Comments on Puget Sound Energy's 2017 Integrated Resource Plan

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1. INTRODUCTION

In November 2017, Puget Sound Energy (PSE) released its 2017 Integrated Resource Plan (IRP). Sierra Club retained Synapse Energy Economics, Inc. (Synapse) to review the IRP. These comments are based on Synapse's examination of PSE's input assumptions and evaluation of its resource options, as well as on the relationship between PSE's proposed resource plan and its immediate action plan.

2. SUMMARY AND RECOMMENDATIONS

Overall, Synapse finds PSE's 2017 IRP to be a comprehensive document that lays out a prudent and low-risk vision for near-term procurement, but falls short with respect to renewable input assumptions, assumed coal unit retirement dates, and the specificity of its action plan. The IRP is grounded in the use of AURORA and PLEXOS, two industry-standard models that are well-suited for the purposes to which PSE applies them. The IRP evaluates 14 scenarios that vary assumptions regarding load, gas prices, and emission prices; it produces a resource plan based on an assessment of quantitative and qualitative risk considerations.

Synapse finds the near-term resource plan outlined in the IRP to be reasonable and well justified. Given recent economic and policy trends, we agree with PSE's determination that the prudent immediate course of action involves investing in demand-side resources, renewables, market purchases, and storage rather than constructing a new thermal generation plant. Synapse also agrees with several specific elements of the action plan that PSE proposes to implement. Acquisition of cost-effective demand-side resources is rightfully at the top of the action plan, and we are encouraged by PSE's forward-thinking commitment to gain experience with developing battery storage technologies. We also agree with PSE's determination to continue to participate in the western Energy Imbalance Market, which has saved PSE customers millions of dollars while aiding the increased integration of renewable resources.

Nevertheless, while this IRP represents a step in the right direction, it also raises some serious concerns. Of most immediate concern is the possibility that certain elements of the action plan could lead to PSE substantially deviating from its resource plan outside of any public review process. In particular, the all-source resource solicitation and risk mitigation processes contained in the IRP action plan could lead to PSE procuring new natural gas capacity within the next two to three years, without having its decision vetted through a rigorous, transparent process.

Synapse has also identified several areas upon which PSE could and should improve in future IRP cycles, including:

- **Renewable cost assumptions**. PSE employs an array of assumptions that overstate the capital, operational, and transmission costs associated with renewable resources. These assumptions could bias the determination of the most cost-effective means of

complying with Washington State's Renewable Portfolio Standard. They also artificially undermine the competitiveness of renewables relative to other types of resources.

- **Renewable resource constraints**. PSE unjustifiably constrains the cumulative development of solar resources to 500 megawatts (MW) over a 20-year period.

- **Colstrip retirement dates.** The IRP contains an analysis that indicates that Colstrip Units 3 and 4 will be uneconomic by 2025 under base assumptions. PSE's proposed resource plan nonetheless includes a retirement date of 2035 for those units, without providing an explanation for this choice.

- **Data access and transparency.** Unlike in many similar IRP proceedings that Synapse has participated in, we were unable to review PSE's modeling files or other workpapers. This limits the effectiveness of stakeholder review.

- **Aggressive carbon reduction scenarios.** The IRP contains limited and superficial analysis of how PSE may need to adjust to aggressive carbon reduction goals.

Based on these findings and concerns, we offer the following recommendations:

- **The Commission should ensure the opportunity for full stakeholder participation in PSE's resource procurement process**, particularly if that process leads PSE to make a procurement decision at odds with this IRP.

- **The Commission should ensure that any emergency capacity construction plans incorporate non-thermal resources.**

- **In future IRP cycles, the Commission should require PSE to:**

    - Use up-to-date, defensible renewable cost assumptions that account for recent capital and transmission cost declines and do not baselessly assume variable costs of operating renewable resources;

    - Refrain from imposing arbitrary renewable build limits;

    - Rigorously evaluate the economics of alternative Colstrip retirement options and, if any units are found to become uneconomic prior to the current planned retirement date, lay out plans for progressing toward early retirement;

    - Provide access to non-confidential workpapers and modeling files to interested stakeholders, and provide confidential workpapers to those who sign non-disclosure agreements; and

    - Evaluate the impacts of aggressive carbon reduction goals that are consistent with the commitments to climate change mitigation expressed by PSE, its customers, and the state of Washington.

