**EXH. EAB-1T**
**DOCKETS UE-220066/UG-220067**
**2022 PSE GENERAL RATE CASE**
**WITNESS: ED BURGESS**

**BEFORE THE**
**WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

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| **WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,**<br>**Complainant,**<br>**v.**<br>**PUGET SOUND ENERGY,**<br>**Respondent.** | **Docket UE-220066**<br>**Docket UG-220067** |

# PREFILED RESPONSE TESTIMONY (NONCONFIDENTIAL) OF

# ED BURGESS

## ON BEHALF OF NW ENERGY COALITION, FRONT AND CENTERED, AND SIERRA CLUB

**JULY 28, 2022**

**NW ENERGY COALITION, FRONT AND CENTERED, AND SIERRA CLUB**

**PREFILED RESPONSE TESTIMONY (NONCONFIDENTIAL) OF**

**ED BURGESS**

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| Exh. EAB-18 | Advice No. 2021-43 Cover Letter, Compliance Filing on Behalf of Puget Sound Energy, UG-210729, Nov. 17, 2021 |
| Exh. EAB-19 | Phase III Staff Proposal, CPUC Energy Division, R.19-01-011, Nov. 16, 2021 |
| Exh. EAB-20 | B. Seals & A. Krasner, "Gas Stoves: Health and Air Quality Impacts and Solutions" (2020) |
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| Exh. EAB-23 | Yifang Zhu, Y., R. Connolly, Y. Lin, T. Mathews, Z. Wang, "Effects of Residential Gas Appliances on Indoor and Outdoor Air Quality and Public Health in California," UCLA Fielding School of Public Health, Department of Environmental Health Sciences (April 2020) |
| Exh. EAB-24 | Lebel, E.D., C. J. Finnegan, Z. Ouyang, R. B. Jackson, "Methane and NOx Emissions from Natural Gas Stoves, Cooktops, and Ovens in Residential Homes," *Environ. Sci. Technol.* (2022) |
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## 1. SUMMARY OF FINDINGS AND RECOMMENDATIONS

**Q. Please provide a summary of your testimony.**

**A.** My testimony provides an examination and analysis of PSE's significant planned expansion of its natural gas system, and continued focus on a "business as usual approach" to growing its gas customer base. I explain why this expansion is at odds with Washington's climate policies, exposes ratepayers to unnecessary risks from volatile fuel costs, and why alternatives can and should be considered, with a strong focus on electrification, especially for new customers. I also identify certain shortcomings in PSE's overall decarbonization strategy and supporting analysis including its planned investments in renewable natural gas (RNG). Finally, I address steps that should be taken in this case to better align PSE's approach with the state's policy goals, including changes to PSE's line extension subsidy, and the creation of a new performance-based incentive mechanism.

**Q. Please provide a summary of your findings.**

**A.** My findings are as follows:

1. PSE's proposal to continue growing its gas system is inconsistent with Washington's climate policy requirements.
2. PSE overstates the limitations on meeting customer needs via full electrification – particularly for new customers and for customers that install high-efficiency cold climate heat pumps.
3. PSE's line extension subsidy should be reconsidered for a variety of reasons including recent policy considerations and a questionable underlying rationale.
4. PSE's decarbonization plan has several deficiencies that require more details,

including its approach to RNG.

5. PSE's capital investments during the rate plan period (2023-2025) include $213.5 million related to customer growth, and $87 million related to RNG, for a combined increase in rate base of about $300.5 million. Assuming a 7.39% ROR, this amounts to about a $22.2 million increase in annual revenue requirement.
6. PSE has a strong incentive to continue growing its gas system unless new incentive structures are put in place.

**Q. Please provide a summary of your recommendations.**

**A.** My recommendations are as follows:

1. The Commission should require PSE to develop a much more detailed and comprehensive near-term action plan for its "targeted electrification" efforts which the Company claims to be a core pillar of its overall gas decarbonization strategy. This plan should include the elements discussed in Section 3-C of my testimony.
2. The Commission should require PSE to revise its long-term decarbonization study to include more up-to-date assumptions regarding efficient Cold Climate Heat Pumps (CCHPs) as well as opportunities to fully electrify new customers in the near term, and existing customers over the longer term. This revision should include the elements discussed in Section 4-B of my testimony.
3. The Commission should not approve any future gas capital expenditures for customer growth until PSE has completed its near-term action plan for targeted electrification (see Recommendation 1 above) and revised its long-term decarbonization study (see Recommendation 2 above). These capital expenditures

include $213.5 million PSE requested in this case from 2023-2025.

4. PSE's line extension subsidy should be set to zero.
5. The Commission should not approve PSE's requested $87 million for RNG facilities until the company has provided much more information about the projects being considered. Some of this necessary information is described in Section 6 of my testimony.
6. The Commission should reduce PSE's annual revenue requirement by approximately $22.2 million to account for a $300.5 million reduction in approved capital expenditures during the rate plan.
7. The Commission should establish a performance metric and potential incentive mechanism based on the annual ratio of new gas to electric customers added to PSE's system. The incentive should be designed such that PSE is encouraged to provide fully electric service for new customers rather than continue to expand the gas system, as described in Section 7 of my testimony.

## 2. INTRODUCTION

**Q. Please state your name, title, and business address.**

**A.** My name is Edward A. Burgess. I am a Senior Director at Strategen Consulting. My business address is 10265 Rockingham Dr. Ste. 100-4061, Sacramento, CA 95827.

**Q. Please summarize your professional and educational background.**

**A.** I am a leader on Strategen's consulting team and oversee much of the firm's utility-focused practice for governmental clients, non-governmental organizations, and trade associations. Strategen's team is globally recognized for its expertise in the electric and gas utility sectors on issues relating to resource planning, transmission planning,

renewable energy, energy storage, rate design, cost of service, program design, and utility business models and strategy. During my time at Strategen, I have managed or supported projects for numerous client engagements related to these issues. Before joining Strategen in 2015, I worked as an independent consultant in Arizona and regularly appeared before the Arizona Corporation Commission. I also worked for Arizona State University where I helped launch their Utility of the Future initiative as well as the Energy Policy Innovation Council. I have a Professional Science Master's degree in Solar Energy Engineering and Commercialization from Arizona State University as well as a Master of Science in Sustainability, also from Arizona State. I also have a Bachelor of Arts degree in Chemistry from Princeton University. A full resume is attached as Exh. SC-2.

**Q. On whose behalf are you testifying?**

**A.** I am testifying on behalf of NW Energy Coalition ("NWEC"), Front and Centered, and Sierra Club (collectively referred to in this testimony as the "Joint Environmental Advocates").

**Q. Have you previously testified before this utility commission?**

**A.** Yes. I testified in UE-200900 and in UE-220053/UG-220054, Avista's 2020 and 2022 general rate cases.

**Q. Have you ever testified before any other state regulatory body?**

**A.** Yes. I have testified before the California Public Utilities Commission (Docket Nos. A.19-08-002, A.20-08-002, R.20-11-003, A.21-08-004, A.21-10-010, and A.21-10-011), the Oregon Public Utilities Commission (Docket Nos. UE-375, UE-390, and UG-435), the Indiana Utility Regulatory Commission (Cause Nos. 38707 FAC 123 S1 and 38707 FAC 125), the Louisiana Public Service Commission (Docket No. U-36105), the

Massachusetts Department of Public Utilities (D.P.U. 18-150 and D.P.U. 17-140), the Michigan Public Service Commission (Docket No. U-21090), the Nevada Public Utilities Commission (Docket No. 20-07023), and the South Carolina Public Service Commission (Docket Nos. 2019-186-E, 2019-185-E, 2019-184-E, and 2021-88-E). Additionally, I have represented numerous clients by drafting written comments, presenting oral comments, and participating in technical workshops on a wide range of proceedings at utilities commissions in Arizona, California, District of Columbia, Maryland, Minnesota, Nevada, New Hampshire, New York, North Carolina, Ohio, Oregon, Pennsylvania, at the Federal Energy Regulatory Commission, and at the California Independent System Operator.

**Q. How is your testimony organized?**

**A.** My testimony is organized as follows:

- Section 1 provided a Summary of Findings and Recommendations.
- Section 2 is this Introduction.
- Section 3 discusses PSE's general plan for continued growth of its gas system and how this relates to Washington's climate policies.
- Section 4 provides a critique of PSE's rationale for not pursuing greater electrification efforts. This includes a critique of PSE's interpretation of the gas decarbonization study performed by E3.
- Section 5 addresses PSE's proposed continuation of its line extension allowance policy.
- Section 6 focuses on PSE's planned investments in RNG and hydrogen.
- Section 7 introduces a potential performance metric and incentive

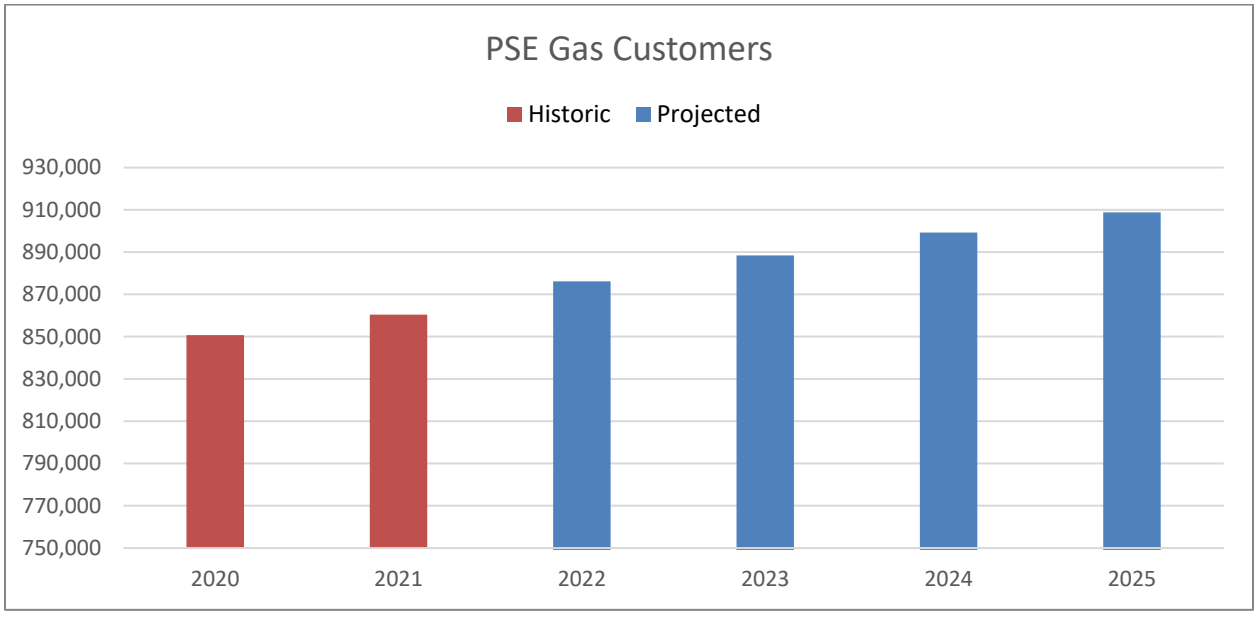
mechanisms intended to motivate PSE to pursue electrification efforts for new customers.

### 3. PSE'S PROPOSAL TO CONTINUE GROWING ITS GAS SYSTEM IS INCONSISTENT WITH WASHINGTON'S CLIMATE POLICY REQUIREMENTS AND LACKS MEANINGFUL ELECTRIFICATION PLANNING.

#### A. PSE's Gas Customer Growth Plan

**Q. What is PSE's projection for customer growth on its gas system over the rate plan period?**

A. PSE anticipates adding "56,961 gas customers from July 1, 2021 through December 31, 2025."[1] This equates to approximately a 7% percent increase in the number of gas customers PSE serves.[2] The chart below shows the Company's planned trajectory of future gas customer additions:




[1] Exh. CAK-4, p. 4.

[2] Compared to 850,720 gas customers served at the end of 2020 as reported in PSE's Annual Report. https://www.pse.com/-/media/PDFs/PugetEnergy/PE-10K-12312021.pdf

**Q. Is this anticipated growth in the number of gas customers concerning to you?**

**A.** Yes. While this level of growth might be expected or reasonable under a "business as usual" approach, it is concerning given recent major additions to Washington's climate policies, including that PSE and other Washington utilities must now comply with the Climate Commitment Act (CCA), which requires steep reductions in greenhouse gas emissions for natural gas companies. Thus, to the extent that PSE is allowing or encouraging significant new customer growth, the Company is exacerbating the potential costs and challenges of meeting its CCA obligations. This approach will also subject both new and existing customers to heightened risk factors including fuel price risk, stranded cost risk, and environmental compliance risk.

