2023 Gas Utility Integrated Resource Plan Feedback

This document captures public feedback from the January 17, 2023 Integrated Resource Plan (IRP) public webinar on Draft Gas Portfolio Results and Draft Gas Utility IRP, published January 24, 2023.

Feedback from Interested Parties

The following organizations and individuals submitted feedback to PSE on the Draft Gas Portfolio Results webinar and the Draft Gas Utility IRP. Click on any name (listed in alphabetical order by first name) to review their feedback.

- Aaron Tam, Public Counsel Unit, Office of the Attorney General
- Amy Wheeless, Northwest Energy Coalition (NWEC)
- Deepa Sivarajan, Climate Solutions
- Don Marsh, Washington Clean Energy Coalition
- James Adcock
- Jennifer Snyder, Washington Utilities and Transportation Commission
- Jim Dennison, Sierra Club
- Joel Nightingale, Washington Utilities and Transportation Commission
- Kelly Hall, Climate Solutions
- Kevin Jones

Feedback Themes

Table A.1 describes the major public feedback themes identified by PSE throughout the 2023 Gas Utility IRP process.

Table A.1 Feedback Themes

#	Feedback Topic	PSE Response
A	Electrification; heat pumps	PSE electrification analysis is an "integrated" analysis in that it looks at the impacts on both the gas and the electric system. This was a first step at such an analysis and our approach will continue to evolve over the next IRP cycle. The electrification looked at a broad spectrum of heat pump applications and technologies, which included dual fuel or hybrid heat pumps, air source heat pumps – both ductless and ducted, both standard efficiency and cold climate. The approach to including cold climate heat pumps was similar to the 2021 Power Plan, whereby we assumed standard heat pumps in the electrification portion and then included cold climate heat pumps under the energy efficiency supply curve convert them as conservation measures to the higher efficiency units. The 2023 IRP included hybrid heat pumps to assess their viability as a decarbonization pathway. One major advantage of HHPs is that they would have no direct impact on peak need on the electric system. An associated benefit is that by not having to build peak generation and associated transmission/distribution systems, the implementation could be achieved sooner. The decarbonization could be affected at a faster pace, than if additional electric infrastructure is needed to serve the added peak electric load. The assumptions around heat pumps can be found in the Conservation Potential Assessment (CPA) in Appendix C: Conservation Potential Assessment. Cadmus Group, the consultant who completed the CPA, used the best information available at the time of this study. How the electrification was conducted in the gas scenarios and sensitivities is discussed in Chapter Four: Key Analytical Assumptions. The results of the electrification runs are discussed in Chapter Six: Gas Analysis and Appendix F: Gas Analytical Methodology and Results. We think that electrification offers a way for the gas utility to reduce its emissions. We will continue to make improvements to our assumptions and analysis as we learn more and more data becomes available.
B	Review timeline	In subsequent IRP cycles, PSE will work to build factor in additional time for members of the public and interested parties to review IRP documents and have adequate time to provide feedback in future IRP cycles.

#	Feedback Topic	PSE Response
C	Accessibility and plain language	PSE is committed to removing participation barriers and attracting more members of the public into the resource planning process. In this IRP cycles we took steps to improve readability and accessibility for all and moving forward this will be a continued priority.
D	Inflation Reduction Act (IRA)	We incorporated as much of the Inflation Reduction Act as possible into the Gas IRP; however, because the law was enacted late in our planning process, we could not consider all the nuances of the bill without revising the CPA and therefore causing a significant delay in the filing of the 2023 Gas IRP. In the September 22, 2022 Gas IRP Public Webinar the Washington Utilities and Transportation Commission expressed that they did not endorse a delay in filing of the IRP in order for PSE to revise the CPA for the IRP. We will continue to study the impacts of the IRA for the 2025 IRP as the rulemaking process develops.
E	Green hydrogen and alternative fuels	We explored the use of alternative fuels including green hydrogen and renewable natural gas (RNG) in the 2023 Gas Utility IRP. These fuels support our natural gas operations' decarbonization and power generation portfolio, which will be essential for a clean, reliable resource portfolio. In this report, we captured key characteristics of alternative fuels such as price and availability. Having established the potential benefit of alternative fuels in this report we aim to further refine the assumptions for alternative fuels in future IRP cycles.
F	Equity	When considering equity in resource planning, it is important to note that no specific guidance exists today to inform how we should embed equity into our 2023 Gas Utility IRP. We recognize, however, that although resource planning is not a decision-making process, it presents opportunities to view critical elements of our work through an equity lens and to make progress toward our equity goals. For this IRP, we adjusted the cost-effectiveness threshold for low-income conservation programs, an adjustment we made in past IRPs. We took additional steps to consider equity for the gas utility by including spatial analysis of vulnerable populations in the conservation potential assessment, consistent with the low-income programs. We also initiated a conversation with

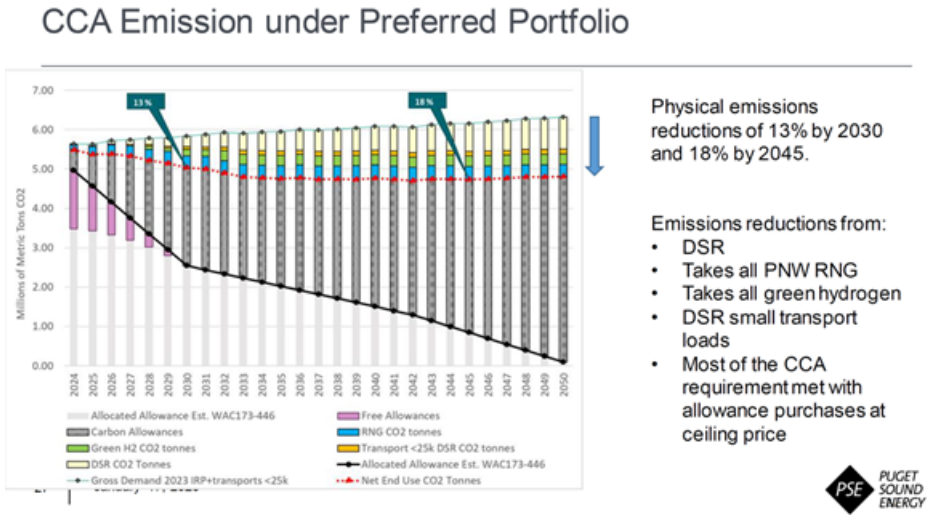
#	Feedback Topic	PSE Response
		interested parties, including our Equity Advisory Group (EAG), which will continue into the 2025 IRP cycle. We expect to expand equity considerations in the 2025 Gas Utility IRP and beyond by applying lessons learned from equity work across PSE and identifying desired outcomes and goals.
G	Zero-growth scenario	PSE considered feedback from interested parties and determined the zero-growth scenario should be the preferred portfolio for the Gas Utility IRP.
H	Climate Commitment Act (CCA); carbon allowances	PSE included the direct effects of the CCA in this IRP. We examined how purchasing allowances will affect our current resource plan. We began IRP analysis before the CCA was enacted and incorporated as many impacts as possible with the information we have. At this point we do not fully understand how ratepayers will be impacted. We will continue to monitor developments in the details of the CCA in future IRP cycles. In accordance with RCW 80.28.010 PSE is legally obligated to provide customers with "safe, adequate, and sufficient" gas and related services.

January 17, 2023 Webinar Feedback

Table A.2 records responses to unanswered questions heard during the **January 17, 2023 webinar** and questions submitted via the feedback form and irp@pse.com.

Table A.2 Questions and Comments from January 17, 2023 webinar on Draft Gas Portfolio Results

Date	Interested Party	Comment	PSE Response
1/17/23	Jennifer Snyder, UTC	When you get to slide 34, could you please also be prepared to show the total portfolio costs in addition to the $/Dth? Thanks.	The graphs are mislabeled. They are not dollars per Mdth. The Y axis should read "NPV Portfolio Costs in $". This is corrected in the final IRP.
1/17/23	Don Marsh	When Phillip says electrifying a home is really expensive, it would be helpful for us to know what number PSE is plugging into the model for average home cost	This is something that PSE can share, it was done as a part of the conservation potential

Date	Interested Party	Comment	PSE Response
		of electrification. I believe it IS expensive, but emissions are also very costly for society and the environment.	assessment. See Appendix C: Conservation Potential Assessment, then navigate to Appendix A-Heat Pump Market Research Findings.
1/24/23	Kevin Jones	Reports from your latest GAS IRP leave me almost speechless regarding the intractable slowness of reducing your gas sales and glacial pace of shifting your gas customers to electricity. While carbon pollution is tending to make glaciers extinct, along with many other life forms currently on the planet, glaciers should not be your model to achieve zero gas emissions by 2050 as the State and its residents expect.  Your plan to reduce gas use by less than 1% per year over the next 22 years is completely unacceptable. Purchasing “carbon allowances,” which means you continue to pollute, literally at my expense paying for your carbon allowances through my energy bills while also paying for your carbon pollution through sea level rise, heat domes and wildfire smoke which trends indicate will soon make	Thank you for your feedback. Please see our answer to Feedback Theme H.

Date	Interested Party	Comment	PSE Response
		summers a life and death proposition for anyone with a serious respiratory condition. You. Must. Do. Better.	

Feedback on the Draft Gas Utility IRP

Table A.3 records questions and comments on Draft Gas Utility IRP via the feedback form and irp@pse.com.

Table A.3 Draft Gas Utility IRP Public Comments (in alphabetical order by interested party)

1. Aaron Tam on behalf of Public Counsel Unit, Office of the Attorney General, February 14, 2023

No.	Category	Comment	How PSE used/may use this feedback
1.1	Clarification	On page 2.5, figure 2.2 shows the emission reduction pathway in the preferred portfolio. 1. The distinction between free allowances and allocated allowance is not clear from the narrative or the figure. Could PSE elaborate a little bit more on the distinction between these two in the narrative? We understand the distinction but a reader who is unfamiliar with the Climate Commitment Act may not.	Thank you for your feedback. We have improved Figure 2.2 and other figures in the final Gas IRP for greater clarity.
1.2	Typo	On page 2.6, the last paragraph has a few typos: 1. “zero-growth in sensitivity G” should say, “zero-growth in sensitivity F.” 2. “The zero growth is lower due to lower demand than in the reference scenario” should say something along the lines of: “The zero gas growth sensitivity’s conservation savings are lower than the reference scenario’s conservation savings due to lower gas demand.”	Thank you for your feedback. This is updated in final Gas IRP.
1.3	Typo	A couple of typos on page 3.5:	Thank you for your feedback. This is updated in the final Gas IRP.

