EXH. KKD-5
DOCKET UE-210795
PSE'S CEIP
WITNESS: KARA K. DURBIN

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of **PUGET SOUND ENERGY** **Clean Energy Implementation Plan Pursuant to WAC 480-100-640**	**Docket UE-210795**

FOURTH EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF

KARA K. DURBIN

ON BEHALF OF PUGET SOUND ENERGY

JULY 11, 2022

May 6, 2021

Mark Johnson
Executive Director and Secretary
Washington Utilities and Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98504-7250

RE: Comments of Renewable Northwest, Docket UE-200304
Utilities and Transportation Commission's January 5, 2021, Notice of Opportunity to File Written Comments Relating to Puget Sound Energy's 2021 Final Integrated Resource Plan for Electricity, Docket UE-200304.

I. INTRODUCTION

Renewable Northwest thanks the Washington Utilities and Transportation Commission ("the Commission") for this opportunity to comment in response to the Commission's May 6, 2021, Notice of Opportunity ("Notice") to File Written Comments relating to Puget Sound Energy's 2021 Final Integrated Resource Plan ("Final IRP") for Electricity, which Puget Sound Energy ("PSE" or "the Company") filed April 1, 2021.

Renewable Northwest was an active stakeholder during the public participation process of PSE's Draft and Final IRP development, and we submitted written feedback on the Company's generic resource assumptions, transmission constraints, portfolio sensitivities, electric portfolio model, flexibility analysis, and draft portfolio results. In our previous comments to the Commission, we noted various areas for improvement in the Draft IRP for PSE and the Commission to consider, bearing in mind the important role of this IRP to plan for compliance with the clean energy standards of Washington's Clean Energy Transformation Act ("CETA"), and as such, to inform PSE's first Clean Energy Implementation Plan ("CEIP"), set to be published later this year.[1] Our recommendations included revision of PSE's analytical assumptions and resource adequacy considerations, as well as various sensitivity analyses with the goal of helping the Company identify a clean, cost-effective and non-emitting portfolio with the best likelihood of meeting CETA's clean energy standards.

Unfortunately, in several key respects that we outline below, the Company's Final IRP does not reflect our broad recommendations. We hope the Company considers these comments as it

[1] WAC 480-100-640

moves forward with its 2020 All-Source RFP and the upcoming CEIP to be filed in accordance with CETA. In these comments, we identify areas where PSE's Final IRP does not align with the most current resource costs and operational characteristics of emerging resources. We also offer recommendations for revising PSE's key analytical assumptions related to storage resources, resource adequacy considerations, and a portfolio sensitivity analysis approach with the goal of nudging the Company toward a least-cost portfolio with the best likelihood of meeting CETA's clean energy standards.

II. COMMENTS

1. Changes to electric resource assumptions would help PSE effectively consider emerging non-emitting capacity resources as an alternative to risky gas peakers.

PSE's preference for dispatchable thermal resources to maintain resource adequacy may create significant financial risks for PSE and its customers brought on by investing in gas infrastructure that may be underutilized, prone to fuel supply risks, and stranded in the future, and we still have questions about the Company's resource assumptions which informed the portfolio model to opt for new thermal resources rather than non-emitting capacity resources following 2025 coal retirements. In the Final IRP, PSE concludes that "this IRP determined that the limited-run use of simple-cycle combustion turbines (peakers) operated on biodiesel (a CETA complaint fuel) is the most cost effective means of ensuring resource adequacy." However, PSE's modeling of alternative fuel enabled combustion turbines -- limited to sensitivity W in the Draft IRP -- may not support the claim that this resource is least cost. Sensitivity W explores a ramped schedule of DER procurements with biofuel as the fuel source for new frame peaker resources. Because PSE assumes a *fixed* biofuel price of $30.53 per million British Thermal Units over the entire study period, the model does not consider volatility of that market, inflation, or limited access to the resource. In addition to these factors, building new gas infrastructure is antithetical to CETA and creates significant financial risks of stranded assets for PSE and its customers due to large capital investment and limited use of the resource. The most recent Lazard's Levelized Cost of Energy Analysis compares new-build wind and solar against the marginal cost of operating *existing* combined-cycle gas units and shows that renewable resources are cost-competitive[2]; given trends in resource costs, it is very possible that portfolios of renewable resources, storage, efficiency, and demand-side management will similarly render gas peakers uneconomical and obsolete well before utility customers have paid for utilities' investments in those peakers.

[2] Lazard's Levelized Cost of Energy Analysis--Version 14.0 at 7 (Oct. 2020), *available at* https://www.lazard.com/media/451419/lazards-levelized-cost-of-energy-version-140.pdf.

We also have particular concerns in PSE's treatment of the cost and operational characteristics of storage resources; these characteristics are flowing into the modeling and creating a false picture that storage and hybrid renewable-plus-storage resources are not cost-effective capacity resources in the near-term. On the contrary, recent cost declines and efficiency improvements particularly in Li-ion battery storage technology have supported an emerging consensus that standalone storage and hybrid resources are increasingly essential grid resources, capable of performing multiple services including providing capacity and ancillary services in addition to energy needs. This value, however, can be challenging to capture -- for example, in developing its 2019 IRP preferred portfolio featuring 600 MW of new storage resources in the action-plan window, PacifiCorp had to force its system-optimizer model not to select stand-alone solar, with the result that the model instead picked hybrid solar-plus-storage that yielded a lower overall system cost after running the portfolio through stochastic risk analysis.[3] PacifiCorp's experience goes to show that accurately reflecting the value of storage resources in portfolio modeling may require significant attention from PSE's planning team, likely including additional storage and hybrid configurations and possibly including manual modeling adjustments.

