February 10, 2025

Dear Chair Sollman, Vice-Chair Brock Smith and Members of the Senate Energy and Environment Committee,

Re: Support for SB 685

Breach Collective is a 501(c)(3) nonprofit organization based in Portland and Eugene. Breach's mission is to build power within the climate and labor movements through organizing, legal advocacy, education, and storytelling.

Breach supports Senate Bill 685 including the proposed -1 amendment.[1] The notice process in this Bill is not intended to stand in the way of sound hydrogen innovation by gas utilities. Rather, the disclosure requirements would help consumers and regulators distinguish between fact and spin when it comes to utility decarbonization, and thereby encourage gas utilities in Oregon to utilize hydrogen in ways that will have the greatest greenhouse gas emissions reduction potential. Accordingly, this testimony focuses on the emissions reduction potential of hydrogen blending.

1. <u>All forms of hydrogen have lifecycle greenhouse gas emissions and other environmental externalities</u>

On paper, and as a matter of basic chemistry, pure hydrogen produces zero greenhouse gas emissions when combusted.[2] However, the means by which utilities produce hydrogen are associated with lifecycle greenhouse gas emissions. This can be illustrated by way of discussing NW Natural's two hydrogen proposals in Oregon to-date.

[1] Breach Collective would have preferred that the -1 amendment retain the requirement that the PUC approve the blending, but the notice requirement at the core of the -1 amendment would redress our primary concerns with NW Natural's current Portland hydrogen blending project: (i) the apparent lack of public disclosure requirements mandated by Oregon law for hydrogen blending; and (ii) the information NW Natural has communicated (or withheld) about the project has occurred in a selective, self-serving manner not befitting a regulated utility.

[2] This is the case in an environment of pure oxygen ($2H_2 + O_2 = 2H_2O$). However, in regular air, which contains substantial nitrogen, the combustion process also produces nitrogen oxides (NO_x) – a respiratory irritant. Some studies have shown that nitrogen-methane blends may produce higher amounts of NO_x emissions than combusting a 100% methane fuel. See Seth Mullendore et al., *Hydrogen Hype in the Air* (Clean Energy Group, Dec. 14, 2020), https://www.cleanegroup.org/hydrogen-hype-in-the-air/.

a. Electrolytic hydrogen proposal in Eugene (Bethel neighborhood – 2021)

In 2020, NW Natural first proposed a 5% hydrogen blend in the Bethel neighborhood in Eugene.[3] The hydrogen would have been produced by electrolysis, using electricity from the Eugene Water and Electricity Board (EWEB)'s ultra-low-carbon energy mix to produce hydrogen from water. Hydrogen produced from electrolysis is typically regarded as having the lowest lifecycle greenhouse gas emissions intensity of any form of hydrogen.

Electrolytic hydrogen is, however, a highly energy-intensive process, and the Bethel project would have been extraordinarily costly for the emissions benefit: several times more expensive than even direct carbon capture and storage.[4] In contrast, using EWEB's low-carbon electricity directly by replacing gas with heat pump space and water heating would have achieved greater emissions reductions on a per-household basis. This was demonstrated by, for example, a 2022 report commissioned for the City of Eugene by Good Company (now Parametrix), which found that "Over the next 20 years significant cumulative emissions can be saved if electrification of homes is pursued instead of waiting for the Climate Protection Program requirements to achieve reductions in household gas use."[5] The Bethel project was later abandoned by NW Natural following community opposition,[6] and indications from public records are that it is no longer financially viable for the company to pursue without dedicated, immediately proximate renewable generation resources.[7]

b. Turquoise hydrogen blending in Portland (2023–)

According to NW Natural, since December 2023 a 0.2% blend of hydrogen has been delivered to customers in certain neighborhoods of Portland. NW Natural has yet to publicly identify the exact area within Portland that is receiving this blend, and/or the

[3] Alex Baumhardt, *State's first green hydrogen project could be among most expensive attempts to cut emissions* (Oregon Capital Chronicle, Oct. 12, 2022), https://oregoncapitalchronicle.com/2022/10/12/states-first-green-hydrogen-project-could-be-among-most-expensive-attempts-to-cut-emissions/.

[4] *Id*.