No.	Category	Comment	How PSE used/may use this feedback
		1. In the last sentence of section 4 on the IRA, the first use of “IRP” should say “IRA.” 2. In section 4.1, toward the end of the paragraph, there are two sentences that would read better as one (“Future appliance subsidies may not affect future conservation potential assessments. Due to the use of a total resource cost test in Washington”).	
1.4	Typo	On page 4.9, the very last sentence has a #3 superscript with no corresponding footnote.	Thank you for your feedback. This is updated in the final Gas IRP.
1.5	Typo	On page 5.3, there is a typo where it says, “It is essential to consider climate change in resource planning because is a heating fuel.”	Thank you for your feedback. This is updated in the final Gas IRP.
1.6	Clarification	On page 6.33, the legend for figure 6.21 shows a blue and red “DER.” What is the difference between the blue and the red DER? What are “system purchases”?	The chart has been updated and clarified in the final Gas IRP.
1.7	Typo	On page 6.33, figure 6.22’s vertical axis label has formatting issues.	Thank you for your feedback. This is updated in the final Gas IRP.
1.8	Typo	On page 6.4, the #6 in “allowance6” should be in superscript format.	Thank you for your feedback. This is updated in the final Gas IRP.
1.9	Clarification	2. PSE shows allocated allowances in light blue in figure 2.2 which must be consigned to auction for the benefit of ratepayers. Is it assumed that PSE will purchase the same amount of allowances (light blue) as well as purchase the amount of carbon allowances in gray for compliance with the CCA?	The allowances in light blue will be consigned and so PSE will have for determination in the future as to how those allowances could be used, the grey allowances PSE will purchase to meet the requirements of the CCA.
1.10	Carbon allowances, Clarification	3. PSE does not discuss the role of offsets in CCA compliance. Is it assumed that PSE will not use offsets to comply with the CCA? If not, does PSE plan on modeling the use of offsets for CCA compliance in future IRPs? On page 2.9, figure 2.4 shows two bars for each scenario and sensitivity. What is the difference between each bar for each scenario or sensitivity?	PSE did not include offsets in this IRP; however, we will discuss this more in future IRPs, as the rulemaking process progresses and we learn more about how offsets will be available for meeting CCA requirements. Please see our answer to Feedback Theme H.

No.	Category	Comment	How PSE used/may use this feedback
1.11	Pipeline expansion	On page 3.8, the document mentioned that pipeline expansion is not likely to be pursued by PSE, but may be re-evaluated "if doing so could obtain more favorable capacity than the existing one without imposing high costs or risks on PSE customers." Does PSE plan to re-evaluate these pipeline expansions for each IRP going forward?	PSE always evaluates any cost that could be reduced for the benefit of the ratepayers, which also includes expansion of pipelines. There is a low likelihood of this occurring, however, especially with regard to upstream pipelines. In terms of overall peak day deliverability, we are more likely to be reducing contracts for capacity with interstate pipelines.
1.12	Alternative fuels	On page 4.15, table 4.3 shows a table of renewable natural gas alternatives modeled which includes RNG-physical and RNG attribute. Could PSE elaborate on the distinction between these different types of RNG contracts?	RNG consists of the energy commodity and environmental attributes. Physical RNG is both the energy and the environmental attributes, whereas RNG attributes are only the environmental attributes associated with the RNG without the energy.
1.13	Clarification	On page 6.15-6.16, the connection between the sentence "These hybrid heat pumps reduce emissions significantly and are the greatest contributor to reducing emissions, see figure 6.8" and figure 6.8 is unclear. Does the light blue portion of the bar in figure 6.8 represent only HHPs or does it include other types of heat pumps as well (but is mostly composed of HHPs)? Some clarification would be helpful here.	Thank you for your question. The light blue portion is all hybrid heat pump. In this sensitivity we tested the market hybrid heat pump; in other words the same assumption as the reference scenario. However, we made emissions reductions a priority in this sensitivity to see what would happen to the portfolio. We analyzed this both in terms of emissions reduction and costs; if we did not let the gas portfolio model optimize around cost as a first step, but as a second step after all decarbonization resources had been implemented, only then was it allowed to add net additional CCA allowances.
1.14	Green hydrogen	The gas IRP discusses green hydrogen starting as a resource in 2028. Similar to the electric IRP, Public Counsel is interested in the Company's plans should green hydrogen not be available in 2028. Have PSE planning staff been involved with the Company's efforts and discussions surrounding the decarbonization bill proposed during this legislative session (SB 5562/HB 1589)?	Thank you for your feedback. PSE staff has remained engaged in legislative discussions around the decarbonization bill (SB 5562/HB 1589).

2. Amy Wheeless on behalf of Northwest Energy Coalition, February 15, 2023

No.	Category	Comment	How PSE used/may use this feedback
2.1	Carbon allowances, alternative fuels	Overall, we are concerned that PSE's preferred gas portfolio places too much emphasis on alternative fuels and the purchase of allowances to meet compliance with the Climate Commitment Act (CCA). Incorporating more electrification into the preferred portfolio could help modulate this risk, but overall, we think that the company will need to move to a more holistic and integrating planning process between its gas and electric businesses, in coordination with other utilities where PSE's service territory overlaps. This coordinated planning could help better align expected growth, decline, and efficiencies between the two sides of the utility.	Thank you for your feedback. Please see our answer to Feedback Theme H.
2.2	Climate data	**Climate Data:** We appreciate that the Company has taken steps to better incorporate climate change into its planning. We look forward to further refinement on climate modeling for the next IRP, and encourage the Company to work with nearby utilities and with regional experts, such as the University of Washington Climate Impacts Group, to develop a coordinated approach to climate data and modeling for utility planning.	Thank you for your feedback.
2.3	Green hydrogen, IRA	**Hydrogen in preferred portfolio**: While we understand that the Inflation Reduction Act's production tax credits (PTCs) make hydrogen more cost-effective in the modeling for the preferred portfolio, it is still unclear how the Company plans to source this product and whether there will be sufficient availability to serve this need. It is also unlikely that these PTCs will last through the end of the planning period. We recommend that PSE include more discussion of sourcing constraints for hydrogen in this IRP. We are also not clear that the IRP has accounted for any infrastructure costs associated with increased blending of hydrogen into the system. The	The company is investing in development and growth of green hydrogen in the state of WA. Please see https://www.pse.com/en/press-release/details/Puget-Sound-Energy-and-Fortescue-Future-Industries-Forge-Partnership. The development timeline assumed in the gas IRP is within the time the Production Tax Credits will be available (prior to 2033). The cost assumptions include some pipeline and storage and include capital costs for building an alkaline electrolyzer.

No.	Category	Comment	How PSE used/may use this feedback
		IRP should make clear the cost assumptions associated with assuming increased blending of hydrogen into the system.	The electricity will be sourced from a new solar plant located in the PNW. Blending cost assumes an all in cost that has three phases of blending: 2028 third of 5%, 2030 another third of 5% and 2032 final third of 5%, for a total final blend of 5% in 2032.
2.4	Electrification, CPA, IRA	**Electrification**: Overall, it is surprising to us that no electrification shows up in the preferred portfolio. Based on the analysis and the presentations, we wonder if electrification is showing up as more costly because: 1. All the costs of "electrification" are falling solely on electrification, rather than in other areas that are not strictly related to fuel switching, such as energy efficiency – as we mentioned above, we think more integrated energy system planning could help address the accounting of these costs. 2. Electrification is being analyzed as single building/project costs versus analyzing a group of projects that are locationally close and could be done in lieu of new pipeline or other infrastructure upgrades. 3. The conservation potential assessment (CPA) does not account for the new market changes and drivers for electrification from the federal Inflation Reduction Act (IRA).	1. No, the costs for electrification are only related to electrification. Energy efficiency costs are treated separately. 2. We agree that the locational cost for non-pipes could be a benefit, this will be analyzed on a sub-areas basis by the distribution planning team that will use the information from the IRP to help inform their distribution system planning analysis. 3. We plan to include these as in the next IRP as the IRA rules are developed and also include this in our decarbonization study in 2023. Please see our answer to Feedback Theme F.
2.5	Electrification, carbon allowances, CPA	For this IRP, the sheer number of allowances PSE plans to purchase to be in compliance with the CCA combined with the fact that the IRP's CPA did account for demand-side changes from the federal IRA leads us to believe that the preferred portfolio is unrealistic and risky for customers. The final IRP should have more discussion and information about the assumptions of costs and benefits of electrification. In addition, the final IRP should	Thank you for your feedback. Please see our answer to Feedback Theme H.

No.	Category	Comment	How PSE used/may use this feedback
		incorporate additional analysis to incorporate updated assumptions about decreased demand for the gas and lower costs for electrification – waiting for the next IRP is too late. For the next IRP, in addition to more integrated planning, we recommend the Company explore opportunities for locational electrification pilots (e.g., electrifying a whole area as an alternative to replacing a pipeline). For example, there may be significant gas main upgrades or replacements that could be avoided if an area of buildings was provided with substantial incentives and assistance to electrify. It is possible that PSE analyzed some of these ideas for this IRP as non-pipes alternatives for specific projects; if so, please provide the analysis and information in the final IRP.	
2.6	RNG contracts	**Pipeline Renewals:** In the Company's preferred portfolio, the Company would not renew a number of contracts for pipeline capacity. While we appreciate that the Company is focusing more on energy efficiency, we wonder if this change would make PSE overly reliant on gas storage resources. We would encourage more discussion in the IRP on the implications of this change.	PSE owns an underground gas storage facility which serves our customers in the winter to provide lower cost gas, and this was assumed to continue to be available to serve customers. In the case of electrification, the storage would function to continue to serve the remaining gas loads.
2.7	Carbon allowances	**CCA Allowances**: Probably the biggest policy change since the PSE's last gas IRP is that Washington State now has an official price on carbon. For planning purposes, it is probably reasonable to use the ceiling price of allowances for now, but in the future, we hope that an allowance price index can be developed for this purpose. In the near term PSE should pursue all cost-effective energy efficiency, demand response, and electrification, and it seems likely that PSE will still need to purchase allowances. In the medium term, it may be necessary to pursue more energy efficiency, demand response, and	Thank you for your feedback.

