BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of Puget Sound Energy's 2023 Electric Integrated Resource Plan Progress Report	**DOCKET UE-200304**

COMMISSION STAFF COMMENTS REGARDING PUGET SOUND ENERGY'S 2023 ELECTRIC INTEGRATED RESOURCE PLAN PROGRESS REPORT SUBMITTED IN COMPLIANCE WITH RCWs 19.405, 19.280 and WACs 480-100-600 through -630 AND DOCKET UE-191023, Order R-601

June 5, 2023

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Executive Summary

These comments from Utilities and Transportation Commission (Commission) Staff (Staff) highlight the most important issues identified in our review of Puget Sound Energy's (PSE or Company) first 2023 Electric Integrated Resource Plan (IRP) Two-year Progress Report (Progress Report). In December 2020, the Commission promulgated new rules related to long-range resource planning, and this is the first Progress Report submitted under these rules. As compared to a full IRP, PSE's Progress Report must adhere to a subset of requirements and reflect changing conditions.[1]

This document does not represent an exhaustive summary of Staff's analysis, but instead focuses on particularly salient topics and themes. Staff stresses that any planning document represents a snapshot in time. This IRP was developed over a period during which new policies were at various stages of implementation or passage. With this in mind, Staff's recommendations in this document focus on improvements that Staff believes PSE should make in its next IRP filing in 2025.

Summary of the Progress Report

This Progress Report describes a future with a substantially higher electric load forecast than that of PSE's 2021 IRP, in part due to PSE's forecast of electric vehicle (EV) adoption. Despite this change in load, PSE continues to target 63 percent of energy in 2025 coming from clean and renewable resources, as outlined in its 2021 Clean Energy Implementation Plan's interim targets.[2]

Table 1, below, shows a comparison of the 10-year preferred portfolio resource additions between PSE's 2021 IRP and its 2023 Progress Report. Every category of resources increases in this comparison except for conservation, and capacity contract additions.[3, 4] Many of these resources benefit from federal incentives from the Inflation Reduction Act (IRA), which PSE estimates will save $10 billion over this Progress Report's planning horizon.[5]

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[1] WAC 480-100-625(4) and RCW 19.280.030.
[2] PSE 2023 IRP Progress Report, pg. 2.1, Table 2.1.
[3] The 2023 Conservation Potential Assessment saw a decrease in PSE's 24-year achievable technical potential from 600 aMW to 521 aMW (PSE 2023 IRP Progress Report, Appendix E: Conservation Potential and Demand Response Assessments, Table 3).
[4] PSE plans to reduce reliance on short-term capacity contracts to zero by 2029 due to a shift in the region from net surplus to a net deficit capacity position in the region (PSE 2023 IRP Progress Report, pg. 7.20, Table 7.17).
[5] The impacts of other state and federal policies are discussed in the "Changing Regulatory and Incentive Landscape" section of this document.

Table 1. Comparison of 10-year Nameplate Resource Additions from 2021 IRP to 2023 Progress Report[6]

	10-year Nameplate Capacity Additions (MW)	
Resource Type	**2021 IRP** (2022-2031)	**2023 IRP Progress Report** (2024-2033)
Conservation[7]	639	445
Demand Response	196	387
Distributed Solar	318	850
Distributed Storage	0	223
CETA-qualifying peaking capacity[8]	255	771
Wind	1,500	1,900
Solar	398	698
Hybrid	0	1,449
Standalone storage	0	1,200
Capacity Contracts	979	0

Climate Change

PSE incorporated the impacts of climate change into its analysis in new ways in this Progress Report. The Company used three downscaled climate models from the Northwest Power and Conservation Council as inputs for future temperature and weather conditions in PSE's territory. This affected the expected savings of temperature-sensitive conservation measures, and influenced the load forecast by accounting for generally milder winters and hotter summers. On the supply side of the equation, climate change impacts were also factored into the expected production of hydroelectric resources.

