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Puget Sound Energy
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**RE: Comments of Swan Lake and Goldendale**
**Puget Sound Energy – Draft Integrated Resource Plan**
**UTC Docket UE-200304**

The companies working to develop the Swan Lake and Goldendale pumped hydro storage projects ("Swan Lake and Goldendale") greatly appreciate Puget Sound Energy's ("PSE") work that went into preparing its draft Integrated Resource Plan ("Draft IRP"), filed in the above-referenced proceeding on January 4, 2021. The Washington Utilities and Transportation Commission ("Commission") subsequently issued a notice, on January 5, 2021, indicating it would accept comments on PSE's Draft IRP until February 5, 2021.[1] In response to that notice, Swan Lake and Goldendale are filing these comments.

These comments highlight several areas where Swan Lake and Goldendale believe PSE's modeling and approach with respect to pumped hydro storage should be improved. First, Swan Lake and Goldendale believe that PSE's Draft IRP incorporation of new gas resources into its future resource plans is disconnected from the political reality PSE faces in Washington State and contradicts PSE's recent announcement of a path to net-zero carbon. Second, Swan Lake and Goldendale would like to stress that PSE's analysis should prioritize sensitivities that are consistent with Washington State policies and goals, and in particular its Clean Energy Transformation Act ("CETA") requirements. Third, PSE's Draft IRP significantly focuses too much on batteries relative to other non-emitting technologies, which poses both financial and operational risks to PSE's customers. Fourth, the Peak Capacity Credit for pumped hydro storage is lower than appears reasonable, which Swan Lake and Goldendale believe is due to specific modeling assumptions PSE is using, which could be improved. Fifth, and finally, Swan Lake and Goldendale strongly urge PSE and the Commission to take a more active approach to managing future capacity needs, thereby heeding the lesson that California's capacity crunch revealed.

## I. PSE's Draft IRP Does Not Recognize the Political Reality that New Gas Resources are Infeasible in Washington

PSE's Draft IRP identifies a need for 750 MW of flexible capacity starting in 2026.[2] To meet this need, PSE's Draft IRP has identified "alternative fuel enabled combustion turbines" as the most

[1] Notice of Opportunity to File Written Comments, Docket UE-200304, Jan. 5, 2021, available at: https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/GetDocument.ashx?docID=33&year=2020&docketNumber=200304.
[2] Draft IRP at 1-16.

cost-effective resource.[3] However, this assumption is faulty because new gas resources in Washington state, even ones operated by "alternative fuels," are politically infeasible. Furthermore, the inclusion of new gas resources in the Draft IRP directly contradicts PSE's recent announcement of a path toward "beyond net-zero" carbon emissions.[4]

Puget's Draft IRP seems to leave the door open to powering the 750 MW of flexible capacity needed in 2026 with natural gas.[5] As evidence of the political realities associated with permitting new gas resources, PSE should take note of Portland General Electric's recent experience with the attempted expansion of its Carty Generating Station (referred to as "Carty 2"). When Portland General proposed expanding the capacity of Carty in its IRP process, significant stakeholder opposition arose and effectively killed the gas-fired plant as a potential solution to meet Portland General's future capacity needs.

Despite PSE's own admission in the Draft IRP that renewable gas to fuel its proposed natural gas peakers may not be readily available,[6] the Draft IRP apparently assumes such fuel and cost is priced at a level that is comparable to that of natural gas,[7] resulting in an artificially depressed price of a renewable natural-gas fired plant and, thereby, making it appear to be the least-costly solution. Specifically, the Draft IRP admits that PSE is not appropriately accounting for the cost of a peaker's fuel in its analysis,[8] which is a significant cost component for a renewable natural gas facility that must be considered in order to perform a fair analysis of the various flexible capacity resources PSE is analyzing. However, pricing renewable natural gas at a price comparable to traditional natural gas—as PSE appears to do in its Draft IRP—is an extremely



[3] *Id*.