3. POTENTIAL FOR DISCREPANCIES BETWEEN RESOURCE PLAN AND NEAR-TERM PROCUREMENT

In this IRP, PSE proposes to refrain from acquiring any fossil fuel resources until "beyond 2024."[1] Furthermore, the Company clarifies that it does not have specific plans to acquire fossil fuel resources in 2025 or any year thereafter. Rather, its strategy "provides a significant amount of time for technological innovations in energy efficiency, demand response, energy storage and renewable resources to develop, in the hope that additional fossil-fuel peaking generation plants will not be needed."[2]

Synapse supports the reasonableness of PSE's proposed plan to invest in demand-side resources, renewables, and energy storage rather than fossil fuel resources over at least the next six years. We agree that this "is a low-cost and low-risk strategy that helps avoid locking PSE's customers into a long-lived fossil fuel plant while alternative technology is evolving rapidly and greenhouse gas policies are being developed."[3] However, we are concerned that certain elements of PSE's action plan may lead the Company to deviate from its resource plan and decide to construct new fossil fuel resources outside of a rigorous, public process.

PSE takes pains to make clear that it does not view the resource plan developed through the IRP as "the plan that PSE intends to execute against."[4] Rather, PSE portrays its resource plans as mere "forecasts of resource additions that look like they will be cost effective in the future, given what we know about the future today."[5] This "forecasting exercise" informs the action plan, and the action plan lays out "the activities PSE will execute."[6] Under PSE's IRP, the resource plan is a theoretical construct, whereas the action plan represents concrete commitments. It is therefore concerning that two of the seven elements of PSE's electric action plan could result in a near-term decision to develop fossil resources, despite the conclusions and language surrounding this IRP. These two elements include Action Item 4, which identifies a plan to issue an all-source request for proposals (RFP), and Action Item 5, which includes a plan to maintain "options to build capacity resources quickly."[7]

[1] PSE 2017 IRP, p. 1-17.

[2] *Id*.

[3] PSE 2017 IRP, p. 1-3.

[4] PSE 2017 IRP, p. 1-7.

[5] *Id.*

[6] *Id.*

[7] PSE 2017 IRP, pp. 1-7 to 1-8.

3.1. PSE Must Justify Any Deviations from the Resource Plan That Arise Through the All-Source RFP Process

Under Action Item 4, PSE proposes to "issue an all-source RFP in the first quarter of 2018 that includes updated resource needs and avoided cost information."[8] The Company notes that it believes that demand response and energy storage will be a reasonable and cost-effective means of meeting the forecasted capacity need that appears in 2022, but will re-evaluate that position based on responses to the RFP.[9]

Synapse appreciates that PSE cannot and should not be strictly bound by the resource plan laid out in this IRP. We fully endorse the use of the most up-to-date information at the time of a resource procurement decision. Synapse recognizes that unexpected changes in technologies, markets, or policies could lead to a prudent resource portfolio that differs from the one selected through this IRP. In fact, in these comments we identify certain respects in which an open RFP may be likely to lead to different procurement decisions than those contained in the IRP.

Nevertheless, it is essential that PSE justify any substantial deviation between this resource plan and the results of its upcoming all-source RFP through a public, transparent process. If, for example, PSE were to procure a natural gas plant without any evidence of updated information to justify such an about-face, that would constitute a subversion of the IRP process. The rigor and stakeholder input involved in an IRP should not be taken lightly. If PSE chooses to portray even resource plan decisions that are likely to be made within the next two years as "forecasts," then it should ensure that the actual procurement process is at least as transparent and rigorous as the IRP process.

3.2. Any Contingency Plans for Rapid Resource Development Should Be Specified and Incorporate Non-Thermal Resources

PSE's Action Item 5 consists of developing "strategies to mitigate the risk of redirecting transmission and increasing market reliance."[10] The first such strategy identified by PSE involves "maintaining options to build capacity resources quickly."[11] The IRP does not specify what such quick capacity builds might look like, but there is evidence that PSE is focusing on the construction of natural gas peaking plants as a near-term "risk-mitigation" market alternative. During the IRP stakeholder process, PSE indicated that it has already obtained the necessary permits to construct a natural gas plant.[12] To our knowledge, PSE has not taken similar steps to prepare for the construction of any other near-term capacity resources.

