

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

LC 82

In the Matter of
PACIFICORP,
2023 Integrated Resource Plan and
Clean Energy Plan.

ROUND 0 COMMENTS OF
RENEWABLE NORTHWEST

I. Introduction

Renewable Northwest (“RNW”) appreciates this opportunity to comment on PacifiCorp’s (“PAC” or “Company”) 2023 Integrated Resource Plan (“IRP”) and Clean Energy Plan (“CEP”). This is the Company’s first IRP since House Bill 2021 (“HB 2021”) passed in the 2021 Oregon legislative session, directing electric utilities to achieve zero greenhouse gas (“GHG”) emissions by 2040. In accordance with that law, the Company has filed its first CEP – a planning tool requiring utilities to demonstrate progress toward meeting the clean energy targets set by HB 2021 while considering impacts to Oregon’s communities. The IRP and CEP closely follow the Oregon Public Utility Commission’s (“OPUC” or “Commission”) work in docket UM 2225 regarding near-term implementation of HB 2021, and review of the plans will run in parallel with docket UM 2273 regarding outstanding questions in HB 2021 implementation. Therefore, we appreciate that stakeholder review of these plans is structured as an iterative process, creating more opportunity for due diligence as precedent is set for compliance with HB 2021.

That said, while these Round 0 comments represent our initial thoughts and concerns related to the IRP and CEP, we expect we may have more input as our review continues. Though in these comments we do attempt to put placeholders on topics we intend to cover in detail should it be warranted as more information becomes available.

In these comments, we offer general support for PAC’s transmission modeling efforts and resource modeling approach, while also providing a few suggestions along the way. Notably, in discussing the portfolio modeling specifics, we point to Lazard’s most recent Levelized Cost of Energy report which supports the scale of resource selection that appears in the Company’s preferred portfolio. However, we question the viability of the resources PAC’s model has selected to support capacity needs. We offer recommendations on the Company’s treatment of nuclear and non-emitting peaking resources within the IRP and CEP, though we expect we will have more thoughts on these topics as our review continues and as more information becomes available in the IRP/CEP review process.

Again, we appreciate the Company’s work in putting together these plans and the Commission’s consideration of these comments, and we look forward to continued engagement in this exciting docket.

II. Comments

1. Transmission

a. RNW Supports PAC’s Focus on Transmission Improvements To Facilitate a Clean Energy Transition

On first review of the IRP / CEP, it appears that PacifiCorp continues to do an excellent job of modeling transmission, allowing its model to endogenously select from a suite of potential options for expanding or upgrading its transmission system. The Northwest’s struggles with an increasingly constrained transmission system are well known. For the Company to use its sophisticated modeling and significant geographic footprint to help address those struggles is reasonable and, indeed, welcome. As we continue to review the Company’s plan, we may have more granular comments on the transmission options the Company has modeled and selected, but overall its approach to modeling transmission appears to be a success.

With that said, one area where PacifiCorp likely should do more is in assessing the potential for non-wires transmission solutions and grid-enhancing technologies (“GETs”). These technologies, including dynamic line ratings (“DLR”) and advanced power flow and topology control, improve the efficiency and flexibility of the grid and have the potential to double renewable energy capacity.¹ The Company has experienced the benefits of GETs with its 2014 Standpipe-Platte project which implemented DLR on a 230 kilovolt transmission line.² That said, the Company’s future plans for its Smart Grid program are to “continue to monitor smart grid technologies and determine viability and applicability of implementation to the system,” which we find underwhelming considering the potential for GETs to defer more expensive and time-intensive transmission-related investments.³

The Company will likely be required in future years to regularly examine the potential for non-wires solutions and GETs due to new legislation that passed in Washington in 2023. SSB 5165 amended Washington’s IRP statute to require that a “transmission assessment must take into account opportunities to make more effective use of existing transmission capacity through

¹ See, e.g., *Unlocking the Queue* from The Brattle Group, in which the study’s model demonstrates that in Kansas and Oklahoma, GETs could enable the integration of over double the renewable energy development possible without the technologies. Available at <https://watt-transmission.org/unlocking-the-queue/>.