In the "Electric Resource Assumptions" section, PSE provides details on the type and operational characteristics of the resources considered in the 2021 IRP. We suggest the following recommendations that would provide better insight into how resources are operated:

A. **Pumped-hydro storage:** It is our understanding that PSE considers splitting up the nameplate capacity of the generic pumped hydro resource to account for reasonable joint ownership considerations. In doing so, the model assumes that PSE's share from the resource would be inputted in 25 MW increments. As PSE rightly mentions, pumped hydro storage resources can provide capacity as well as sub-hour flexibility, two key value streams that will be increasingly important in the future power system. Additionally, since the nameplate capacity of a typical pumped hydro storage resource ranges from 250 MW to 3 GW, a model that reflects less than 25% of the average capacity of a pumped hydro resource may not accurately reflect the costs and benefits of the resource. Thus, we suggest that PSE consider at least **100-150 MW** increments of nameplate capacity of pumped hydro with 8-, 10-, and 12-hour duration in their modeling to ensure the resource receives thorough consideration. Additional assessment is warranted because of pumped hydro's unique characteristics as a CETA-compliant resource, one that can integrate large shares of renewables into PSE's system, and one that can provide flexibility (valued at $10/kW-year in this IRP) and other reserve products required to balance the grid.

[3] PacifiCorp 2019 IRP at 199.

B. Hybrid resources: PSE has modeled three different combinations of hybrid resources: eastern Washington solar + 2-hour Lithium-ion battery, eastern Washington wind + 2-hour Lithium-ion battery, and Montana wind + pumped hydro. While we appreciate PSE's addition of these resources into this IRP cycle and the company's recognition of the emergence of hybrid projects as cost-effective, non-emitting resources, below we highlight some additional hybrid resource configurations that may enhance PSE's modeling of hybrids and provide better understanding for the current and future IRPs.

First, hybrid resources can provide valuable energy during peak demand or hours with highest probability of loss of load ("LOLP") because they have the inherent ability to shift delivery of energy based on the needs of the grid. This means hybrids can provide **capacity and additional grid flexibility**, thereby helping to integrate large shares of renewable energy resources. While PV coupled with batteries is the most prevalent hybrid resource currently, utility innovations in this field have shown that concepts like triple-hybrids consisting of wind + solar + batteries are also techno-economically viable generation resources.[4]

Second, typically solar or wind resources are coupled with a **4-hour duration** Li-ion battery system to ensure sufficient MWhs are shifted from the generating resource to the battery during low-demand hours to avoid curtailment and allow for discharge across high-demand hours, as well as to ensure that the additional capital cost of the battery is effectively utilized to the maximum extent.[5] Modeling 2-hour Li-ion batteries might not lead to complete realization of benefits that a 4-hour system can provide, a result that could skew the selection of hybrid and storage resources -- or lack thereof -- in a preferred portfolio.

Finally, hybrid resources are also flexible in terms of the variety of operational **configurations** available. Apart from the generic AC-coupled systems, recent industry developments in DC-coupled systems have provided additional options to deploy hybrid resources. In these systems, batteries provide the extra benefit of recapturing "clipped" energy from oversized solar systems, and enable low-voltage harvesting periods when inverters cannot generate power from the solar system. Modeling different operational configurations could similarly unlock benefits that change the composition and costs of PSE's resource portfolios.

[4] *See*, *e.g.*, Portland General Electric's December 2020 press release regarding the wind + solar + battery storage Wheatridge Renewable Energy Facility procured as a result of a 2018 competitive solicitation: https://portlandgeneral.com/news/2020-12-8-pges-and-nextera-energy-resources-leading-edge-renewable-energy.
[5] NREL Annual Technology Baseline, 2020, *available at* https://atb.nrel.gov/electricity/2020/index.php?t=st

2. Granular modeling capabilities are essential to unlock full value streams of storage and hybrid resources.

Most utility IRPs including PSE's Final IRP still use methods that do not adequately model energy storage. Typical IRP models use three inputs—forecasted demand, the capital cost of available technologies, and those technologies' operating profiles—to calculate long-term economic options for system capacity. These models tend to be simplistic because they only capture the uncomplicated operations of traditional generation units providing capacity. In contrast, current-day advanced energy storage provides high value grid flexibility services, like frequency regulation or ramping support, in addition to capacity.

A large-scale energy storage resource dedicated to providing peak capacity when needed—typically a four-hour period in the morning or afternoon and early evening—can also provide grid services for the many hours when its peak capacity is not needed. In fact, PSE's All-Source RFP mentions the ability of battery energy storage systems both to "charge and discharge all usable energy two times per day up to 60 days per year" and to provide ancillary services on an unlimited basis.[6] This configuration would allow storage resources to deliver energy during PSE's peak demand periods through multiple discharge cycles as specified by the company's LOLP heatmap. It is not clear from the Final IRP whether the generic resource assumptions for Li-ion battery storage systems include cycling twice in a day; limiting cycling to once per day may have been the cause of PSE's lower-than-expected ELCC values. RNW recommends PSE's future modeling and ELCC calculations reflect the base configuration provided in the RFP because this configuration provides necessary flexibility for developers to design systems catering to PSE's unique winter peak needs, and we further recommend that this potential mismatch be remedied in any analysis pertaining to battery storage resources prior to the next IRP cycle (including the RFP and CEIP).