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[8] PSE 2017 IRP, p. 1-7.

[9] PSE 2017 IRP, p. 1-9.

[10] Id.

[11] Id.

[12] Final IRP Advisory Group Meeting Notes. October 27, 2016. https://pse.com/aboutpse/EnergySupply/Documents/10-27-16_Final_IRP_AG_Meeting_Notes.pdf

This raises the possibility that, after the IRP process has concluded, PSE could determine that it is over-reliant on the market and immediately launch into the construction of a gas plant without outside review of its decision-making. Such a decision would constitute an end run around the IRP process.

As an initial matter, PSE should be clearer about what its planned "options to build capacity resources quickly" consist of.[13] In the nearly 400-page IRP, there is no discussion of the details of these potential options, nor of what steps PSE has taken to maintain them. PSE should provide much more detail and specificity about this component of the action plan.

In addition, as with the all-source RFP process, PSE must provide transparent justifications for any near-term deviation from its resource plan, whether for risk mitigation or other purposes. Synapse recognizes that PSE must retain the ability to respond to "unexpected demand-side or supply-side shocks" that "render the region short of resources" in between IRP cycles.[14] But a decision to rapidly construct a new resource should not arise without a substantial change in the facts on the ground.

If PSE deems it important to maintain the ability to build capacity resources rapidly, it should develop its expertise and capability with battery storage resources. The ability of battery storage to address urgent capacity needs has been clearly demonstrated recently in Australia and California. In 2017, Tesla deployed 100 MW of lithium-ion storage in South Australia within three months of its commitment to deliver the resource.[15] In the short time the new battery system has been online, it has not only proven to be an effective capacity resource, but has also demonstrated an ability to respond to emergency ramping needs faster than any other resource on the South Australian system.[16]

California similarly benefitted from the modularity, flexibility, and fast construction times of batteries following a catastrophic leak at the Aliso Canyon natural gas storage site. In response to a solicitation from the California Public Utilities Commission, the energy storage industry brought online 70 MW of lithium-ion battery projects within six months.[17] This time span is much shorter than that required to build a gas plant.

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[13] Id.

[14] PSE 2017 IRP, p. 1-9.

[15] Australian Associated Press. November 30, 2017. South Australia turns on Tesla's 100MW battery: 'History in the making.' The Guardian. Available at https://www.theguardian.com/australia-news/2017/dec/01/south-australia-turns-on-teslas-100mw-battery-history-in-the-making.

[16] Australian Associated Press. December 21, 2017. 'That's a record': South Australia's Tesla battery responds to coal-fired plant failure. Available at http://www.news.com.au/technology/environment/thats-a-record-south-australias-tesla-battery-responds-to-coalfired-plant-failure/news-story/d9e02c0dbf6774ffea948a1b919f3b7f.

[17] Julia Pyper. January 31, 2017. Greentech Media. Tesla, Greensmith, AES Deploy Aliso Canyon Battery Storage in Record Time. Available at https://www.greentechmedia.com/articles/read/aliso-canyon-emergency-batteries-officially-up-and-running-from-tesla-green#gs.ulqkoqQ.

4. RENEWABLE RESOURCE ASSUMPTIONS

PSE's input assumptions generally overstate the cost of renewable resources, biasing its analysis against the selection of renewables beyond those tied to Washington's Renewable Portfolio Standard (RPS). In addition, PSE's modeling appears to arbitrarily limit the selection of solar resources.