[4] *See Beyond Net Zero Carbon by 2045*, Puget Sound Energy, Jan. 2021, available at: https://www.pse.com/-/media/PDFs/Press%20release/7527%20NetZeroPledge.pdf; *see also Puget Sound Energy Sets 'Beyond Net-Zero' Emissions Target*, S&P Global (Jan. 22, 2021), available at: https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/puget-sound-energy-sets-beyond-net-zero-emissions-target-62250492

[5] *E.g.*, Draft IRP at 3-25 ("While PSE hopes technology innovations in energy efficiency, demand response, energy storage and renewable resources will eclipse the need for additional peaking capacity plants of any kind in the future, alternative fuel peakers appear to be the least cost resource to meet the peak reliability needs at the time of this analysis. In all sensitivities that allowed the addition of new combustion turbines, at least one is added by 2026 and the second is added by 2030. The combustion turbines have the best peak capacity value because of their ability to dispatch as needed with no duration limits. PSE is further exploring renewable and alternative fuel supply availability and technology.") (emphasis added).

[6] *Id*.

[7] Of note, Swan Lake and Goldendale see no evidence that PSE is even attempting to model the inclusion of renewable natural gas to fire its proposed peakers. Instead, Appendix D at D-80 to D-88 only speaks to natural gas a fuel source and PSE's analysis appears to base the costs on traditional natural gas fuel prices.

[8] *See* Draft IRP at Fig. 5-15, fn. 1 (noting "Variable O&M costs do not include the cost of fuel for thermal resources"); *see also id.* at Appendix D at D-80 to D-88 (e.g., D-85, which states, "In this analysis, natural gas supply is assumed to be firm year-round at projected incremental gas pipeline firm rates. This analysis assumes 20 percent of gas storage is available to the baseload CCCT plants modeled to accommodate mid-day start-ups or shutdowns. The unit is assumed to be connected to the PSE transmission system and as such does not incur any direct transmission cost.").

flawed assumption that likely, and significantly, distorts the economics of the various flexible capacity resources in favor of gas peaking facilities.[9]

Because Swan Lake and Goldendale do not believe new gas facilities are feasible under CETA or in light of the political climate in Washington State, Swan Lake and Goldendale request that PSE provide a demonstration that new natural gas-fired generation would be permissible under the few and limited CETA provisions allowing construction of such resources. In particular, Swan Lake and Goldendale provide information indicating new gas resources are necessary due to violation of reliability standards and, if violations are possible, whether pumped storage could help alleviate or solve those potential violations. Furthermore, Swan Lake and Goldendale request that PSE provide all stakeholders with an updated IRP analysis that incorporates a more appropriate, renewable natural gas fuel price into the price of a gas peaking facility. Given that market prices for renewable natural gas are somewhere in the range of eight to ten times more expensive than conventional natural gas,[10] Swan Lake and Goldendale strongly believe that using a more appropriate assumption for fuel price will likely result in the proposed gas peaking facilities no longer being selected in the Draft IRP as a least cost solution. Additionally, it is unclear from the Draft IRP that, even if renewable natural gas were available at a competitive price, such generation would be non-emitting or otherwise comply with the requirements of CETA. The lack of any evidence to demonstrate CETA compliance for such theoretical, alternative gas-fueled resources suggests the selection of these resources is a questionable assumption to make.

Finally, while somewhat speculative, it is Swan Lake and Goldendale's judgement that PSE will not be able to obtain Commission approval to build new gas fired resources unless it first demonstrates that it has exhausted all feasible non carbon emitting capacity alternatives. Principal among such alternatives would be pumped storage resources, such as Swan Lake and Goldendale, given their unique flexibility to meet both long duration capacity demand in the winter and to firm up acquired Northwest wind resources (*e.g.* improve their ELCC values and relative economics for PSE), which will further aide PSE in meeting its CETA requirements and clean energy goals. Using pumped storage to meet PSE's projected capacity needs ensures PSE is using not only a carbon free resource, but also one that has decades long history of reliable operation. Such a proven track record is in direct contrast to speculative assumption of relying on renewable natural gas (from both a price and available supply perspective) and depending on extensive use of batteries for raw capacity purposes (as further described in Section III below).

## II. Instead of Seeking to Build New Gas Resources, PSE's IRP Should Focus on Sensitivities and Scenarios that Meet PSE's CETA Requirements and PSE's Own Climate Goals

In addition to the CETA requirements that mandate the removal of emitting generation sources from PSE's generation portfolio, Governor Inslee also recently announced legislation that would

[9] *E.g., Where Is Renewable Natural Gas Moving Forward and What Will This Mean for the Industry and States?*, Waste 360 (April 28, 2020), available at: https://www.waste360.com/gas-energy/where-renewable-natural-gas-moving-forward-and-what-will-mean-industry-and-states-part-2 (noting the price for renewable gas is somewhere around $18 per MMBtu, whereas conventional gas is about $2 per MMBtu).