**Q. Did the UTC acknowledge these policy shifts in its recent decision to significantly reduce line extension allowances?**

**A.** Yes. The UTC cited Washington's evolving climate policies in its 2021 decision significantly reducing gas line extension allowances:

> In 2019, the legislature passed CETA, which requires electric utilities to eliminate coal by 2025 and all carbon-emitting resources by 2045. In 2021, the legislature amended RCW 80.28.074 to clarify that advancing the availability of natural gas services to Washington residents is no longer state policy. Additionally, as several commenters noted, the legislature directed that Washington's energy code be revised to make new construction more efficient, which will result in new homes and buildings using less natural gas than existing structures currently use. Further, this year, the legislature also passed the Climate Commitment Act, under which gas companies must meet specific emissions reductions requirements and must

surrender allowances to cover the greenhouse gas emissions from the use of their product. While gas companies will receive free emissions allowances to address cost impacts to current customers, almost all new customers are excluded from this part of the program.[3]

The UTC framed its recent reduction of line extension allowances as an "interim measure" pending further review, highlighting the urgency of reducing emissions.[4]

**Q. What are PSE's obligations under the CCA?**

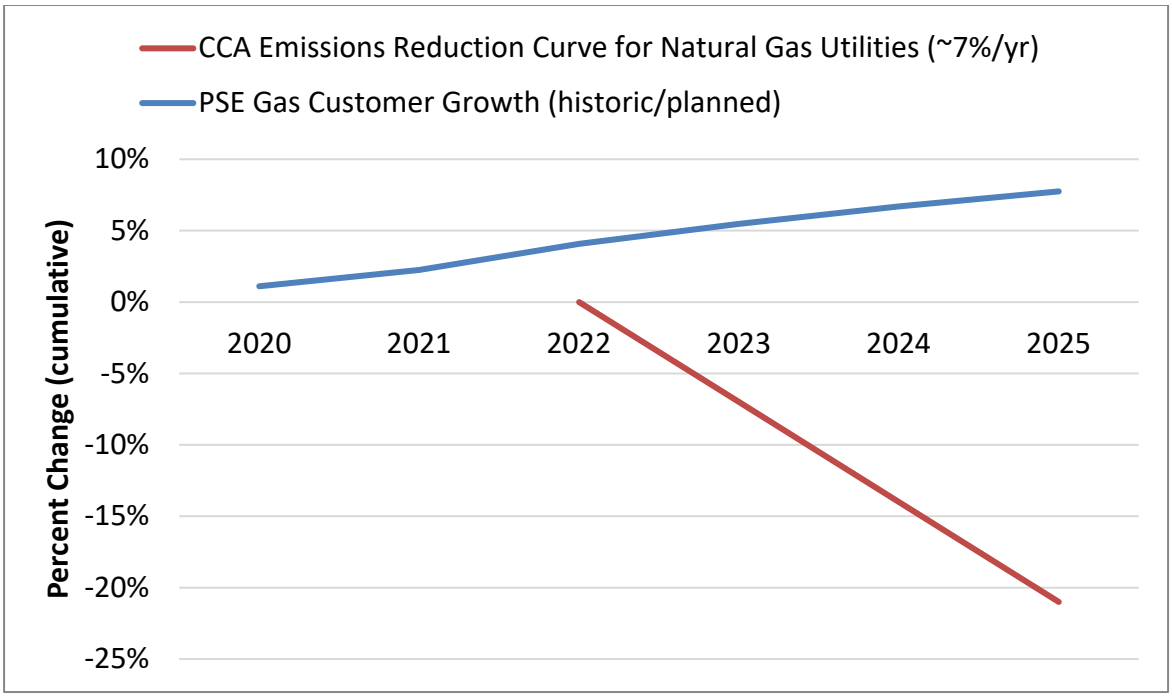
**A.** Under the CCA, the free emissions allowances distributed to gas utilities are reduced over time to reflect RCW 70A.45.020, which mandates emissions reductions of 95% below 1990 levels by 2050 (with interim milestones of 45 % by 2030 and 70% by 2040).[5] Under the draft rulemaking, this translates to an annual decrease in emissions of 7% through 2026.[6] The figure below depicts the stark contrast between the state's emissions reduction requirements and PSE's continued growth plans over the near-term.

[3] Order 01 Authorizing and Requiring Tariff Revisions, Washington UTC, UG-210729, Oct. 29, 2021, apiproxy.utc.wa.gov/cases/GetDocument?docID=67&year=2021&docketNumber=210729 (Exh. EAB-14).

[4] *Id.*, p. 6.

[5] RCW Chapter 70A.65; RCW 70A.45.020.

[6] WAC Chapters 173-446.




**Q. Doesn't PSE project a slower pace of growth in annual customer additions for later years of the rate plan?**

A. Yes. However, PSE still projects very significant customer additions in each year of the rate plan. In fact, PSE's projected year-over-year rate of customer growth in 2022, 2023, and 2024 all exceed the historical rate of growth in the two prior years (2021 and 2020). Only in 2025 does the anticipated growth rate dip slightly below these historical rates. Thus, in my opinion, PSE's plan basically reflects a "business as usual" approach when it comes to gas customer additions.

**Q. In your opinion, can PSE meet its CCA obligations with this level of growth?**

A. No. PSE's obligations under the CCA are already challenging even without adding new gas customers. Thus, I am not confident that PSE will be able to meet its CCA obligations if it continues to pursue new gas customers at the "business as usual" pace projected.

Adding new gas customers exacerbates PSE's challenges in several respects. For example, PSE is contemplating longer-term solutions such as RNG to help decarbonize its gas system; however, the cost and scale of PSE's RNG efforts will only be magnified if it continues to add new gas customers. Furthermore, even if RNG serves as a longer-term solution for 2030 and beyond, it does not alleviate PSE's near-term obligations under the CCA which will emerge even in the mid-2020s. As such, PSE should be seeking to minimize gas consumption, including consumption driven by new gas customer additions, as quickly as possible. Moreover, PSE has identified electrification as the central strategy for meeting compliance obligations, but there is no evidence that PSE intends to fully electrify *any* of its new customers in lieu of expanding gas service.

**Q. Will the $87 million in RNG investments that PSE is proposing in this case enable the Company to comply with the CCA?**

A. No. The Company testified that "[t]he projects will provide an additional 4 Bcf/yr, or four percent of sales, by 2030."[7] By 2025, the end of PSE's proposed rate plan, the Company will have completed 55%of these additions, or approximately 2%of sales. Thus, PSE's planned RNG project additions will not even be on pace to offset the growth in emissions from new customers (*i.e.*, 7% increase by 2025), let alone the significant reductions required under the CCA.

**Q. Describe PSE's planned capital investment in new service equipment that would support growth in future new gas customers.**

**A.** For the January 1, 2022 through December 31, 2025 period, PSE expects to invest

[7] Exh. JJJ-1T, p. 53.

approximately $316.5 million in its gas system to support customer growth and service needs.[8] This constitutes nearly one-third of the Company's total planned capital investment in gas infrastructure over the rate plan period (including the gap year). Thus, PSE appears very intent on growing its gas customer base and associated capital spend over the rate plan period.

**Q. Does PSE have a financial incentive to grow its gas customer base and make related capital investments under a traditional cost-of-service ratemaking model?**

**A.** Yes. Please see Ronald J. Binz's testimony (RJB-1T) starting at page 8 for a more detailed discussion of this. At a high level, PSE is authorized to earn a regulated rate of return on all of its capital investments, including those related to new gas customer connections. As mentioned previously, approximately one-third of PSE incremental gas system capital expenditures are related to customer additions. Meanwhile, customer growth may necessitate capital investments beyond those explicitly dedicated to "customer additions" since new customers also increase overall demand for new or larger gas main extensions. As such, PSE has a built-in incentive to grow its number of gas customers, even if there are cleaner and cheaper alternatives for these customers such as full electrification.

**Q. Does PSE have a *dis*incentive to shrink the number of gas customer additions via electrification?**

**A.** Yes. PSE earns a return on the capital expenditures for both new electric and new gas customer additions. However, if new customers only add electric service, that would

[8] Exh. CAK-4, p. 2, Table 2.

likely represent a significant reduction in the total per-customer capital expenditures that PSE would need to make, thereby reducing the Company's overall earnings opportunity. Thus, PSE has an inherent bias to ensure that new customers add both electric and gas service, rather than prioritizing electric-only service.

**Q. In your opinion, might PSE be even more motivated to add gas customers to its system than electric customers?**

**A.** Yes. As PSE's application showed, the projected level of investment in the gas system (in total $) that PSE proposes for customer growth from 2022-2025 is greater than the investment for customer growth in the electric system.[9] This is true even though far fewer gas customers are expected to be added. Thus, each incremental gas customer represents a greater level of investment and earnings potential for PSE's shareholders than an incremental electric customer. In fact, PSE's planned investment is about $6,545 per gas customer for years 2022-2025 while it is only about $3,280 per electric customer.[10]

**Q. What specific investments might be included in the $6,545 per gas customer?**

**A.** While I don't have a complete breakdown, PSE indicated that there are two general categories of investments in customer growth: 1) Customer Requests, and 2) Capacity. The 'Customer Requests' category includes costs for installing new or upgraded service lines to a home or building. This would include any subsidies that PSE provides through allowances for new service line extensions, which I discuss in more detail in Section 5 below. Currently PSE's line extension allowance is set at $1,997 for new residential customers, meaning that they constitute over 30% of PSE's planned customer growth

[9] Exh. CAK-4, Table 3.

[10] Based on Exh. CAK-4.

investments. Meanwhile 'Capacity' refers to investments made to build larger pipes that can carry more gas to meet growing load forecasts in a reliable manner.

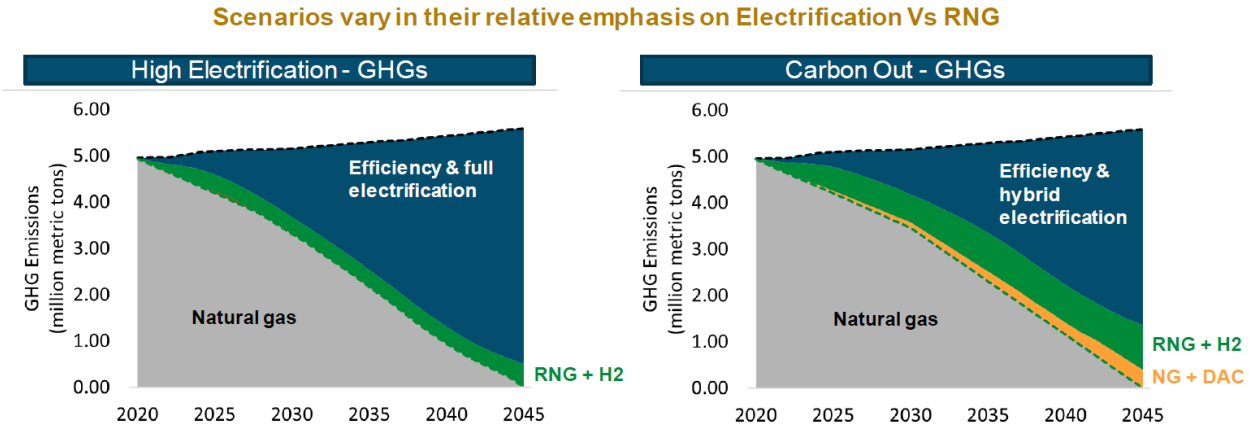
**Q. Do PSE's compliance obligations under the CCA provide a direct financial incentive for the Company to reduce gas system capital investments?**

**A.** No. While the CCA internalizes the environmental costs of continued gas use and requires gas utilities to decarbonize, the law itself does not create any financial incentives that would discourage PSE from continuing to spend resources on growing its customer base—and associated capital expenditures. It is important here to distinguish between expenditures in the form of capital investments in the gas distribution system, and expenditures related to procuring gas fuel commodities (i.e., therms). My understanding is that the CCA would place limits on and potentially increase costs for the quantity of natural gas therms distributed and ultimately consumed, but it would not directly limit new investments in new gas infrastructure. Moreover, fuel costs (including both commodity costs and environmental compliance costs) are generally treated as a pass-through cost to PSE customers, and are recovered through the Purchased Gas Adjustment (PGA) mechanism, which is updated annually. Thus, any additional CCA compliance costs would likely be directly passed through to PSE customers, rather than PSE's shareholders. Meanwhile, PSE still has an incentive to pursue gas distribution system investments for which it has the opportunity to earn a regulated rate of return.