Storage resources are unique because they are "always on", fast-ramping and available for service, in contrast to traditional generation units that need to be started up and shut down to provide peak capacity and other services. For this reason, it is important to update the methods used in IRPs to accurately model advanced storage. Models that use sub-hourly intervals can capture the flexibility of storage operations to provide both capacity and grid services like ancillary services which are also mentioned in the PSE's 2021 All-Source RFP. Several validated commercial models are available that can calculate economic resource options including intra-hourly dynamics, such as PLEXOS and SERVM. If sub-hourly modeling is not possible,

[6] Puget Sound Energy 2021 All-Source Request for Proposal. Published on April 1, 2021. Available at: https://www.pse.com/-/media/PDFs/001-Energy-Supply/003-Acquiring-Energy/000_main_All-Source-RFP_040121.pdf?sc_lang=en&hash=C94AA19A5F074F78CADD1DA699254BC8

then at minimum an hourly chronological production cost model should be used, rather than sampling from a small set of hours from each season. This is similarly true for hybrid resources, which have the added benefit of a clean energy resource charging the storage component to deliver during peak load hours.

In terms of resource costs, planners should use a declining cost curve when projecting the future cost of storage resources based on current industry trends. Utility IRPs typically assume the cost of conventional supply technologies increase over time, based on inflation, since combustion turbines and other traditional generation technologies are no longer experiencing significant cost declines. Advanced energy storage including battery storage is different because the rapidly increasing scale of manufacturing capacity and deployment has resulted in significant unit cost reductions. This trend is expected to continue within Washington's 20-year IRP planning window. A recent report from NREL studying market trends in the storage industry projects a steep drop in Li-ion capital costs from $380/kWh currently in 2021 to less than $200/kWh in 2030[7].

3. **Resource adequacy for a changing grid mix.**

PSE has established a 5 percent loss of load probability (LOLP) resource adequacy metric to assess physical resource adequacy risk. LOLP measures the likelihood of a load curtailment event occurring in any given simulation regardless of the frequency, duration, and magnitude of the curtailment. Renewable Northwest appreciates the Final IRP's detailed description of PSE's efforts to maintain a reliable and adequate system during all hours of the year using the multi-scenario probabilistic Resource Adequacy Model ("RAM"). Evaluating the capacity contribution of individual resources is an integral part of this analysis, which informs the planning reserve margin ("PRM") to maintain the system under the standard of 5% loss of load probability ("LOLP"). As mentioned in our previous comments, we urge PSE to consider the following points:

A. The LOLP matrix for 2027 and 2031 shows peak demand hours for winter months during mornings from (8 a.m. - 11 a.m.) and evenings from (6 p.m. to 10 p.m.); as noted above, the resource needs associated with these peaks can likely be met by a **portfolio of flexible resources such as pumped hydro, standalone storage, hybrids, efficiency, demand response, and market purchases at a lower or comparable cost** than that associated with the biogas fueled gas turbine that appears in PSE's preferred portfolio. The duration (assuming full discharge) for all storage resources combined contributes up

[7] Cost Projections for Utility-Scale Battery Storage: 2020 Update. National Renewable Energy Laboratory (NREL). Wesley Cole and A. Will Frazier. Available at: https://www.nrel.gov/docs/fy20osti/75385.pdf

to 16 hours, excluding demand response. In addition, if PSE considers two cycles/day for batteries, that configuration would allow these resources to address PSE's morning and evening peaks, especially when considered as 4-hour rather than 2-hour storage. Thus, we recommended that PSE consider addressing its capacity needs with a portfolio of clean resources instead of investing in new gas infrastructure which will likely end up being stranded, leading to financial losses for the company and its customers.

B. The Final IRP's peak capacity credit for hybrid solar + storage resources appears to be skewed because coupling solar or wind with 2-hour Li-ion storage contributes much less to peak capacity than a similar resource paired with 4-hour storage, as mentioned previously. In fact, **4-hour storage is the industry standard** for pairing with renewable resources due to their lower $/kW capital costs[8] as well as costs related to the balance-of-system ("BoS")[9], in addition to the ability to provide 4-hour dispatch during evening hours when the solar is ramped down and demand is high on the grid. Research has shown that hybrid solar + battery storage (4-hour duration) can deliver greater than 95% ELCC in the Western US at a lower cost than a combustion turbine peaker power plant in an analysis conducted using Strategic Energy and Risk Valuation Model (SERVM) by Astrape Consulting.[10]

C. PSE is an active participant in the regional resource adequacy program ("RAP") being developed by the Northwest Power Pool ("NWPP") in consultation with the Southwest Power Pool ("SPP"). This program has the ability to unlock the geographical and resource diversity of the region and allow utilities to share resources during stress hours instead of following the traditional "go-it alone" approach. The program is currently in the detailed design phase, and its non-binding forward showing will launch in Q3-2021, with the binding + operational program to be launched in 2024 -- two years before PSE's Final IRP shows a need for new flexible capacity. Thus, it would be prudent for PSE to assess whether participation in the program could reduce or even eliminate the need for new thermal capacity assets, especially when combined with some set of the non-emitting resources discussed above.

[8] See Figure 9. 2018 U.S. Utility-Scale PhotovoltaicsPlus-Energy Storage System Costs Benchmark. Fu et al. 2018. NREL. Available at: https://atb.nrel.gov/electricity/2020/index.php?t=st
[9] Balance-of-system typically includes components like wiring, mounting, inverters and other devices excluding the solar panel or wind turbine blades.
[10] California Public Utility Commission. Joint IOU Study. August 2020. Available at: https://www.astrape.com/2020-joint-ca-iou-elcc-study-report-1/

4. Modeling a clean, non-emitting capacity addition portfolio sensitivity would be important to understand that portfolio's values and costs.