No.	Category	Comment	How PSE used/may use this feedback
		electrification beyond what is deemed costeffective in order to mitigate for fuel price and allowance price risk.	
2.8	General rate case	**General Rate Case Order:** We recommend that the chapter on Legislative and Policy changes include a summary of the recent general rate case order and settlement agreement (UG-220067, et. al). Though this case is not driving any changes in this IRP, it is important context for any reader to know about.	Thank you for your feedback. We are not including a summary of PSE's General Rate Case Order as it does not fall within the scope of this IRP.

3. Deepa Sivarajan and Kelly Hall on behalf of Climate Solutions, February 15, 2023

No.	Category	Comment	How PSE used/may use this feedback
3.1		Climate Solutions appreciates the opportunity to comment on the Draft 2023 Gas IRP. As Puget Sound Energy (PSE) looks towards achieving compliance with the state's decarbonization policies, including the Climate Commitment Act (CCA) and the Clean Energy Transformation Act (CETA), and responding to a rapidly changing economics for heating buildings, it is important that PSE develops an informative and viable Integrated Resource Plan (IRP). Consequently, PSE must ensure that the modeling inputs and assumptions, resource scenarios, and methodologies accurately reflect the conditions and evolutions of both the electricity and gas sectors. We are pleased to see that PSE incorporated several of our suggestions into modeling for the Draft Gas IRP, including adding a zero-growth sensitivity to account for recent statewide policy and market changes that increase building electrification, and running an electrification scenario that applies a	Thank you for your feedback.

No.	Category	Comment	How PSE used/may use this feedback
		carbon constraint based on the Washington 2021 State Energy Strategy's carbon reduction requirements. We also appreciate that the preferred portfolio's assumptions for availability and feasibility of alternative fuels have become more realistic over time. However, we have concerns that PSE's preferred portfolio does not achieve necessary decarbonization and air pollution reduction requirements, nor does its methodology properly assess the potential for wide-scale electrification to impact gas demand and decarbonization strategies. To further improve the Final Gas IRP, we have the following critiques and suggestions.	
3.2	Carbon allowances, reducing emissions, green hydrogen	**The preferred portfolio's compliance with the Climate Commitment Act (CCA) is not in the spirit of the law and does not reflect real-world conditions**. The Draft IRP's preferred portfolio found that the most "cost-effective" way for PSE to meet CCA's requirements is for PSE to reduce emissions 13% by 2030, and only 18% by 2045, making up the remainder of the emissions reduction by purchasing carbon allowances at the ceiling price. The bulk of the actual emissions reductions come from the use of renewable natural gas (RNG) and green hydrogen in the near-term, and then primarily with conservation in the following decades.	Thank you for your feedback.

No.	Category	Comment	How PSE used/may use this feedback
3.3	IRA, alternative fuels, green hydrogen, heat pumps	**The Draft Gas IRP is biased towards supply-side resources and underestimates the potential for additional demand-side resources.** Consistent with our comments on the Draft 2023 Electric IRP, we are concerned that the Draft Gas IRP applied the federal Inflation Reduction Act (IRA) incentives to supply-side resources, but not to the gas demand forecast or demand-side resources. In July 2022, the federal government passed the Inflation Reduction Act, which includes substantial incentives and tax credits for clean energy including green hydrogen, wind and solar generation, and clean heating appliances like heat pumps. For both its electric and gas portfolios, PSE has applied the IRA production tax credit (PTC) for green hydrogen. However, as we stated in our comments on the draft electric IRP update, PSE did not include the IRA's incentives for electric demand-side resources like air and water heat pumps. Customer adoption of electric heat pumps will impact the utility gas company's actual demand. By not incorporating the IRA incentives for electric heating appliances, PSE is likely overestimating the amount of demand for gas over the planning horizon.	Thank you for your feedback. Please see our answer to Feedback Theme D.
3.4	CPA, IRA, gas demand	In its advisory group meetings, PSE stated that its electric Conservation Potential Assessment (CPA) was developed prior to the passage of the IRA and it would be too cumbersome to modify the CPA. Although we disagree with PSE's conclusion about the benefits of modifying the CPA, we encourage you	Thank you for your feedback. Please see our answer to Feedback Theme D.

No.	Category	Comment	How PSE used/may use this feedback
		to seek an alternative analysis that can approximate the impact of the IRA on electric demand-side resources and the PSE's gas demand forecast. For example, PSE could develop a proxy analysis that estimates the impact to certain costs or to the electric and gas demand forecasts. Modeling the law's impact on one set of resources and not the other will unnecessarily favor supply-side resources.	
3.5	Heat pumps, IRA	PSE should also consider electric heat pumps and electrification to be a demand-side resource in the gas IRP and apply IRA benefits to the costs of its electrification scenario and to the heat pump sensitivities. The Draft Gas IRP found that heat pumps were not selected as cost-effective, but the costs of heat pumps are inflated without including IRA funding.	Thank you for your feedback. Please see our answer to Feedback Theme D.
3.6	Gas demand, heat pumps	Additionally, to account for policy and market-driven changes that are already reducing gas use in new and existing buildings, the preferred portfolio has included a zero-growth sensitivity, but only for conservation targets. This results in lower conservation potential without also applying a zero-growth sensitivity on the supply-side, inflating the resource need. Given that zero-growth is already anticipated in law, since the State Building Code Council has updated its commercial and residential energy codes in 2022 to require heat pumps in new buildings, the zero-growth sensitivity must be applied to gas demand and to supply-side resources in the preferred portfolio.	Thank you for your feedback. Please see our answer to Feedback Theme G.

No.	Category	Comment	How PSE used/may use this feedback
3.7	Alternative fuels, green hydrogen, IRA	**The preferred portfolio's reliance on alternative fuels and carbon allowances for CCA compliance is risky for customers.** PSE is required to model commercially-available resources in your IRP; the preferred portfolio currently incorporates green hydrogen blended into natural gas pipelines in 2028. Green hydrogen is not currently commercially available in the quantities necessary for this blending, nor at the price that the Draft IRP anticipates. Additionally, while green hydrogen may be cost-effective in the short-term due to federal Production Tax Credits (PTCs), these tax credits are unlikely to continue through 2050. The preferred portfolio's current price estimates for RNG are also at the low end of current cost ranges, and competition with other hard-to-decarbonize sectors such as transportation will likely raise the costs.	Thank you for your feedback. Please see our answer to Feedback Theme H.
3.8	Green hydrogen	The preferred portfolio also does not account for the feasibility and costs of blending hydrogen into natural gas pipelines without making significant upgrades to both gas infrastructure for safety, and to appliances on the customer ends. The preferred portfolio anticipates green hydrogen blending into natural gas to begin at 5% by energy – this is at the high end of likely blend capacity without infrastructure upgrades. The Draft IRP also does not account for how green hydrogen and RNG will be transported and stored, likely raising costs as well.	The costs shown in figure E.9 in Appendix E: Existing Resources and Alternatives are an all in cost and include costs for pipeline and interconnection into PSE distribution system. The cost estimates for producing green hydrogen are within the range of estimates generally discussed in literature of $4-$6 per kg [1kg of H2 is equal to 8 MMBtu or Dth].
3.9		The Draft IRP may also be overestimating the climate benefits of RNG. The Draft IRP should account for	Thank you for your feedback.

No.	Category	Comment	How PSE used/may use this feedback
		the upstream methane leaks associated with the collection and processing of biogas feedstocks for RNG to ensure that the climate benefits of RNG are accurately measured.	The impacts of upstream RNG leaks is zero, more significantly RNG removes the methane that would have ordinarily been released into the atmosphere. Please see our answer to Feedback Theme E.
3.10	CCA, carbon allowances	Finally, the Draft IRP's strategy to only reduce actual emissions by 18% by 2050 is not in the spirit of CCA and is risky for customers, especially if the ceiling price for carbon allowances increases over time.	Thank you for your feedback. Please see our answer to Feedback Theme H.
3.11	CCA, equity	**The preferred portfolio does not account for impacts to overburdened communities, particularly around air quality.** Purchasing carbon allowances without significantly decreasing natural gas use may account for CCA compliance, but not for the air quality impacts of natural gas. Section 3 of CCA requires emitters to improve air quality as well; while rulemaking has not begun for Section 3, it is unreasonable for PSE to assume that gas use can continue at current rates while staying in compliance with CCA. Environmental justice is also codified statewide through the 2021 Healthy Environmental for All (HEAL) Act, requiring that public agencies consider environmental justice in their programs. PSE should also demonstrate an equitable distribution of benefits to overburdened communities in the Gas IRP, as an equitable distribution of benefits is considered to be in the public interest. The preferred portfolio fails to demonstrate an equitable distribution of benefits, in	PSE is working on its approach to integrating equity into everything we do. This Gas IRP represents first steps toward integrating equity. In this IRP, PSE did look at and provide a more favorable cost benefit threshold to the vulnerable populations in the Conservation Potential Assessment (CPA). PSE will continue to develop our analytical framework to include more equity considerations in future IRPs. Please see our answer to Feedback Theme F.