### B. PSE's Electrification Efforts

**Q. Has PSE described actions that it could take to reduce overall demand for natural gas consumption through electrification?**

**A.** Yes. In fact, PSE identifies "targeted electrification" as one of its four main gas decarbonization strategies.[11] Additionally, PSE engaged E3 to conduct a set of gas decarbonization studies, which included detailed quantitative analysis of different gas decarbonization scenarios. Under the two primary scenarios that E3 reported on, "[e]lectrification is the largest single source of emissions reductions in both scenarios."[12] This is illustrated in the blue portion of the area graphs below, which were excerpted from the E3 study. Thus, it appears that electrification is likely to account for the largest share of PSE's decarbonization efforts, regardless of what other complementary efforts the Company also pursues, such as RNG.




**Q. Has PSE provided a thoroughly detailed action plan for these electrification efforts during the rate plan period (i.e., 2022 through 2025)?**

**A.** No. Even though E3 identified electrification as the most pivotal strategy for gas decarbonization, PSE has provided virtually no details on its electrification efforts during

[11] Exh. JJJ-1T, p. 42.

[12] Exh. JJJ-6, p. 16.

the rate plan period. Regarding near-term electrification efforts, PSE simply states that "PSE is piloting hybrid-heating solutions within its energy efficiency programs to understand how to both develop programs and drive customer adoption of hybrid heating solutions."[13]

**Q. Has PSE requested any funding or cost recovery for its electrification efforts in this case?**

**A.** No. Of the four decarbonization strategies that PSE has outlined in its opening testimony, it is only requesting cost recovery for two items, neither of which are electrification. Specifically, PSE is seeking $87 million for proposed RNG investments, and $15 million for gas infrastructure investments intended to reduce methane leaks. This is true even though electrification was identified as the largest potential source of decarbonization by PSE's consultant, E3.

**Q. Has PSE described how it would approach electrification efforts for new customers prior to installing a service connection, as distinct from existing customers that already have a service connection?**

**A.** No. This is a missed opportunity since it will be much easier and cost effective for customers to install electric appliances at the front end, rather than retrofit or replace existing gas appliances later. Additionally, electrification of new customers has the potential benefit of avoiding the cost of a new gas service line if the customer is able to fully electrify. A recent analysis performed by Rocky Mountain Institute on new homes in the Seattle area found that the upfront cost of appliances for a mixed-fuel home was

[13] Exh. JJJ-1T, p. 45.

$17,900 versus only $13,400 for an all-electric home.[14] Thus, not only would a new mixed-fuel home be paying $4,500 more initially, but they would have to pay more later to convert gas appliances to electric ones, further exacerbating this differential. Similarly, a recent E3 report prepared for the Washington Department of Commerce found that new construction "offers one of the most promising near-term opportunities for building electrification,"[15] and that an all-electric new home saves ~$2,000 in upfront participant costs and ~$1,000 per year over the lifetime of the equipment compared to a mixed-fuel home.

**Q. Are any effects from PSE's future electrification efforts apparent in its gas customer growth forecasts during the rate plan period?**

**A.** No. As mentioned above, the growth pattern appears to reflect a "business as usual" approach. I was unable to discern any meaningful reduction in new gas customers due to PSE's electrification efforts during the rate plan. In fact, PSE confirmed that "Forecasts relative to customer requests or customer additions do not consider targeted electrification."[16] While the E3 study includes scenarios with reductions in the number of gas customers over the long term, no such reductions are contemplated by PSE through 2025.

[14] C. McKenna, et al., *The New Economics of Electrifying Buildings: An Analysis of Seven Cities*, Rocky Mountain Institute (2020), https://rmi.org/insight/the-new-economics-of-electrifying-buildings/ (Seattle Analysis included as Exh. EAB-12).

[15] E3, Financial Impact of Fuel Conversion on Consumer Owned Utilities and Customers in Washington, at 3 (May 2022), http://www.commerce.wa.gov/wp-content/uploads/2022/06/Financial-Impact-of-Fuel-Conversion-on-Consumer-Owned-Utilities-and-Customers-in-Washington-Final-Report.pdf

[16] PSE Response to NWEC DR 089 (Exh. EAB-6).

**Q. Based on your review of PSE's testimony, does the Company intend to encourage new customers to fully electrify (thereby avoiding the need for new gas service) rather than install both electric and gas appliances (which requires new gas service)?**

**A.** No. There is no evidence that the Company plans to encourage any of its new customers to fully electrify, and thereby avoid the need for a new gas service. On the contrary, PSE goes to great lengths to describe the potential limitations of electrifying its customer base, which I dispute and will discuss in greater detail in the next section of my testimony (Section 4). In assessing these limitations, PSE also does not clearly distinguish between new and existing customers, and how the ability to electrify customers would differ in each case. Thus, the limitations PSE describes may not even be applicable or relevant when considering electrification of new customers rather than PSE's existing customer base.

### C. Recommendations

**Q. Based on your review of PSE's customer growth projections and electrification efforts, what are your recommendations for the Commission?**

**A.** PSE has identified "targeted electrification" efforts as one of four pillars of its overall gas decarbonization strategy, and its own analysis confirms that electrification is the most important pillar of the four. However, PSE has not developed a commensurate plan to achieve any meaningful electrification either in the near-term (including the rate plan period) or over the longer term. The Commission should require PSE to develop a much more detailed and comprehensive near-term action plan detailing its targeted

electrification efforts over the rate plan period. This electrification action plan should include, at a minimum, the following elements:

1. Annual targets for new electric appliances. This should include an explanation of how the annual targets are consistent with PSE's gas decarbonization scenario analysis.
2. Annual targets for new gas customer additions, with a goal to reduce the net number of additions to zero within the next 5 years.
3. A description of individual strategies and/or measures PSE will use to encourage customers to adopt electric appliances. This should distinguish between strategies used for a) new and existing customers, b) different customer types (*e.g.*, residential or commercial), and c) different end uses (*e.g.*, space heating, hot water).
4. A proposed budget for each strategy, including any incentives, rebates, customer outreach, and education efforts.
5. Elimination of any promotional materials and subsidies for new gas appliances or new connections.

Additionally, PSE's future capital expenditures related to customer growth on the gas system are directly impacted by the number of new customers that fully electrify and PSE's success in executing its electrification plan. Thus, the Commission should not pre-authorize cost recovery for any future growth-related capital expenditures until that electrification plan has been developed. As such, PSE's requested pre-approval for capital investments in its gas system should be reduced by $213.5 million until PSE demonstrates that its electrification efforts have been fully exhausted and whether any remaining portion of this gas capital investment for customer growth is still needed. This

$213.5 million reduction is based on the forward-looking investment amounts provided in Exh. CAK-4 as follows:

| Customer growth and service needs ($ Millions) | Rate Plan Year 1 2023 | Rate Plan Year 2 2024 | Rate Plan Year 3 2025 | Total |
|---|---|---|---|---|
| Gas Capital Investment | 79.9 | 71.3 | 62.3 | 213.5 |

## 4. PSE OVERSTATES THE LIMITATIONS ON MEETING CUSTOMER NEEDS – PARTICULARLY NEW CUSTOMERS – VIA FULL ELECTRIFICATION.

### A. Critique of PSE's Conclusions from the E3 Study

**Q. Did you review PSE's gas decarbonization study that was conducted by E3?**

**A.** Yes. I reviewed both the 2020 and 2021 studies that were provided as Exhs. JJJ-5 and JJJ-6.

**Q. What were some of the conclusions that PSE drew from this analysis regarding electrification?**

**A.** The most consequential conclusion that PSE drew from the study was that "full electrification is not an appropriate solution at this time."[17]

**Q. Do you agree with PSE's conclusion that "full electrification is not an appropriate solution at this time"?**

**A.** No. In my opinion, the Company's conclusion is overly simplistic and paints a misleading picture of the potential to fully electrify some, if not all, of its customers.

[17] Exh. JJJ-1T, p. 45.

More specifically, PSE's conclusion was based on the E3 analysis of one relatively narrow and extreme electrification scenario which included some questionable assumptions.

**Q. Please elaborate on some of your concerns regarding PSE's interpretation of the E3 analysis as its basis for not pursuing full electrification for some of its customers.**

**A.** PSE's assertions regarding the efficacy of full electrification were primarily informed by the performance of the "High Electrification" scenario in the E3 study, and primarily based on the final years of analysis (i.e., 2045). Under these hypothetical conditions, PSE envisions that it would have fully electrified nearly 100% of its gas customers, including conversion of all heating appliances to all-electric (i.e., non-hybrid) heat pumps. PSE explains how the "High Electrification" scenario would present challenges in terms of cost and reliability. However, this scenario is not indicative of the full range of possible electrification scenarios, some of which may not present the same challenges. In particular, the challenges PSE describes are extremely unlikely to emerge within the rate plan period (i.e., by 2025), even if aggressive electrification efforts are pursued during that time. Meanwhile, PSE contrasts the high electrification scenario with its preferred approach of relying on hybrid heating systems. This hybrid approach appears to be informed by the "Carbon Out" scenario in the E3 study, in which virtually no customers are fully electrified, and all customers continue to rely upon gas for heating, albeit with a hybrid system in many cases.

**Q. Are you opposed to PSE's hybrid heating system approach?**

**A.** Not necessarily. I think the hybrid approach could have short-term value, particularly as a solution for reducing gas consumption from heating appliances for existing customers.

However, I think it has much less relevance when considering new customers that can avoid gas connections altogether if fully electrified with high efficiency CCHPs. Moreover, it may still be possible to fully electrify a large portion of PSE's existing customers and reserve hybrid heating systems for a small remaining share of customers that are "hard to electrify."

**Q. What is your overarching concern regarding PSE's characterization of the two primary scenarios it compared: namely the "High Electrification" scenario which fully electrifies all customers and the "Carbon Out" scenario which fully electrifies no customers?**

**A.** My overarching concern is that the two scenarios are presented as a binary choice, with the implication that actions over the next 3-5 years should be based on two hypothetical long-term futures of the gas system: in other words, it suggests that going forward, either 100% of PSE customers must be fully electrified, or 100% of PSE customers will still be connected to gas, and there is no room in between. Meanwhile, the "High Electrification" scenario contains unrealistic assumptions regarding CCHP performance – a key variable that turns out to be a significant driver of the model's results, and in turn PSE's conclusions. Other scenarios contain more realistic CCHP assumptions, put less stress on the electric system, and are much less costly. I will discuss one of these scenarios further below (i.e., the "High Electrification - Innovation" scenario).

Additionally, the scenario analysis fails to make a distinction between the relative costs of electrifying new customers versus existing customers in the short term, the former being a much easier class of customers to electrify at a lower cost and without putting significant strain on the electric distribution system. In essence, PSE loses sight of

the near-term (i.e., the next 3-5 years), during which all new customers could be fully electrified without reaching anywhere close to 100% of PSE's overall customer base as represented by the final year of the "High Electrification" scenario.

*i. Opportunities for Electrifying New Customers*

**Q. Why is it important to focus on new customers in the near-term?**

**A.** New customers represent the "low hanging fruit" of full electrification. Since these customers have not yet invested in gas appliances, and PSE has not yet constructed new gas service lines, there are fewer challenges to fully electrifying these new customers relative to existing gas customers. Furthermore, such a scenario would minimize new capital investments in the gas system and would therefore help to mitigate some of the cost impacts that PSE and E3 identified of a highly electrified system. Once the impacts of fully electrifying *new* customers has been fully considered, then the full electrification of different shares of PSE's *existing* customer base can also be considered, including any cost or reliability challenges to be addressed over the longer term. For existing customers, there could also be further segmentation into homes with and without central air conditioners, which may be a way to identify the next lowest hanging fruit.

**Q. Did the E3 study evaluate a scenario like the one you described – that is, where all new customers are fully electrified?**

**A.** Not exactly. While the E3 study report did describe a "Carbon Out with Additional Electrification" scenario which includes 25% all-electric heat pump sales by 2030, this does not exactly align with full electrification of all new customers. For example, this scenario still includes the assumption that there would be "[n]o electrification of gas cooking." This suggests that all new customers would probably still require a new gas

connection and the associated capital costs for the service line would be incurred. As such, this scenario does not represent the full potential benefits associated with avoided gas distribution system costs.