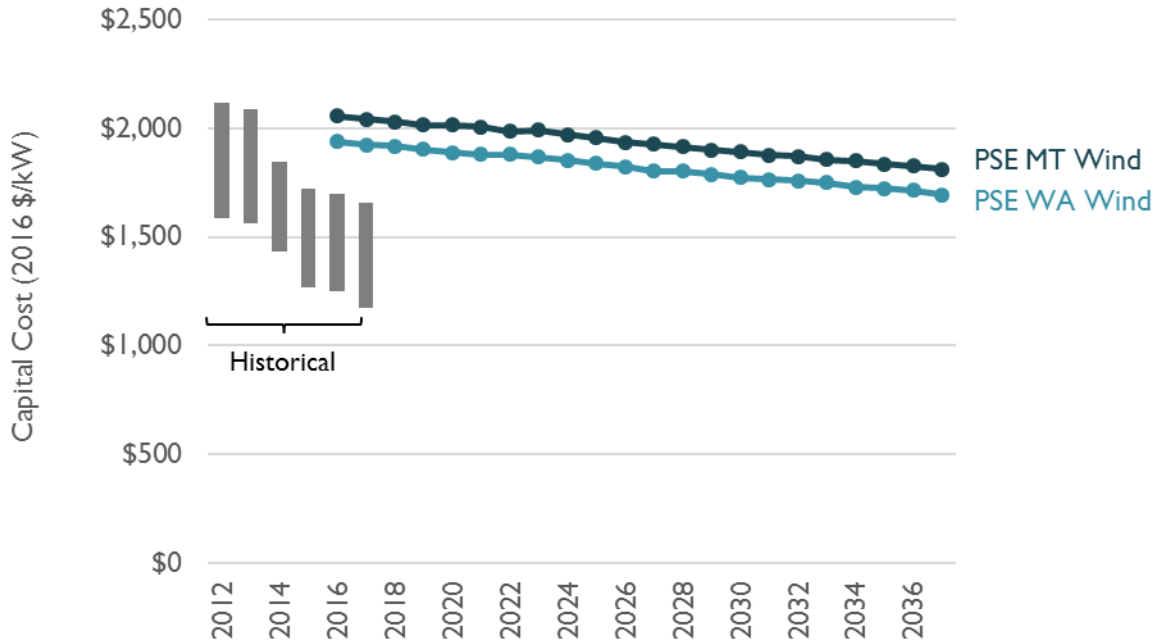
4.1. Renewable Capital Costs Are Overstated

PSE assumes solar and wind capital costs that evidently fail to account for recent cost declines. According to Lazard's annual reports, wind capital costs have declined by about 25 percent over the past five years and solar capital costs have declined by about 50 percent over the same period.[18] Yet PSE's assumed capital cost trajectory indicates that it expects current capital costs consistent with those from about five years ago.

Figure 1 depicts PSE's forecasted capital costs for Washington and Montana wind in comparison to historical Lazard capital cost estimates. This shows that Lazard's estimates of 2017 wind capital costs are 15 percent lower than PSE's Washington wind assumptions and 23 percent lower than PSE's assumptions for Montana wind. Under PSE's projected trajectory, wind capital costs remain above currently achievable levels through 2037.

[18] Lazard. November 2017. Lazard's Levelized Cost of Energy Analysis – Version 11.0; Lazard. December 2016. Lazard's Levelized Cost of Energy Analysis – Version 10.0; Lazard. November 2015. Lazard's Levelized Cost of Energy Analysis – Version 9.0; Lazard. September 2014. Lazard's Levelized Cost of Energy Analysis – Version 8.0; Lazard. August 2013. Lazard's Levelized Cost of Energy Analysis – Version 7.0; Lazard. June 2012. Lazard's Levelized Cost of Energy Analysis – Version 6.0.

Figure 1. Wind Capital Costs, Lazard Historical and PSE IRP Forecasts



Sources: Lazard, PSE 2017 IRP

Recent power purchase agreement offers in Montana underscore the unreasonableness of PSE's cost assumptions for Montana wind resources. In one recent case, a developer committed to constructing a 23 MW wind facility at a 25-year fixed price of less than $44 per megawatt hour (MWh).[19] This aggregate cost figure for Montana wind resources is less than PSE's assumed construction costs alone.[20]