[5] https://www.eugene-or.gov/DocumentCenter/View/70633/Good-Company-Decarbonization-Report

[6] Alex Baumhardt, *NW Natural scraps plans for blended hydrogen and natural gas project in Eugene* (Oregon Capital Chronicle, Nov. 2, 2022), https://oregoncapitalchronicle.com/briefs/nw-natural-scraps-plans-for-blended-hydrogen-and-natural-gas-project-in-eugene/.

[7] This is based on notes taken by EWEB Energy Resource Analyst Eli Volem during an October 17, 2023 meeting between representatives of EWEB and NW Natural, produced in response to a public records request by the author. The relevant portion of the notes states "Green hydrogen insn't (sic.) penciling compared to all other options. Have to have a dedicaed (sic.) renewable resources directly adjacent. Taking from the grid won't be clean enough to qualify for the highest level incentive. Cost of power is the killer, cost of electrolyzer isn't the barrier." The original record is shareable on request.

exact point in their distribution system where the blend is occurring. This "turquoise" hydrogen is produced by a process called "methane pyrolysis." Although NW Natural's partner Modern Hydrogen has not specified the exact process used, methane pyrolysis usually involves using electricity to heat methane in an oxygen-free environment to produce hydrogen and solid carbon.

Turquoise hydrogen typically has higher lifecycle emissions than green electrolytic hydrogen, but lower than other forms of hydrogen produced from a methane feedstock.[8] That said, NW Natural's turquoise hydrogen is produced by almost 100% fossil methane, predominantly produced by fracking, with all of the negative environmental externalities and upstream methane leakage that entails. To put it more directly, turquoise hydrogen is embedded in the political economy and supply chain of fossil fuel extraction, which is the principal driver of runaway climate change.

In theory, NW Natural could reduce the emissions intensity of its turquoise hydrogen resources by reducing the emissions intensity of the methane feedstock, by increasing the proportion of biogenic methane resources – so called "Renewable Natural Gas" (RNG) – in that feedstock. However, evidence indicates that NW Natural is continually falling behind its own RNG procurement targets.[9] Additionally, many RNG resources can be significantly emissions-intensive due to, among other reasons, the need to purify the raw biogas produced by those biogenic sources.[10] This is the case for NW Natural's first two SB 98 RNG investments in the Lexington and Dakota City, Nebraska Tyson Foods facilities.[11] These facilities also have massive environmental externalities; specifically, those two Nebraska meat processing facilities are among the most polluting in the country in terms of their nitrogen discharges.[12] Finally, the solid carbon produced

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[8] Gulam Husain Patel et al., *Climate change performance of hydrogen production based on life cycle assessment*, 26 Green Chemistry 992 (2024) https://pubs.rsc.org/en/content/articlehtml/2024/gc/d3gc02410e.

[9] Monica Samoya, *NW Natural once again misses its own targets to offset emissions with renewable natural gas* (OPB, Jul 10, 2024), https://www.opb.org/article/2024/07/10/nw-natural-misses-own-targets-renewable-natural-gas/; McKenzie Funk, *Oregon's Largest Natural Gas Company Said It Was Going Green. It Sells as Much Fossil Fuel as Before.* (ProPublica, Sep. 13, 2024), https://www.propublica.org/article/nw-natural-gas-oregon-fossil-fuel.

[10] See U.S. Environmental Protection Agency, "Renewable Natural Gas from Agricultural-Based AD/Biogas Systems" https://www.epa.gov/agstar/renewable-natural-gas-agricultural-based-adbiogas-systems.

[11] See NW Natural, *OAR 860-150-0600(1) – Annual Renewable Natural Gas Compliance Report*, https://edocs.puc.state.or.us/efdocs/HAA/haa181512.pdf.

[12] Environmental Integrity Project, *Water Pollution from Slaughterhouses* (Oct. 11, 2018), https://environmentalintegrity.org/wp-content/uploads/2018/10/Slaughterhouse-report-2.14.2019.pdf (finding that Tyson Foods' Lexington and Dakota City slaughterhouses ranked number one and number five respectively in terms of the largest nitrogen polluting slaughterhouses in the United States).

by turquoise hydrogen needs a market for its utilization, otherwise it is just a waste byproduct of the process.[13]

2. <u>All methane-hydrogen blends have inherently limited emissions reduction potential</u>

Whatever the lifecycle emissions of a hydrogen resource, the emissions reductions achieved at the point of use by a hydrogen-methane blend are limited by two factors. The first is the technical limits on the proportion of hydrogen blended, which means that – for safety and other reasons – a 20% blend is the highest that we could expect a gas utility to pursue in their distribution system. The second is the lower energy density of hydrogen versus methane, which means you need to use more of the fuel for the same amount of heat. This means that even a 20% blend of hydrogen to methane would only achieve about a 7% reduction in greenhouse gases, compared with a 100% methane fuel.[14] This similarly means that NW Natural's Eugene proposal would have achieved only about a 1.75% emissions reduction within the Bethel neighborhood, and the current 0.2% blend in Portland would only achieve about a 0.07% emissions reduction within the areas receiving the blend.