Emerging Technologies

New technologies are needed in the transition to a clean and renewable electric system. While PSE modeled new generic resources in this Progress Report, the Company does not appear to employ a consistent methodology when deciding to include or exclude certain emerging technologies in its long-term capacity expansion modeling. For example, PSE opted to include green hydrogen[9] peakers and small modular nuclear reactors as generic resources in its long-term

[6] This table was adapted from Figure 2-1 in PSE's 2021 IRP and Table 2.2 in PSE's 2023 Electric IRP Progress Report.
[7] Includes energy efficiency, distribution efficiency, and codes and standards.
[8] CETA-qualifying peaking capacity resources in PSE's 2023 Preferred Portfolio include: green hydrogen blended peaker plants and biodiesel peaker plants.
[9] Though PSE did not include a definition for "green hydrogen" in the Progress Report, Staff assumes the Company is using a definition compatible with the definition of "green electrolytic hydrogen" in statute (RCW 80.50.020(15)).

capacity expansion modeling,[10] but did not include in this modeling any long-duration energy storage generic resources. Staff believes that in order to fairly assess which generic resources warrant consideration in PSE's long-term capacity expansion modeling, the Company needs a robust and transparent methodology developed with input from its advisory group.

Equity

PSE expanded the way it considered equity in its conservation potential assessment and in the Company's "Portfolio Benefit Analysis." These represent steps in the right direction in planning for an equitable system, but Staff has some concerns about the details and continues to question PSE regarding more broad improvements and navigating new paths forward to a clean energy future in its 2025 IRP.[11]

Summary of Recommendations

Staff makes the following recommendations to PSE for its 2025 IRP (unless a different timeline is stated explicitly).

Topic	No.	Recommendations
Changing Regulatory and Incentive Landscape	1	Include full accounting for the impacts of the IRA in PSE's 2025 IRP, including time in the work plan for discussion with advisory group(s).
	2	For the upcoming CEIP Update, include impacts of IRA provisions for which there is available information even if it was not available in time for the Progress Report, particularly around electrification and demand-side resources.
	3	Collaborate with the Conservation Resources Advisory Group to determine appropriate treatment of particular federal dollars in the cost-benefit analysis of distributed energy resources for the 2025 IRP.
Public Participation	4	Provide full draft versions of its planning filings far enough in advance for feedback from interested persons to be incorporated into the final document.
Customer Benefit Analysis	5	Quantify costs and benefits of all resources, including how these quantities vary in named communities, to comply with WAC 480-100-620(10)(c), (11)(g), and (13). The Company should involve appropriate advisory groups to determine which benefits should be studied, what existing studies can be leveraged, and where estimations and proxies are appropriate.
	6	Continue exploring ways to account for *weather correlations* in PSE's resource adequacy and stochastic modeling.

[10] Green hydrogen peakers were included in PSE's 2023 Progress Report's preferred portfolio, but small modular reactors were not.

[11] As described in more detail in the "Customer Benefit Analysis" section of these comments, PSE's approach to considering equity in its portfolio selection process could be susceptible to "gaming," and the metrics used do not reflect quantified customer benefits and may not be well suited to optimization.

Resource Adequacy Assessment	7	Explore ways and continue discussions with advisory group to model hydroelectric resources more realistically, including modeling flexibility across more than one day (where possible).
	8	Do not rely on resource diversification – as a goal in itself – to guide PSE's planning process and portfolio selection.
Conservation and CPA	9	Explore – in consultation with its conservation resource and IRP advisory groups – quantifying the amount of conservation that is currently excluded from its portfolio on a $/kWh basis, but would be included if considered primarily on a $/kW basis
Decarbonization and Electrification	10	Update its assumptions around electric vehicle adoption in its 2025 IRP to reflect recent trends, policies, and incentives that have emerged since the Company produced its EV forecast used in this filing. These updates should also include learnings from PSE's implementation of its transportation electrification programs and related demand response programs.
Emerging Technologies	11	Account for the capital costs associated with transitioning existing plants to using green hydrogen as a fuel.
	12	Account for alternative fuel price risk in its modeling.
	13	Account for and explain in its narrative the potential negative equity impacts of repowered thermal resources.
	14	Work with its IRP advisory group to develop a consistent and transparent methodology for evaluating emerging technologies for inclusion in IRP modeling.
	15	Include in its 2025 electric IRP portfolio analysis at least one LDES technology capable of dispatching at its full rated capacity over multiple days.