Before we filed our previous comments, we had understood that PSE staff would run a sensitivity allowing the model to select from a *mix* of storage options, notably 4-hour lithium-ion batteries and 8-hour pumped hydro storage. Renewable Northwest was concerned and disappointed to see that this portfolio sensitivity was not included in both the Draft and Final IRP. PSE's capacity needs occur mostly during winter mornings and evenings in the months of January and February as per the LOLP heat map shown below and shared in the Final IRP (Figure 3-11). To meet these needs especially the highest loss of load hour windows highlighted in Figure 1, PSE could utilize a portfolio of clean, non emitting capacity resources to provide energy during the separate 4-hour windows instead of building assets which are underutilized and have the increasing risk of being stranded in a few years.

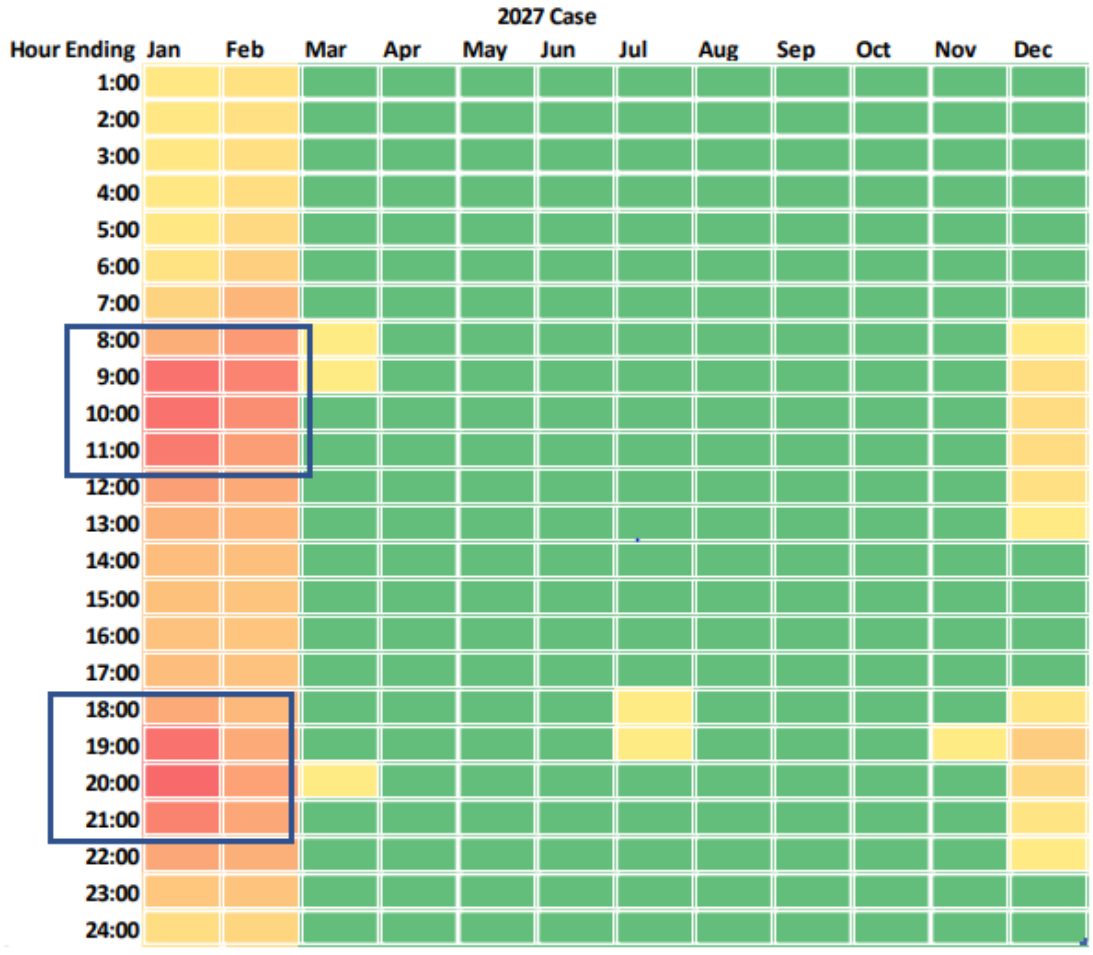

Figure 1. Loss of Load Hour heatmap for PSE's system in 2027 with winter super-peak windows highlighted.

Meeting winter peak needs using non-emitting capacity resources including a combination of pumped hydro storage, battery storage, hybrids, efficiency, and demand response provides PSE an opportunity to be CETA compliant over the long term and invest in emerging technologies which are most likely to be status quo in the future due to fast-changing state and federal policy efforts, significant tax incentives, and rapidly decreasing capital costs.

Another important factor to note is the changing nature of the climate and its effect on supply and demand characteristics of the region. We applaud PSE for conducting the "Temperature Sensitivity" analysis as part of this IRP by utilizing Northwest Power & Conservation Council's ("NPCC") downscaled climate model to inform PSE's system load and evaluate the loss of load hours for years 2027 and 2031 using climate-adjusted datasets. The analysis results show (Figure 7-33) the significant trend of increasing loss of load events during the summer, especially during the late evening periods, as a result of warming temperatures. These changing weather patterns create a significant opportunity for PSE to invest in standalone storage and hybrid renewable plus storage technologies equipped to deliver energy during these hours which is proven by the nearly doubling of capacity credit values for these resources (tabulated in Figure 7-34).

III. CONCLUSION

Renewable Northwest thanks PSE and the Commission for their consideration of this feedback. We are optimistic that the changes and additional analysis we have recommended above will help PSE to identify a least-cost portfolio that also puts the Company on a path to achieving CETA's clean energy standards and the Company's own emission reduction goals. We look forward to continued engagement as a stakeholder as we move from this 2021 IRP process into PSE's 2021 All-Source RFP and its first CEIP.