*ii. CCHP Performance Assumptions in the "High Electrification" Scenario*

**Q. Did the E3 study workpapers include other scenarios besides the ones you have already mentioned (i.e., "High Electrification," "Carbon Out," and "Carbon Out with Additional Electrification")?**

**A.** Yes. However, the other scenarios besides those three are not discussed in the E3 study report, and PSE does not discuss these alternatives in its testimony.

**Q. Are there other scenarios evaluated by E3, but not discussed in the E3 report or in PSE's testimony, that you think are especially noteworthy?**

**A.** Yes. There is one very important scenario that E3 evaluated called the "High Electrification - Innovation" scenario. This scenario is nearly identical to the "High Electrification" scenario except for the fact that it assumes more efficient heat pump operation in cold weather. This is noteworthy because high-efficiency CCHPs (which I will denote as "he-CCHPs") are an increasingly viable option in climates like Washington's due to recent advances in heat pump technology. More specifically, the "High Electrification - Innovation" scenario assumes that heat pumps were able to operate effectively down to temperatures of 10°F (before applying inefficient resistive heating), rather than operating only to 25°F which was assumed in the base "High Electrification" case. Note that, in its analysis, E3 still refers to the less-efficient heat pumps used in the base "High Electrification" scenario as "cold climate heat pumps" despite the very high 25°F temperature limit which is higher than most modern CCHPs.

**Q. In your opinion, is the 10°F threshold used in the High Electrification - Innovation scenario more appropriate than the 25°F threshold used in the High Electrification scenario?**

**A.** Yes. In fact, even the 10°F threshold used in the Innovation scenario might be considered a relatively conservative assumption due to the fact that many modern CCHPs are still fairly efficient even down to temperatures of 5°F (i.e., COP of > 2.0)[18]. In fact, the highest-rated cold climate heat pump models can maintain their full heating capacity down to 5°F without supplemental resistance heating, while still maintaining a COP above 2.5.[19] Meanwhile, it's not clear that such high-performing models would even be necessary to maintain high efficiency in Washington's climate. In fact, 10°F appears to be below even the most extreme cold temperature conditions that PSE's gas system planners generally assume (i.e., Design Day), which I will discuss further below.

**Q. Have there been recent advances in cold climate heat pump technologies since PSE filed its application, and since E3's study was performed?**

**A.** Yes. In June 2022, the Department of Energy announced that American heat pump manufacturer Lennox International became the first partner in the U.S. Department of Energy's (DOE's) Residential Cold Climate Heat Pump Technology Challenge to develop a next-generation electric heat pump that can more effectively heat homes in

[18] See, *e.g.*, NE Energy Efficiency Partnerships, *NEEP's Cold Air Climate Heat Source, Heat Pump List*, https://ashp.neep.org/#!/product_list/

[19] K. Purdy, "How to Find the Best Cold Climate Heat Pump," *Climate Switch*, https://carbonswitch.com/best-cold-climate-heat-pump/

northern climates.[20] This advancement came almost a year ahead of schedule and means that heat pumps can provide effective heating down to -10ºF. For comparison, Seattle's record low temperature recorded in 1950 was 0ºF.[21] Additionally, this demonstrates that advancements are still occurring for CCHP technology, and may even come more quickly than anticipated.

**Q. How do the results differ between the "High Electrification - Innovation" scenario and the base "High Electrification" scenario?**

By changing a single assumption (i.e., the efficiency of heat pumps in cold weather), the "High Electrification - Innovation" scenario was able to reduce incremental costs on the electric system by approximately 39%, relative to the base "High Electrification" scenario, or about $953 million annually by 2045. Inclusion of more efficient cold climate heat pumps provides cost savings in the short term as well, as total annual resource costs in the "High Electrification - Innovation" scenario are $56 million lower than PSE's preferred "Carbon Out" scenario by 2025 and continue to be lower each year through 2037. Despite these benefits, PSE did not appear to consider the "High Electrification - Innovation" scenario as a viable option in its final analysis or discuss this in its testimony.

**Q. Besides CCHP performance, are there other changes to the assumptions in the "High Electrification" scenario that might improve the results of that scenario?**

[20] U.S. Dep't of Energy, "DOE Announces Breakthrough in Residential Cold Climate Heat Pump Technology," Jun. 17, 2022, https://www.energy.gov/articles/doe-announces-breakthrough-residential-cold-climate-heat-pump-technology (Exh. EAB-15).

[21] https://en.wikipedia.org/wiki/Climate_of_Seattle#Daily_record_cold_maxima

A. Yes, there are several. These include improvements to building envelope efficiency and weatherization, as well as load shifting and demand response. These are discussed at length in Josh Keeling's testimony (Exh. JBK-1T). Additionally, there are key assumptions regarding electric system costs that I discuss further below.

**Q. Have you estimated the potential benefits of electrifying all new customers during PSE's upcoming rate plan period (i.e., 2023-2025)?**

**A.** Yes. While the E3 study did not explicitly analyze electrifying new versus existing customers, I believe the "High Electrification – Innovation" scenario provides a reasonable proxy for electrifying all new customers during the earlier years. For example, this scenario involves fully electrifying 11,183 customers in 2023, which is roughly similar to the 10,166 of total customers (electric and gas) added that year. For this scenario, the E3 analysis shows a total reduction in the gas revenue requirement of $312 million from 2023-2025 relative to the baseline. Even when the incremental electric system costs are included, the combined total resource costs are still $67 million lower than PSE's preferred "Carbon Out" scenario. Thus, there could be substantial benefits to PSE customers from pursuing full electrification of all new customers in the near term.

**Q. Does PSE have an incentive to downplay the feasibility of the "High Electrification – Innovation" scenario?**

**A.** Yes. The feasibility of such a scenario calls into question PSE's strategy of pursuing "business as usual" gas customer growth and related expansion of the gas distribution system. As such, I think PSE has an incentive to downplay the results (as it has done in this case) since they would suggest a lower level of investment in the gas system might

be more reasonable. It also calls into question PSE's decarbonization strategy of pursuing a "hybrid only" approach and not considering full-electrification for some customers.

**Q. How did PSE characterize the energy currently provided by the gas system relative to the capacity of the electric system?**

**A.** PSE provided a misleading comparison which implied that the electric system would be totally incapable of handling new heating demand under a future electrification scenario. More specifically, PSE stated that "[t]he study performed by E3 in 2021, shown in Exh. JJJ-6, concluded that PSE's natural gas system is designed to deliver approximately 17 GW of energy during the system hourly winter peak. By comparison, PSE's 2021 IRP referenced a 4.7 GW hourly load in 2022 for electric peak demand."[22] However, in providing this detail, PSE omits a crucial fact from the E3 study that "heat pumps can be five times more efficient than gas."[23] While efficiencies may decline during winter peaks, it would be a mistake to assume that all heat pumps would switch to resistance heat at lower temperatures. Thus, it would be inaccurate to suggest that the current 17 GW peak demand on the gas system would equate to the same level of peak demand on the electric system under an electrification scenario. Instead, taking into account the assumptions in the E3 study and best-in-class performance of cold climate heat pumps today (*e.g.*, COP of 2.5 at 5 degrees), the increase in heating demand to the electric system under a 100% electrification scenario might be closer to 6-7 GW (rather than 17 GW). Moreover, under the high electrification scenario, full electrification would not occur until 2045. Thus, while this is a substantial increase in demand from current levels, it is reasonable to

[22] Exh. JJJ-1T, p. 47.

[23] Exh. JJJ-6, p. 23.

consider over a multi-decade timeframe. This is especially true in light of continued improvements in heat pump technology that are also likely to occur over that time period and further mitigate incremental demand from electrification.

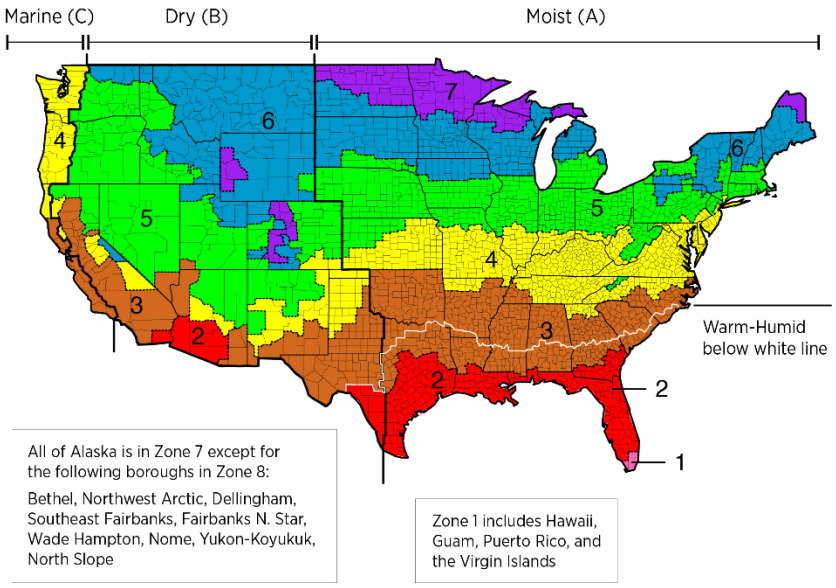
**Q. Do you agree with PSE's suggestion that the climate in Washington is too cold to consider electric heat pumps as a viable heating option?**

**A.** No. In fact, Washington's climate is relatively mild compared to many other places in the country that are aggressively pursuing heat pumps as an electrification strategy. This includes states in New England such as Maine, Vermont, Rhode Island, and Massachusetts, as well as the midwest such as Minnesota and Michigan.[24] Several of these states are starting to see cold-weather heat pumps deployed at scale. For example, a recent evaluation of Vermont's program noted that the state "Observed continued high demand for CCHPs (supported 9,647 units in 2021) despite supply chain disruptions due to COVID-19."[25] In contrast, PSE's service area falls almost entirely within Climate Zone 4, which is much more temperate than those other locations.

[24] See, *e.g.*, S. Nadel, *Programs to Electrify Space Heating in Homes and Buildings*, Amer. Council for an Energy Efficienty Economy (June 2020), https://www.aceee.org/sites/default/files/pdfs/programs_to_electrify_space_heating_brief_final_6-23-20.pdf (Exh. EAB-16).

[25] Efficiency Vermont, Savings Claim Summary (2021), https://www.efficiencyvermont.com/Media/Default/docs/plans-reports-highlights/2021/2021-savings-claim-summary.pdf

*Figure 1. Climate Zones in the U.S.*[26]




**Q. Do PSE's own planning metrics suggest that Washington's climate is unsuitable for heat pumps?**

**A.** No. PSE's own planning metrics indicate that Washington could be a particularly appropriate region for heat pumps. In discovery, PSE acknowledged that the Design Day it uses for energy supply and distribution system planning for winter loads is a 52 Heating Degree Day, which is equivalent to an average temperature of 13ºF for a 24-hour period.[27] A minimum temperature of 13ºF is well within the capabilities of today's heat pumps, particularly more efficient cold climate heat pumps that do not need to incorporate supplemental resistance heating until at least 10ºF. The actual number of days that a heat pump would need to operate at that temperature is also likely quite low; in the

[26] https://basc.pnnl.gov/images/iecc-climate-zone-map

[27] PSE Response to NWEC DR 118 (Attached as Exh. EAB-8).

ASHRAE temperature data that PSE provided in discovery to demonstrate the heating need of hybrid systems, there were zero hours when temperatures dropped below 20ºF.[28]

**Q. You mentioned that the "High Electrification" scenario discussed in the E3 report and in PSE's testimony contained some questionable assumptions. Is heat pump performance in cold weather one of the assumptions you are skeptical of?**

**A.** Yes. E3's report specifically acknowledges that electrification costs could be "considerably lower" if customers install heat pumps with higher efficiencies and performance during cold weather.[29] However, it is not clear why the benefits of he-CCHPs, as demonstrated by the "Innovation" scenario, were excluded from the results presented in the report.