Compliance with Commission Rules

Per WAC 480-100-625, electric investor-owned utilities (IOUs) regulated by the Commission are required to file a full electric integrated resource plan (IRP) every four years on January 1, and an IRP progress report two years later. In the order adopting the Clean Energy Transformation Act (CETA) IRP rules, the final filing date for this set of IRPs was moved to April 1.[12] PSE filed a two-year Progress Report in Docket UE-200304 on March 31, 2023. The Company's next full IRP is due to the Commission on January 1, 2025.

A Progress Report is required to update several elements of the most recent full electric IRP, including:

- The load forecast;
- The demand-side resource assessment, including a new conservation potential assessment;
- The resource costs;
- The portfolio analysis and preferred portfolio;
- Any other updates necessary due to changing state or federal requirements, or significant changes to economic market forces;
- Any updates for elements found in the utility's current clean energy implementation plan (CEIP).

Staff has reviewed PSE's 2023 Electric IRP Progress Report and found that it includes the above updates required by Commission rule, but much of Staff's questions concern the reasonableness of PSE's approaches and assumptions. Staff is pleased that PSE also included in this progress report other updates, including those that go beyond requirements outlined in rule, including:

- Significant updates to its resource adequacy analysis;
- Inclusion of new generic resources in its portfolio analysis;
- An attempt to quantify the customer benefit impacts of modeled portfolios.

While Staff commends PSE for going beyond the explicit requirements in the rule, many of the following comments highlight significant issues that Staff expects PSE to address in its 2025 IRP.

[12] UE-191023 General Order R-601, paragraph 23 "Proposed WAC 480-100-625 states that utilities' IRPs must be filed with the Commission by January 1, 2021, and on January 1 every four years thereafter, unless otherwise ordered by the Commission. Given the changes in IRPs required by CETA, the Commission ordered in Dockets UE-180259, UE-180738, UE-180607, that for each electric utility, the next draft IRP must be submitted by January 4, 2021, and its next final IRP must be submitted by April 1, 2021. To avoid last-minute changes to utility requirements as we adopt these rules, we waive the conflicting requirement in the proposed rule and retain the dates established in these three dockets for this upcoming set of IRPs."

Changing Regulatory and Incentive Landscape

The impacts of changing laws and policies, as well as economic or market force dynamics, are integral to an electric IOU's Progress Report.[13] Recently, Staff observes that changes to the energy regulatory environment have been coming fast and furious, both at the state and federal level.

At the state level, Commission IRP rules implementing CETA were adopted mere days before IOUs were required to file a draft of the 2021 IRP, which this Progress Report is based on. The 2025 IRP will be the first full IRP process to fully incorporate all of the new rules. In addition, state building code continues to embed efficiency into new construction, impacting the load forecast while limiting traditional utility energy efficiency program savings potential.

As described in more detail in Staff's comments on PSE's Gas IRP, the Climate Commitment Act (CCA) made major changes to the way carbon emissions are treated in Washington. Electric utilities are allocated no-cost allowances that companies may use for compliance or sell for the benefits of ratepayers. As PSE and others continue to explore the nuances of this law, Staff expects PSE to refine its modeling of the CCA in the 2025 IRP.

The Infrastructure Investment and Jobs Act (IIJA), also referred to as the Bipartisan Infrastructure Law, was signed in November of 2021. PSE describes that it evaluated opportunities made available by the IIJA, and moved forward with grant applications in the areas of grid flexibility, grid resilience, hydroelectric fleet, and hydrogen hub.[14] The Progress Report briefly addresses the Company's efforts to help establish a hydrogen hub and PSE's role with the Pacific Northwest Hydrogen Association.[15]

Another important legislative change was the passage of the Inflation Reduction Act (IRA). The IRA was signed into law several months into PSE's Progress Report development process. This law is poised to have wide-ranging impacts on the energy system including on the demand and supply side of the equation, though many of the implementation details needed to fully understand and plan for the IRA are still under development at both the federal and state level. PSE included known information and assumptions about production and investment tax credits that resulted in approximately $10 billion of savings over the planning horizon.[16] These incentives almost exclusively affect supply-side resources. The assumptions used around which technologies are eligible for these tax credits, as well as adders and bonuses for achieving environmental justice outcomes, will need to be refined in the next planning cycle.