² IRP at 117.

³ IRP at 123.

improved transmission system operating practices, energy efficiency, demand response, grid modernization, nonwires solutions, and other programs if applicable.”⁴ RNW recommends that PAC begin to take a harder look at GETs options and that the Commission affirm that the policy adopted by the Washington legislature is appropriate for consideration in Oregon as well.

2. Generation

a. RNW Generally Supports PAC’s Modeling Approach

As the Commission is well aware, over recent IRP cycles PacifiCorp has significantly revamped its IRP modeling, building in sophisticated capabilities such as endogenous selection of coal unit retirements and transmission options and updating its approach to increasingly important topics such as flexibility and reliability. In developing its current modeling approach, the Company has generally been responsive to input and feedback from interested parties, and the result appears to be a robust model that is well-equipped to facilitate the Company’s transition from intensive reliance on high-GHG-emissions coal generation to a diverse portfolio of clean resources. We appreciate the considerable work that has gone into developing the current modeling approach.

Our general support for PAC’s modeling approach comes with one significant caveat, however: we recommend that for the next IRP cycle the Company endeavor to complete its initial model runs earlier in the planning cycle, to allow for more robust engagement by interested parties. We noted above that the Company has been responsive to input in developing its overall modeling *approach*, but recent cycles have not allowed for that same level of responsiveness to the specifics of PAC’s portfolio modeling. For example, in developing its 2019 IRP, midway through the process PAC released the results of model runs that allowed interested parties to carefully review results and suggest additional scenarios and sensitivities for the Company to model in successive runs. One of these third-party suggestions, requested by a group of NGOs including RNW, ended up forming the basis for the Company’s preferred portfolio.

The 2019 IRP was transformative at the time, and the current planning environment -- with 100% clean energy standards in multiple states where PAC serves customer load -- calls for still further transformation. Making room for more third-party engagement on the details of portfolio modeling may well help the Company identify an optimal path toward achieving a fully modern system that effectively integrates a suite of low-cost, non-emitting resources.

b. RNW Supports PAC’s Identification of Robust Renewable Energy and Storage Portfolio

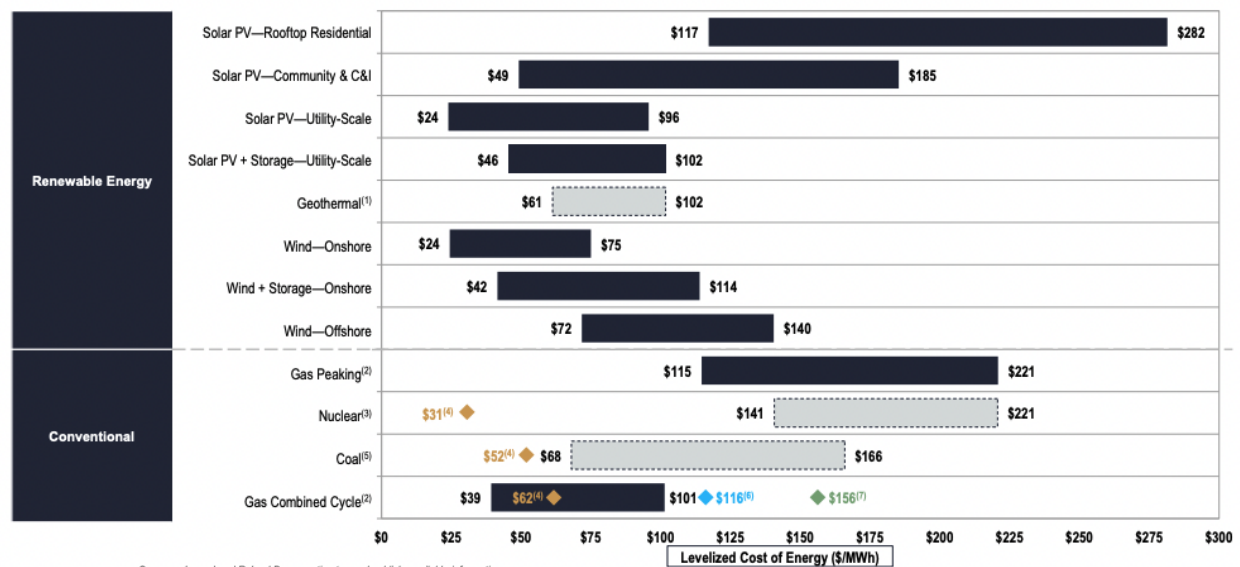
⁴ The full text of SSB 5165 is available at <https://lawfilesexternal.wa.gov/biennium/2023-24/Pdf/Bills/Session%20Laws/Senate/5165-S.SL.pdf>.