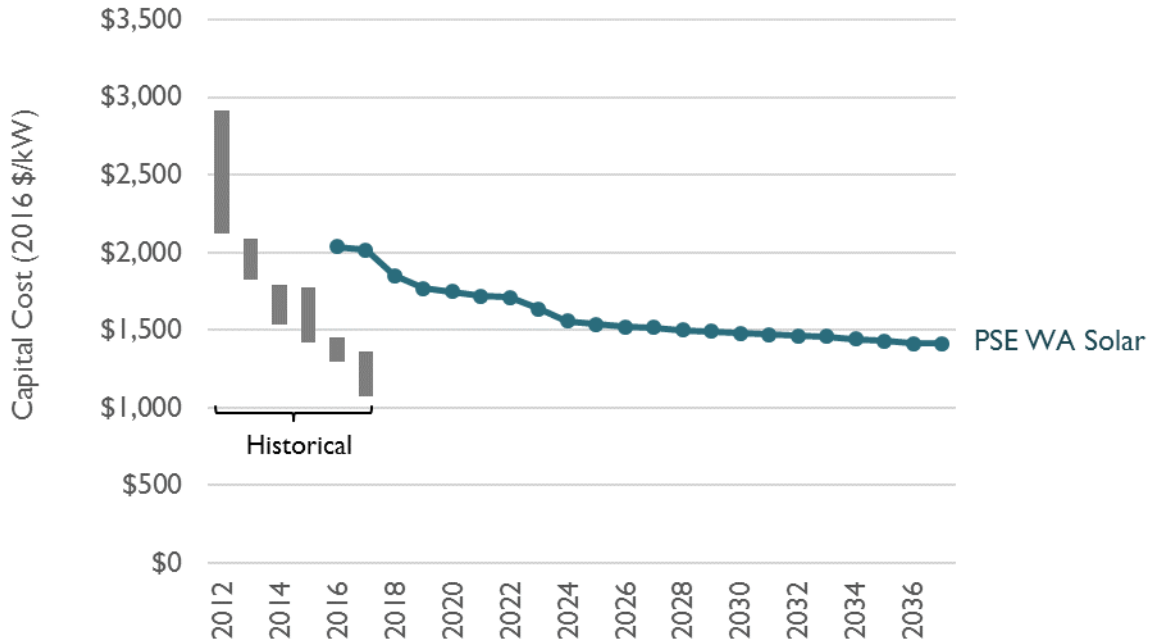
PSE's solar cost assumptions appear to be even more overstated than its wind costs in the near term. Figure 2 shows that PSE's cost estimates are about 50 percent too high for 2017. Although PSE forecasts future declines in solar costs, its projection still remains higher than Lazard's estimate of current costs. Moreover, even PSE's "lower" solar cost sensitivity assumes capital costs of $1,755 per kilowatt (kW), about 30 percent higher than current capital costs per Lazard.[21]

[19] Michelle Frose. December 17, 2017. Montana PSC Approves PPA Between NorthWestern & New Colony Wind. http://www.windpowerengineering.com/business-news-projects/montana-psc-approves-ppa-northwestern-new-colony-wind/

[20] PSE 2017 IRP, p. 6-78. Construction costs include "EPC Costs" and "Owners Costs."

[21] PSE 2017 IRP, p. 4-39.

Figure 2. Solar Capital Costs, Lazard Historical and PSE IRP Forecasts



Sources: Lazard, PSE 2017 IRP

4.2. Wind Operations and Maintenance Costs Are Overstated

In addition to overstating the capital costs for wind resources, PSE assumes unjustified operations and maintenance (O&M) costs for future wind resources. IRP Figure 6-47 indicates that PSE assumes variable O&M costs of $8 per MWh for Washington wind resources and $9 per MWh for Montana wind.[22] These assumptions are surprising because wind projects, like solar projects, are typically assumed to have *zero* variable O&M costs.[23] In fact, the absence of variable operational costs is a key characteristic of renewables. Since PSE assumes a reasonable set of wind fixed O&M costs, it is not clear what comprises its assumed variable O&M costs.[24]

This assumption is significant, because variable O&M costs make up more than half the difference between PSE's calculated levelized costs of Montana wind and Washington solar resources.[25] Thus PSE's treatment of O&M costs could help explain PSE's surprising finding that Washington solar resources are

[22] PSE 2017 IRP, p. 6-78. Figure 4-18 provides different variable O&M assumptions of $3.15/MWh for Washington wind and $3.50/MWh for Montana wind. It is not clear to us why these figures provide such different assumptions.

[23] See., e.g., Lazard's Levelized Cost of Energy Analysis – Version 11.0, p. 19; U.S. Energy Information Administration. January 2017. Costs and Performance Characteristics of New Generating Technologies, Annual Energy Outlook 2017. P. 2. Available at https://www.eia.gov/outlooks/aeo/assumptions/pdf/table_8.2.pdf.

[24] PSE 2017 IRP, p. 4-32.