No.	Category	Comment	How PSE used/may use this feedback
		fact likely decreasing benefits to communities already disproportionately impacted by air pollution.	
3.12	Alternative fuels, green hydrogen	Additionally, while biodiesel and RNG may be lower- or zero-carbon fuels, their combustion still releases air toxics like nitrogen oxides (NOx) into the air, which are both criteria pollutants and important precursors for particulate matter. This increases outdoor air pollution and can also harm indoor air quality if RNG is used in gas cooking appliances. Similarly, blending hydrogen into natural gas as a combustion fuel will require a higher temperature for combustion, as hydrogen burns at a higher temperature than methane, and this increase in temperature will result in higher NOx emissions as well.	Thank you for your comment. The Gas IRP did not analyze the combustion or use of biodiesel. We will continue to explore the feasibility of green hydrogen in the 2025 IRP.
3.13	Electrification, IRA, heat pumps	**PSE needs to clarify the assumptions made in their cost-benefit analysis for electrification.** The Draft IRP finds electrification to not be a cost-effective way to comply with CCA. However, it is unclear what costs and benefits PSE included in its assumptions. Washington's moderate climate should allow for electrification to be cost-effective, as long as the costs to the utility are not the only consideration. IRA funding for electrification would also make electrification significantly more affordable, but the IRA has not been applied either to the heat pump sensitivities or to the electrification scenario in the Draft IRP. PSE must clarify the assumptions made for the availability, costs, feasibility, and performance of all-	Thank you for your feedback. Please see our answer to Feedback Theme A and Feedback Theme D.

No.	Category	Comment	How PSE used/may use this feedback
		electric heat pumps, particularly all-electric cold climate heat pumps, as it seems that PSE has primarily studied "hybrid" heat pumps that would switch over to back-up gas heat at 35°F. All-electric cold climate heat pumps have greatly increased in product availability and proven performance in the past decade. These products are tested and rated to provide heating safely and efficiently down to 5°F and below – well below PSE's winter peak design day temperature of 13°F.	
3.14	Alternative fuel	**PSE must provide more information on the non-pipe alternatives studied.** PSE also needs to significantly expand upon its non-pipe alternative (NPA) section by providing detail and clarity of its analysis. PSE's Appendix G generally describes PSE's tool and process without providing any analytical detail, much less provided details on its analytical framework, cost-benefit test, or the results of any analysis from the NPAs it has conducted. PSE should be identifying projects in the near-term (two to five years) and the results of the utility's NPA analysis, as well as identifying potential projects in the medium-term (six to ten years) that could be deferred, reduced, or replaced by a NPA.	We agree and that is why part of our Delivery System Planning (DSP) model includes performing NPA for projects and is working to expand the NPAs available for consideration. You can read more about demand response in Appendix G: Delivery System Planning.
3.15	Electrification, CPA	**To remedy issues with the Draft Gas IRP, we recommend that the Final Gas IRP:** **Integrate the electric and gas IRP processes to ensure that the impacts of electrification are**	PSE incorporated electrification in both the gas and electric documents for this cycle. We will continue to integrate them more effectively in future IRP cycles.

No.	Category	Comment	How PSE used/may use this feedback
		captured accurately on both the demand and supply side. The gas and electric IRP processes should be integrated more holistically to ensure that any modeled increase in electrification on one side shows up in the other fuel's load forecast. Both the electric and gas IRPs should incorporate expected future electrification into demand forecasts and Conservation Potential Assessments (CPA).	
3.16	IRA, heat pumps, gas demand	**Clarify modeling assumptions, incorporate additional analysis, and conduct studies on the feasibility of proposed resources.** The Final IRP should incorporate additional inputs for modeling the preferred portfolio, including: 1. Applying the impacts of the IRA to the gas demand forecast and to demand-side resources, including to heat pumps and electrification. 2. Clarify the assumptions made for the availability, costs, feasibility, and performance of all-electric heat pumps, and demonstrate why hybrid heat pumps would have an advantage over all-electric cold weather heat pumps. 3. Incorporating the zero-growth sensitivity to both gas demand, and to demand and supply-side resources in the preferred portfolio, rather than solely to conservation, to more accurately reflect existing law and market trends. 4. Clarifying if your portfolio optimization model allows demand-side resources for energy and capacity. 5. Modeling commercially-available resources.	1. Please see our response to Feedback Theme D. 2. The cost data is in the DSR report. The hybrid heat pumps advantages are primarily borne out in the electrification analysis; they don't add peak electric leads. 3. We changed this in the final IRP. 4. Yes it does. 5. We only modeled commercially available resources. 6. Up to a 15 percent hydrogen blend, PSE does not expect to have large infrastructure upgrades to inject into the pipeline system. Analysis on injection continues and the capital requirements will be incorporated into future long range plans including the 2025 IRP.

No.	Category	Comment	How PSE used/may use this feedback
		6. Sharing cost estimates for any infrastructure upgrades that will be required to inject hydrogen into the gas pipeline system. 7. Providing a systems-level analysis showing that RNG use in the distribution system is the most cost-effective method for decarbonizing the system, including a comparison of the relative costs of decarbonizing industrial processes vs. residential and commercial space heating with RNG and green hydrogen. 8. Applying a higher price for RNG to better account for the projected range in prices and the high demand for the fuel in other sectors as a decarbonization strategy. 9. Incorporating the upstream carbon impacts of RNG from methane leaks associated with the collection and processing of biogas feedstocks. 10. Clarifying and share assumptions made in the cost-benefit analysis for electrification to show why electrification is not considered cost-effective in the model.	7. The IRP already shows in what scenarios and sensitivities RNG is cost effective, same thing with the green hydrogen. There are some industrial processes for which green hydrogen is the most viable/feasible alternative for decarbonization. We are currently evaluating PSE's decarbonization strategy as part of the GRC settlement and will use that information to inform the 2025 IRP. 8. The RNG pricing we have is based on the actual costs seen in the market at the time of this IRP. If RNG costs change in the future, we will update them in the 2025 IRP. 9. The impacts of upstream RNG leaks is zero, more significantly RNG removes the methane that would have ordinarily been released into the atmosphere. 10. We showed the higher portfolio costs that resulted from electrification, both for the heat pump equipment and also the added electric system costs. We added further discussion in Chapter Two: Resource Plan in the final IRP.
3.17	Equity, green hydrogen	**At minimum, the Final IRP should answer the following questions for the preferred portfolio:** 1. Does the Final IRP demonstrate an equitable distribution of benefits to overburdened communities, including reducing air pollution? If not, how does PSE plan to mitigate air pollution impacts?	1. Please see our response to Feedback Theme F. 2. 100 percent green hydrogen is especially of interest to industrial customers as a decarbonization fuel. Most of our industrial customers would receive the hydrogen unblended directly at their facility.

No.	Category	Comment	How PSE used/may use this feedback
		2. Can RNG and hydrogen be injected at a point on the system where it can continue to serve high-priority users (e.g. industrial customers) if large numbers of residential or commercial customers choose to electrify their heating systems? 3. How will RNG and green hydrogen be transported to project sites and then stored until needed? 4. How are green hydrogen prices expected to change with the likely expiration of PTCs?	3. RNG is methane and blends into the pipeline without any issue, and hydrogen will be blended in limited quantities into the gas pipe system. There is no storage on project sites for green hydrogen; the only storage would be on the production site. 4. Most forecasts suggest that the cost of green hydrogen will decline over time as demand grows from various sectors (transportation, industrial, buildings, etc), the IRA PTC will help to accelerate that cost curve to decline faster.
3.18	Clarification	**PSE should clarify which resources are allowed to compete in the portfolio optimization model.** PSE should also clarify if the portfolio optimization model allows any demand-side resources, including energy efficiency, demand response, and electrification, to compete against supply-side resources in the capacity expansion model. Additionally, we recommend you include a discussion on how it evaluates opportunities for non-pipeline alternatives to defer, reduce, or avoid future distribution investments.	Yes, the demand-side resources compete with the supply side resources in the Sendout model to achieve the least cost solution. Non-pipes is not part of the portfolio model; this analysis is done on a project-by-project basis by the distribution system planning team.
3.19	Review timeline	**Improve public engagement by increasing transparency and allowing sufficient time to provide comments.** The engagement process for the Draft Electric and Gas IRPs has not been sufficient for stakeholders to provide meaningful feedback and input. At the December 12, 2022 IRP meeting, you provided a preferred portfolio in the “Draft Results of Electric	Thank you for your feedback. Please see our answer to Feedback Theme B.

No.	Category	Comment	How PSE used/may use this feedback
		Portfolio" that did not comply with CETA, then did not provide an updated portfolio ahead of the release of the Draft Electric IRP. Additionally, only two weeks were initially given to provide comments on both the Draft Electric and Gas IRPs; while the deadline for the Draft Gas IRP was extended by an additional week, this is still not sufficient time to review and provide responses for both drafts. We are concerned that this timeline undermines the concept of stakeholder engagement through this rushed process and lack of transparency.	

4. Don Marsh on Behalf of Washington Clean Energy Coalition, February 14, 2023

No.	Category	Comment	How PSE used/may use this feedback
4.1		The Washington Clean Energy Coalition (WCEC) asks the Commission to reject Puget Sound Energy's Draft Gas Utility Integrated Resource Plan (IRP) published on January 24, 2023.[1] WCEC is a coalition of environmental and civic organizations that have participated as stakeholders in the development of PSE's IRPs for many years. In the Draft IRP, PSE analyzes many possible sensitivities that model different assumptions and policies. We would like to focus on three: PSE's Preferred Portfolio, a Hybrid Heat Pump Portfolio, and an Electrification Portfolio based on the State Energy Strategy.	Comment noted.