On the specifics of PAC’s portfolio modeling, RNW was pleased to see the Company identify another portfolio with thousands of megawatts of new renewables and storage across the west. These results appear to be driven not just by state-level clean-energy policy such as HB 2021’s 80% emission-reduction mandate by 2030, but also by resource economics that continue to be highly favorable for clean resources. For additional context on current resource economics, we find it may be helpful to briefly review some results from Lazard’s Levelized Cost of Energy Plus from April 2023.⁵

First, on an unsubsidized basis -- that is to say, not accounting for tax subsidies such as the federal production tax credit and investment tax credit -- utility-scale renewable resources are generally less expensive than traditional thermal resources in terms of dollars-per-megawatt-hour.

Levelized Cost of Energy Comparison—Unsubsidized Analysis

Selected renewable energy generation technologies are cost-competitive with conventional generation technologies under certain circumstances



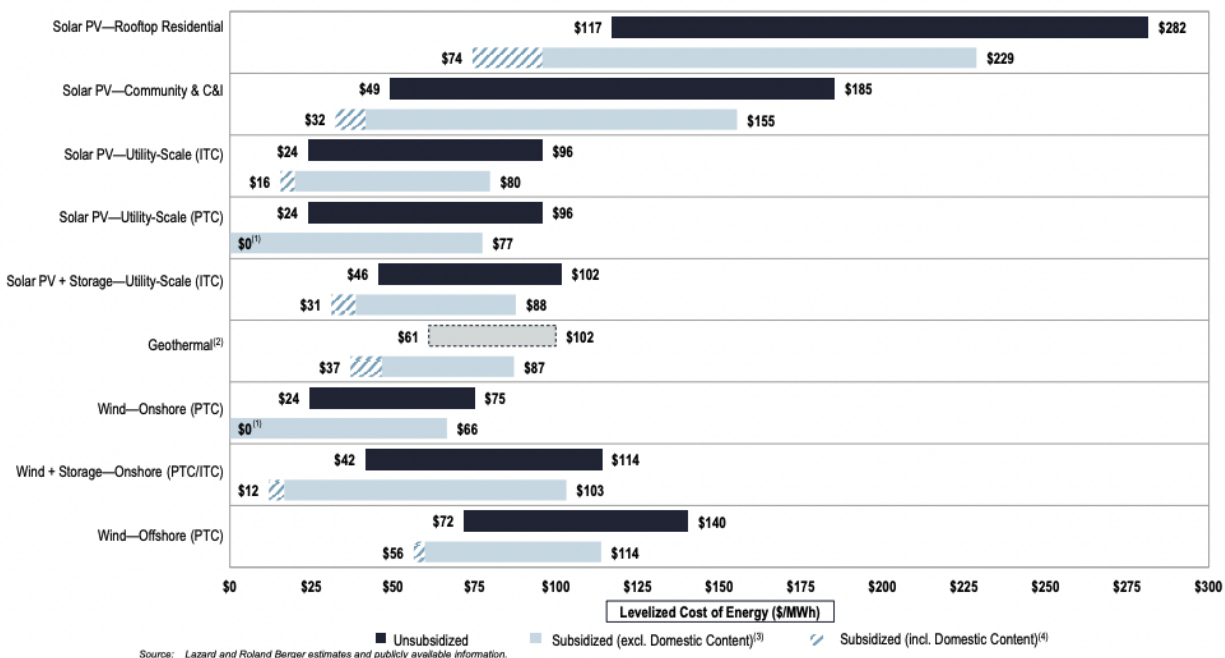
The gold-colored diamonds in the preceding figure represent the average marginal cost of operating existing resources. Comparing technology costs reflected in the figure indicates that the cost per unit of energy of building new renewable resources is often lower than the cost of continuing to operate existing conventional resources on an unsubsidized basis. Storage is also increasingly competitive, with the price ranges for solar-plus-storage and gas combined cycle appearing roughly equivalent, again on an unsubsidized basis.