[25] PSE 2017 IRP, p. 6-78.

more cost-effective than competing wind resources that offer higher capacity factors and higher expected load carrying capacity at similar capital costs.[26]

Ultimately, the all-source RFP that PSE plans to issue will reveal the degree to which PSE's IRP assumptions reflect the reality of renewable costs in the Pacific Northwest. Throughout its RFP process, PSE should remain open to the possibility that wind resources may provide a more cost-effective means of achieving RPS compliance than solar resources. Equally importantly, PSE should continue to evaluate the potential for renewable resources to serve as cost-effective sources of energy and capacity beyond the levels required by the RPS. Finally, PSE should be sure to use the most up-to-date renewable cost assumptions available in future IRPs. Even if PSE's IRP assumptions do not determine its procurement decisions, they could discourage renewable developers from participating in procurement processes that they perceive to be biased against them.

4.3. Montana Wind Transmission Cost Assumptions Are Outdated and Overstated

PSE indicates that transmission and integration costs make up more than one third of the total levelized cost of its Montana wind resource options.[27] If these transmission costs turn out to be lower than assumed in the IRP, Montana wind would be more competitive than PSE portrays it to be.

PSE's estimate of a $72.94 per kW-year total transmission charge for Montana wind is based on the sum of an array of component transmission charges, as summarized in IRP Figure D-26 and re-produced in Figure 3 below.[28] There are at least two aspects of PSE's transmission cost assumptions that are outdated and too high. First, the Colstrip transmission rate is evidently based on a 2016 rate schedule. Under the current 2017 schedule, the Colstrip rate amounts to $27.84 per kW-year, a decrease of 12.5 percent from the $31.83 per kW-year assumption used by PSE.[29] Second, the Montana Intertie rate that applies to transmission from Townsend to Garrison has declined to $6.108 per kW-year, 17 percent lower than PSE's assumption.[30] Together, these updates add up to a 7 percent decrease in the total transmission rate assumed by PSE (as shown in Figure 3).

[26] PSE 2017 IRP, p. 4-32.

[27] PSE 2017 IRP, p. 6-78.

[28] PSE 2017 IRP Appendix D, p. D-50. Figure D-26 incorrectly labels the transmission costs as in units of "percentage." These costs are in fact in units of $/kW-year, as correctly labeled in Figure D-20.

[29] PSE. 2017. 2017 Annual Update to the PSE Formula Rate. http://www.oatioasis.com/PSEI/PSEIdocs/2017_Annual_Update_Customer_Meeting_July_20_Presentation.pdf

[30] Bonneville Power Administration. 2018 Transmission, Ancillary and Control Area Service Rate Summary Effective October 1, 2017. https://www.bpa.gov/Finance/RateInformation/RatesInfoTransmission/FY18-19/2018%20Rate%20Schedule%20Summary.pdf (see rate IM-18 Montana Intertie Rate)

Figure 3. Montana Wind Transmission Rate Breakdown Under PSE Assumptions and Updated Assumptions

Transmission rates	PSE 2017 IRP	2018 updated	% difference	Colstrip as sunk cost	% difference
	$/kW-year	*$/kW-year*	%	*$/kW-year*	%
Colstrip to Townsend (PSEI)	$31.83	$27.84	-13%	$0.00	-100%
Townsend to Garrison (BPA)	$7.36	$6.11	-17%	$0.00	-100%
Garrison to PSEI (BPA)	$21.62	$21.62	0%	$21.62	0%
Estimated Wind Integration Costs	$12.12	$12.12	0%	$12.12	0%
Impact of Capacity Increase on Rate	Uncertain	Uncertain	-	Uncertain	-
Total Transmission Rate	**$72.94**	**$67.69**	**-7%**	**$33.74**	**-54%**

In addition, Synapse would note that PSE's modeling assumes that PSE would be able to avoid the costs of transmission capacity running from Colstrip to Garrison if it did not use this capacity to access wind resources. This assumption may be incorrect—current agreements require PSE to pay for the Colstrip and Montana Intertie lines regardless of whether it uses them. If PSE cannot avoid these transmission costs, they should be treated as sunk costs that are not associated with Montana wind resources. This would reduce PSE's assumed Montana wind transmission costs by more than 50 percent (see Figure 3).