**Q. Does PSE or E3 provide any justification for why heat pumps with improved cold weather performance are not considered?**

**A.** No. PSE does not mention heat pumps with improved performance at colder temperatures anywhere in its testimony. The only justification E3 provided for why they were not modeled was that "today, those systems come at a substantial cost premium to conventional heat pumps."[30]

However, it is unclear what additional premium, if any, E3 has assumed for the high-efficiency heat pumps used in the "High Electrification - Innovation" scenario (i.e., he-CCHPs) versus the lower-efficiency heat pumps used in the "High Electrification" scenario (i.e., CCHPs). In fact, PSE considered the heat pumps modeled in both scenarios

[28] PSE Response to NWEC DR 068, Attachment A (Exh. EAB-13).

[29] Exh. JJJ-6, p. 31.

[30] *Id*.

to be "cold climate heat pumps."[31] In the decarbonization analysis, both types of heat pumps have an identical cost premium of $2,000 which PSE stated was the assumed premium for a CCHP over a hybrid heat pump.[32] Thus, while it seems reasonable that the he-CCHP might be more expensive than the CCHP, this difference was not reflected in E3's analysis, and therefore it is unclear how PSE concluded that there were fundamental barriers to he-CCHP deployment.

**Q. Is the "cost premium" of he-CCHPs a logical basis for omitting them from consideration?**

**A.** No. The omission of an existing commercial technology like he-CCHPs is especially concerning because PSE's analysis also includes technologies like synthetic natural gas (SNG) or direct air capture (DAC) that have not been deployed commercially yet and would almost certainly come at a high-cost premium. Even if SNG or DAC eventually become available at lower price points the logic here is not consistent. On the one hand, E3's analysis assumes a relatively optimistic scenario for SNG/H2 technology cost declines; yet on the other, it does not assume any similar improvements in heat pump technology costs over time. This is also contradictory to the fact that E3's own report acknowledges that the cost premium for more efficient heat pumps may drop over time. Meanwhile, as I indicated earlier, innovation in heat pump efficiencies is happening rapidly across the world and will likely continue to accelerate as heat pumps are deployed more widely.

[31] PSE Response to NWEC DR 123 (Exh. EAB-10).

[32] PSE Response to NWEC DR 121 (Exh. EAB-11).

**Q. In your opinion, does the "cost premium" of he-CCHPs present an insurmountable barrier to deployment?**

**A.** No. Higher upfront costs can be an obstacle for uptake of any new technology, but there have been many examples in recent decades of utilities playing a pivotal role in overcoming these obstacles, such as for energy efficiency programs, rooftop solar, and electric vehicles. PSE could similarly seek to minimize or eliminate such obstacles for CCHP adoption through measures like incentives, customer financing plans, and marketing and education efforts. As climate policies advance and more robust markets for CCHPs develop, it's likely that CCHP deployments will increase and could even become the dominant choice for customers in the 2030-2040 timeframe. As E3 acknowledged, the costs for CCHPs may fall over time, which seems likely as more heat pumps are manufactured and deployed across the country. In fact, the Biden administration recently announced that it would invoke the Defense Production Act to accelerate domestic manufacturing of several energy technologies, including heat pumps.[33]

**Q. Are there other utilities that are developing programs to accelerate CCHP deployment?**

**A.** Yes. In 2020, ACEEE compiled a report summarizing information on over 22 state or utility programs designed to electrify space heating buildings, including in cold-weather states.[34]

[33] *See supra*, U.S. Dep't of Energy, n.20.

[34] Exh. EAB-16.

**Q. Are there other assumptions that you are concerned about in the "High Electrification" scenario?**

**A.** Yes. PSE's conclusions about the high cost of this scenario rest significantly on E3's assumptions about electricity system supply costs. However, the assumptions used in the underlying analysis are relatively crude and may be overstating the incremental electricity system costs associated with full electrification. Below is a summary of the electricity system costs included in all of the scenarios that E3 analyzed.

| **PSE Electric System Assumptions** | Carbon Out Scenario |
|---|---|
| Generation Capacity Marginal Cost ($/kW-yr) | 100 |
| T&D Marginal Cost ($/kW-yr) | 120 |
| CETA Compliant MWh Cost ($/MWh) | 50 |

As a simple comparison, incremental costs for new large-scale wind and solar projects have recently been reported at costs much lower than $50/MWh.[35] These assumptions are particularly important to vet as they significantly impact the incremental cost of scenarios with higher levels of electrification, to the point where they can change the preferred solution from a cost standpoint.

**Q. Can you give an example of how a change in electric system cost assumptions might change the preferred solution?**

**A.** Yes. As I mentioned earlier, the "High Electrification – Innovation" scenario features a 39% decrease in incremental costs relative to the "High Electrification" scenario. Thus,

[35] See, *e.g.*, Lazard, "Levelized Cost of Energy, Levelized Cost of Storage, and Levelized Cost of Hydrogen," Oct. 28, 2021 https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/ (Exh. EAB-17).

while it is still more costly than PSE's preferred "Carbon Out" scenario, the cost difference is much lower. However, a reduction to the electric system cost assumptions on the order of 15% would make "High Electrification – Innovation" the lowest-cost scenario among those developed by E3.

**Q. Given all the factors you've just discussed, do you think PSE was correct in concluding that "full electrification is not an appropriate solution at this time"?**

**A.** No. The reality is that:

1. There are unique opportunities for fully electrifying new customers which PSE has not fully explored,
2. There have been recent technological advancements in CCHPs which would be suitable for Washington's climate,
3. Robust program support has been developed by other utilities to overcome barriers to CCHP deployment in cold weather regions, and
4. E3's own "High Electrification – Innovation" scenario shows that full electrification of new customers could reduce costs in the near-term, and potentially the long-term depending on other modeling assumptions (*e.g.*, electric system costs).

Given all these factors, it makes sense to look at the impacts of a scenario where he-CCHPs are more widely deployed in the near-term in lieu of new gas connections. Including such a scenario would not only give a more accurate picture of potential futures, but would also help guide policy by determining whether he-CCHPs are a valuable technology to support through incentives and other policy support. Instead, PSE and E3 opted not to include this in the scenarios they reported.

### B. Recommendations

**Q. What are your recommendations for the Commission based on your analysis of the supposed limits to electrification in Washington that PSE claims?**

A. The Commission should direct PSE to revise its gas decarbonization analysis to include the following:

1. A more up-to-date electrification scenario that takes into account recent performance trends of Cold Climate Heat Pumps.
2. An accounting of both near-term (3-5 years) and long-term benefits of electrification, including avoided gas system infrastructure costs due to fewer new customer connections.
3. A segmentation of new and existing customers and a scenario whereby PSE seeks to electrify all new customers.
4. A review of the cost of incremental electric system costs based on recent cost trends in power and capacity, as well as sensitivity analysis around electric system assumptions to understand how these assumptions impact the viability of high electrification scenarios.
5. This revised analysis should be provided within 6 months of a decision in this case.

## 5. PSE'S LINE EXTENSION SUBSIDY SHOULD BE SET TO ZERO.

### A. Background on Line Extensions

**Q. What are line extensions?**

A. Natural gas utilities install line extensions to connect prospective customers to the distribution system. This may include installing new service lines (which distribute gas to

an individual customer's meter) as well as mains (which distribute gas to the service line).

**Q. What are line extension allowances?**

A. Line extension allowances are ratepayer-funded subsidies that cover the cost of extending service lines and that limit a prospective customer's upfront investment in the capital-intensive process of extending service. Line extension allowances are a fairly common practice among utilities across many jurisdictions. In fact, many utility commissions around the country have line extension allowance policies that were established in previous decades to support the policy goals at the time. However, energy policy goals have shifted significantly since those initial line extension policies were adopted, and some commissions – including the Washington UTC – have recently begun to reexamine those line extension policies. For example, in 2021 the Washington UTC concluded a statewide investigation that resulted in a revised approach to calculating natural gas line extension allowances. This caused the allowance value for PSE to be reduced by over 50 percent ($4,328 to $1,997) for residential customers.[36] In California, the Public Utilities Commission recently released a staff report recommending an end to all new gas connection subsidies.[37]

**Q. What is PSE's anticipated level of spending on line extensions?**

[36] Advice No. 2021-43 Cover Letter, Compliance Filing on Behalf of Puget Sound Energy, UG-210729, Nov. 17, 2021, apiproxy.utc.wa.gov/cases/GetDocument?docID=81&year=2021&docketNumber=210729 (Exh. EAB-18).

[37] Phase III Staff Proposal, CPUC Energy Division, R.19-01-011, Nov. 16, 2021, docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M423/K516/423516230.PDF (Exh. EAB-19).

A. From July 2021 to December 2025, the Company anticipates spending approximately $373 million to add 56,961 new customers to the gas system. This figure is net of any customer contributions in aid of construction ("CIAC")[38] and equates to about $6,545 per customer addition.

**Q. How does the Company calculate line extension allowances?**

**A.** Following the state of Washington's recent investigation on gas line extensions (Docket No. UG-210729), PSE updated its line extension allowance methodology to reflect the net present value (NPV) of margin sales revenues for a seven-year period. The calculation results in an allowance of $1,997 for residential customers.[39] Thus, the line extension allowance equates to about 31% of PSE's capital investment for each new customer addition (assuming $6,545 capital investment per customer). In other words, every $1 granted through a line extension subsidy equates to over $3 in overall costs to PSE ratepayers. This 3:1 ratio only reflects the costs that are socialized to PSE ratepayers and does not reflect any additional private costs that individual customers might choose to pay for line extensions beyond the $1,997 subsidy.

Additionally, none of these costs reflect any cost increases attributable to CCA compliance, as I discussed earlier in Section 3-A.

**Q. How does the Company justify line extension allowances?**

**A.** According to the Company, "individual customers benefit from the availability of electric and gas service through a regulated service provider. All system customers benefit from economies of scale that customer growth provides. For example, the vast majority of

[38] Exh. CAK-4, p. 4.

[39] Exh. EAB-18.

delivery service costs (both electric and gas) are fixed in nature. System growth costs are spread across all customers so as customer growth increases, the cost per customer decreases."[40]

**Q. Do you believe this provides a sufficient justification for line extension allowances?**

**A.** No. First, while joint and common utility costs are usually socialized, this is not always true for dedicated facilities (such as a line extension) that are used to serve a single customer. Second, from a policy perspective, I find the justification for line extensions to be quite short-sighted, particularly in light of the state's recent climate goals. As explained below, subsidizing line extensions not only contradicts the state's climate goals but risks steering potential customers towards decisions that are against their long-term economic interests since climate policies are expected to increase the cost of gas over the coming decades, potentially hitting low- and moderate-income customers the hardest. Finally, the hypothetical benefit of reducing average cost per customer would still occur from new customer additions even if those new customers were not given a line extension subsidy. In fact, if no allowances were given, average costs could be *lower* for existing customers since they would not be required to pay for any line extension subsidies.

### B. <u>Reconsidering line extensions in an evolving industry</u>

#### *i. Traditional rationale for line extension subsidies*

**Q. Can you explain some of the typical rationales used to support line extension allowances in prior decades?**

**A.** Yes, but as I explain in the sections below, many of the previous rationales for line extension allowances have become less applicable in an evolving gas industry and in

[40] Exh. CAK-4, p. 6 at 13-18.

light of state climate goals.

*1. Historical affordability*

For a subset of customers, providing a free line extension allowance may be an important step to ensure that those customers are able to access a fuel source for home heating that has historically been relatively affordable. In recent years, this rationale has become less applicable due to volatile and increasing natural gas prices as well as advances in the availability and affordability of alternative home heating options such as air source heat pumps. In addition, as discussed below, gas is likely to become substantially less affordable over the long-term as Washington's recent climate policies take effect.

*2. Historical environmental benefits*

In the past, natural gas was viewed as having environmental benefits as compared to other heating sources such as oil, wood, or propane. Currently, this rationale is much less compelling due to an increasingly decarbonized electric grid, advances in the availability and affordability of alternative home heating options such as air source heat pumps, and increased home weatherization/insulation. In addition, we now understand that there are far more emissions associated with the natural gas lifecycle than previously understood, including through upstream methane leakage associated with the extraction and transport of gas for ultimate delivery to end-use customers, and ultimately poor indoor air quality resulting from gas-burning appliances in the home.[41]

[41] See, *e.g.*, B. Seals & A. Krasner, "Gas Stoves: Health and Air Quality Impacts and Solutions," (2020) https://rmi.org/insight/gas-stoves-pollution-health/ (Exh. EAB-20); J. Dennison, Louis-Prescott, L., Gruenwald, T., "How Air Agencies Can Help End Fossil Fuel Pollution from Buildings" (2021) https://rmi.org/insight/outdoor-air-quality-brief/ (Exh. EAB-21).