⁵ Lazard’s LCOE+ (April 2023) is available at <https://www.lazard.com/research-insights/2023-levelized-cost-of-energyplus/>.

But strong federal tax subsidies are the policy of the United States. And accounting for these subsidies, the picture is even clearer:

Levelized Cost of Energy Comparison—Sensitivity to U.S. Federal Tax Subsidies

The Investment Tax Credit (“ITC”), Production Tax Credit (“PTC”) and domestic content adder, among other provisions in the IRA, are important components of the levelized cost of renewable energy generation technologies



Solar and wind costs drop as low as zero dollars per megawatt-hour of energy. Hybrid renewable-plus-storage resources easily out-compete even the marginal cost of operating existing conventional generation. The low end of offshore wind is less than half the cost of the low end of a gas peaker. New geothermal can out-compete existing coal generation on cost.

All of this is to say that the scale of renewable and storage resources in the Company’s preferred portfolio is entirely consistent with arms-length analyses of current resource economics. On a dollars-per-unit-of-energy basis, market forces call for meeting as many hours of electricity demand as possible with renewable generation. The hard question is how to provide power 24/7 and ensure adequate capacity. The remainder of our comments on the generation elements of PAC’s IRP/CEP will explore that dynamic.

c. PAC’s Reliance on Nuclear and Non-Emitting Peakers Raises Questions about Assumptions and Viability

RNW acknowledges that the Company is operating within a difficult planning environment given the evolving understanding of new federal tax provisions, uncertainty around the impact of electrification on load growth, and complicated multi-state compliance obligations. The

Company is exploring new technologies to relieve potential temporal imbalances between peak demand and generation, most notably with the Natrium™ reactor demonstration project and non-emitting peaker plants. However, the extent to which the Company’s 2023 preferred portfolio (“P1-MM”) relies on these nascent technologies warrants a more careful look both at the viability of these technologies and at alternative resources and actions that could allow the Company to meet its full suite of needs.

The Company does model a sensitivity (“P06 - No Forward Tech”) excluding both nuclear and non-emitting peaking resources, finding that the resulting alternate portfolio would be a \$1.57 billion increase beyond the P1-MM portfolio.⁶ But because the IRP does not provide a detailed definition of “non-emitting resource,” it is difficult to assess the accuracy of this portfolio cost delta. Additionally, notwithstanding the results of the P06 sensitivity, it is possible that exploring specific combinations of clean resource alternatives could unlock diversity benefits and ultimately displace uncertain emerging resources that the Company has selected in the post-2030 timeframe.