No.	Category	Comment	How PSE used/may use this feedback
		The Preferred Portfolio would cut present day emissions only 12% by 2050. The portfolio employs a mix of renewable natural gas, hydrogen, and Demand Side Resources. Together, these would reduce emissions by 24% of the inexorably rising demand forecast. To mitigate harm caused by the remaining 76% of emissions, PSE proposes to buy billions of dollars of "carbon allowances" from other companies, as permitted by the Washington Climate Commitment Act. The cost of these allowances will be passed on to customers who will pay for PSE to pollute while doing little to reduce real emissions.	
4.2	Heat pumps	The Hybrid Heat Pump Portfolio assumes widespread switching of natural gas furnaces to a type of heat pump that burns natural gas whenever the temperature dips below 35 degrees. By 2050, this option would reduce emissions by 79% (the remaining 21% would be covered by allowances). The cost would be $2.4 billion, about 12% higher than the Preferred Portfolio. Although cleaner than the Preferred Portfolio, the adoption of hybrid heat pumps would prolong use of natural gas for many years to come.	Comment noted.
4.3	Electrification	Washington Clean Energy Coalition prefers the Electrification Portfolio, which reduces 2050 emissions by 86% (14% left for allowances) and sets us on a path to eliminate gas emissions shortly afterward. Electrification would cost $3.1 billion, 15% more than the Preferred Portfolio, but customers	Comment noted.

No.	Category	Comment	How PSE used/may use this feedback
		would fund investments in a clean energy grid rather than mitigating harmful emissions.	
4.4	Carbon allowances	PSE claims the Preferred Portfolio is the cheapest solution, but the company is hiding the cost of converting to cleaner energy beyond the 2050 planning horizon. When that inevitable cost is added to the cost of buying enormous carbon allowances for decades, the Preferred Portfolio becomes undesirable economically as well as ethically.	PSE looks at a 20-year planning horizon typically in its IRPs, but in this one the study extended to 2050 to align with the provisions in the Climate Commitment Act. PSE electrification analysis showed that the total portfolio costs were even higher than buying carbon allowances. Please reference Chapter Two: Resource Plan for more details.
4.5	Reducing emissions, carbon allowances	**Instead of paying other companies to offset PSE's emissions, we want PSE to invest our dollars in a clean, smart, reliable, affordable electric grid.** Why would PSE prefer a plan that postpones real action on carbon emissions? It appears that PSE is prioritizing the interests of its shareholders. More than half of PSE's gas customers buy their electricity from a utility other than PSE.[2] If PSE pursues electrification with any vigor, the company would lose customers to other utilities. PSE apparently sees a transition to a clean electric grid as a risk to its revenues. We conclude that government oversight is necessary to serve the public interest.	Comment noted.
4.6	Reducing emissions	Due to our state's history and geography, Washington benefits from abundant hydropower produced by dams that were funded by all US taxpayers. Consequently, we enjoy the cleanest electric grid and the least expensive residential electricity in the nation.[3] Washington is now in a unique position to	Comment noted.

No.	Category	Comment	How PSE used/may use this feedback
		play a leading role in our nation's critically important transition away from fossil fuels.	
4.7	Heat pumps	However, Washington's largest utility company (PSE) has no incentive to enable this transition unless it is compelled by legislation and regulatory enforcement. Two bills being debated in the legislature, SB 55624 and HB 15895 may help, although we believe stronger legislative language would be needed to discourage PSE's self-interested promotion of hybrid heat pumps.	Comment noted.
4.8		We ask the Commission, the Governor, the Legislature, and other representative bodies to compel PSE to create an energy plan that is worthy of our state, our planet, and those who will follow in our footsteps. [1]PSE's 2023 Gas IRP can be found at https://www.pse.com/IRP/Current-IRP-Process#2023GasIRP. [2]We surveyed the 50 largest cities in PSE's service territory to estimate how many gas customers would not be served by PSE if they electrified completely. The top four cities served by an electric utility other than PSE (Seattle, Tacoma, Everett, and Marysville) account for 40% of PSE's gas customers. The top four cities that get both gas and electricity from PSE (Bellevue, Kent, Renton, and Federal Way) account for only 18% of PSE's gas customers. [3]https://www.citizensutilityboard.org/wp-content/uploads/2022/09/Electric-Utility-Performance-	Thank you for your feedback.

No.	Category	Comment	How PSE used/may use this feedback
		Report-Second-Edition-final.pdf. Outstanding Washington results are shown on pages 7 and 27. [4]https://www.waclimateleg.info/sb5562/ [5]https://www.waclimateleg.info/hb1589/ The following individuals and organizations (in bold) reject the Preferred Portfolio as described in PSE's 2023 Gas IRP and ask for a better plan for the sake of ratepayers, our world, and future generations.	

5. James Adcock, February 14, 2023

No.	Category	Comment	How PSE used/may use this feedback
5.1	Heat pumps, emission reduction	I think it is readily apparent that the best way for PSE to reduce emissions from its Natural Gas is to reduce consumption of Natural Gas, either via Heat Pumps and/or Hybrid Heat, and PSE should just get on with it, no more foot-dragging and no more excuses. And no more new construction Gas Hookups.	Thank you for your feedback. In accordance with RCW 80.28.010 PSE is legally obligated to provide customers with "safe, adequate, and sufficient" gas and related services."

6. Jim Dennison on behalf of Sierra Club, February 14, 2023

No.	Category	Comment	How PSE used/may use this feedback
6.1		Thank you for the opportunity to provide these opportunities on PSE's Draft 2023 Gas IRP, on behalf of Sierra Club and its more than 27,500 members in Washington, many of whom are PSE customers. A critical element of the IRP process is evaluating how PSE will meet its decarbonization	Thank you for your feedback. We have included electrification scenarios in this IRP and continue to study this in the decarbonization study in 2023.

No.	Category	Comment	How PSE used/may use this feedback
		obligations under the Climate Commitment Act, and what role it will play in carrying out Washington's broader decarbonization goals and policies. Electrification is the most well-founded strategy for decarbonizing Washington's buildings and transitioning away from fossil gas, as recognized in the 2021 State Energy Strategy and a growing number of local, state, and federal policies.[1] PSE's IRP must recognize this reality, and incorporate a serious, accurate assessment of opportunities to pursue decarbonization and avoid stranded gas system investments through building electrification.	
6.2	Alternative fuels, electrification, carbon allowances	Unfortunately, the Draft IRP applies several unrealistic assumptions and analytic methods that lead it to significantly underestimate the potential for full electrification. As a result, the IRP and Preferred Portfolio significantly over-rely on incomplete and unproven decarbonization strategies including alternative fuels, carbon allowance purchases, and partial or "hybrid" electrification. We support many of the recommendations and concerns about the IRP's assessment of electrification raised by other commenters, including the Washington Clean Energy Coalition, Climate Solutions.	We presented the assumptions and analytic methods in our public meetings for the 2023 Gas IRP and are consistent with how we have approached them in prior IRP cycles.
6.3	Heat pumps, electrification	Our comments focus on the need for accurate assumptions about the performance, availability, and cost of heat pump equipment, particularly efficient cold climate heat pumps. As discussed below, PSE's unrealistic assumptions about these foundational inputs are significant drivers of the IRP analysis,	PSE relies on The Cadmus Group to do the market research on heat pumps for the IRP; we have no reason to believe that this data is not current. In addition in this IRP, Cadmus also interviewed contractors/builders to attain the actual costs and these results are provided in the CPA report under

No.	Category	Comment	How PSE used/may use this feedback
		leading it to underestimate the opportunity and overestimate the cost of full electrification. We urge PSE to update its IRP assumptions to more realistically reflect the current and expected state of the heat pump market. The Draft IRP materials provide limited information about the assumptions used in PSE's analyses of electrification, and we urge PSE to be clearer and more transparent in its Final IRP. The available information suggests that PSE significantly has underestimated the availability, efficiency, and performance of heat pumps, especially all-electric cold climate heat pumps. For example, the "Full Electrification" scenario assumes that all installed heat pumps are "standard efficiency units."[2] Details on the specifications of these units do not appear to be included in the Draft IRP materials, but it is highly unlikely that all heat pumps installed over the multi-decade analysis period will perform at the levels of today's standard efficiency units. Additionally, the "Hybrid Heat Pump" scenario assumes that heat pumps switch over to backup heat (provided by gas in this case) at an unreasonably high temperature of 35F.[3] Presumably, a similar switchover temperature is assumed for other electrification scenarios and at other points in the analysis. PSE has applied similar flawed assumptions about changeover temperatures in other contexts, including a gas decarbonization	Appendix C: Conservation Potential Assessment. PSE has included cold climate heat pumps in the IRP, they are included in the energy efficiency supply curve.

No.	Category	Comment	How PSE used/may use this feedback
		study that it cited in its most recent general rate case.[4] Because heat pump performance (and especially changeover temperature, which determines how often inefficient backup resistance or gas heat is used) can affect outcomes from customers' energy bills to system-wide electric resource needs, it is "a key variable that turns out to be a significant driver" of many analyses and conclusions.[5] Many heat pumps on the market already exceed PSE's assumed performance levels by a wide margin, and available models can be expected to become significantly higher-performing, more efficient, more widely available, and lower cost over the course of the IRP analysis period.[6] As detailed in testimony to the UTC prepared by Strategen Consulting on behalf of NW Energy Coalition, Front and Centered, and Sierra Club, many modern cold climate heat pumps can operate more than twice as efficiently as resistance backup heat at temperatures as low as 5F.[7] This has enabled highly successful electrification strategies in states with significantly colder climates than Washington, including Maine, Vermont, Minnesota, and Michigan.[8] Moreover, this level of performance would likely not even be necessary to maintain high efficiency in Washington's relatively mild climate. The lowest Design Day temperature	

No.	Category	Comment	How PSE used/may use this feedback
		conditions that PSE's gas system planners generally assume is warmer than 10F.9 And there are significant opportunities to get maximum performance from heat pumps at minimum cost by combining electrification with improvements to building envelope efficiency, load shifting, and demand response.[10] We recommend that the Final IRP apply updated assumptions around heat pump performance, make these assumptions fully available and transparent, and clarify how they are applied in PSE's analysis. In particular, we recommend that PSE evaluate the benefits and costs of electrification based on specifications for efficient, all-electric models with changeover temperatures no higher than 10F.[11] [1]Washington State Department of Commerce, Washington 2021 State Energy Strategy at 15,46, 66 (Dec. 2020), (finding that "decarbonizing the building sector requires the state to maximize electrification," which is the least-cost way to achieve decarbonization goals), https://www.commerce.wa.gov/wp-content/uploads/2020/12/Washington-2021-State-Energy-Strategy-December-2020.pdf. [2]Draft IRP at Chapter 4, Key Analytical Assumptions at 4.11. [3]Draft IRP at Chapter 6, Gas Analysis at 6.17.	