[10] *Id*.

phase out all natural gas in homes and businesses by 2050.[11] Furthermore, PSE recently announced that it would move its generation fleet to "beyond net zero" carbon emissions by 2045.[12]

Given the unfriendly political environment for natural gas, PSE should focus its efforts on aligning with CETA and transitioning away from natural gas facilities. To that end, Sensitivities N and O represent what Swan Lake and Goldendale believe are some of the most likely future scenarios modeled by PSE and, therefore, Swan Lake and Goldendale request these scenarios be further explored, including a more robust benchmarking of the assumptions and inputs that went into developing these sensitivities.

## III. PSE's Draft IRP is Too Reliant on Batteries for Potential Capacity

Swan Lake and Goldendale are concerned about the over-reliance on batteries in PSE's Draft IRP. As noted in Section II above, given the recent announcements regarding the phasing out of natural gas service by utilities in Washington, Sensitivities N and O represent what Swan Lake and Goldendale believe are some of the most likely future scenarios modeled by PSE. Both of these scenarios rely **significantly** on battery storage to meet PSE's future capacity needs. For example, while PSE's preferred portfolio calls for 750 MW of battery energy storage by 2045,[13] Sensitivity N, where PSE modeled a 100% renewable fleet by 2030, suggests that PSE would acquire **18,000 MW of batteries by 2030**. Additionally, Sensitivity O, where PSE modeled all gas generation out of its fleet by 2045, concludes that a similar amount of battery storage would be necessary to meet this scenario.[14]

Swan Lake and Goldendale suggest that such over-reliance on batteries is misplaced, unfounded, and untested, unnecessarily exposing PSE's customers to higher-than-projected replacement costs and potential reliability concerns. As support for Swan Lake and Goldendale's concerns about the over-reliance on batteries, attached to these comments is a series of three research papers by Navigant Consulting that highlights some of the complications, challenges, and pitfalls with relying too heavily on batteries, including the significant environmental degradation impacts and hidden costs of those projects.

Of particular note, Swan Lake and Goldendale would highlight for PSE that a key issue with proposing acquisition of Li-ion batteries for raw capacity needs is their likely performance for this new application. For example, a recent presentation by Energy GPS suggests that batteries are well-suited for meeting ancillary services needs; however, they are largely unable to provide significant energy or capacity to utilities, making them inept for meeting the upcoming capacity

[11] *See Washington State Proposes Legislation to Phase Out Natural Gas Utility Service*, S&P Global, Jan. 6, 2021, available at: https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/washington-state-proposes-legislation-to-phase-out-natural-gas-utility-service-61819435.

[12] *See Puget Sound Energy Sets 'Beyond Net-Zero' Emissions Target*, S&P Global (Jan. 22, 2021), available at: https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/puget-sound-energy-sets-beyond-net-zero-emissions-target-62250492

[13] *See* Draft IRP at Fig. 1-4.

[14] *Id*. at 8-58.

deficit in the Pacific Northwest, which further means that they are also not well suited to provide the type of capacity PSE is modeling in its Draft IRP.

Additionally, there is virtually no data on Li-ion battery performance for utility scale applications. Battery installations of over 50 MW have run for no more than 1-3 years in an operational grid/utility environment, meaning it is impossible to credibly judge whether a four-hour discharge duration used for capacity purposes is a suitable use for batteries. Additionally, PSE assumes a 30-year lifespan for batteries, with at least two cycles per day, at an Operations & Maintenance cost of approximately $23 to $32/kw-yr.[15] Swan Lake and Goldendale have significant concerns with this assumption, particularly considering most other utilities in the Pacific Northwest assume half of that useful life (15 years) and only one cycle per day at a cost similar to those projected by PSE.