To clarify our questions around uncertainty and resource viability, in Chapter 8 of the IRP, under the section Non-Emitting Resources, the Company notes that “[t]he non-emitting peaking resource is assumed to use a non-CO₂ emitting fuel *such as* hydrogen” (emphasis added). In Volume II, Appendix B, the Company notes that it “continues to assess the viability of green hydrogen, as well as the ability for existing infrastructure to accommodate the chemical properties of this fuel type. PacifiCorp’s modeling in the 2023 IRP allows for non-emitting peaking units at current coal plant sites and in other locations. *These peaking resources were assumed to be fueled using 100 percent green hydrogen, supplied via pipeline due to the high cost of onsite storage ...*” (emphasis added).⁷

This ambiguity is unnecessary and confusing, and we presume stakeholders would rather have a more direct discussion about green hydrogen, if that is what PAC is modeling. Thus, we ask that the Commission require the Company to more explicitly define “non-emitting resource” in this IRP, and to include in its 2021 IRP Action Plan Status Update, under New Resource Actions, a section outlining PAC’s near- to mid-term actions supporting the addition of green-hydrogen-fueled non-emitting peakers by year-end 2029.

We also recommend that PAC explore alternative solutions to the trigger event “No Natrium™ Advanced Nuclear Demonstration Project in 2030, and no other nuclear projects.” Currently the Company’s solution to this scenario is the addition of nearly 900 MW of non-emitting peakers.⁸ However, until the Company can better define this resource and establish its viability, we recommend consideration of other resources that might help the Company meet its capacity

⁶ IRP at 272.

⁷ IRP Vol. II, App. B at 47.

⁸ IRP at 357.

needs. Moreover, we would like to see in Table 10.3 an additional trigger event outlining PAC’s near- and long-term resource acquisition strategy in the event of “no non-emitting peaker” viability.⁹

To put a finer point on the question of viability, RNW understands that in 2025, the Inflation Reduction Act (“IRA”) replaces the current resource-specific tax credit schemes with technology-agnostic Clean Energy Production and Investment Tax Credits. Though currently not technically or economically feasible, utilities are pondering a future in which today’s gas peaker plants may eventually use a non-emitting fuel source such as hydrogen. As such, PAC’s modeling approach for the 2023 IRP capitalizes on the IRA-related tax credits for these non-emitting peakers to support system capacity needs across the planning horizon.

However, as is often noted – including during PAC’s April public input meeting – transportation and storage of hydrogen as a non-emitting fuel source for these peakers are outstanding issues. The Company briefly addressed transportation costs during the April public meeting, noting that pipeline costs for natural gas were tripled in the IRP to estimate pipeline costs for hydrogen. Still, it is unclear how the Company developed this estimate, and it is unclear how this tripled pipeline cost is incorporated in Table 7.2, Total Resource Cost for Supply-Side Resource Options, for the simple-cycle frame type combustion turbine fueled by hydrogen alone, labeled “SCCT Frame “J” X1, 100H2.”¹⁰

The Company also mentioned at the April public meeting that hydrogen resources have already been proposed by Los Angeles Department of Water & Power (“LADWP”), at a location with the potential for underground hydrogen storage, though we would like to better understand to what extent this is a determination informed by data. On-site storage tanks for this finicky fuel seem unlikely for peaking units “designed to run infrequently to support system reliability by dispatching only when needed to meet shortfalls.”¹¹

Again, we recognize that PAC wants to participate in a hydrogen economy, and we recognize the potential for hydrogen to play a role in system decarbonization. But considering the uncertainties regarding hydrogen as a fuel source for non-emitting peakers, including but not limited to the methods of fuel transportation, storage, and leakage detection and tracking, RNW hopes to better understand the Company’s confidence level that these resources will prove to be viable and least-cost. Moreover, to the extent that the Company is incorrect in this regard, we would like to understand what near-term actions PAC will take to ensure alternative non-emitting resources can be brought onto the system. Below we discuss some long-lead options that may be well positioned to displace peakers in the post-2030 timeframe.

⁹ IRP at 352.

¹⁰ IRP at 181.

¹¹ IRP at 225.