4.4. PSE Places Unjustified Restrictions on Renewable Builds

In two IRP scenarios, PSE found that new solar resources were cheaper than market purchases, such that its capacity expansion model was inclined to select large quantities of new solar builds. PSE responded to this by constraining its model such that it could only select a total of 500 MW over the planning period.[31] Notably, this 500 MW limit is only 14 MW greater than the amount procured to meet RPS policies under PSE's Base scenario.[32] Constraints on resource builds should be done sparingly and only with sound justification. PSE's explanations for its chosen constraints are unsatisfactory.

PSE's first justification for constraining solar resource builds is that if solar became cheaper than market energy, the resulting rush to build new solar projects would drive up the costs of solar resources.[33] PSE provides no evidence to support this assertion, and there are good reasons to doubt it. To a considerable degree, the past decade of declining solar costs is a story of increased demand and rapidly increasing production leading to economies of scale and *further cost decreases* rather than the sort of cost rebound posited by PSE. If PSE truly believes that solar resource costs will increase once a certain amount of the resource is obtained, it should model different quantities of solar with different cost profiles, rather than going with the coarse option of a hard constraint on the development of new resources.

PSE also raises the specter that if solar became cheaper than the market, "PSE's resources could greatly exceed load," forcing PSE to "adopt an energy planning standard to ensure the company operates as a

[31] PSE 2017 IRP, p. 6-32.

[32] PSE 2017 IRP, p. 6-33.

[33] PSE 2017 IRP, p. 6-32.

utility rather than a wholesale power marketer."[34] Given that PSE's resource plan calls for net market purchases starting at 872 average MW in 2018 and growing over time, the idea that building more than 500 MW of solar over the course of the next two decades could cause PSE's generation to "greatly exceed load" should not be taken seriously. This is not to say that PSE should procure a limitless amount of renewables if the model tells it to. But the level of feasible construction of solar over the next two decades should range in the thousands of MWs, not the hundreds.

5. Economic Status of Colstrip Units

Under PSE's baseline IRP assumptions, Colstrip Units 1 and 2 retire in 2022, while Colstrip Units 3 and 4 continue to operate through 2035.[35] However, PSE's analysis indicates that under its Base Scenario, retiring Units 3 and 4 in 2025 would result in nearly $150 million in savings for PSE customers.[36] PSE does not provide an adequate explanation for why it nonetheless sticks to its assumed 2035 retirement date for Units 3 and 4.

The resource plan's 2035 retirement date for Colstrip Units 3 and 4 is particularly surprising in light of the rate case settlement agreement that Colstrip signed in September 2017. Under this agreement, which the Commission approved in December, PSE will recover all capital costs associated with Colstrip Units 3 and 4 by the end of 2027.[37] Although this settlement does not commit PSE to fixed retirement dates, it paves the way for retirement in the mid-2020s, and it reflects the likely uneconomic status of the Colstrip units over the longer term.

A potential 2025 retirement date may seem distant enough to not require immediate planning. However, the complexity of Colstrip's ownership structure means that PSE should proactively engage in early discussions regarding the economic merits of alternative retirement dates. Given PSE's expectations that carbon regulations will ultimately affect Colstrip, and that carbon regulations will render Colstrip uneconomic, PSE should be taking steps toward the retirement of all Colstrip units, not just Units 1 and 2.

[34] Id.

[35] PSE 2017 IRP, p. 6-50.

[36] PSE 2017 IRP, p. 6-52.

[37] Order 08 in Dockets UE-170033 and UG-170034 before the Washington Utilities and Transportation Commission.

6. VALUATION OF BATTERY STORAGE RESOURCES

In this IRP, PSE commits to taking steps toward better understanding and accommodating battery storage as a part of the future grid. PSE's near-term plan to develop flexible, modular storage resources rather than a large fossil fuel plant is forward-looking and prudent. Similarly, PSE's inclusion of the installation of a small-scale battery within its action plan priorities indicates the Company's commitment to gaining competence in managing and integrating an important emerging technology.

Synapse strongly supports PSE's use of PLEXOS to model the full flexibility and transmission and distribution benefits of storage resources. Many electric sector optimization models have yet to fully react to the recent emergence of battery storage as a viable component of resource portfolios. PLEXOS is likely the most-developed tool for modeling energy storage resources, and PSE's use of PLEXOS to model resource dispatch down to five-minute intervals puts it at the cutting edge of granular electric-sector analysis.[38] We encourage PSE to continue to rigorously model storage in future IRP cycles.