*3. Downward rate pressure in the short-term*

Encouraging customer growth and subsequently increasing sales can put downward pressure on rates for all customers by spreading the fixed cost of the distribution system over a larger customer base. Downward rate pressure would occur following the seven-year period after which PSE recoups the cost of its allowance. In many ways, this is the core economic rationale for providing line extension subsidies, and I will address it in greater detail in Section 5-C below.

*4. Redundancy of heating fuels*

In the event of a large-scale winter power outage, natural gas fuel may provide a secure source of heat when electricity is unavailable. However, most types of gas heating equipment have electric starters and would be similarly unavailable should an electrical power outage occur.

*ii. Factors supporting eliminating allowances/subsidies*

**Q. Are there other recent developments that support a reduction or elimination of PSE's current line extension allowances?**

**A.** Yes, there are at least six additional developments to consider:

*1. Climate policy and greenhouse gas emissions*

First and foremost, subsidies for line extensions contradict Washington's climate policies including the CCA, as described in Section 3. It is wholly inconsistent for the state to be placing an economic penalty on gas consumption through its cap-and-invest program on the one hand while subsidizing it through ratepayer-funded allowances on the other. Moreover, the impacts of subsidizing new gas connections can be long-lasting: When new customers are added to the natural gas system, customers are typically locked

into the system for the life of their appliance—which can average 18 years for gas furnaces and 10-20 years for gas water heaters—or even the life of their building as the potential need for additional investments may dissuade gas customers from electrifying.[42]

**Q. Is PSE's line extension policy consistent with the Company's climate pledge?**

**A.** No. PSE has set an "aspirational goal to reach net zero carbon emissions for natural gas sales by 2045—customer use in homes and businesses—with an interim target of a 30 percent emissions reduction by 2030" and has pledged to "modify tariffs and incentives to mitigate natural gas load growth including changes to the line extension policy and appliance incentives."[43] It is contradictory to require ratepayers to generously subsidize the expansion of its natural gas distribution system while at the same time the Company has pledged that all natural gas sales will be net zero by 2045. I recognize that PSE has announced plans to scale up alternative fuels, such as RNG and hydrogen, as a partial solution to achieving the Company's decarbonization goals. However, the Company has stated that these plans will contribute to decarbonizing gas sales by only 30% below 2019 levels by 2030. Meanwhile, the CCA requires PSE to reduce emissions by 45% by 2030.[44]

Moreover, every scenario considered in the Company's recent decarbonization analysis included a substantial role for electrification and demonstrated that the

[42] Consumer Reports News, "By the Numbers: How long will your appliances last? It depends" (Mar. 21, 2009), www.consumerreports.org/cro/news/2009/03/by-the-numbers-how-long-will-your-appliances-last-it-depends/index.htm (Exh. EAB-22).

[43] "PSE sets 'Beyond Net Zero Carbon' goal," Puget Sound Energy, www.pse.com/press-release/details/pse-sets-beyond-net-zero-carbon-goal

[44] RCW Chapter 70A.65; RCW 70A.45.020.

Company's goals could not be achieved through alternative fuels alone.[45] As noted earlier in my testimony, new customers represent "low-hanging fruit" for electrification efforts, as it is often less costly for them to electrify their heating systems than customers that have already connected to the gas network. Continuing to expand the natural gas system will only increase gas volumes that will need to be decarbonized and will miss significant opportunities to advance electrification at key decision points, such as when customers are deciding which appliances to install at a new home.

*2. Increased cost for new customers*

**Q. What factors should be considered regarding potential increased costs for new customers?**

**A.** New gas customers may experience not only near-term volatility in gas prices, but also the long-term price increases that are likely to occur as Washington's climate policies take effect. In the near-term (and potentially over the long-term), natural gas spot prices have become increasingly volatile. This is not an aberration, but rather reflects the nature of gas commodity markets – and a risky prospect for ratepayers.[46] While the spot price of gas at the NW Sumas trading hub—a benchmark for natural gas prices in the Pacific Northwest—–averaged $3.18/MMBtu over a 9-year period from July 2012-July 2021, this average rose to over $5.30/MMBtu over the last year (i.e., July 2021-July 2022) – an increase of 67 percent.[47] In contrast to the gas market, there are many types of electric generators, including renewables which have no fuel price exposure, leaving customers

[45] Exh. JJJ-6 (E3 PSE Gas Utility Decarbonization: Beyond Net Zero Scenario Analysis).

[46] Although natural gas utilities rely on a mixture of long-term and short-term contracts, every gas utility I have examined relies on spot prices to some extent and is exposed to the volatility of gas price spikes.

[47] Analysis based on S&P Global data.

less susceptible to the risk of price volatility over the long run. There is presently a global natural gas supply crunch and the U.S. is increasingly exposed to these market dynamics as it has expanded liquefied natural gas (LNG) exports in recent years.[48]

Over the intermediate-term, efforts to incorporate low-carbon fuels into the gas system—which has been identified by PSE as a component of their decarbonization efforts—will also increase gas costs as these low-carbon fuels almost all sell at a premium to even today's high-cost natural gas supplies. In addition, the CCA leverages market forces to ensure that the social cost of emissions—a negative externality—is incorporated into the private cost of gas. As the budget for free emissions allowances declines annually to reflect statutory decarbonization goals, decreasing supply will put upward pressure on the cost of allowances which may be quite substantial and which utilities can pass to these new gas customers. Encouraging the addition of new gas customers to PSE's system via line extension subsidies will only exacerbate these challenges and potential cost of compliance. In other words, the subsidies could be encouraging a decision that may have some short-term customer benefits but is ultimately against their long-term economic interests.

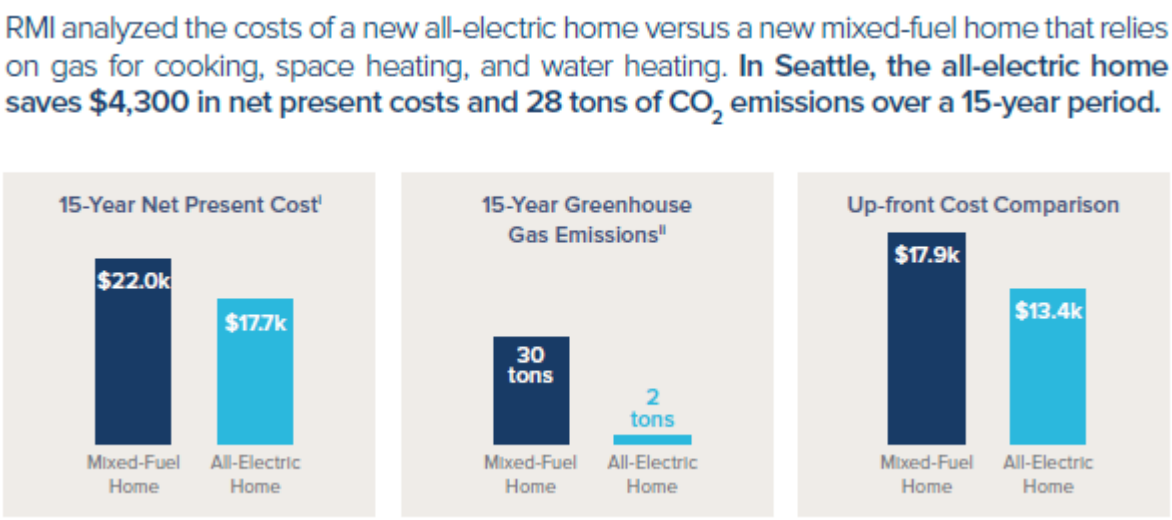
*3. Availability/affordability of alternatives*

While natural gas prices have been volatile and are likely to increase over the long-term as state policies take effect, recent studies have shown that electrification has become increasingly cost competitive when compared to gas. For example, a recent RMI report compared the net present costs of "a new all-electric home versus a new mixed-

[48] *See*, *e.g.*, Corey Paul, "Surging US LNG exports hike domestic gas prices amid global supply crunch," S&P Global (2021), www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/surging-us-lng-exports-hike-domestic-gas-prices-amid-global-supply-crunch-67508815

fuel home that relies on gas for cooking, space heating, and water heating" in several major cities across the country, including the Pacific Northwest as well as colder climates such as Boston, Columbus, Denver, Minneapolis, and New York City. The study found that all-electric homes were the cheaper option in every instance.[49] Below is a summary of the study's findings for Seattle. It is noteworthy that this study was published in 2020, well before gas prices had reached their current high levels and before the state's cap-and-invest program has impacted supply. This suggests that if recent price volatility and future climate policies are taken into account, the cost savings associated with electrification could be substantially higher.

*Figure 2. Excerpt from "The New Economics of Electrifying Buildings: An Analysis of Seven Cities," Rocky Mountain Institute (RMI) (2020) showing analysis for Seattle, WA.*




*4. Stranded asset risk and equity considerations*

As noted above, state policies will likely require many gas customers to electrify in the future to meet state decarbonization goals. While there may be short-term benefits

[49] Exh. EAB-12.

to adding new customers to the system, the necessity of fuel switching creates substantial stranded asset risk and upward pressure on rates over the long-term, as gas sales revenues will need to decrease but fixed costs remain level or even increase. The result is rate increases for customers who remain on the gas system. These rate increases will occur whether departing customers fully exit from the system (fuel switching) or remain on the gas system but consume decreasing volumes of gas due to more efficient appliances, conservation, or partial electrification. As such, it makes sense to decrease the extent of this challenge by eliminating the line extension allowance and thereby encouraging reduced growth in the number of new customers, and new infrastructure, exposed to this risk. This results in an orderly transition for an inevitable switch.

**Q. Could future rate increases due to stranded costs disproportionately impact certain types of gas customers?**

**A.** Yes. They are most likely to affect low- and moderate-income customers. Due to the upfront cost of new appliances, it may be more difficult for these customers to electrify at a later date. Therefore, minimizing this stranded cost risk has benefits from an equity perspective.

**Q. Are there other negative externalities associated with line extensions that the Commission should be aware of?**

**A.** Yes. Gas connections can have negative impacts on indoor air quality and land use, which are described in more detail below.

*5. Indoor air quality*

While there are a variety of factors that influence indoor air quality, with ventilation being a chief factor, there is a body of research suggesting that homes with

natural gas appliances can experience elevated levels of nitrogen dioxide and carbon monoxide.[50] A recent Stanford University study found that appliances such as gas stoves emit up to 1.3 percent of the gas they use as unburned methane, which has an annual emissions impact nationwide similar to that of approximately 500,000 gasoline-powered cars.[51] It is becoming increasingly clear that there may be public health and safety benefits from encouraging customers to adopt appliances that do not rely on natural gas combustion.

*6. Land use and sprawl*

Granting free allowances for a portion of line extension costs may encourage developers to favor designs for homes and businesses that are spaced further apart with a greater number of individual line extensions. This contributes to inefficient land use and urban sprawl relative to designs that rely more heavily on shared infrastructure and compact design. This could ultimately lead to increases in car travel, impermeable surfaces, and removal of natural habitats.

**Q. When considering all of these factors, do you think that PSE's line extension allowance should be modified?**

**A.** Yes. These factors weigh decisively towards eliminating line extension allowances. Line extension subsidies contradict state policy and typical policy justifications to subsidize a

[50] Yifang Zhu, Y., R. Connolly, Y. Lin, T. Mathews, Z. Wang, "Effects of Residential Gas Appliances on Indoor and Outdoor Air Quality and Public Health in California," UCLA Fielding School of Public Health, Department of Environmental Health Sciences (April 2020), available at: coeh.ph.ucla.edu/effects-of-residential-gas-appliances-on-indoor-and-outdoor-air-quality-and-public-health-in-california (Exh. EAB-23).

[51] Lebel, E.D., C.J. Finnegan, Z. Ouyang, R.B. Jackson, "Methane and NOx Emissions from Natural Gas Stoves, Cooktops, and Ovens in Residential Homes," *Environ. Sci. Technol.* (2022) 56 (4), available at pubs.acs.org/doi/10.1021/acs.est.1c04707 (Exh. EAB-24).

fuel source that not only contributes directly to carbon emissions, but is also likely to conflict with customers' economic interests over the long-term – particularly when cleaner, more affordable, and less risky alternatives (*e.g.*, electrification) are readily available. Even if customer growth puts downward pressure on rates over the short-term, it is short-sighted to focus solely on this potential benefit. More specifically, low-income customers and renters will be the ones paying for increased gas commodity costs through their utility bills, while landlords and developers will be the ones benefiting from the line extension subsidies. As explained in the subsequent section, I also believe that it is worth re-evaluating PSE's economic rationale for line extensions.