Currently planned Li-ion battery installations, especially in California, should provide the necessary operational data regarding whether batteries are suitable for this capacity purpose, however, it will probably not be sufficiently robust to validate (or rebuke) currently advertised Li-ion performance metrics until the post-2025 timeframe. The need for more data is especially important since, in an operational utility environment, these large battery installations will be fully charging and discharging several times per day over a multi-month per year period. Similar to a cell phone battery, the more it is used, the quicker its capacity degrades, meaning the currently-asserted and modeled assumptions regarding charge/discharge and useful life cannot be fully vetted until more information is available. For these reasons, Swan Lake and Goldendale suggest that PSE's assumptions regarding useful life and the degradation rate of batteries may be too low. Without existing evidence that supports PSE's current battery projections, Swan Lake and Goldendale believe that PSE's massive battery acquisition campaign would over-expose PSE to significant replacement and upgrade costs more frequently than modeled,[16] thereby resulting in massively inflated battery acquisition and maintenance costs to the detriment of PSE's ratepayers.

Besides these potential performance issues with batteries, PSE should examine the serious problems CAISO is now experiencing in integrating Li-ion batteries into its grid to prevent additional outages in summer 2021. Specifically, CAISO has been struggling to interconnect batteries and operate them. More pointedly, CAISO has found it cannot depend on their output to assist in meeting the summer net demand evening peaks, particularly when the sun sets. The battery owners want to retain the ability to provide high value/lucrative ancillary services throughout the day, in addition to supplying energy for the post-solar evening peak. CAISO is concerned that allowing such marketing flexibility will result in an insufficient state of charge to provide the necessary evening peak capacity to meet load. This debate has been going on for over two years with no resolution in sight. While this is a unique operational problem that should eventually be worked out, it provides an excellent example of the complex issues associated with integrating such a new technology with highly uncertain performance characteristics into the

[15] *Id*. at Appendix D, Fig. D-32.

[16] Additionally, relying too heavily on batteries exposes PSE to the uncertain safety risks associated with batteries that have been shown to be the cause of fires and other safety risks. *See APS Details Cause of Battery Fire and Explosion, Proposes Safety Fixes*, Greentech Media, July 27, 2020, available at: https://www.greentechmedia.com/articles/read/aps-battery-fire-explosion-safety-lithium-mcmicken-fluence.

grid. Most experts believe that any eventual solution will cost a lot more, and result in suboptimal performance, from what the California utilities and their regulators assumed when they initially acquired these resources. PSE will undoubtedly face the same state of charge/reliability problems if it acquires significant amounts of batteries to meet its peak capacity needs. In contrast, pumped storage, given its longer discharge capability and inherent operational flexibility, will either avoid such problems entirely or greatly minimize their real-world cost and performance impacts inherent in batteries used to meet capacity needs.

## IV. The Peak Capacity Credit for Pumped Hydro Storage is Too Low

PSE's Draft IRP attributes an eight-hour pumped storage resource a peak capacity credit of only 37.2% in year 2027, which the Draft IRP indicates would increase to 43.8% in 2031.[17] Swan Lake and Goldendale would also note for the Commission's benefit that PacifiCorp, Northwestern, and Portland General Electric use capacity contribution figures in the range of 89-100% for pumped storage in their respective IRPs. Thus, PSE's use of a sub-40% figure is far too low and does not align with common practice amongst Pacific Northwest for these reliable, and flexible capacity resources. Therefore, Swan Lake and Goldendale request that PSE provide further information and support for their capacity figures—particularly including how they were calculated and why they are delivered to be on reasonable and accurate assumptions. Swan Lake and Goldendale believe these figures are lower than is reasonable for a grid-scale capacity resource like pumped storage.

In an effort to better understand PSE's modeling, Swan Lake and Goldendale raise the following issues for consideration to ensure that all of the unique benefits associated with pumped hydro are accurately reflected in PSE's analysis. Swan Lake and Goldendale are interested in seeing PSE's analysis of how pumped hydro storage compares to batteries along different saturation curves. As PSE discussed at its meetings prior to filing of the Draft IRP, PSE may be basing its capacity contribution calculations on a much smaller increment of batteries than for pumped hydro storage. Comparing a 25 MW battery to a 500 MW storage project unfairly pushes pumped storage further down the capacity saturation curve, resulting in a biased comparison.

While it is true that pumped storage projects are generally larger in minimum size than battery projects, PSE's analysis ignores the reality that PSE would not necessarily need to own or contract for the full capacity of a project. PSE may find that modeling smaller slices of a pumped hydro storage project results in a higher capacity contribution for pumped storage and lower overall cost of a portfolio that includes pumped storage.