No.	Category	Comment	How PSE used/may use this feedback
		[4]Washington Utilities and Transportation Commission Dockets UE-220066/UG-220067, Prefiled Response Testimony of Ed Burgess on Behalf oF NW Energy Coalition, Front and Centered, and Sierra Club, Exh. EAB-1T, at 19-23 (describing the gas decarbonization study, its assumption of a 25F switchover temperature in the "High Electrification" scenario, and the conclusions about electrification potential that PSE drew based on the study) [hereinafter, "Burgess Testimony"]. [5]Id. at 21; see also id. at 25, 30 (discussing some of the significant cost savings that can result from improved heat pump performance assumptions). [6]See id. at 24-25, 31 (discussing rapid ongoing advancements in cold climate heat pump technology and anticipated cost reductions). [7] Id. at 24 (citing NE Energy Efficiency Partnerships, NEEP's Cold Air Climate Heat Source, Heat Pump List, https://ashp.neep.org/#!/product_list/; K. Purdy, "How to Find the Best Cold Climate Heat Pump," Climate Switch, https://carbonswitch.com/best-cold-climate-heat-pump/); see also "Trane Technologies Surpasses U.S. Department of Energy Requirements for High-Efficiency, Cold Climate Heat Pump." Business Wire, Nov. 3, 2022 (reportingnew model testing indicating that heat pumps can perform at -23F), https://www.businesswire.com/news/home/20221103005955/en/Trane-Technologies-Surpasses-U.S.-Department-of- Energy-Requirements for-High-	

No.	Category	Comment	How PSE used/may use this feedback
		Efficiency-Cold-Climate-Heat-Pump; US Department of Energy, "Residential Cold Climate Heat Pump Challenge." Energy.gov, Office of Energy Efficiency & Renewable Energy (noting that major manufacturers are partnering with DOE on the Cold Climate Heat Pump Challenge to make electric heat pumps more effective, cheaper, more widely adopted, and grid interactive), https://www.energy.gov/eere/buildings/residential-cold-climate-heat-pump-challenge [8]Id. at 28 (citing S. Nadel, Programs to Electrify Space Heating in Homes and Buildings, Amer. Council for anEnergy Efficient Economy (June 2020), https://www.aceee.org/sites/default/files/pdfs/programs_to_electrify_space_heating_brief_final_6-23-20.pdf). [9] Id. at 21, 29-30. [10]See, e.g., id. at 26. [11]Since backup resistance heat can be used to supplement, rather than replace heat pump operation at low temperatures, we also recommend that PSE assume heat pumps' COPs do not immediately drop to 1.0 at the switchover temperature.	

7. Joel Nightingale on behalf of, Washington Utilities and Transportation Commission staff, February 14, 2023

No.	Category	Comment	How PSE used/may use this feedback
7.1		Staff would like to acknowledge the amount of work PSE's planning team has put into an increasingly complex gas IRP. These comments are intended to be helpful to the Company as it puts together the final version of the IRP. Please reach out to Staff with any clarifying questions.	Thank you for your feedback.
7.2	Review timeline	**Duration of review:** As expressed previously, Staff does not believe that two weeks is a sufficient timeline for interested persons and parties to read, analyze, and provide comprehensive comments on a draft IRP (especially in light of the simultaneous comment review of the draft 2023 Electric IRP Progress Report chapter 3). We appreciate PSE's willingness to increase its comment period to three weeks, but also note that other gas utilities gave 4 weeks or more for review of their draft 2023 IRPs.	Thank you for your feedback. Please see our answer to Feedback Theme B.
7.3	Accessibility	**Accessibility:** It is imperative that PSE make IRPs accessible and relevant to a broader range of parties than ever before. Integrated resource plans are already complicated documents. Staff sees the further complication of missing and/or misleading references, and overly complex language as unnecessary additional barriers for PSE's interested persons/parties to understand these critical planning documents. Staff believes there is significant room for PSE to improve the readability, accessibility, and transparency of this IRP. Staff suggests PSE use plain language, as discussed in examples below. One easily actionable item would be to embed more internal links to ease navigation. Staff provides some	Thank you for your feedback. Please see our answer to Feedback Theme B.

No.	Category	Comment	How PSE used/may use this feedback
		select examples below to illustrate the accessibility problem:	
7.4	Green hydrogen	At the end of Chapter 3, Section 7.1, PSE notes that "price is the final consideration required to model green hydrogen" (pg 3.10). This paragraph goes on to state that "Chapter Four illustrates the price forecast for green hydrogen in the SENDOUT model." A review of Chapter Four shows that the primary section related to green hydrogen includes only two paragraphs. The first paragraph is a verbatim copy/paste of a paragraph already in Chapter 3 (at pg 3.9), and the second paragraph includes a vague mention of a joint effort to develop an electrolyzer facility and a couple of sentences reiterating PSE's plan for hydrogen blending. Neither of these paragraphs offer any insight into how PSE considered the price of green hydrogen in its SENDOUT model. Staff then looked to the Appendices, though nothing in the Chapters' text pointed us there. In the last sentence of the green hydrogen section of Appendix E (pg E.17), PSE mentions that it "relied on assumptions in the E3 Pacific Northwest report as the basis for the cost curve for developing electrolyzer-based green hydrogen." This report from 2020 is an 81-page pdf for which PSE's footnote provides a hyperlink with no further guidance (e.g., a page number, table, or figure reference). Staff finds it incredibly difficult to determine whether PSE's preferred portfolio represents the lowest reasonable	Section 6.1 in Appendix E: Existing Resources and Alternatives we discuss the green hydrogen costs, and provide context of where current prices are and ongoing efforts of the Department of Energy specifically to drive down the cost 75 percent lower in the next ten years. This is similar to their million roofs program that was designed to increase penetration and drive down costs for rooftop solar. The IRA subsidy of $3/kg is a significant reduction in the cost of green hydrogen and that is the key driver of the cost effectiveness in this IRP. On Slide 52 in the September 22, 2022 meeting we discussed E3's cost curve for green hydrogen relative to the total cost of natural gas with the carbon adders, and also the impact of the IRA PTC on the green hydrogen costs. The annual prices shown at the September 22, 2022 meeting is the same data shown in Appendix E: Existing Resources and Alternatives. These prices for the green hydrogen reflect the IRA PTCs, and these are the same prices that were used in the Sendout model.

No.	Category	Comment	How PSE used/may use this feedback
		cost path forward when basic information (like fuel cost assumptions) is so hard to find.	
7.5	Clarification	In Chapter 3, page 3.4 PSE states "working with our trade allies to understand and mitigate barriers to new technology adoption." PSE provides no explanation of the nature or scale of barriers or steps that have been taken to overcome them. Staff encourages PSE to either remove vague sentences like this or provide enough information to justify their inclusion.	This is a standard process for running our energy efficiency programs; it is a routine part of making programs successful with our customers. Trade allies deliver the programs to our customers, without understanding their concerns and issues, programs will be less likely to succeed. We are suggesting that this same cooperation with our trade allies will be applied to making decarbonization ideas successful.
7.6	Clarification	In Appendix E, page E.18, PSE bounces between several different similar units when describing how conservation measures are bundled. The use of $/Th, $/Dth, and thousand dekatherms (MDth) in the same narrative can be confusing. While Staff understands the need to use different units in some cases, we encourage PSE to eliminate unnecessary unit switching where it may hinder layperson understanding. Staff appreciates that PSE included an acronyms and definitions attachment to help with understanding.	Thank you for your feedback. We have endeavored to reduce the amount of unit switching in the final documents for better clarity. Please also see our answer to Feedback Theme C.
7.7	Accessibility	In many places, PSE misses the mark on using plain language in this IRP. • For example, in Chapter 6, page 6.17, the first bullet describing the hybrid heat pump sensitivity's portfolio results reads: "The conservation supply curve has lower potential savings than in the reference scenario, as the balance between declining load and cost-	Thank you for your feedback. Please see our answer to Feedback Theme C.

No.	Category	Comment	How PSE used/may use this feedback
		effective results in the cost point being slightly lower than in the reference scenario." • Staff suggests PSE read this IRP with fresh eyes and eliminate sentences like this one that try to cram too much content into one sentence, making it very difficult for a layperson to understand. Staff wonders if PSE has adopted any plain language guidelines to standardize this practice in an effort to bring more interested persons/parties into the process.	
7.8	Accessibility	Staff suggests PSE develop a section that lays out the overall structure of the IRP document and describes how each of the inputs/processes interacts with the overall development of this IRP's Preferred Portfolio.	Thank you for your feedback. We will consider this for the 2025 IRP. Please see our answer to Feedback Theme C.
7.9	Accessibility	**Expectations:** Staff questions whether one summary Excel workbook provided is sufficient backup data and analysis to support this IRP. Staff expects a significant body of analysis to be provided in the final IRP such that Staff and other interested persons/parties can interrogate the modeling work that PSE references but does not provide access to in this draft.	This spreadsheet is consistent with what was filed in the 2021 IRP. PSE is including additional work papers with the filing.
7.10	Accessibility	**Presentation of information:** • Please review charts and tables to ensure that units are clearly marked (for example, Figure 2.1 has no units on its x-axis, and Figure 2.2	Thank you for your feedback. We have made updates for the final document for clarity as suggested.