In our Round 1 comments we intend to further explore the Company's options for capacity resources in the post-2030 timeframe, including assumptions around small modular nuclear reactors.

d. RNW Recommends a Harder Look at Offshore Wind & Long-Duration Storage Post-2030

RNW appreciates the Company's consideration of long-lead resources and currently nascent technologies of offshore wind and long-duration storage. As seen in this IRP and in the LC 80 filing of Portland General Electric, the Post-2030 picture is much less clear than the near term and will likely rely heavily on technologies currently not available in the Northwest. As such, RNW encourages the Commission and the Company to consider new ways to assess additional emerging technologies that would not only provide a more fulsome look at the resources' potential but also send important signals to those industries to encourage continued development resulting in market/commercial availability for post-2030.¹² In other words, to create certainty that those post-2030 long-lead resources will be available, RNW encourages the Company and Commission to consider ways in which the IRP process -- or other PUC proceeding -- can offer important signals to those industries as to potential offtake. To be clear, this is not in order to indicate technology preference beyond what would best support Oregon's non-emitting energy future while pursuing the most affordable, reliable electricity grid possible.

In the case of offshore wind (OSW) this is especially relevant. The Company acknowledges that "Offshore wind holds the promise of high production capacity but faces various risks and costs that are higher than onshore wind projects."¹³ OSW has the potential to become a rich post-2030 resource given the generation profile and capacity factors for locations off the Oregon Coast.¹⁴ RNW encourages more scrutiny of model assumptions around OSW to ensure the Company's analysis is capturing the resource's full potential and benefits. One indicator of the full benefit of OSW in the Company's portfolio is shown in Figure 9.18, which identifies the proxy resources that are added or decreased in the portfolio with addition of OSW. Notably, the OSW proxy displaces the "non-emitting peaker" resource. Given uncertainties around future non-emitting

¹² This is reflected in LC 80, PGE's IRP/CEP which emphasizes the importance of new resource technologies post-2030 and also in conversations at PUC public meetings.

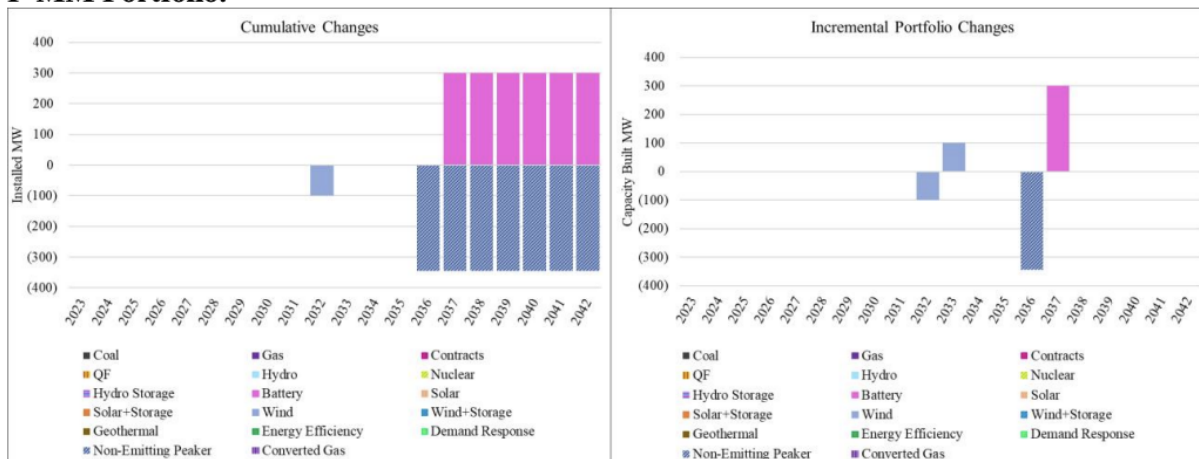
¹³ IRP p.194

¹⁴ The Pacific Northwest National Lab presented an analysis in 2020 on the value of Oregon OSW in its study "Exploring Grid Value Potential of Offshore Wind Energy in Oregon."