Moreover, PSE may not be looking at state of charge properly, which could explain part of the lower than expected capacity contribution values. Swan Lake and Goldendale appreciate the complexity associated with modeling resource adequacy and recognize the time PSE has put into calibrating the model to produce reasonable capacity contribution estimates. That said, Swan Lake and Goldendale believe that additional refinements may be required in order to properly model the dispatch of long duration storage, such as pumped hydro. Pumped hydro facilities are responsive

[17] *See* Draft IRP at Fig. 2-6.

to demand and can quickly dispatch to serve several hours of critical peak periods. Assuming that the highest priority of pumped storage is reliability, then PSE would be interested in charging the pumped hydro during off peak hours to ensure there is enough water in the reservoir to address multi-hour capacity need periods.

Operationally, peak load days are fairly predictable, meaning that PSE's operations employees would set up for those days in advance to ensure its hydro (or pumped storage) facilities have sufficient pond fills to cover the expected peak load hours. Furthermore, the pumped hydro facility would not necessarily need to deplete its full reservoir daily to address capacity needs (low frequency of 8-hour reliability events), reducing the total amount of charging required to address all potential loss of load events. A low capacity contribution value (ELCC) for pumped hydro implies that the facility is energy limited and does not have access to the market or other on-system resources to charge for peak load events. Swan Lake and Goldendale understand that PSE is concerned about the evolving market on peak import capability, particularly during the winter, given the emerging regional capacity shortage documented in several NWPCC studies. However, import assumptions during off-peak hours in the winter should be re-visited, given that these would be key hours when long-duration storage would charge for the winter on-peak reliability. Additionally, if not already doing so, Swan Lake and Goldendale recommend that PSE consider optimizing the dispatch of their resources over a wider time window (1-2 weeks). A wider optimization time window in resource adequacy models allow for greater operational flexibility of long duration storage and minimize the need for daily charging and discharging.

Thus, Swan Lake and Goldendale would like to better understand PSE's perspective on how pumped hydro storage would be used operationally to understand if the capacity contribution modeling reflects those operational assumptions. Stated another way, assuming PSE is uninterested in economic arbitrage during winter months where there is a higher loss of load probability, PSE should conform its capacity contribution modeling to reflect those operational priorities.

As further support that PSE's capacity contribution figures for pumped storage are too low, Swan Lake and Goldendale note that PSE's analysis of its hydro projects do not appear to discount the available capacity of those projects, despite their nearly-identical operation characteristics to pumped storage. For example, Figure D-3 of PSE's Draft IRP identifies the net maximum capacity from various hydro facilities for which PSE has contracts, including the Rock Island dam. Rock Island is a Columbia River dam that has no designated reservoir to speak of other than what storage is available in the Columbia River basin, meaning it has somewhat limited operating and storage capabilities. Despite these limitations, there appears to be no discount to the capacity contribution of Rock Island. Swan Lake and Goldendale request that PSE provide further explanation of why run-of-river facilities like Rock Island are not discounted, yet facilities with storage (such as pumped storage) receive significant capacity contribution discounts.

Swan Lake and Goldendale suggest that their pumped storage facilities should be treated similarly to PSE's other hydro facilities, for purposes of modeling their respective capacity contributions in this Draft IRP, considering the similarities in operating characteristics and flexibility provided to PSE. One possibility for further sensitivity exploration would be to re-run Sensitivities N and O,

but using a higher capacity contribution figure for pumped storage, consistent with Swan Lake and Goldendale's comments expressed herein.

Finally, Swan Lake and Goldendale suggest that PSE's stochastic analysis underestimates the risk of a particular variable resource not being available when needed for reliability, compared to a resource like pumped storage. PSE's modeling should also consider extended cold snaps, or other highly correlative weather events, where pumped hydro storage is likely to outperform other technologies. This is an important aspect of resource diversity. Wide variations from year to year are arguably mitigated by looking at averages, but Swan Lake and Goldendale urge PSE to better explain how it is valuing the lack of variability associated with pumped hydro storage from year to year.

