceeding.

Respectfully submitted this 11th day of March, 2022,

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