On the other hand, areas of the IRA that increase or decrease energy *demand* were almost entirely absent from PSE's Progress Report. Significant incentives for increased electric vehicle adoption, building electrification, rooftop solar, distributed storage, and energy efficiency are all

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[13] *Per* WAC 480-100-625(4)(b).
[14] See UE-220066 2022 Multi-Year Rate Plan Annual Report. March 31, 2023.
[15] PSE IRP Progress Report, pg. 2.7.
[16] PSE IRP Progress Report, pg. 1.3.

part of the law.[17] One complicating question is how to include IRA funds within the current modified total resource cost (TRC) test. The TRC is "designed to capture all of a conservation program's benefits and costs, regardless of who pays for them."[18] If incentives from the federal government are treated as both a cost and a benefit, it becomes a transfer payment with no effect on the cost-effectiveness of the utility programs. However, it may be more appropriate to treat this federal investment solely as a benefit intended to increase uptake of these measures. **Staff recommends PSE collaborate with the Conservation Resources Advisory Group to determine appropriate treatment of particular federal dollars in the cost-benefit analysis of distributed energy resources for the 2025 IRP.**

While the details of many of the IRA's demand-side programs are still being developed, Staff requested PSE include an evaluation of the magnitude of impact the IRA may have on electricity demand in their service territory in the progress report. Disappointingly, the Company only included an acknowledgement that there may be an impact of these provisions, with no attempt to estimate the magnitude or provide a narrative regarding research on this topic.[19]

By including nearly all supply-side impacts and no demand-side impacts of the IRA, there is potentially an overestimation of needed supply-side investments. **Staff expects to see a full accounting for the impacts of the IRA in PSE's 2025 IRP.**

For the upcoming CEIP Update, Staff expects PSE to include impacts of IRA provisions for which there is available information even if it was not available in time for the Progress Report, particularly around electrification and demand-side resources. The Company should continue to adaptively manage its portfolio of DERs, ensure customer awareness of beneficial federal programs, and actively facilitate customers stacking utility, state, and federal programs.

Public Participation

Staff views public participation as critical to a robust and trusted planning process. PSE filed a Work Plan for this Progress Report on August 25, 2022. This Work Plan was updated on October 21, 2022, and again on December 15, 2022. The effect of these updates was to push two meetings back: one from November 17 to December 12, and the other from March 1 to March 14. The Public Participation-related recommendations in Staff's comments on PSE's 2023 Gas IRP hold true on the electric side as well – including the recommendations to share available data earlier in the process, include tables of contents and "readme" tabs in workpapers, and host a

[17] IRA provisions for distributed solar investment tax credits were included in the analysis. PSE IRP Progress Report Appendix A, pg. A.6.
[18] UG-121207 Commission Policy Statement on Cost-Effectiveness, pg. 5 para. 9.
[19] PSE IRP Progress Report, pg. 4.9.

"workpapers workshop." Staff would refer PSE to the gas comments and recommendations for more details.[20]

In addition to Staff's comments on PSE's 2023 Gas IRP, Staff also notes that PSE only provided a draft of one chapter (Chapter 3: Resource Plan) of its 2023 Electric Progress Report for interested persons to review prior to filing its final draft. Along with the condensed timeline, this narrow view of the plan further limited interested persons' ability to provide meaningful feedback. **Staff recommends PSE provide full draft versions of its planning filings far enough in advance for feedback from interested persons to be incorporated into the final document.**

Customer Benefit Analysis

To better incorporate customer benefit indicators into the portfolio analysis, PSE used a subset of Customer Benefit Indicator's (CBI's) developed with the Equity Advisory Group (EAG) for the 2021 Clean Energy Implementation Plan (CEIP) to perform a portfolio benefit analysis. Staff appreciates the effort to embed equity in the IRP process, especially the additional small group public participation opportunities provided by the Company to both inform and consult.