One surprising element of PSE's decision-making process around storage resources is the choice to pursue development of flow batteries rather than lithium-ion batteries. PSE's cost assumptions for both types of resource fall within a reasonable range for resources procured to provide transmission and distribution benefits as well as capacity benefits.[39] However, the more developed commercialization of lithium-ion batteries has typically made them the preferred choice for utilities investing in storage. The previously discussed cases of California and Australia demonstrate this.

Ultimately, Synapse believes that PSE's decision to develop experience with flow batteries is reasonable. However, we encourage PSE to solicit and evaluate lithium-ion options as part of any future procurement process for storage or general capacity resources. In addition, Synapse would expect PSE to continue to evaluate the viability of more extensive buildout of storage resources in future IRPs, particularly if battery costs continue to drop as they have in recent years.

7. DATA ACCESS AND TRANSPARENCY

Synapse recommends that the Commission require that PSE provide greater transparency and access to underlying data in future IRP cycles. Synapse appreciates the opportunity to provide these comments and recognizes PSE's efforts to respond to stakeholder concerns. However, interested parties should have the opportunity to do more than offer commentary during the development of an IRP. They should

[38] PSE 2017 IRP, p. 3-12.

[39] See Lazard. 2017. Lazard's Levelized Cost of Storage Analysis – Version 3.0.

be permitted to provide a thorough review of the final IRP analysis, and a thorough review requires access to core modeling files, inputs, and outputs.

Through its participation in IRP proceedings throughout the country, Synapse is accustomed to reviewing the details of IRP analyses, including through review of modeling files. For example, Oregon's IRP dockets allow for a discovery process that enables access to utility workpapers, including confidential modeling data. In many cases, Synapse's reviews of IRP workpapers and modeling files have enabled us to identify errors and inconsistencies that, once resolved, ultimately lead to more sound final resource plans. The Commission and PSE should fully embrace the transparency and rigor of the IRP process by following Oregon's lead and providing access to IRP workpapers and modeling files.

8. CONSIDERATIONS FOR A LOW-CARBON FUTURE

While the 2017 IRP takes resource planning for PSE one step further into the future, it falls short of an overhaul of the way that PSE operates its business. Meeting existing RPS requirements, building renewable energy, deferring new thermal units, and investing in small-scale battery storage are all worthy components of a near-term resource plan. However, in addition to following through with the plan laid out in this IRP, PSE should begin to plan for more aggressive carbon reduction futures during the next resource planning cycle.

One way for PSE to approach this would be through modeling a scenario that includes strict emission reduction requirements. In one example from another large utility, DTE Electric Company's 2017 IRP included a sensitivity that required a 75 percent reduction in its carbon dioxide emissions by 2040.[40] PSE should similarly model a declining emissions cap that reflects the progression toward a zero-carbon future envisioned by the state of Washington. State law sets an emissions target of 25 percent below 1990 levels by 2035, and Washington has signed onto an agreement to reduce emissions by 80 to 95 percent below 1990 levels by 2050.[41] A recent report commissioned by the state concludes that achieving such goals at the economy-wide level would require "a decrease in the carbon intensity of electricity generation to near zero."[42] It is therefore incongruous that PSE's Base Case emissions remain above 1990 levels in 2037.[43] A scenario with a properly set emissions cap would resolve this disconnect.

[40] DTE Electric Company. 2017. 2017 Integrated Resource Plan. Pp. 225-226.

[41] Haley, Ben et al. Evolved Energy Research. April 2017. Deep Decarbonization Pathways for Washington State: Executive Summary. Available at http://www.governor.wa.gov/sites/default/files/DeepDecarbonizationPathwaysAnalysisforWashingtonSt.pdf.

[42] Id., p. 2.

[43] PSE 2017 IRP, p. 6-37.

Because any deep carbon reduction scenario will necessarily rely upon high levels of electrification across other sectors,[44] PSE's future planning should also include a sensitivity that incorporates increased load associated with substantial electrification of the transportation and heating sectors, as well as demand side management programs to minimize the peak impacts of such load. In the present IRP, PSE discusses a single electric vehicle sensitivity, but falls well short of the type of analysis needed to understand how to best integrate higher levels of electric vehicle charging load.

[44] Haley, Ben et al. Evolved Energy Research. April 2017. Deep Decarbonization Pathways for Washington State: Executive Summary.