Sincerely,

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May 6, 2021

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Re: Puget Sound Energy 2021 Electric Integrated Resource Plan, Dockets UE-200304

Mr. Johnson:

The NW Energy Coalition ("NWEC" or "Coalition") appreciates the opportunity to comment on the Integrated Resource Plan ("IRP") submitted by Puget Sound Energy ("PSE") on April 1, 2021, as provided by the Notice of Opportunity to File Written Comments issued April 6, 2021.

The Coalition is an alliance of more than 100 organizations united around energy efficiency, renewable energy, fish and wildlife preservation and restoration in the Columbia basin, low-income and consumer protections, and informed public involvement in building a clean and affordable energy future.

Overall comments

There are good elements in this IRP, which move PSE's resource portfolio in the right direction compared to past IRPs. Overall, the preferred resource portfolio shows progress in reducing emissions and advancing customer-side resources. Achieving a 70 percent reduction in greenhouse gas emissions by 2030 is noteworthy, and also presents many operational challenges. We appreciate the focus on renewable resources to fill the anticipated energy need, and increased acquisition of demand response and integration of distributed energy resources.

However, there are two key areas in which this IRP falls short in both aspiration and analysis. First, CETA requires that the clean energy targets be met in the lowest reasonable cost manner, considering risk. There are places where the IRP does not adequately explore this balance, and fails to consider a full range of potential solutions. This is especially true of PSE's preferred capacity strategy, which leaves many questions unanswered, and lacks sufficient analytical support. This, in turn, causes significant shortcomings in the Clean Energy Action Plan, where inadequate capacity and market analysis generates unambitious results for demand response and energy storage, and speculative reliance on a 255-MW biodiesel-fired peaker plant for capacity generation as well as up to 1,000 MW of unspecified "firm resource adequacy qualifying capacity contracts" using PSE's Mid-C transmission. When considered in the context of the need to transform our electric system by 2045, these results are rather unambitious, and

the preferred capacity strategy appears quite risky. While we are doubtful that these shortcomings can be remedied in this IRP, they should be addressed before the company commits to procure new capacity and resource adequacy resources.

Second, this IRP is a critical first step in implementation of the Clean Energy Transformation Act (CETA) RCW 19.405, and as such, the Commission must hold PSE to the new standards created by the Act, and CETA rules. While assessing PSE's compliance with the requirements, we also urge the Commission to consider the IRP as a policy document – does it set a new direction in electric system planning in accordance with the transformational policy direction of CETA? We are not convinced that this IRP has met that aim. Instead, it holds fast to traditional methods of least-cost planning, and treats CETA as an add-on compliance obligation, while stopping short of necessary innovation in planning and operations. Because we are doubtful that these issues can be addressed before PSE submits its CEIP, we urge the Commission to take steps to ensure that the CEIP will not be limited by the preferred resource portfolio provided in the IRP.

1. PSE's capacity strategy is not a lowest reasonable cost solution

In reviewing PSE's Final IRP, we find that the company's preferred capacity strategy stands out as both out of sync with the resource preferences provided in CETA, and falling short of the lowest reasonable cost criteria required in the electric utility resource planning statute. In meeting the standards required under CETA, an electric utility must pursue all cost-effective, reliable, and feasible conservation and efficiency resources, and demand response. In making new investments, an electric utility must, to the maximum extent feasible:

> *(i) Achieve targets at the lowest reasonable cost, considering risk; (ii) Consider acquisition of existing renewable resources; and (iii) In the acquisition of new resources constructed after May 7, 2019, rely on renewable resources and energy storage.* (RCW 19.405.040(6)(a))
>
> *"Lowest reasonable cost" means the lowest cost mix of generating resources and conservation and efficiency resources determined through a detailed and consistent analysis of a wide range of commercially available resources. At a minimum, this analysis must consider resource cost, market-volatility risks, demand-side resource uncertainties, resource dispatchability, resource effect on system operation, the risks imposed on the utility and its ratepayers, public policies regarding resource preference adopted by Washington state or the federal government, and the cost of risks associated with environmental effects including emissions of carbon dioxide.* (RCW 19.280.020(11))

PSE's preferred capacity strategy includes a reduction in short-term market purchases in favor of "firm resource adequacy qualifying capacity contracts," and acquisition of a 255 MW single-cycle combustion turbine fueled with biodiesel. It is not reasonable for the IRP to rely on this strategy over a more dynamic set of flexible load management and energy storage solutions, nor is this approach sufficiently supported by the analysis presented in the IRP or the CEAP. We

therefore cannot reasonably support the inclusion of this strategy in a lowest reasonable cost portfolio compliant with CETA for the following reasons:

- **Failure to consider reasonable alternatives:** The IRP fails to adequately consider the peak capacity credit of renewable + storage hybrid systems, and includes some odd results for renewables. We support the comments submitted by Renewable Northwest on this point. In our February 5th comments on the Draft IRP, we provided ELCC values determined by California utilities for a wider range of resources, which recommended average ELCC values for solar + storage of 98% and wind + storage of 95% in 2026.[1] We also proposed that PSE follow a staged approach to meeting its capacity need, maximizing the availability of so-called "energy limited" clean flexible resources to meet needs during typical peak periods BEFORE considering supplemental resources to meet rare long-duration peaks. Alternatives for supplemental long-duration peak capacity could include increased demand response, storage and hybrid systems, and surplus capacity imports from California. We see no evidence that PSE has considered these alternatives, and the result significantly undervalues the capacity contribution of both renewables and storage. PSE's failure to evaluate the capacity contribution of renewable hybrid resources - which are currently being procured by other Northwest utilities – renders the company's preferred capacity strategy even more unreasonable. We urge the Commission to direct PSE to conduct a more thorough analysis of potential capacity solutions, including renewable hybrid systems, demand-side resources, and California winter capacity imports.
- **Inadequate support for short-term market purchase strategy:** PSE proposes to reduce short-term market purchases by two-thirds in four years - transitioning the historical 1,500 MW limit to a 500 MW limit by the year 2027. While we recognize that the UTC directed PSE to consider its market reliance risk in its acknowledgement of PSE's last IRP, we are not convinced that the need for this significant of a change in market strategy has been adequately expressed, or its potential impacts adequately analyzed in this IRP. PSE did not appear to analyze multiple options for reducing market reliance, or a longer timeframe for doing so, and this leaves us questioning whether this approach is appropriate, since it appears to exacerbate the capacity need. There is also no comparison of the costs or risks of a strategy that relies more on short-term market purchases and a strategy that relies on biodiesel availability. The Commission should question this strategy, and be skeptical of the trade-offs between reliance on electricity markets on one hand, and renewable fuel markets on the other.
- **Insufficient analysis of resource adequacy qualifying capacity contracts:** To replace short-term market purchases, PSE will seek "firm resource adequacy qualifying capacity contracts, compliant with CETA, that meet PSE's resource adequacy requirements and

[1] 2020 Joint IOU ELCC Study. Prepared for California Investor Owned Utilities. (June 26, 2020) https://www.pge.com/tariffs/assets/pdf/adviceletter/ELEC_5868-E.pdf

align with a potential regional resource adequacy program." While we are intrigued by the prospect of CETA-compliant RA capacity contracts, we note that the design and full effect of a regional RA program remain under discussion, and the Commission has not determined whether PSE's participation in a proposed regional RA program is in the public interest. NWEC has been participating in the Stakeholder Advisory Committee for the NW Power Pool RA process. While we are hopeful that this process will deliver clean, flexible capacity resources that enable Washington utilities to comply with CETA and properly value customer-side resources, we note that the initial design of the program does not appear to distinguish between resource fuel type or otherwise recognize CETA eligibility requirements. We also note that the structure and governance of the program remain to be determined, including the role of states in providing oversight, and the process for public participation. We encourage PSE and the Commission to consider these factors as they provide input into the design of the regional RA program. At a minimum, we believe that the IRP should provide more detail about the anticipated nature of these contracts in order to justify their inclusion in a lowest reasonable cost portfolio.

- **Lack of market analysis for biodiesel supply or engineering analysis of using biodiesel as a peaking resource fuel:** PSE states that the limited run-time expected of these biodiesel-fired peaker plants could be met with the existing Washington state biodiesel supply. But, it does not provide enough analysis to demonstrate that burning biodiesel in a SCCT will prove to be a viable and cost-effective strategy, compared to other flexible capacity options in 2026. Further, given that the Washington Legislature recently passed a Clean Fuel Standard, we anticipate that much of the biodiesel production in the state will go toward transportation fuels, which is a higher value use of this limited resource in terms of its energy and emissions reduction benefits. As discussed above, hybrid resources (renewables + storage), combined with demand response and flexible load solutions are likely to be a much more reasonable option for flexible capacity generation in 2026. Finally, we would note that many leading studies on transitioning to a 100 percent clean grid support our conclusion, and that PSE provides no other evidence that burning biodiesel to generate power is a viable or preferred clean energy transformation and decarbonization strategy.
- **The Social Cost of Greenhouse Gases is not properly applied to dispatch of existing natural gas plants:** We continue to have concerns about how PSE has applied the Social Cost of Greenhouse Gases in this IRP. PSE's failure to apply the SCGHG to dispatch will distort these facilities' use in the dispatch model, and will be inconsistent with the method used to determine PSE's compliance obligation under the recently passed Climate Commitment Act. We support the comments of Jim Lazar on this point.

2. PSE's IRP is not transformational in its consideration of demand-side resources

As stated in our February 5th comments on the Draft IRP, the standard for integrated resource planning has changed. IRPs are no longer simply analyzing lowest reasonable cost alternatives, but *lowest reasonable cost alternative pathways that lead to achieving the 2030 and 2045 standards*. Achieving these standards under a lowest reasonable cost framework will require a new approach to integrated resource planning, which properly values the resources that will be necessary to transition to a 100% clean grid.

While we are glad to see the openness to demand-side resources reflected in this IRP, and the accompanying Request for Information concerning DERs, we note that this IRP adheres to a traditional approach to least-cost planning in a number of important ways, which prevent it from being a transformational planning document. For example, Figure 1-3 presents PSE's expected "renewable energy need", without factoring in the benefits of any demand-side resources, which would reduce the need significantly. Presenting CETA requirements in this way is misleading, since the law requires that demand-side resources be considered first before new investments in supply-side resources. Later, the Clean Energy Action Plan states, "the final analysis indicates that although current market power prices are low, accelerating the acquisition of [demand-side resources] (DSR) continues to be a least-cost strategy to meet renewable requirements.... The large amounts of renewable resources needed to meet CETA move higher cost demand-side resources into the portfolio because conservation reduces load, thereby reducing the amount of renewable resources needed to meet requirements." (2-8)

We agree with this statement, and support the basic outcome - that demand-side resources provide a significant contribution to meeting the clean energy targets in the bill. The IRP analysis evaluates the amount of DSRs that are cost-effective to meet the portfolio's capacity and energy needs, compared to CETA-compliant supply-side resources. However, this doesn't tell the whole story. We are concerned that this approach to resource planning stops short of actually recognizing the full value of DSRs, which have benefits beyond their value as a compliance resource under CETA. The demand response additions, in particular, could be much more ambitious.[2] In our February 5th comments on the Draft IRP, we offered a simplified approach for accelerating the acquisition of grid-enabled water heaters as a demand-side resource.