**Q. Would eliminating the line extension allowance prevent new customers from connecting to gas utility service?**

**A.** No, not at all. Customers would still be free to choose to connect to gas utility service. Removing the line extension allowance simply removes the subsidy for each new service connection, and ensures that each new customer is paying their fair share of the new service connection costs (rather than socializing these costs).

**Q. Have other independent entities advocated for similar reforms of line extension allowances?**

**A.** Yes. A recent Rocky Mountain Institute report included a recommendation to "end or reform gas line extension allowances." The report argues, as I do here, that gas line extensions no longer provide a public benefit given the economic risks in an evolving industry and in light of emissions reductions mandates.[52]

[52] Alter, A.L., S. Billimoria, M. Henchen, "Overextended: It's Time to Rethink Subsidized Gas Line Extensions," Rocky Mountain Institute (RMI) (December 2021), available at rmi.org/insight/its-time-to-rethink-subsidized-gas-line-extensions (Exh. EAB-25).

### C. The core economic rationale underpinning gas line extension allowances should be re-examined

**Q. What is the core rationale that PSE, and other gas utilities, generally rely upon to justify natural gas line extensions?**

**A.** Of the reasons I listed above, the core rationale which typically forms the basis for computing the actual allowance values themselves is generally the economic benefits delivered to other customers (i.e., "downward rate pressure"). The basic premise is that the initial investment made by PSE (in the form of an allowance) unlocks incremental new revenues that provide economic benefits to all customers since those revenues contribute towards the utility's fixed cost revenue requirements, thus putting downward pressure on rates.

**Q. Do you think this core rationale holds up under closer scrutiny?**

**A.** No. I am concerned that some customers are likely receiving a windfall payment, meaning that they can afford and would have chosen to fully pay for connection to gas service even without receiving an allowance. From a basic fairness standpoint, if a customer is sufficiently motivated to install new gas appliances, it is only fair that the customer should pay the cost for the new line extension, rather than passing those costs onto other customers. In such cases, a lower allowance value would in fact be *more* beneficial for PSE ratepayers since they would not be subsidizing the line extension. Meanwhile, removing the line extension allowance provides a more transparent price signal to those choosing whether or not to fully electrify.

**Q. Do you think some customers might choose against connecting to gas service if the allowance value were set at $0?**

**A.** Yes. Line extension subsidies would likely provide a necessary incentive for low- to moderate-income customers, who may be unable to afford connection to the gas system without financial support. Some middle- or upper-income customers may also be unwilling to invest in connection at full (unsubsidized) cost, given the availability of alternatives that are likely to be more affordable over the long-term (electrification).

**Q. If reduced or eliminated line extension subsidies cause fewer gas customers to connect to PSE's system, could this be considered a beneficial outcome?**

**A.** Yes. Any potential benefit of subsidizing line extensions must be weighed against the customer risks and public policy considerations discussed above. Incentivizing low-income customers to join the natural gas system is a risky proposition that may harm the most vulnerable customers in the future. It would also send a price signal that steers the market towards a fossil fuel source, contrary to state policy goals. Rather than incentivizing connection to a system with substantial long-term risks to affordability, providing subsidies for electrification and heat pumps would allow customers to access equipment more aligned with their economic interests and state climate goals.

**Q. Even if the core economic rationale were correct (i.e., that line extension subsidies meaningfully increase revenues), would this be sufficient to justify continued line extension allowances?**

**A.** No. As stated, this small benefit would not be worth contradicting state climate goals or encouraging customers to make decisions contrary to their long-term interests.

**Q. Do natural gas utilities like PSE have a financial incentive to provide an allowance?**

**A.** Yes. Utilities have a financial incentive to provide an allowance because it effectively expands the size of the gas system and adds a greater share of the service line costs to the utility's rate base. As noted earlier, from July 2021 to December 2025, the Company plans to spend $373 million on connecting customers to the gas system – investments on which PSE can earn a rate of return. All else being equal, it would be in PSE's interest to propose higher allowance values since that would increase its capital expenditures and overall rate base upon which it earns a rate of return. It is the UTC's role to appropriately mitigate any capital expenditures that may be inflated or unnecessary, including line extension allowances. The testimony of Ronald J. Binz (RJB-1T) provides additional detail on the "capital bias" and "throughput incentive" that incentivizes utilities to provide line extension allowances, opportunities to address these incentives through performance-based ratemaking, and the UTC's role in adopting PBR under SB 5295.

### D. Recommendation Summary

**Q. What are your recommendations for the UTC regarding PSE's line extension allowances?**

**A.** I recommend that the UTC do the following:

1. Require PSE to reduce line extension allowances to $0 going forward.
2. Require that the $0 allowance be applied to both residential and non-residential customers.
3. PSE's revenue requirement in each future year of its rate plan should be adjusted accordingly to decrease the amount of capital investment normally attributed to line extension allowances.

## 6. PSE HAS PROVIDED INSUFFICIENT DETAIL TO SUPPORT PREAPPROVAL OF ITS PROPOSED RENEWABLE NATURAL GAS (RNG) AND GREEN HYDROGEN (GH2) INVESTMENTS.

**Q. What is your opinion of the role of RNG and GH2 as part of PSE's broader gas decarbonization strategy?**

**A.** In my opinion these fuels could play an important, albeit very limited role in serving a small subset of customer needs that cannot be electrified over the long-term. Since these are longer-term solutions for "hard to decarbonize" use cases, I don't believe there is an urgent need to incorporate them into the gas distribution system for residential or commercial customers.

**Q. In your opinion, are PSE's proposed investments in RNG supply in the best interest of customers?**

**A.** No. Although I'm not categorically opposed to utility investments in RNG, I don't think that PSE has provided sufficient detail to justify its proposed RNG investments in this proceeding. Before the Commission approves cost recovery for any current or future RNG projects (including those proposed by PSE in this case), the Company should be required to demonstrate that 1) it has completed an evaluation of industrial market segment demand, 2) the projects are accompanied by other concrete and complementary steps as part of PSE's comprehensive gas decarbonization strategy, and 3) the projects have met specific project-level criteria. I discuss each of these below.

### A. <u>Industrial Demand Evaluation</u>

**Q. Did the E3 study consider industrial gas service in its evaluation of decarbonization?**

**A.** No. PSE shared modeling results from E3 showing that some RNG may be needed to decarbonize residential and commercial space heating in its service territory.[53] However, it appears that only the residential and commercial sectors were considered and PSE did not direct E3 to evaluate the costs of decarbonizing industrial processes. This is a significant omission given that many industrial processes are particularly expensive and/or technically difficult to electrify.

**Q. Is industrial gas service a significant portion of PSE's overall gas sales?**

**A.** Yes. PSE currently has about 2,378 industrial gas customers in its service territory right now, mostly in King County.[54] According to the inputs in E3's model, these customers currently use around 16% of PSE's gas sales, a number that the model forecasts will stay largely constant out to 2045.

**Q. Why is it important for PSE to include industrial customers in its decarbonization pathway modeling that uses RNG?**

**A.** For some industrial customers, carbon-neutral fuels like RNG may be the only viable option to comply with Washington's broader climate goals. Although I don't have concrete details on the types of industrial processes PSE's customers are using that gas for, it's likely that many of these processes involve very high temperatures that will be more difficult to electrify than residential or commercial space heat, which typically only need to achieve temperatures in the range of 68-72° Fahrenheit. Other industrial decarbonization options, such as hydrogen or carbon capture, are also expensive, as they

[53] Exh. JJJ-6.

[54] PSE Community Profiles, available at https://www.pse.com/en/about-us

can require substantial electricity purchases and/or costly retrofits to industrial equipment.

However, RNG is currently a scarce resource. Under PSE's approach, much of the RNG that may be required for industrial uses would be in competition with residential and commercial heating demand that could readily be electrified. Including industrial customers in regional decarbonization models could change the entire calculus of how this resource is best allocated among PSE's customers.

**Q. What steps would you recommend that the Commission require PSE to undertake regarding decarbonizing industrial sector emissions?**

**A.** I believe PSE should model pathways and relative costs of decarbonizing all customer segments on its system, including residential, commercial, *and* industrial before determining a) the most efficient use of RNG on its system and b) the best pathway for electrifying residential and commercial customers.

**Q. How does the failure to review and evaluate industrial sector gas service use inform the prudence or lack thereof of PSE's RNG investments?**

**A.** If the costs of decarbonizing these industrial processes were taken into account, it may show that the lowest-cost decarbonization pathway would actually use PSE's limited RNG resources to decarbonize industrial processes, rather than to support residential and commercial space heating. To clarify, while this analysis may not impact the need for PSE to begin procuring RNG at this time, it could affect decisions on where these RNG projects should be interconnected to reduce the risk that these assets will become stranded if portions of the distribution network serving residential and commercial customers are ultimately phased out in the future. Additionally, better information on

industrial RNG demand versus total available supply is necessary to inform PSE's overall strategy for the commercial/residential sectors. More specifically, if there is limited supply and inflexible demand for industrial RNG, it may place limitations on the feasibility of PSE's proposed hybrid heat pump strategy (versus a high electrification strategy).

### B. Complementary Steps

**Q. Returning to your second point, could you describe the "concrete and complementary steps" that should accompany approval of an RNG investment?**

**A.** Yes. As PSE has explained, RNG is just one of the four pillars of its decarbonization strategy and is likely to not even be the primary one. Thus, in my opinion, a much higher priority for the Company to pursue in parallel to this effort is to develop a comprehensive electrification plan as outlined above to reduce demand on the gas system. Thus, before considering or approving any RNG investments, it is important for the Commission to understand how RNG fits within PSE's broader decarbonization strategy, and that enough details of those other pillars (especially electrification) are spelled out to ensure that the overall level and timing of RNG investment is appropriate.

**Q. Can you elaborate on why approval of RNG investments should be tied to other decarbonization measures?**

**A.** Yes. RNG is a limited resource that cannot serve as a complete replacement for the amount of gas used on the system today, let alone to meet future demand for an expanded gas system. In fact, PSE's own modeling indicates that RNG is *only* a viable climate solution if virtually all gas customers also install heat pumps that are either fully

electrified, or are hybrid systems that only use gas during meet peak demand.[55] Even then, RNG supply must be supplemented with underdeveloped technologies like synthetic natural gas (SNG) or direct air capture (DAC). As I mentioned, PSE's analysis doesn't consider potential demand for RNG from the industrial sector, which may be a higher priority than residential or commercial customers. Given this, it is clear that RNG will not work on its own as a complete decarbonization strategy and may not be a prudent investment unless complementary measures are also undertaken, such as electrification.

**Q. Would some of these complementary measures also include limiting expansion of the gas system?**

**A.** Yes. PSE's proposed investment in RNG is fundamentally at odds with PSE's proposed gas system expansion since RNG is only a viable climate solution if overall demand on the gas system is significantly reduced in parallel. Put differently, PSE is requesting permission to make investments to solve a problem (i.e., RNG facilities to decarbonize the gas supply) while simultaneously making investments that exacerbate that problem (i.e., increased gas use from new customer gas connections). To avoid this conflict, approval of any RNG investments (including those proposed in this case) should only be approved if these investments are accompanied by comprehensive measures to reduce gas demand from new customer connections. These measures should include a comprehensive plan for electrifying new customers as discussed above in Section 3. Absent a complementary electrification plan, it is not clear that PSE's investments into

[55] Exh. JJJ-6.

RNG are prudent since they would be disconnected from a comprehensive plan to decarbonize the gas system.

**Q. Does PSE's proposed "hybrid heat" decarbonization approach provide a rationale for investing in RNG while continuing new customer connections?**

**A.** No. While hybrid customers use less gas than gas-only customers, they still use meaningful quantities of fuel that would need to be met by RNG or another zero-carbon fuel in the future. In addition, hybrid heat will be an even more expensive option for new customers than all-electric customers, since it would require both a gas connection and a heat pump system. In my opinion it would be better to both avoid this additional cost and avoid additional gas demand by setting up a framework encouraging all-electric connections for these new customers.