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-29935.pdf A more detailed analysis of capacity credit of offshore wind is presented in "A systematic evaluation of wind's capacity credit in the Western United States," a 2021 paper in the Wind Energy Journal. <https://onlinelibrary.wiley.com/doi/full/10.1002/we.2620> This evaluation finds that offshore wind capacity credits (CC) average 41% while terrestrial averages 16%. CC analysis considers the degree to which energy resources can contribute to capacity required to meet resource adequacy requirements.

peaker resources and SMRs as discussed above, RNW suggests that OSW could be more of a “least regrets” resource selection for the post-2030 scenarios.¹⁵

Figure 9.18 – Increase/(Decrease) in Proxy Resources when Offshore Wind is Added to the P-MM Portfolio.



The anticipated offshore wind lease sale for Oregon in 2024 by the Bureau of Ocean Energy Management is currently aiming to offer lease areas which could support up to 3 GW of generation capacity.¹⁶ While the lease does not guarantee eventual projects, the profile of Oregon offshore wind has attracted interest from OSW developers even given the uncertainty around transmission capacity to access the resource, and the ongoing discussions with adjacent communities and Tribes to sufficiently understand and address concerns.¹⁷ This lease process is only one piece of the long-lead nature of OSW projects which will require long development timelines that place realistic CODs in the early 2030s. RNW is concerned that, without a harder look at OSW as an option and adequate consideration of how procurement of long-lead resources could work, current IRP and RFP processes could impede earnest consideration of OSW project procurement, and, in turn, discourage the continued development of this long-lead resource.

¹⁵ This is illustrated by examining the amount of non-emitting peaking capacity additions in PacifiCorp's various portfolios. See Volume I Table 9.1 - Non-Emitting Peaking page 255. Non-emitting peaking plants rely on future technologies that have not been developed and have an unknown cost. PacifiCorp's offshore wind preferred portfolio variant P10 displaces 345 MW of non-emitting peaking capacity and selects the third lowest level of future technologies. The only portfolios with lower selection of future technologies are the “No future tech” portfolio and the “40 year gas life” portfolio.

¹⁶ Oregon Activities for the Bureau of Ocean Energy Management - <https://www.boem.gov/renewable-energy/state-activities/Oregon> and the Request for Information and Nominations on potential offshore wind lease areas in Oregon - <https://www.regulations.gov/document/BOEM-2022-0009-0001>

¹⁷ In a June 9, 2023, letter, Governor Kotek and Oregon Federal Delegation members sent a letter to BOEM requesting a pause in the lease process to allow for consultation with Tribes and stakeholders. https://www.capitalpress.com/ag_sectors/water/oregon-governor-members-of-congress-call-for-pause-on-offshore-wind-turbines/article_006dc7ca-0943-11ee-aebb-03dace78973d.html

To be more specific, the long lead time and large upfront costs of emerging technologies, and OSW especially, create higher risk for developers, especially relative to onshore wind projects. The current resource procurement process does not align with the challenges of OSW given it does not offer a path for contracting long-lead time projects prior to developers incurring substantial development costs. This procurement uncertainty could discourage development of these projects or result in higher project costs.¹⁸ Considering ways to accommodate long-lead resources in the IRP and RFP processes would not only benefit potential OSW projects, but other emerging technologies and those with similar development timelines which currently exceed the planning horizons of the IRP/RFP process.