Broadly, NWEC has serious concerns that the tried-and-true power planning models in use in the region are not well-suited for a high-penetration renewables scenario, and are undervaluing demand-side resources. If the shortcomings of our current planning models are not addressed, this trend could have long-term implications for EE and DR programs in the region, reducing their operational capacity and ultimately, their effectiveness. DSRs have many benefits, some of which are not accounted for in current cost-effectiveness criteria:

[2] For example, Portland General Electric's 2019 IRP includes 141 MW winter and 211 MW summer demand response by 2025.

- Unlike many clean energy resources, energy efficiency is available at all hours and provides many ancillary system benefits and non-energy benefits.
- Energy efficiency and demand response bring locational value and time of use value to the grid, which is currently not adequately accounted for in cost-effectiveness calculations.
- The societal benefits of reducing energy burden to overburdened communities and vulnerable populations, and promoting job growth in the region after a period of economic hardship, are not accounted for in cost-effectiveness calculations.
- DSRs are also an essential part of reducing the risk of the overall CETA-compliant portfolio, in the event that supply-side resources are unavailable, construction is delayed, or transmission pathways are constrained.

We encourage PSE and the Commission to evaluate what changes to existing planning models and cost-effectiveness criteria are needed in order to properly value DSRs in a 100% clean grid. This will be an important consideration in ensuring that utilities implement CETA in a lowest reasonable cost manner, supported by analysis in their IRPs. We are encouraged by the potential use of Customer Benefit Indicators to potentially help with this transformation, but we note that these metrics are in a preliminary phase of development in this IRP, and we look forward to further development through the Equity Advisory Groups and the CEIPs.

Conclusion

We appreciate the opportunity to comment on PSE's Final IRP. Due to the shortcomings still present in the IRP at this time, we urge the Commission to take steps to ensure that PSE's CEIP will not be limited by the preferred resource portfolio provided in the IRP.

Respectfully,

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May 6, 2021

Via Electronic Filing

Mr. Mark L. Johnson
Executive Director & Secretary
Washington Utilities & Transportation Commission
621 Woodland Square Loop SE
Lacey, WA 98503

Re: In the Matter of Puget Sound Energy 2021 Integrated Resource Plan
Docket No. UE-200304/UG-200305

Dear Mr. Johnson:

Pursuant to the Washington Utilities and Transportation Commission's (the "Commission") April 6, 2021 Notice of Opportunity to File Written Comments, the Alliance of Western Energy Consumers ("AWEC") respectfully submits these comments on Puget Sound Energy's ("PSE" or the "Company") 2021 Integrated Resource Plan ("IRP").

AWEC focuses its comments on two action items in the IRP: (1) PSE's proposal to reduce its reliance on market purchases to meet its capacity needs; and (2) PSE's identification of biodiesel-fueled simple cycle combustion turbines to meet flexible capacity needs.

1. <u>PSE has not provided a sufficient basis to reduce its reliance on market purchases for capacity to 500 MW by 2027.</u>

The 2021 IRP proposes to reduce PSE's reliance on short-term market purchases through 2027, lowering the maximum available capacity from 1,500 MW to 500 MW.[1/] PSE identifies increasingly constrained supply due to the retirement of dispatchable capacity in the west as the basis for this decision. PSE's decision increases its capacity deficit by 947 MW in 2027,[2/] which it proposes to fill with higher cost resources such as simple cycle combustion turbines and "firm resource adequacy qualifying capacity contracts."[3/]

1/ PSE 2021 IRP at 1-7.
2/ PSE 2021 IRP at 3-35.
3/ PSE 2021 IRP at 1-13.

PSE's position that capacity is becoming constrained due to primarily coal plant retirements is indisputable, and some reduction to PSE's reliance on market purchases for capacity is likely prudent. AWEC is concerned, however, that PSE's proposal to reduce that reliance to 500 MW by 2027 lacks any analytical basis. Rather, PSE's own resource adequacy modeling shows "that of the 1,500 MW of available Mid-C transmission, PSE was only able to fill 1,000 MW in January 2027."[4/] It seems logical, therefore, that PSE would adopt a resource plan that reduces its reliance on market purchases to 1,000 MW in 2027, not 500 MW. Yet, the IRP offers no explanation for PSE's decision. PSE only asserts that regional events like the Enbridge pipeline rupture in the winter of 2018-2019 result in increased market volatility, and that PSE has experienced a significant reduction in trading volume in the day-ahead market, which is "suggestive of more energy being transacted before the month of delivery."[5/]

With regard to the first rationale, the notion that regional events like supply shortages and forced outages increase market volatility is neither surprising nor new. To justify a reduction of market purchases based on these events, PSE could have modeled whether these events are occurring with more frequency than they have in the past, and performed a cost and risk assessment to determine whether the cost of buying in high-priced hours during these events offsets the savings PSE realizes by substituting market purchases for more expensive alternatives. To AWEC's knowledge, however, the Company did not perform such an analysis.