### C. Project-Level Criteria

**Q. Given your concerns about RNG and/or green hydrogen projects as a source of replacement fuel for natural gas, how should the Commission evaluate the RNG/GH2 projects proposed by PSE in this case, or other future projects?**

**A.** I think that the Commission should establish a set of criteria to evaluate the prudence of these projects to ensure that they are truly providing clean energy that is in the best interest of PSE customers. This could be accomplished as part of an order in this case, or a future rulemaking. In any case, the Commission should ensure these criteria are met before granting any advanced approval or cost recovery of future RNG/GH2 projects.

**Q. In your opinion, is there a particular set of criteria the Commission should consider at this time?**

**A.** Yes. Although I recommend updating the criteria as more is learned about the market for RNG and green H2, at a minimum, I think the following criteria should be met in this case:

a) For new generation projects that include combustion of RNG/GH2 fuel:

i) A date should be set for when the conversion to RNG/green hydrogen will be made.

ii) A concrete estimate of the costs of converting the generation technology to be capable of utilizing RNG/hydrogen versus conventional fuels.

iii) Demonstrated performance of the underlying technology's ability to avoid contributing to local air pollution.

b) For projects that inject RNG/green hydrogen into the gas distribution system:

i) Systems-level analysis should be provided 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/commercial space heating with RNG/hydrogen.

ii) A supply curve of decarbonization resources by price and availability should be provided, and included in all future iterations of PSE's decarbonization plan. This supply curve should include specific measure availability and cost (*e.g.* energy efficiency bundle 1 costs X$/ton of carbon reduction and can reduce Y tons of CO2, dairy RNG costs A$/ton and can reduce B tons of CO2). The supply curve should include electrification efforts in addition to new fuel options like RNG/GH2.

iii) The RNG/GH2 fuel should 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.

c) Each project should include a comprehensive plan for how the RNG/green hydrogen will be generated or procured, including:

i) An assessment of upstream methane leaks associated with the collection and processing of biogas feedstocks for RNG.

ii) Any necessary certifications to qualify the carbon abatement benefits of the fuel.

d) Each project should include a comprehensive plan for how the RNG/green hydrogen will be transported to the project site and stored until needed.

e) Each project should include a concrete estimate of the incremental costs of procuring, transporting, and storing RNG/hydrogen fuel relative to conventional fuels.

i) These incremental costs should include a forecasted cost curve for RNG/hydrogen over the course of the project, if relevant.

ii) For hydrogen projects that plan to exceed limitations of existing natural gas infrastructure to carry more than a fraction of hydrogen fuel (*e.g.*, >20% mix), such plans must explain the types of investments and associated costs that will be required to overcome these limitations.

**D. <u>Recommendations</u>**

**Q. Given these criteria, what is your recommendation to the Commission regarding PSE's proposed $87 million RNG/GH2 investments in this case?**

**A.** I recommend that the Commission not approve these investments until PSE can demonstrate that it has met these criteria. Additionally, any funds authorized for RNG

projects should be part of a comprehensive package that details the relative level of investment and intended performance of all four pillars of PSE's decarbonization plan, including electrification.

### 7. THE COMMISSION SHOULD CONSIDER ADOPTING A PERFORMANCE METRIC AND INCENTIVE MECHANISM TO ENCOURAGE PSE TO ELECTRIFY NEW CUSTOMERS.

**Q. Earlier you mentioned that PSE has a financial incentive to grow its gas customer base so that it makes growth-related capital investments. Correct?**

**A.** Yes. As I mentioned, PSE plans to invest over $213 million in customer growth-related capital over the rate plan period (2023-2025), upon which it would be authorized to earn a regulated rate of return. In fact, it appears that PSE's investment opportunity in terms of dollars spent per customer is greater for new gas customers than it is for electric customers.

**Q. What are the implications of this in terms of PSE's efforts to electrify new customers?**

**A.** It means that PSE has a strong disincentive to pursue full electrification of new customers and thereby avoid providing new gas service. Instead, PSE is strongly incentivized to continue providing gas service for new customers. Modifying this incentive could encourage PSE to play an important role in furthering electrification as a dual fuel utility.

**Q. What is the significance of the fact that PSE is a dual fuel utility?**

**A.** Since it is a dual fuel utility, PSE is in a position where it can still add customers and capital investments over time by growing its electric customer base, even if its gas customer base declines over time, in alignment with the state's climate policy goals. In contrast, many gas utilities only provide gas service, making it much more difficult to

embrace a strategy of reducing their gas customer base. While PSE currently has an incentive to grow its gas customers, it could still have a robust and growing business serving electric customers even if new gas customers were no longer added or eventually eliminated.

**Q. What would the opportunity cost to PSE be if no new gas customers were added during the forward-looking rate plan period?**

**A.** Assuming no new customers were added from 2023-2025, the proposed $213 million capital investment associated with customer growth would be removed from PSE's projected rate base. At PSE's proposed 7.39% ROR, that equates to a reduction in annual operating income of about $15.8 million.

**Q. Assuming a $213 million reduction in PSE's rate base, what ROR would be needed to make PSE indifferent in terms of operating income?**

**A.** If $213 million were removed from PSE's rate base, a ROR of 7.91% would be needed to yield the same operating income as PSE is proposing in this case. This is assuming only PSE's gas utility operations are considered and the adjusted ROR would not apply to PSE's electric utility.

**Q. Given the inherent financial incentives PSE faces under the current utility business model, do you think that PSE is likely to pursue full electrification of its own volition?**

**A.** No. I think there are substantial financial disincentives for it to do so. As I mentioned earlier, complete electrification of new customers could reduce PSE's annual earnings potential by about $16 million. However, it may be possible to construct an incentive mechanism that would encourage PSE to pursue electrification such that it is indifferent

to reduced gas customer growth. Given Washington's ambitious climate policy goals, it is imperative that the state's utilities shift towards a focus on electrification rather than "business as usual" expansion of gas service. As such, a performance incentive for dual fuel utilities like PSE that is tied to customer electrification may be a sensible approach. This is true especially in light of the fact that PSE is in a unique role where it can help shape new customer choices with regards to utility service, appliances, and energy consumption.

**Q. What is a performance incentive mechanism, and how can it support PSE in shifting to a greater focus on electrification?**

**A.** A performance incentive mechanism ("PIM") is a type of performance-based regulation that provides a utility with a financial incentive for acting in a way that furthers policy or societal goals. Typically, the incentives are tied to an underlying "performance metric," which is a metric of utility performance that is tracked over time and provides an insight into how well a utility's actions are aligned with a specific performance goal. Once this performance metric is established, the Commission can create financial incentives for the utility to achieve certain targets as measured by this performance metric, or financial penalties if its performance slips in accordance with that metric. In many cases, these financial incentives or penalties are provided in the form of an increase or decrease to the utility's allowed ROR. When based on transparent metrics and coordinated effectively with state policy goals, performance incentives can provide a powerful tool to better align utility actions with societal needs. Witnesses Amy E. Wheeless and Ronald J. Binz provide further testimony regarding the value of using performance metrics and performance incentive mechanisms in utility regulation.

**Q. Do you have any recommendations regarding how such an incentive mechanism should be structured in PSE's case regarding electrification?**

**A.** Yes. In my opinion it is appropriate for the Commission to adopt a performance-based transition mechanism to encourage PSE to drive new customer additions toward full electric service rather than the extension of new gas service. To this end, I recommend that the Commission consider a performance-based mechanism that would be linked to PSE's ratio of new gas customers to new full-electric customers. The goal of this incentive would be to drive this ratio down to zero over time, while holding PSE harmless from the financial opportunity costs of foregoing additional investments in its gas distribution system to accommodate new customer service extensions. Under this approach, PSE would have an incentive to encourage more of its new customers to install *solely* electric appliances such as heat pumps and electric water heaters, rather than gas appliances.

**Q. Have you examined current and projected ratios of new gas to electric customers for PSE?**

**A.** Yes. The ratio of gas to electric customers is a metric that has been tracked and reported by PSE for a few years now, which makes it an appropriately transparent metric on which to build a performance incentive. In examining PSE's projections of new gas customers to new electric customers, the following ratios are shown:

| Year | Elec. Cust. Add'ns | Gas Cust. Add'ns | Ratio (Gas/Electric) | Source |
|---|---|---|---|---|
| 1/1/2019 – 6/30/2021 | 15,183 | 50,521 | 3.33 | CAK-4 |
| 7/1/2021 – 12/31/2021 | 1,716 | 8,601 | 5.01 | CAK-4 |
| 2022 | 12,707 | 15,740 | 1.24 | CAK-4 |
| 2023 | 17,582 | 12,205 | 0.69 | CAK-4 |
| 2024 | 18,906 | 10,898 | 0.58 | CAK-4 |

| | | | | |
|---|---|---|---|---|
| 2025 | 20,901 | 9,517 | 0.46 | CAK-4 |

**Q. Do you believe this projection reflects PSE's current electrification efforts?**

**A.** No. The ratio of gas to electric customers projected in future years is far lower than what PSE has experienced in recent years. However, as I explained earlier, PSE has not proposed any comprehensive efforts to encourage electrification. Thus I'm not confident that these declines will occur absent new efforts from PSE to encourage electrification. Furthermore, to meet Washington's climate goals, it is imperative that PSE drives the ratio of gas to electric customers down towards zero.

**Q. Please describe at a high level how this performance incentive would be designed.**

**A.** The performance incentive would be linked to the ratio of new gas customers to electric customers. This adjustment would provide PSE with earnings equivalent to what it otherwise would have received if it had invested in new gas distribution infrastructure for customer growth. This is intended to overcome PSE's inherent disincentive to reduce the number of new gas hookups. I would also recommend a symmetrical design of the mechanism such that it would either reward or penalize PSE, depending upon the level of electrification achieved.

**Q. What specific adjustments should be made to PSE's rate of return based on the ratio of new gas to electric customers?**

**A.** I propose that an incentive should be applied in the form of a ROE adjustment (gas system only) that would provide an equivalent income to PSE regardless of whether it spent on new gas infrastructure or converted new customers to electric-only appliances.[56]

[56] Note that this preliminary analysis only considers capital expenditures associated with new customer service line extensions. Additional adjustments may be warranted due to increased electricity margin

Specifically, PSE projects spending approximately $213.5 million in new gas customer capital expenditures from 2023-2025. In the event that such expenditures are not made, PSE's rate of return would need to be increased to 7.91% (or +0.52%) to provide an equivalent net income to PSE. This 0.52% differential serves as the basis for computing my proposed performance incentive for reducing gas customer additions. The table below illustrates how the incentive would scale for different levels of performance for new customer additions. I am open to other parties' perspectives on how this calculation could be refined while retaining the same overall goal of encouraging PSE to actively pursue electrification.

| **Performance Level** | **Ratio of Annual Gas/Electric Customer Additions** | **ROE Adjustment (Gas Only)** |
|---|---|---|
| Tier -3 | 1.98 | -0.64% |
| Tier -2 | 1.73 | -0.43% |
| Tier -1 | 1.49 | -0.21% |
| *Current Ratio (2022)* | 1.24 | 0.00% |
| Tier 1 | 0.99 | 0.21% |
| Tier 2 | 0.74 | 0.43% |
| Tier 3 | 0.50 | 0.64% |
| Tier 4 | 0.25 | 0.85% |
| Tier 5 | 0.00 | 1.07% |
| Tier 6 | -0.25 | 1.28% |

**Q. Over what time period would this performance be tracked?**

**A.** I recommend that PSE provide quarterly reports to the Commission on the number of customers being added, ideally no later than 30 days after the quarter has ended. After the final quarterly report in each rate plan year has been provided (*e.g.*, Q4 2023), the

sales. The Joint Environmental Advocates are open to further discussions with other parties to this case on how to further develop this incentive mechanism.

Commission would review the reports and determine which performance tier PSE has met in the table above. The corresponding ROE adjustment would be applied in the following rate plan year.

**Q. Should there be any exceptions to this adjustment?**

**A.** Possibly. In order to minimize any potential risk of harmful impacts to low-income customers, it may be appropriate to exclude the adjustment from the rates charged to those customers.

**Q. If the Commission does not adopt this PIM, what action would you recommend to the Commission?**

**A.** At a minimum, I recommend that the Commission begin to track the metric of gas to electric customer additions on a regular basis (*e.g.*, quarterly) and encourage PSE to try to reduce this ratio over time.

## CONCLUSION

**Q. What are your conclusions about PSE's GRC filing with respect to electrification and gas decarbonization?**

**A.** There are many deficiencies in PSE's proposal which I have outlined in my testimony above.

**Q. Does this conclude your testimony?**

**A.** Yes, it does.