Unfortunately, Staff views the method PSE used as problematic. While the comparative nature of the analysis provides useful information, as the Company notes, it can overstate the impact of small differences, and adding new portfolios to the analysis can cause the indices to vary.[21] As expressed by IRP advisory group members, these issues raised concerns that PSE could "game" the system.

Staff is concerned that some CBI metrics are inherently unsuited to optimization and cannot provide an accurate representation of customer benefit in an IRP. For example, metrics that measure "energy efficiency capacity added" and "number of customers projected to participate in DER programs" as benefits, predictably favor increased DERs but do not differentiate between DERs' abilities to provide actual benefits and make reasonable trade-offs with other benefits or costs. "The results of the portfolio benefit analysis indicate that increasingly distributed and demand-side resources significantly increase the potential for more equitable outcomes for customers."[22] Staff agrees that increasing energy efficiency and DER programs provide an *opportunity* to benefit all customers but has concerns that the costs and benefits of these programs are not being fully accounted for, especially for named communities.

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[20] See Commission Staff Comments on PSE's 2023 Gas IRP, Docket UG-220242.
[21] PSE Portfolio Benefit Analysis presentation, September 2022; https://www.pse.com/-/media/PDFs/IRP/2022/09282022/2022-0928-PortfolioBenefitsAnalysis-FINAL.pdf?modified=20220929150605.
[22] PSE 2023 IRP Progress Report at page 3.27.

For the 2025 IRP, Staff expects PSE to quantify costs and benefits of all resources, including how these quantities vary in named communities, to comply with WAC 480-100-620(10)(c), (11)(g), and (13).[23, 24, 25] The Company should involve appropriate advisory groups to determine which benefits should be studied, what existing studies can be leveraged, and where estimations and proxies are appropriate.

Despite the issues highlighted above, Staff is pleased to see progress in PSE's ongoing efforts in this area. Incorporating equity into resource planning will continue to be a work-in-progress and Staff expects PSE to improve in tangible ways with each iteration. When considering how to improve IRP modeling efforts, Staff suggests PSE review the Equitable Deep Decarbonization framework and discuss within the Advisory Group.[26]

IRP Modeling

PSE continues to use AURORA for its long-term capacity expansion modeling as well as its hourly portfolio modeling. The reference scenario and PSE's preferred portfolio were then run

[23] WAC 480-100-620(10) Scenarios and sensitivities. The IRP must include a range of possible future scenarios and input sensitivities for the purpose of testing the robustness of the utility's resource portfolio under various parameters. The IRP must also provide a narrative description of scenarios and sensitivities the utility used, including those informed by the advisory group process. . . (c) At least one sensitivity must be a maximum customer benefit scenario. This sensitivity should model the maximum amount of customer benefits described in RCW 19.405.040(8) prior to balancing against other goals.

[24] WAC 480-100-620(11) Portfolio analysis and preferred portfolio. The utility must integrate the demand forecasts and resource evaluations into a long-range integrated resource plan solution describing the mix of resources that meet current and projected resource needs. Each utility must provide a narrative explanation of the decisions it has made, including how the utility's long-range integrated resource plan expects to:
(g) Achieve the requirements in WAC 480-100-610 (4)(c); the description should include, but is not limited to:
(i) The long-term strategy and interim steps the utility will take to equitably distribute benefits and reduce burdens for highly impacted communities and vulnerable populations; and
(ii) The estimated degree to which benefits will be equitably distributed and burdens reduced over the planning horizon.

[25] WAC 480-100-620 (13) Avoided cost and nonenergy impacts. The IRP must include an analysis and summary of the avoided cost estimate for energy, capacity, transmission, distribution, and greenhouse gas emissions costs. The utility must list nonenergy costs and benefits addressed in the IRP and should specify if they accrue to the utility, customers, participants, vulnerable populations, highly impacted communities, or the general public. The utility may provide this content as an appendix.

[26] Spurlock, C. Anna, Salma Elmallah, and Tony G. Reames. "Equitable deep decarbonization: A framework to facilitate energy justice-based multidisciplinary modeling." *Energy Research & Social Science* 92 (2022): 102808.
https://doi.org/10.1016/j.erss.2022.102808

through a stochastic modeling run to test them against a wide range of possible future conditions.[27]

This modeling process follows a similar path to that of PSE's 2021 IRP, with many of the changes revolving around the inputs to the long-term capacity expansion (LTCE) and stochastic model including the impacts of climate change, updated and new generic resources, and updated resource adequacy metrics (effective load carrying capacity and planning reserve margin, for example).