RNW intends in our Round 1 comments to suggest areas for further analysis around the modeling of OSW and other post-2030 resources. OSW's significant scale and complementary generation profile (to other, existing and planned renewable energy resources) has the potential to change the shape of net peaks, creating an opportunity for greater utilization of short and long-duration energy storage instead of the capacity resources currently reflected in the Company's post-2030 portfolio. Indeed, this combination of OSW with expanded storage options may present a lower-regret alternative to meeting these net peaks than investing in SMRs and hydrogen peakers, both of which appear further from commercialization than long-duration storage. And the economics of OSW could be bolstered if modeled in conjunction with greater regional integration, particularly in the case of a western RTO. RNW is currently assessing potential sensitivities to further explore, and hopefully validate, these tentative conclusions.

e. RNW Recommends a Harder Look at Effects of WRAP & Regional Markets

PacifiCorp has been a leader in recent developments to regionalize the western electricity system. In December, the Company announced its commitments to join both the California Independent System Operator's Extended Day-Ahead Market ("EDAM") and the Western Power Pool's Western Resource Adequacy Program ("WRAP").¹⁹ The Company's IRP / CEP references both programs, but it is not entirely clear whether, and if so how, its participation in these programs is reflected in its IRP modeling.

What the IRP / CEP does say, however, is that PAC's participation in EDAM "will help reduce emissions and maintain a reliable, resilient power supply year-round, including during extreme weather events." The IRP / CEP also notes that two elements of the WRAP will help the Company (and indeed other load-responsible entities throughout the region) achieve its reliability obligations: "The Forward Showing program will ensure participants procure

¹⁸ If the OPUC can lower project risk for developers through an IRP and RFP process that allows for more certainty for long-lead resources, it is likely that developers will face lower required rates of return and lower finance cost.

¹⁹ "PacifiCorp to build on success of real-time energy market innovation as first to sign on to new Western day-ahead market" (Dec. 8, 2022), available at <https://www.pacificorp.com/about/newsroom/news-releases/EDAM-innovative-efforts.html>.

sufficient resources to meet a footprint wide reliability standard, and the Ops Program will facilitate transfers between entities in a resource deficit and those with excess resources.”

Given the potential role of these regionalization efforts in helping the Company meet its reliability obligations, RNW recommends that the Company work with the Commission, Staff, and interested parties to incorporate both programs into its modeling -- particularly before moving forward with plans that rely on the acquisition of potentially non-viable capacity resources.

3. Regulatory Compliance

a. RNW Intends To Explore PAC’s Approach to GHGs and Regulatory Compliance in More Detail

RNW appreciates the Company’s development of alternative (and perhaps complementary) pathways to achieving HB 2021’s emission-reduction mandates. We look forward to reviewing the Company’s work papers in more depth, as well as additional information on these pathways that may emerge through the regulatory process and developing comments on the Company’s potential approaches in Round 1. We are particularly interested in understanding how the pathways might affect not only Oregon-allocated emissions but the Company’s overall emissions -- material we have not yet identified in the work papers.

Additionally, with respect to RECs, we are interested in understanding how the Company has identified how many OR RECs beyond the Company’s RPS obligations will be banked for compliance and how many the Company proposes to sell. We note that the IRP indicates that sale of RECs not needed for RPS compliance will be maximized, the CEP indicates that “excess RECs not retired on behalf of PacifiCorp’s Oregon customers ... are banked for future compliance with Oregon RPS requirements,” and that some percentage of RECs are likely to be resold in either emissions pathway.²⁰ This material may be reflected in the Company’s confidential work papers; if so, we look forward to reviewing that material. Regardless, some additional information may be helpful for those interested parties that do not intend to formally intervene and review confidential work papers.

III. CONCLUSION

We appreciate the efforts undertaken by PAC in the development of the IRP and CEP, especially considering the complexity of this resource planning cycle, and we are grateful for the opportunity to offer our initial comments to the Commission. We look forward to further engagement with the Company and the regulatory process around these plans, ultimately in

²⁰ CEP at 82-84.

support of the Commission's mandate to eliminate GHG emissions from Oregon's electricity sector.

Respectfully submitted this 30th day of June, 2023,

/s/ Max Greene
Deputy Director
Renewable Northwest
max@renewablenw.org

/s/ Diane Brandt
Oregon State Director
Renewable Northwest
diane@renewablenw.org

/s/ Katie Ware
Consultant
katie@renewablenw.org