With regard to the second rationale, PSE offers no evidence that reductions to traded volumes in the day-ahead market are due to more energy being transacted before the month of delivery. AWEC reviews the power costs of each utility in the region and has learned that a substantial cause of the decline in day-ahead traded volumes is the evolution of the Energy Imbalance Market ("EIM"). Market participants hold generation back in the day-ahead period with an eye toward receiving a higher price for it in the EIM. The reduction in day-ahead traded volumes, in other words, is not necessarily because this generation has already been secured.

Finally, PSE's proposal to replace a portion of its short-term market purchases with "firm resource adequacy qualifying capacity contracts" is unclear. PSE does not identify anywhere in the IRP that AWEC has found what characteristics of a contract would allow it to provide resource adequacy.[6/] The requirements associated with demonstrating resource adequacy are unsettled and are being heavily debated in various forums, including in the Northwest Power Pool's resource adequacy initiative,[7/] at the Oregon Public Utility Commission,[8/] and at this Commission.[9/] Does a "resource adequacy qualifying capacity contract," for instance, need to be associated with a specified resource? What term does such a contract need to have to qualify as meeting resource adequacy? The IRP does not answer these and similar questions, which have a direct bearing on the cost of these contracts.

4/ PSE 2021 IRP at 3-33.
5/ PSE 2021 IRP at 3-34.
6/ See generally, PSE 2021 IRP Chapter 7.
7/ https://www.nwpp.org/about/workgroups/12.
8/ Docket No. UM 2143.
9/ Docket No. UE-210096.

AWEC recommends that PSE modify its proposed reduced reliance on market purchases to 1,000 MW in 2027 or provide a more thorough analytical basis for reducing this reliance below this amount. PSE's reliance on the market for capacity has consistently proven reliable and has been a source of low-cost power for customers, and any reduction in purchases should be well founded. Additionally, AWEC recommends that PSE further explain what the characteristics of a "resource adequacy qualifying contract" would be and what the bases for these characteristics are so that the Commission and stakeholders can adequately review whether these characteristics are necessary and the contracts are in the best interest of customers.

2. PSE has not modeled all possible peak generation options, and has not shown that biodiesel-fueled peaking generation is a viable option to meet capacity needs

The IRP preferred portfolio selects 255 MW of peaking capacity fueled by biodiesel to meet PSE's capacity needs in the 2026-2031 timeframe.[10/] AWEC understands PSE's desire to secure CETA-compliant peaking capacity, and commends PSE for identifying biodiesel as a potential option. AWEC is concerned, however, that PSE has done insufficient analysis to identify the least-cost means of meeting peak capacity needs, and has not demonstrated that biodiesel is feasible both technically and economically.

With regard to CETA-compliant resource alternatives, PSE states that it "is exploring fuel alternatives to natural gas fuel, such as [renewable natural gas ("RNG")], hydrogen and biodiesel …" but the Company only modeled biodiesel in the 2021 IRP.[11/] AWEC feels it is important to understand the economics and feasibility of fueling peaking resources at least partially with RNG, potentially combined with offsets to ensure carbon neutrality, before PSE commits to a different unproven fuel such as biodiesel. PSE must meet CETA's clean energy requirements at the lowest reasonable cost, which requires the Company to understand the economics of potentially viable CETA-compliant alternatives.[12/]

As to the analysis it does perform, PSE identifies that if it runs peakers with biodiesel, they would need to run approximately 10,000 MWhs per year, which would require 828,000 gallons of biodiesel.[13/] To demonstrate the feasibility of biodiesel as a fuel option, PSE then simply compares that consumption to total state-wide biodiesel production of 114 million gallons per year and concludes that there is sufficient fuel to run any peaker(s) it would acquire.[14/] The Company does not analyze where biodiesel production occurs relative to the location of the peakers it might acquire; how it will transport this biodiesel to its peakers and at what cost; whether storage for biodiesel will exist at the peakers it acquires, how much and at what cost. As AWEC understands it, PSE used the same assumptions previously applied to fuel oil to back up a gas-fired peaking unit for biodiesel. The Company does not explain why the assumptions for fuel oil would be equivalent for biodiesel. Moreover, while PSE may be correct that the peaking resources it will acquire will run for relatively few hours, those hours are likely to be concentrated in certain months of the year. Additionally, in some periods, such as during a

[10/] PSE 2021 IRP at 1-13.
[11/] PSE 2021 IRP at D-85.
[12/] RCW 19.405.060(1)(c)(ii).
[13/] PSE 2021 IRP at 3-21.
[14/] Id.

regional reliability event, these resources may be required to run much longer. Ensuring an adequate supply of biodiesel in these periods is imperative to the feasibility of these resources in meeting the Company's needs.

In addition to meeting its clean energy requirements, PSE also has an obligation under CETA to maintain the reliability of its system at the lowest reasonable cost.[15/] It may be that biodiesel-fueled peakers that are feasible and cost-effective will bid into PSE's request for proposals. Until this option is proven out, however, AWEC encourages the Company not to dismiss natural gas as a low-cost option for ensuring reliability, particularly in the near term where a newly acquired resource can still have a useful life of upwards of 20 years under CETA. This will allow PSE to further study the potential for biodiesel to meet its peaking requirements in the outer years of the IRP study period. Moreover, because PSE expects these peaking units to run relatively infrequently, the increased emissions associated with a gas-fired resource are negligible compared to one fueled by biodiesel, based on PSE's analysis.[16/]

AWEC appreciates the ability to provide comments on PSE's 2021 IRP. Please feel free to contact me if you have any questions or concerns.

Sincerely,

/s/ Tyler C. Pepple
Tyler C. Pepple

[15/] RCW 19.405.060(1)(c)(i)-(ii).
[16/] PSE 2021 IRP at 8-102 & 8-103.