## V. California's Recent Capacity Shortages Suggest PSE and the Commission Should Act Swiftly to Shore-Up the Looming Capacity Crunch in the Pacific Northwest

If California's recent capacity shortages, rolling blackouts, and reliability issues have anything to teach us in the Pacific Northwest, it is that we cannot continue to delay addressing our looming capacity issues. Another study by E3 from December 2019, suggests that the capacity needs in the Pacific Northwest are significant—up to 7 GW by 2025, up to 10 GW by 2030, and up to 20 GW by 2050.[18] These figures are alarming. When coupled with California's recent capacity shortfalls and rolling blackouts, Swan Lake and Goldendale strongly urge PSE and the Commission to consider taking immediate steps to address this significant, looming problem.

One specific step PSE can take in this Draft IRP is to remove any assumption that future capacity purchases will be available via the bilateral markets. While PSE is completing an additional analysis on the availability of market purchases to support peak capacity needs,[19] PSE's Draft IRP drastically over-relies on capacity market purchases to meet its peak load days. For example, Fig. 7-13 suggests that PSE intends to rely on up to 1,471 MW of short-term market purchases in 2027 to ensure it is meeting its peak load. As noted by the E3 study referenced above, and supported by every utility in the Pacific Northwest's IRP results that show a need for capacity, this assumption is both flawed and presents grave reliability concerns for PSE and its customers. PSE and the Commission need only look to the south for an example of what happens when utilities and regulators assume capacity will be available to meet peak load days, but no such capacity actually shows up.

In addition, PSE has apparently programed its GENESYS model to assume 3,400 MW of short-term imports from California (presumably available 24/7) to meet Northwest and PSE winter peak capacity needs.[20] While it is unclear how much winter capacity such a regional import assumption provides to PSE, such an assumption creates three major problems for the accuracy of PSE's resource adequacy ("RA") analysis. First, the 3,400 MW South-to-North on the California Oregon Intertie ("COI") apparently comes from the historical available transmission limit on that path in

[18] *See Capacity Needs of the Pacific Northwest-2019 to 2030*, E3, Dec. 2019, available at: https://www.ethree.com/wp-content/uploads/2019/12/E3-PNW-Capacity-Need-FINAL-Dec-2019.pdf.
[19] Draft IRP at 7-3.
[20] *Id*. at 7-6, 7-7.

the South-to-North direction. It has nothing to do with whether excess generation is actually available for export from California during winter months. To that end, regional reliability planners, under the guidance of the Northwest Power and Conservation Council ("NWPCC") have historically used 2,500 MW of assumed winter imports from California. Second, in light of pending winter capacity shortages in the Northwest and current reliability problems in California, the Northwest Power Pool ("NWPP"), of which PSE is a member, is developing an RA program specifically for its members. While that program is still in its design stages, one of its key initial decisions has been to avoid relying on annual, seasonal, or even monthly averages of available RA capacity, imported or otherwise, and instead focus on establishing RA capacity for each critical hour during the day in grid stressed periods. Third, given California's well-advertised problems, it may be appropriate to assume some level of RA type imports for hours 0100 to 1600 on a winter day, but it is clearly not appropriate to assume any available RA imports for hours 1600-2100 on a winter day, given California's massive evening ramp and need for capacity to support its evening peak. California has an ever-increasing, post-solar evening ramp (which was the main cause of its August 2020 outages). Furthermore, even though California evening temperatures are moderate during the winter, many of their thermal resources are offline for needed maintenance during that period. Considering these three factors together, PSE's assumptions that it can receive its "share" of the 3,400 MW South-to-North transmission capability during winter early evening hours, and that any capacity will be available from California to import during those early evening hours, are simply not prudent assumptions to make. Instead, PSE should assume 0 imports for hours 1600-2100 and procure needed capacity resources from within the Northwest.

To avoid a fate like California, Swan Lake and Goldendale request that PSE significantly reduce their reliance on short-term capacity purchases in its Draft IRP modeling and assumptions, and re-run its analysis to demonstrate its real capacity needs. Specifically, Swan Lake and Goldendale request that PSE run a scenario where the 2021-2030 reliance on 1,500 MW of annual market purchases[21] is reduced by 50%, to no more than 750 MW. Modifying the Draft IRP assumption to limit PSE's ability to acquire capacity from the market, likely better aligns with the realities facing the Pacific Northwest capacity markets and, while the results of that analysis may be dire, doing so would prevent the significant reliability concerns Californians are currently experiencing, as well as the price shock associated with later attempting to expeditiously build and acquire capacity resources.

Sincerely,

*/s/ Nathan Sandvig*

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[21] *Id*. at 1-8.