No.	Category	Comment	How PSE used/may use this feedback
		includes two “callouts” where units are not clear). • Please review charts and tables to ensure that the relevant scenario/sensitivity displayed is clearly marked, especially in Chapter 6 where the narrative is describing the portfolios developed by the different scenarios/sensitivities (e.g., Figure 6.6). • Please review charts to ensure that colors/points/lines are sufficiently distinguishable from one another (e.g., Figure 6.8, the lines for “Net End Use CO2 Tonnes” and “Allocated Allowances Est. WAC 173-446" are nearly the same color and have identical point markers).	
7.11	CCA	Chapter 2: Resource Plan Overall, Staff is concerned that PSE has left many of the details of their decision-making process out of this IRP draft. The one Excel workbook provided in this draft lacks the granularity required for interested persons/parties to follow PSE’s process and quantitative assumptions as basic information like PSE’s fuel cost assumptions (natural gas, hydrogen, renewable natural gas) are omitted from this workbook. This is especially concerning since PSE’s Preferred Portfolio proposes a significant shift away from traditional pipeline capacity in favor of new fuel types and resources. Additionally, PSE asserts that – even in electrification scenarios – the gas utility will not be able to “achieve the low-carbon future	PSE will include the workbooks with its final filing.

No.	Category	Comment	How PSE used/may use this feedback
		mandated by Washington State's Climate Commitment Act." This proposal would benefit from input from Staff and other interested persons and parties, but meaningful feedback requires that PSE "show its work." Staff expects to see additional workpapers filed with the final IRP and is disappointed that more was not provided in this draft.	
7.12	Equity	At page 2.8, PSE states that "we need to determine whether upgrading Swarr has negative or positive equity impacts on the local community as a key input to the decision to upgrade the facility." It is unclear what process PSE will use to make that determination, and whether similar equity considerations apply to the other resources PSE describes in this IRP.	We do not know the impacts of upgrading Swarr at this point. The IRP process identifies cost-effectiveness and PSE will do further equity assessments in the future.
7.13	Green hydrogen	Staff encourages PSE to include a customer impacts-focused discussion of its Preferred Portfolio including the impacts of blending hydrogen and renewable natural gas on the system (especially on appliance performance, appliance wear & tear, safety, etc.).	Thank you for your feedback.
7.14	Green hydrogen	At page 2.9, PSE states that "5 percent was determined to be the maximum limit of blending into the system with no meaningful impact on operations and integrity of the pipeline infrastructure." Staff would like to see more information about PSE's study of the impact of hydrogen blending on "operations and integrity of the pipeline infrastructure." NREL conducted an analysis of existing research and found significant data gaps and conflicting results among	NREL's analysis reviewed a number of blending demonstrations with various level of hydrogen blending. NREL concluded that additional research across the entire hydrogen and natural gas supply chain is needed to fill current knowledge gaps and better inform decision makers on future blending projects. For now, PSE has determined that five percent is the maximum limit of blending into the system with no meaningful impact on our operations and integrity of our pipeline infrastructure. PSE may

No.	Category	Comment	How PSE used/may use this feedback
		studies of H2 blending (https://www.nrel.gov/docs/fy23osti/81704.pdf).	change its position in the future as more research is conducted on hydrogen blending. Our limits are also in line with the recently release NEEA study.
7.15	Clarification	Page 2.11, Figure 2.5, Staff recommends adding a comparison of the various portfolios' Total Portfolio Costs in this section (i.e., NPV Portfolio Costs in $). Figure 2.5 is useful, but it does not show Total Portfolio Costs (as its title suggests). Staff notes the description of this figure in the preceding paragraph appears to be inaccurate. The figure does not show the portfolio costs "by year."	Figure 2.5 is meant to show portfolio costs, but the axis is mislabeled; this has been corrected in the final IRP.
7.16	Green hydrogen	At page 2.9, PSE states that it "modeled potential future green hydrogen contracts that would be available by 2028." Staff expect to see more information and analysis backing up the resources PSE chose to model, especially for new technologies with uncertain futures.	The green hydrogen we modeled is not considered a new technology as the electrolyzer technology has been around for decades, the only element that makes the hydrogen green is renewable sources used for the generation of the electricity used to run the electrolyzer. The introduction of significant IRA PTCs makes this technology less uncertain. We based our assumptions of potential availability in 2028 on the best assessment available to us from activities in the PNW to develop green hydrogen at the time of the 2023 IRP.
7.17	IRA	Chapter 3: Legislative and Policy Change **Inflation Reduction Act (IRA):** Staff expects to see a robust discussion of how the impacts of the IRA were – or were not – included in the analysis of this gas IRP, whether quantitatively or qualitatively. Discussion of the IRA should include the approximate magnitude of expected impacts, such as accelerated adoption of demand side resources and EVs, that	Thank you for your feedback. Please see our response to Feedback Theme D.

No.	Category	Comment	How PSE used/may use this feedback
		PSE was unable to include in the demand forecast and potential assessments. It would be helpful to discuss whether passage of the IRA had an impact on the choice of preferred portfolio.	
7.18	CCA, gas demand	**Climate Commitment Act (CCA):** Staff also expects to see a robust discussion of the impacts PSE included, or did not include, in this IRP from the CCA. This should include a discussion of: • Whether PSE expects the CCA's impact on gas prices to affect customer demand, customer adoption of conservation measures, or customer electrification of gas loads; • The approximate magnitude of those impacts; • How these impacts did, or did not, impact PSE's choice of its preferred portfolio.	Thank you for your comment, we agree that the higher CCA allowance prices could impact demand and we plan to develop our analytical framework to be able to account for this in future IRPs. Based on the review of feedback comments, we have changed our preferred portfolio in the final Gas IRP to the zero demand growth and in this case the impact of the CCA allowance prices are the mid price. The price of the allowance did not impact the choice of the preferred portfolio.
7.19	WSEC	**Washington State Energy Code:** At page 3.3, PSE states that "Another provision included in the 2023 CPA is a statutory requirement (RCW 19.27A.160) that directs the WSEC revision process to achieve a 70 percent reduction in energy consumption by the year 2031 compared to a 2006 code baseline." Staff would like PSE to clarify whether it also incorporated the requirements of RCW 19.27A.020(2)(a) into its analytical assumptions (particularly in the CPA). If so, how did it impact PSE's input assumptions and resource decisions (including PSE's use of its Mid Demand Forecast in its preferred portfolio which shows gross demand increasing after 2031)? If not, why not?	RCW 19.27A.020 (2)(a) is discussed in Appendix C: Conservation Potential Assessment in the last paragraph on page 6. Its impact was to shift savings away from the program savings potential to a codes bundle. The gross demand is without the reduction from conservation, including codes and standards, but if you look at net demand, which includes the conservation, the demand declines.

No.	Category	Comment	How PSE used/may use this feedback
	Green hydrogen	Starting on page 3.9, PSE describes Green Hydrogen's potential benefits. While Staff appreciates the inclusion of some of the "obstacles" that the "hydrogen industry must overcome," we would like to see more of PSE's analysis and assumptions, such as: • PSE's cost assumptions for green hydrogen given (1) competing end uses (gas system, electric system, industry, transportation, etc.), (2) the "relatively few installations" of large-scale electrolyzers globally, and (3) increasing installations of grid scale storage and their impact on electric energy costs. (Staff would also like to see PSE's analysis and assumptions related to #1, with respect to renewable natural gas.) • PSE's analysis of the unknowns and potential risks of green hydrogen in the gas distribution system.	Competing end uses is not an obstacle for green hydrogen. The market for green hydrogen is not supply constrained as much as demand constrained and all the market players and analysts have concluded that demand from all end uses will generate the economies of scale that will reduce the cost of green hydrogen. While there are few installations of large-scale electrolyzers globally, with the addition of IRA subsidies, the scaling is likely to spur development. Battery storage technology provides short term storage whereas green hydrogen can offer seasonal storage, so the two are complementary and we see them developing side by side. With respect to RNG, the recent laws passed for EV adoption by the state of CA and WA may make more RNG available for the utility sector. In order to mitigate risk, PSE continues to test hydrogen through various pilots and learn more about making blending into the gas system safe: https://www.pse.com/pages/Lower-Carbon-Fuels/Hydrogen-pilots.
7.20	CPA	Staff would like PSE to address (in the IRP itself or in the CPA) how it models building stock attrition. The CPA, at page 58, describes how the baseline load forecast integrates various end-use assumptions, but	The baseline end-use consumption forecast methodology described on pages 57, 58, and 59 details the changes in annual end-use consumptions. Annual end-use consumptions

No.	Category	Comment	How PSE used/may use this feedback
		does not discuss how those end uses may change over time.	change in two ways. First, as shown in the equation the annual consumption is dependent on end-use market share of efficiency level in equipment for each customer segment. The market share changes over time as existing stock turns over from below standard efficiency equipment and converts to standard efficiency equipment. This changes the overall average market annual end-use consumption. Second, the annual end-use consumptions for heating and cooling equipment change overtime to account for climate related changes as described in "PSE Forecast Climate Change Alignment" section on page 59. This study incorporates an annual change in residential and commercial heating end-use consumption within annual load forecasts to reflect climate change over the course of the study. In addition to changes in the baseline energy consumption forecast described above, when estimating energy efficiency potential there is an interaction between the annual end-use consumption and the installation of higher energy efficiency equipment and retrofit measures (e.g., weatherization). As a result, the annual end use consumptions changes over time as energy efficiency measures are installed, as described in the Technical Potential section on page 61.
7.21	IRA	Addressing the appliance subsidies from the IRA on page 3.5: it would be more accurate to describe that, depending on how federal incentives are included in	Thank you for your feedback. We will characterize the impact of the Inflation Reduction Act on conservation as you suggested.