Staff believes these updates represent a net improvement from the 2021 IRP, but we discuss some concerns in the Resource Adequacy Assessment and Emerging Technologies sections of these comments.

Resource Adequacy Assessment

Staff appreciate many of the changes that PSE made to its resource adequacy analysis in this Progress Report. Important changes in this area include:

- Including seasonal (winter and summer) resource adequacy metrics.
- Updates to effective load carrying capacity (ELCC) methodology.
- Incorporating climate change in PSE's hydroelectric generation, and other weather-dependent resource draws.
- Modeling the flexibility of dispatch of many hydroelectric resources.

Staff discusses these and other resource adequacy-related topics, and makes several recommendations, in the following subsections.

Seasonal Resource Adequacy Metrics and ELCC

One important area of improvement was PSE's consideration of resource adequacy metrics on a *seasonal* basis. This new approach to resource adequacy led to different planning reserve margins and resource ELCCs for summer and winter. This allowed PSE's long-term capacity expansion model to give due credit to resources that can contribute to meeting summer peaks, even if their availability during winter peaks is limited.

Staff see this as a critical update to PSE's approach to resource planning that has had an immediate and significant impact, particularly on storage and demand response resources. The ELCC for battery storage resources has increased by a factor of between two and seven – depending on duration – from the values in the 2021 IRP. For demand response, ELCCs have increased by two to four times their 2021 IRP values.[28]

The results show that interested party skepticism of the 2021 resource adequacy analysis was well-founded. Staff sees the 2023 analysis as a significant step forward.

[27] PSE 2023 Electric IRP Progress Report, pg. 8.14.
[28] PSE 2023 IRP Progress Report, Appendix L: Resource Adequacy, Table L.16.

Weather-based Correlations

In the past, PSE has relied on historical years to inform its modeling of the future. This included using past hydro years, past solar years, past wind years, to predict what the realm of possible resource availability may be. These historical data sets have the advantage of being naturally correlated, meaning the hydro year in 1992, for example, is based on the same actual annual climate patterns that produced the wind, hydro, and solar resources that year.

Now, as utilities grapple with the impacts of climate change on resources and loads, they must shift from relying entirely on historical data sets to those informed by climate models. This becomes an issue when data relied upon for one resource does not use the same assumptions as the data relied upon for another resource. For example, a very rainy summer (and a resulting low solar year) could be paired with a very dry summer (and a resulting low hydro year). This, albeit oversimplified, example, may point towards a need for resource additions in the summer, even though these descriptions of the summer season's climate are contradictory. These correlations also impact load. To continue with this same example, a very rainy summer season (and resulting low solar year) could be paired with a very hot summer (and resulting high load year, due to increased cooling load). This scenario may also point to a resource need, even though weather-sensitive loads are not likely to be high during a very rainy summer. **Staff encourages PSE to continue exploring ways to account for these weather correlations in its resource adequacy and stochastic modeling.**

Flexible Dispatch of Hydroelectric Resources

PSE updated its treatment of hydroelectric resources to allow them to dispatch flexibly within a given day. Staff commends PSE for taking this step to model these hydro resources in a way that better reflects their actual operation. **Staff recommends that PSE explore ways to continue to model hydroelectric resources more realistically, including modeling flexibility across more than one day (where possible).**[29]

Diversified Portfolio

PSE makes a point to emphasize diversity in its preferred portfolio (and portfolio analysis overall). Staff sees resource diversity as potentially helpful for several reasons (hedge against technology risk, benefit from complementary ELCC benefits, avoid risk associated with correlated weather events, etc.), but wants to emphasize that diversity in resources should not be used in resource planning as an end in itself. Rather, it is a *potential outcome* of addressing other higher-order goals, like those mentioned above.

