

**BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**Dockets UE-240004 & UG-240005  
Puget Sound Energy  
2024 General Rate Case**

**JEA Data Request No. 021**

**“CONFIDENTIAL” Table of Contents**

	<b>“CONFIDENTIAL” Material</b>
<b>Data Request No. 021</b>	Shaded information is designated as CONFIDENTIAL per Protective Order in Dockets UE-240004 and UG-240005 as marked in Puget Sound Energy’s Response to JEA Data Request No. 021 Attachments K, L, M, N and P.

**BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**Dockets UE-240004 & UG-240005  
Puget Sound Energy  
2024 General Rate Case**

**JEA DATA REQUEST NO. 021:**

**Re: Jacobs Testimony**

Please refer to JJJ-1Tr, 33:5 – 34: 5, where the witness testifies on PSE’s efforts to prepare for alternative fuels like green hydrogen.

- a. What does PSE assume is the technical limit for blending hydrogen into the gas distribution system on a volume basis?
- b. Please provide all analysis or reports PSE relied on to support its answer in subpart (a).
- c. What does PSE assume is the technical limit for blending hydrogen into the gas distribution system without having an impact on end-use customer appliances?
- d. Please identify the percentage of emissions reductions PSE assumes it can achieve in each year for the next twenty years through the purchase and blending of hydrogen into the natural gas delivery system. Please provide the response in an unlocked Excel workbook with all formulas intact.
- e. Is PSE considering procuring synthetic methane for delivery to natural gas customers? If yes, what is the Company’s timeline and expected cost of synthetic methane (\$/Dth)?
- f. Please identify the number of electric customers, and percentage of total electric customers, whose primary heating source is something other than electric or gas, such as wood or propane.
- g. Please identify the number of electric customers, and percentage of total electric customers, whose primary heating source is something other than electric or gas, such as wood or propane, who live in a highly-impacted community.
- h. Does PSE have an estimate of the average energy burden of electric customers whose primary heating source is something other than electric or gas, such as wood or propane?

- i. Does PSE have estimated household income levels of electric customers whose primary heating source is something other than electric or gas, such as wood or propane? If yes, please provide the information.
- j. Has PSE conducted or purchased an assessment of the estimated cost of converting households whose primary heating source is something other than electric or gas, such as wood or propane, to highly efficient electric sources? If yes, please share all relevant information and documentation.

**Response:**

Puget Sound Energy (“PSE”) objects to JEA Data Request No. 021 to the extent it requests information that is publicly available or obtainable from some other source that is more convenient, less burdensome, or less expensive. Notwithstanding these objections, and subject thereto, PSE responds as follows:

- a. PSE is using 15% Hydrogen by volume as the maximum technical limit for natural gas blending. As additional research and testing is completed that number may change. Many factors identified through the research would need to be addressed before PSE would blend the 15%. PSE would likely start blending up to 5%, expand to 10% and evaluate if the technical limit would make sense based on the updated research, PSE’s system, and the customer end use. PSE views the blending of hydrogen as a benefit to building the hydrogen economy while simultaneously offering incremental reductions in carbon emissions from existing natural gas end-use appliances as the clean energy transformation materializes.
- b. Please see Attachments A through Q to PSE’s Response to JEA Data Request No. 021 for all analysis and reports PSE relied on to support its answer in subpart (a). Additionally, PSE has included website links to several utility and industry websites that have informed PSE.

PSE has mainly leveraged findings from other utilities (including Hawaii Natural Gas, ATCO, and Dominion), industry and government research, and special consortiums like DNV’s Hyready. Additionally, PSE has performed modeling and smaller demonstrations and has included those attachments as well.