No.	Category	Comment	How PSE used/may use this feedback
		the cost-effectiveness test, the IRA may or may not have an impact on cost-effective conservation. It is not clear if the cost to the federal government should be included in the cost-effectiveness calculation. This question will be discussed in the UTC staff investigation UE-210804 and treatment when implementing programs should be discussed with the CRAG until there is guidance from the Commission.	
7.22	Clarification	At page 4.2, PSE states that "This IRP portfolio analysis optimizes the system costs and resource needs to meet compliance (a) through the purchase of allowances, a price cap, and/or (b) enforcing a hard emissions reduction, or emissions cap, or (c) a combination of allowance purchases and emissions reductions. This IRP gas analysis will examine the price cap and emissions cap." Staff finds this excerpt to be confusing and ambiguous. Please clarify what these three approaches to optimization mean, and which were considered in this IRP analysis.	The price cap implies reliance on purchasing allowances after the cost effective resources have been selected in the model, and the emissions cap implies first emphasis on reducing emissions, regardless of cost, and then purchasing allowances to meet the Climate Commitment Act requirements. Both of the above can be considered to be a combination of price and emissions cap.
7.23	Climate change	At page 4.3, PSE states that "Although experts expect the average temperature to increase, our analysis reaffirmed the design temperature's extreme low of 13° F due to the increasing extreme temperature ranges." Staff encourages PSE to expand on this analysis including citations. Please describe how PSE's extreme low design temperature is consistent with the NWPCC's climate change analysis.	The analysis is described in more detail in Chapter Five: Demand Forecast and Appendix D: Demand Forecast Analysis. PSE's low design temperature for the natural gas system is based on a 1-in-50 chance of occurring in a year. This is different than an electric design temperature that typically has a 1-in-2 chance of occurring. This analysis used data that was consistent with the NWPCC's climate change analysis.

No.	Category	Comment	How PSE used/may use this feedback
7.24	Clarification	In addition to the levelized cost of natural gas shown in Figure 4.4 (page 4.6), Staff would appreciate a figure showing PSE's gas cost forecasts over time as used in its high and mid gas price sensitivities. Staff expects to see backup workpapers in the final filing. A narrative describing how gas price volatility is included in this IRP would also be helpful.	As in the past IRPs, PSE purchases the gas price forecast from WoodMackenzie; their subscription service conditions restrict us from publishing the annual prices. We typically use a low, base and high forecast to reflect volatility and we use monthly prices instead of yearly prices. There are a couple reasons why volatility has become muted over the years, as supply reserves have expanded, this has dampened volatility as the dry wells are quickly brought online when prices increase; these keep prices range bound. The second reason has to do with the total cost we input in the portfolio model is new dominated by social cost of greenhouse gas (SCGHG) and CCA adders, the volatility in gas commodity prices is further reduced as a factor in the overall cost volatility.
7.25	Clarification	At page 4.18, PSE states that this "2023 Gas IRP does not predict which scenario is more likely than another." At page 1.1, PSE lists four of its "key objectives" that it focused on for this IRP. WAC 480-90-238 defines a gas "integrated resource plan" as: "a plan describing the mix of natural gas supply and conservation designated to meet current and future needs at the lowest reasonable cost to the utility and its ratepayers." Staff would like PSE to present a clear and positive explanation of what this IRP is meant to achieve/show. If PSE's Preferred Portfolio does not represent the future PSE considers to be the	Based on the feedback from interested parties PSE changed the final preferred portfolio from what was presented in the draft IRP. We agree that the future is more likely to be restrictive towards gas growth and the zero-growth scenario seems more likely than the reference load growth scenario. Therefore, PSE agreed with interested parties that shifting the preferred portfolio to be based on the zero-growth sensitivity was an improvement over the draft plan.

No.	Category	Comment	How PSE used/may use this feedback
		most likely (of those modeled), Staff would like to see a narrative describing why it was chosen, as this is not intuitive.	
7.26	Gas demand	Chapter 5: Demand Forecast Staff is surprised to see such a small decline in gas demand over the planning horizon given the state and federal policies that incent adoption of electrification technologies and near zero emissions goals (CCA). As discussed with PSE previously, Staff understands the passage of the Inflation Reduction Act occurred after PSE had already developed its Conservation Potential Assessment and Demand Forecast, but reiterates that Staff suggests PSE should discuss the impacts, at least qualitatively.	Staff is correct that the IRA will likely result in lower gas demand, however, as mentioned, it was released after the demand forecast for this IRP was created. PSE did run the "no gas growth" scenario to analyze the effects of no growth in gas customers, a lower growth rate from the base forecast. PSE will add a discussion to Chapter Five: Demand Forecast that qualitatively discusses that the IRA will likely lower gas loads.
7.27	Gas demand	In Table 5.1, PSE does not consider the effects of the CCA on "Demand Forecast Before Additional DSR." Staff struggles to understand why the cost of CCA allowances would not have an impact on gas demand beyond what is included in the CPA.	The CCA was first analyzed in this IRP. Before this IRP the CCA was not well enough defined through rulemaking to know what the CCA prices might be. Since the load forecast is one of the first inputs into the IRP, we were not able to capture the costs associated with the CCA in the load forecast. Future load forecasts will better capture these costs.
7.28	Gas demand	On page 5.21, PSE describes the concept of a "block load" added to its demand. It is unclear what sector these block loads are coming from and what magnitude their impact has on the overall demand forecast.	We do not publish information on individual customer usage, which is why further detail is not provided on block loads. In this forecast PSE has included one block load, which is in the transport class, and therefore does not affect the firm or interruptible loads in this IRP, nor does it affect the peak load in this IRP.

No.	Category	Comment	How PSE used/may use this feedback
7.29	Clarification	Staff encourages PSE to expand upon the bullet list at the top of page 5.20, including a description of how these data points interact (e.g., how does a significant reduction in the employment growth rate square with a relatively steady projection for population growth rate?)	PSE has added more clarification around the growth rates of employment vs population in the final Gas IRP.
7.30	Carbon allowances	Chapter 6: Gas Analysis Scenarios and sensitivities: PSE uses the Department of Ecology's current estimate of allowance ceiling price for its "Allowance Price High" sensitivity. Given that – by PSE's estimation – "demand for allowances will likely exceed the supply," is it possible (or likely even) that the cost of allowances will be higher than current ceiling price estimates? If so, did PSE explore this possibility?	PSE did not explore or speculate on this possibility; instead, we relied on the price ranges established by the Department of Ecology.
7.31	Electrification	Staff wonders why the Preferred Portfolio section (Chapter 6, Section 4.4) comes before the Electrification Scenario is presented. This seems to counter the narrative introduction to the Preferred Portfolio section which states that "the preferred portfolio is created from the gas analysis after we run all the scenarios and sensitivities and a complete picture of the portfolios under varying conditions starts to emerge" (page 6.19, emphasis added).	The chapters in the IRP book are not written chronologically after each portfolio run. Instead, PSE writes and organizes the IRP chapters after all the portfolio runs are completed and all the results have been reviewed.
7.32	Gas demand	PSE describes that its Preferred Portfolio takes the Reference Scenario and substitutes in the CCA price from the "Carbon Allowance Price High" sensitivity and the conservation from the "Zero Gas Growth" sensitivity. In the latter change, Staff understands the	PSE agrees that the preferred portfolio should include a zero growth demand forecast and has made this change in the final IRP.

No.	Category	Comment	How PSE used/may use this feedback
		change that caused less conservation to be chosen in the "Zero Gas Growth" sensitivity to be a change in the demand forecast. We encourage PSE to explain why it makes sense to change the conservation in its Preferred Portfolio without changing the input that precipitated that change in the "Zero Gas Growth" sensitivity (i.e., the impact of zero gas customer growth on demand). This disconnect makes it appear that PSE's preferred portfolio is not describing an internally consistent future world. If its gas customer base grows, then more conservation should be available. If its gas customer base does not grow, then less conservation should be available. PSE's preferred portfolio describes a case in which its gas customer base grows for the purposes of its demand forecast, but somehow less conservation is available.	
7.33		Staff suggests creating a chart similar to Figure 6.22 for the gas utility (i.e., comparing CO2 emissions of the electrification, HHP, and gas reference portfolios).	Figures 6.7, 6.8, 6.11, and 6.16 are gas utility emissions. For a comprehensive list of figures see Appendix F: Gas Analytic Methodology and Results.
7.34	Electrification	Figure 6.20, on page 6.32 shows fewer nameplate resource additions in 2025 and 2030 under both electrification scenarios as compared to the reference portfolio. There is no narrative describing why this is the case. Are these bars mislabeled, or is there a reason why fewer electric resources would be needed in the short- to medium-term for scenarios where more end uses are electrifying? Staff suggests PSE provide a narrative expanding on this.	How a resource fits into the portfolio is not necessarily based on nameplate, but the attributes of the resource. It is not a one-to-one comparison of nameplate among different resources. The driving constraint in the model is meeting the winter capacity need. To meet capacity as a result of the electrification scenarios, the model is building more CETA qualifying peaking resources at the expense of renewable resources. The reference portfolio exceeds the 80 percent CETA target, which provides space to back off renewable builds.

No.	Category	Comment	How PSE used/may use this feedback
7.35	Electrification	Staff suggests adding a section to the electrification narrative describing the interaction between the electric and gas systems regarding assumptions: • What assumptions is PSE making about the peak electric system impact in its electrification scenarios? For example, when a customer electrifies various end uses, what assumptions does PSE make about that customer's participation in demand response, time-of-use/time-varying-rates/critical-peak-pricing, or other programs that could mitigate the need for electric resource additions and transmission & distribution upgrades? • What assumptions is PSE making about reduced costs on the gas system as customers electrify?	The electrification has its own energy efficiency (EE) and demand response (DR) supply curve with more achievable technical potential due to the increased electric load. These EE and DR resources are treated independently and the same way EE is generally treated to cost effectiveness in the portfolio analysis. The EE and DR help to mitigate the peak impacts from electrification and have been accounted for in the portfolio analysis. The reduction in the gas costs are reflected in the gas portfolio models through reduced resources and reduced gas consumption.
7.36	CCA	On page 6.4, PSE mentions that this IRP "draws on the rulemaking documents" for the CCA. Is this IRP's consideration of the CCA consistent with the now final rules?	Yes, we used the final rules proposed on September 29th, 2022 and adopted in October 2022.
7.37	Accessibility	On page 6.5, PSE discusses certain developments on the larger natural gas supply infrastructure in the Pacific Northwest. Staff encourages PSE to use plain language to communicate the potential risk this poses in terms that a layperson can understand (also, see general comments above about accessibility).	Thank you for your feedback. Please see our answer to Feedback Theme C.