3. <u>The optimal use-case for hydrogen is direct use in hard-to-decarbonize industrial processes</u>

The inherently limited emissions reduction potential and unavoidable environmental externalities of blending hydrogen into a gas utility's distribution system underscores that existing hydrogen projects do not represent an optimal use case for hydrogen as a decarbonization tool. Rather, heat pump-based electrification of space and water heating is the least-cost, most effective tool for reducing building emissions in Oregon, even when accounting for the emissions in electric utilities' current resource mix.[15] Where hydrogen can be useful is in hard-to-decarbonize industrial processes, particularly those that rely on process heat with a thermal density that cannot be achieved by electricity. For those processes, the best way to deploy hydrogen is on-site,

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[13] See Laurent Fulcheri, *Turquoise hydrogen takes a step towards the next level* (Polytechnique Insights, Sep. 27, 2022), https://www.polytechnique-insights.com/en/columns/energy/turquoise-hydrogen-takes-a-step-towards-the-next-level/ ("If all of our current hydrogen production were replaced by turquoise hydrogen, the market would be saturated very quickly, and we would end up with "mountains" of solid carbon.").

[14] Mathias Zacarias and Joseph Majkut, *What Happened to Hydrogen in the EPA's Power Plant Rule?* (Center for Strategic and International Studies, Jun. 12, 2024), https://www.csis.org/analysis/what-happened-hydrogen-epas-power-plant-rule.

[15] See, e.g., Lacey Tan and Jack Teener, *Now Is the Time to Go All In on Heat Pumps* (RMI, Jul. 6, 2023), https://rmi.org/now-is-the-time-to-go-all-in-on-heat-pumps/ (finding that, in Oregon, replacing gas furnaces with heat pumps would reduce building space heating operational emissions by 41% in year one, and by 84% over an appliance's 15-year lifespan.).

or as close to the process as possible. This may allow for the safe and technically feasible use of much higher blends of hydrogen. This is why the Oregon Department of Energy's 2022 report to the legislature on renewable hydrogen found that the "priority sectors" for supporting hydrogen development are "those where decarbonization is especially expensive and/or not amenable to direct electrification."[16] Additionally, Oregon's Public Utilities Commission has already shown some skepticism towards NW Natural's hydrogen procurement plans in their 2022 Integrated Resource Plan proceeding as a cost-effective decarbonization resource.[17]

4. Conclusion

The above evidence should concern legislators about whether a miniscule blend of hydrogen in a gas utility's distribution system – such as is occurring currently in Southeast Portland – is intended to result in meaningful, cost-effective greenhouse gas emissions reductions in priority sectors for ratepayers and the State, or is instead functioning as an expensive public relations exercise. The procedures envisioned by SB 685 would help to alleviate these concerns, foremost by requiring utilities to disclose enough information for regulators and the general public to ascertain whether hydrogen development in the State is consistent with the former objective.

Sincerely,

Danny Noonan, Climate and Energy Strategist, Breach Collective

[16] See Oregon Department of Energy, *Renewable Hydrogen in Oregon: Opportunities and Challenges* (Nov. 15, 2022), 56, https://www.oregon.gov/energy/Data-and-Reports/Documents/2022-ODOE-Renewable-Hydrogen-Report.pdf.

[17] See Public Utility Commission of Oregon, *Disposition: 2022 Integrated Resource Plan Acknowledged in Part* (PUC Docket No. LC 79, Aug. 2, 2023) https://apps.puc.state.or.us/orders/2023ords/23-281.pdf. See also Public Utility Commission of Oregon, *Staff Final Comments* (Docket PUC Docket LC 79, Mar. 30, 2023), https://edocs.puc.state.or.us/efdocs/HAC/lc79hac142022.pdf.