Staff's position also connects to the assessment of emerging technologies for inclusion in IRP modeling.[30] A resulting portfolio can only be as diverse as the resources PSE chooses to model and analyze. The only resources PSE offered to the model that could realistically meet multi-day winter peak events are thermal resources. In Staff's view, long-duration energy storage (LDES)

[29] Staff notes that the NWPCC has been working on better reflecting realistic hydro operations in their modeling and we would encourage PSE to learn from those efforts.
[30] See Emerging Technologies section of these comments.

technologies are also well suited to meet this type of need (including, possibly a hydro resource modeled with sufficient flexibility), but PSE did not include them as an option in the long-term capacity expansion modeling. **Staff recommends PSE not rely on resource diversification – as a goal in itself – to guide PSE's planning process and portfolio selection.**

Climate Change Impacts

Staff discusses the impacts of incorporating climate change models into PSE's planning process in our comments on PSE's 2023 Gas IRP. Most of the comments and recommendations in that document also apply to the electric side of PSE's planning.[31]

Conservation and CPA

Staff discusses PSE's approach to its 2023 Conservation Potential Assessment (CPA) at greater length in our comments on PSE's 2023 Gas IRP. Most of the comments and recommendations in that document also apply to the electric side of PSE's planning.

However, one issue that Staff would like to highlight here is the capacity benefit of energy efficiency measures. As required by statute, each IRP must examine a range of forecasts, for at least the next 10 years or longer, of projected customer demand that considers econometric data and customer usage, and assess commercially available conservation and efficiency resources for the planning horizon. Because PSE's conservation efforts are largely driven by the Energy Independence Act (EIA),[32] the focus is rightfully placed on energy savings (in kWh). Staff recognizes that PSE is obligated to "pursue all available conservation that is cost-effective, reliable, and feasible."[33] Staff also sees that, as the state and region transition towards higher penetration rates of variable renewables, capacity constraints – along with renewable energy needs – are driving resource acquisition. This is evidenced by the increasing ELCCs of demand response and storage resources: both well suited to meet peak capacity needs. In light of this dynamic, Staff wonders if the current method for bundling conservation measures on the basis of cost per energy savings ($/kWh) sufficiently captures the capacity value of measures in determining their cost-effectiveness with respect to other resource types. **Staff recommends that PSE explore – in consultation with its conservation resource and IRP advisory groups – quantifying the amount of conservation that is currently excluded from its portfolio on a $/kWh basis, but would be included if considered primarily on a $/kW basis.** A discussion of this work, and any resulting changes to PSE's approach, should be included in the Company's 2025 IRP.

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[31] See Commission Staff Comments on PSE's 2023 Gas IRP, Docket UG-220242.
[32] See 19.285 RCW.
[33] RCW 19.285.040(1).

Decarbonization and Electrification

Staff discusses PSE's approach to modeling the electrification of gas loads in our comments on PSE's 2023 Gas IRP. We commend PSE for taking on this analysis in its planning process, but make several recommendations to refine the analysis and account for voluntary electrification and gas customer attrition.

In addition to Staff's comments on PSE's 2023 Gas IRP, **Staff recommends that PSE update its assumptions around electric vehicle adoption in its 2025 IRP to reflect recent trends, policies, and incentives that have emerged since the Company produced its EV forecast used in this filing. These updates should also include learnings from PSE's implementation of its transportation electrification programs and related demand response programs.**

Emerging Technologies

PSE's Progress Report evaluates several technologies that were not included in previous analyses. These include alternative fuels for thermal plants (green hydrogen, biodiesel, and renewable natural gas) as well as new generating technologies (small modular nuclear reactors).

Staff largely agrees with the Company that modeling alternative, non-greenhouse gas (GHG) emitting fuels for capacity resources makes sense, especially given the incentives for green hydrogen projects offered by the IRA and IIJA and direct GHG emissions costs associated with the CCA. However, Staff has some concerns with PSE's analysis for a few reasons:

1. **Staff recommends that in its 2025 IRP, PSE account for capital costs associated with transitioning existing plants to using green hydrogen as a fuel.** Staff understands that PSE included the fuel costs associated with this transition, but without accounting for the capital investment required to start burning green hydrogen, Staff has serious questions about the decision to make that transition on economic terms.
2. **Staff recommends that in its 2025 IRP, PSE account for alternative fuel price risk in its modeling.** The risk of fossil natural gas price volatility is included in PSE's stochastic risk analysis, but PSE does not appear to account for price uncertainty or potential volatility for alternative fuels like green hydrogen and renewable natural gas.
3. **Staff recommends that PSE account for and explain in its narrative the potential negative equity impacts of repowered thermal resources in its 2025 IRP.** PSE proposes converting existing natural gas plants to green hydrogen in this Progress Report. Staff notes that sites of existing natural gas plants – by nature of their vintage – almost certainly were not chosen with equity in mind. While most generic resources in this Progress Report's analysis are not site-specific, Staff expects PSE to include in its portfolio development process the distributional impacts of resources for which sites *are* known. Without accounting for this dynamic, PSE runs the risk of doubling down on – rather than fixing – energy system inequities.

Consistency of Evaluation of Technologies

During the public participation process, Staff and other interested persons noted that PSE does not appear to have a consistent methodology for evaluating new technologies for inclusion as generic resources. For example, PSE chose to include small modular nuclear reactors (SMRs) and green hydrogen-fueled peakers as generic resources even though these technologies have yet to be deployed at scale, and sourcing of green hydrogen is still speculative. On the other hand, the Company chose not to model any long-duration energy storage (LDES) technologies despite multiple utility scale pilot projects being on a similar pace to, or ahead of, SMR pilots in development.[34]

In a section describing PSE's proposed capacity resource additions, the Company states that "energy storage resources are not energy-producing resources; they store the energy produced from other resources to be available during peak hours."[35] While Staff agrees that energy storage resources do not produce energy, Staff notes that green hydrogen is also a storage resource in this sense. The advantage of green hydrogen over the other storage options PSE modeled is that (1) it can store and dispatch energy over longer durations, and (2) it is useful for many applications outside of the electricity sector.[36] On the first point, Staff again notes that there are promising long-duration energy storage technologies that would serve a similar purpose to green hydrogen peakers in this respect. On the second point, Staff encourages PSE to evaluate, and be transparent about, the most likely applications of its potential investments in green hydrogen, and to include discussion of the rationale driving these investments with its advisory groups and in the Company's future planning documents.

Staff appreciates PSE describing the technologies it considered – but did not ultimately include – in its modeling.[37] **Staff recommends that ahead of the 2025 IRP, PSE work with its IRP advisory group to develop a consistent and transparent methodology for evaluating emerging technologies for inclusion in IRP modeling. Staff recommends PSE include in its 2025 electric IRP portfolio analysis at least one LDES technology capable of dispatching at its full rated capacity over multiple days.[38]**

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[34] For example, several Iron-air battery projects are at various stages of development including in two projects in Minnesota, and one project in Georgia. Avista modeled several different long-duration energy storage technologies, and included multiple Iron-air (which Avista calls "iron-oxide") batteries in their 2023 Electric IRP Progress Report's Preferred Portfolio, coming online starting in 2039 (Table 9.5, page 9-13, Draft 2023 Electric Integrated Resource Plan, Avista, April 11, 2023, UE-200301).
[35] PSE 2023 IRP Progress Report at page 3.10.
[36] See Staff Comments on PSE's 2023 Gas Integrated Resource Plan, Docket UG-220242.
[37] PSE 2023 IRP Progress Report, Appendix D, Section 5.
[38] Staff expects that *part of* PSE's methodology for evaluating emerging technologies will include a review of the technologies that PSE's peer utilities include in their IRPs.

Summary of Public Comments

As of writing,[39] three comments had been filed to this docket since PSE filed its Progress Report. One of these comments came from the Coalition of Eastside Neighborhoods for Sensible Energy and related to their opposition to PSE's Energize Eastside project. One came from the Washington Clean Energy Coalition (WCEC) highlighting several DER-related issues – including virtual power plants, vehicle-to-grid, time-varying-rates, and others – that they believe PSE should explore and provide more detail on. WCEC concludes by recommending that the Commission "engage an independent auditor to review the assumptions and analysis of PSE's long-term electric plans." The last comment was from a customer with wide-ranging criticism of many aspects of the Progress Report.

[39] As of 6/2/2023.