Attachment A – National Renewable Energy Laboratory (“NREL”) Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues

Attachment B – NREL 2022 Hydrogen Blending into Natural Gas Pipeline Infrastructure: Review of the State of Technology

Attachment C – California Public Utilities Commission (“CPUC”) Hydrogen Blending Impacts Study

Attachment D – Northwest Energy Efficiency Alliance (“NEEA”) Hydrogen-Ready Appliances Assessment Report

Attachment E – Hydrogen in Natural Gas: How does it impact industrial end users

Attachment F – Admissible Hydrogen concentrations in natural gas systems

Attachment G – The Use of the Natural-Gas Pipeline Infrastructure for Hydrogen Transport in a Changing Market Structure

Attachment H – Pipeline Safety Trust 2023: Hydrogen Pipeline Safety

Attachment I – Congressional Research Service Pipeline Transportation of Hydrogen: Regulation, Research, and Policy

Attachment J – Pipeline Safety Trust 2022 Report: Safety of Hydrogen Transportation by Gas Pipelines

Attachment K – PSE initial review of steel embrittlement and impacts to the PSE system

Attachment L – PSE's initial summary of impact of hydrogen to the system

Attachment M – Summary of PSE's hydrogen pilot on known components

Attachment N – Summary of PSE's hydrogen pilot on appliances using current equipment

Attachment O – PSE considerations for impact to appliances

Attachment P – Overall summary of PSE's considerations related to Hydrogen blending

Attachment Q – Sandia National Laboratories Codes and Standards Assessment for Hydrogen Blends into the Natural Gas Infrastructure

Website links to utility and industry information that has informed on the characteristics of hydrogen blending and impact on pipeline operations and customer end-uses:

- 1) Hydrogen Blending in Delta Utah | Dominion Energy  
<https://www.dominionenergy.com/projects-and-facilities/natural-gas-projects/hydrogen-blending-in-delta-utah>
- 2) Hydrogen | ATCO  
<https://www.atco.com/en-au/for-business/hydrogen.html>

- 3) Decarbonization | Hawaii Gas  
<https://www.hawaiigas.com/clean-energy/decarbonization>
  - 4) Clean hydrogen | Enbridge Inc.  
<https://www.enbridge.com/about-us/new-energy-technologies/clean-hydrogen>
  - 5) Hydrogen | SoCalGas  
<https://www.socalgas.com/sustainability/hydrogen>
  - 6) Hydrogen's Impact on End-Use Appliances | Xylem US  
<https://www.xylem.com/en-us/brands/sensus/hydrogen-impact-on-appliances>
  - 7) HyBlend: Opportunities for Hydrogen Blending in Natural Gas Pipelines | United States Department of Energy  
<https://www.energy.gov/eere/fuelcells/hyblend-opportunities-hydrogen-blending-natural-gas-pipelines>
- c. The referenced literature reflects a common agreement that 10% hydrogen by volume meets safety and system requirements, pending specific system and customer research. Ranges above and below 10% are possible depending on specific use case allowances or limitations. These considerations include appliance Wobbe limitations, direct use applications like glass production, use in combustion engines. PSE will need to have an understanding of the customers' end use applications before agreeing to inject in parts of the delivery system serving their specific loads.
  - d. Attached in Attachment R to PSE's Response to JEA Data Request No. 021 are the emissions reduction in the 2023 Gas IRP from blended green hydrogen.
  - e. No, PSE is not considering synthetic methane at this point.
  - f. While PSE does not have perfect data that identifies electric residential customers whose primary heating source is something other than electric or gas, PSE has attempted to estimate the number. The number of PSE residential electric customers is approximately 1.1 million. When PSE excludes its dual fuel and Cascade Natural Gas customers, and filters to the lowest electric users remaining, PSE finds that an estimated 45,500, or 4.1%, appear to heat with something other than electricity or natural gas.
  - g. Of those 45,500 customers in f), roughly 13,400 are found to be in highly-impacted communities. This is roughly 1.2% of the entire PSE electric residential customer base.
  - h. For the 45,500 customers identified in f), PSE estimates the average energy burden to be 3.88%.
  - i. For the 45,500 customers identified in f), PSE estimates the household income level to be approximately \$79,500.

- j. PSE has not conducted or purchased an assessment for the estimated costs to convert from these other heating sources to high efficiency electric sources.

Attachments K, L, M, N, and P to PSE's Response to JEA Data Request No. 21 are marked CONFIDENTIAL per the Protective Order in Dockets UE-240004 and UG-240005.

**ATTACHMENTS A-R to PSE's Response  
to  
JEA Data Request No. 021**