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Re: Natural Gas Fact Finding Workshop 3 (UM 2178)

Our undersigned organizations, made up of climate and energy justice advocates and experts, appreciate the opportunity to submit comments on the model result presentations of the Natural Gas Fact Finding Workshop #3 (UM 2178).

As we shared in our previous comments, our organizations commend the OPUC for opening this necessary fact-finding proceeding. Effectively evaluating the future of methane gas (i.e., natural gas) in Oregon and the impacts of a transition to cleaner energy will profoundly impact the state's ability to combat the climate emergency, achieve the state's greenhouse gas (GHG) reduction goals, and improve public health for all Oregonians. This evaluation could also significantly impact Oregon's current and future gas ratepayers, particularly those least able to shoulder the burden of transitioning away from gas and its infrastructure.[1] To find the most cost-effective, most prudent and least risky pathway to a decarbonized future, the Commission must evaluate all available solutions; this will not be possible if the proceeding continues to be constrained by gas utility-driven Climate Protection Program (CPP) compliance modeling.

The use of methane gas in the electricity sector and for direct use in homes and buildings is on the rise in Oregon and nationwide, despite its significant public health,[2] racial justice,[3] and climate consequences.[4]

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[1] *See, e.g.*, THE GREENLINING INSTITUTE & ENERGY EFFICIENCY FOR ALL, EQUITABLE BUILDING ELECTRIFICATION: A FRAMEWORK FOR POWERING RESILIENT COMMUNITIES 22 (2019), https://greenlining.org/publications/reports/2019/equitable-building-electrification-a-framework-for-powering-resilient-communities/.

[2] In Oregon burning fossil fuels in buildings was responsible for 20 premature deaths and $221,326,511 in health impacts in 2017. 89% of those impacts were from burning gas in buildings. This is a conservative estimate because it only includes health impacts from outdoor PM2.5 and precursor pollution; it also does not include pollution from upstream extraction. *See,* Jonathan J Buonocore (Harvard T.H. Chan School of Public Health) et al, "A decade of the U.S. energy mix transitioning away from coal: historical reconstruction of the reductions in the public health burden of energy", 2021 Environ. Res. Lett. 16 054030, https://doi.org/10.1088/1748-9326/abe74c.

[3] Pollution and climate harms of gas operations disproportionately affect Black communities in the United States. Black Americans are exposed to 38 percent more polluted air than white Americans, on average. And more than one million Black Americans live within a half mile of gas facilities, resulting in higher risks of cancer and other health problems. *See* NAACP ET AL., FUMES ACROSS THE FENCELINE (2017), http://www.catf.us/wp-content/uploads/2017/11/CATF_Pub_FumesAcrossTheFenceLine.pdf; *See also* Mikati et al. *Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status*, AMERICAN PUBLIC HEALTH ASSOCIATION (2018), https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2017.304297; *See also* Sarah Kaplan. *Climate Justice is a Racial Justice Problem*, WASH. POST (June 29, 2020), https://www.washingtonpost.com/ climate-solutions/2020/06/29/climate-change-racism/.

[4] Recent research demonstrates that burning fossil fuels causes 50,000 U.S. deaths and $445 billion in economic damage annually. *See* Karn Vorha et al., *Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem*, ENV'T. RES. 195 (2021), https://www.seas.harvard.edu/news/2021/02/deaths-fossil-fuel-emissions-higher-previously-thought; A recent UN report demonstrates that cutting global methane emissions, including from gas utilities, is more critical than previously thought. *See generally,*

Indeed, it is subsidized and encouraged under existing policies and paradigms overseen by the OPUC. But as Oregon already faces significant climate and public health harms from the fossil fuel industry, it is urgently clear that methane gas use must significantly decline in the coming years if the state hopes to achieve its longer-term GHG reduction goals.[5]

Fortunately, electrification of buildings, particularly space and water heating, is an increasingly compelling option for customers and a transition to primarily clean energy sources is now possible. The OPUC is uniquely situated to aid in this transition with an eye toward protecting ratepayers' best interests, including access to affordable energy and avoidance of stranded assets, and ballooning infrastructure costs. It is critical that throughout and after this specific proceeding, the OPUC keeps an eye on how best to transition this part of our energy system off of fossil fuels in ways that prioritize the public interest.

Our overall assessment of the utilities' modeling results presented is that they combine wildly unrealistic pathways and assumptions that are not supported by common understanding and likely outcomes. As shown in the chart attached as Appendix A, nearly every input (from efficiency and demand-side resources to RNG/biomethane and hydrogen) and most assumptions (from unfettered customer growth to the sole focus on gas solutions without electrification and other non-pipe solutions) are unjustified and out of step with reality today and in the foreseeable future. Combined together, these scenarios do not reflect the likely reality of what will or should happen and therefore do not provide clarity of the cost effectiveness of different investments, risk to customers of unabated, subsidized growth, or other considerations the OPUC Commissioners and staff will need to make going forward.

In the sections below, we outline concerns and questions we have with the utilities' presentations, including:

1. The Natural Gas Fact Finding (NGFF) Compliance Model process and design continue to prevent meaningful stakeholder input;
2. Utilities' model inputs re: customer growth scenarios are unrealistic and unsupported given the likelihood that customers would switch to lower-cost heating options as gas prices increase and consumer awareness about the climate impacts of methane grows;
3. Utilities' consideration of gas-powered appliances over all-electric appliances results in dramatically high energy efficiency cost assumptions;
4. Utilities do not consider demand-side options without gas use -- and do not justify incentivizing gas-powered heat pumps when electric heat pumps are more efficient, provide cooling and are commercially available today. The Northwest Natural (NW Natural) model indicates that they foresee a need to reduce demand in order to comply with CPP. Thus, alternatives to expensive and unproven gas solutions for demand reduction should be explored.
5. Utilities over-rely on biomethane/RNG and assume high availability of this scarce commodity which will be in high demand from transportation and industry, while appearing to assume it is

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United Nations Environment Programme and Climate and Clean Air Coalition, *Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions*, NAIROBI: UNEP, https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions.

[5] *See* United Nations Environment Programme and Climate and Clean Air Coalition, supra, at 11-12.

carbon neutral in spite of the best available science. NW Natural inappropriately buries the cost of RNG in its "business as usual" scenario;

6. Utilities' inputs regarding green hydrogen are unsupported and unrealistic given how nascent, risky, and limited it is as a resource.

Given the significance of the subject matter of this proceeding -- that billions of dollars and how quickly we transition off of fossil fuels and onto clean energy sources are at stake -- it is critical that the OPUC get this right. To that end, we urge the OPUC to:

1. Require utilities to publicly disclose their models and all critical underlying data, including sources, for their model inputs;
2. Require utilities to consider a robust array of regulatory shifts in the next stage of this process, including those that would support electrification, stop the continued expansion of gas infrastructure that will add costs to be borne by a shrinking customer base, and protect low-income customers from inevitable gas cost increases;
3. Require utilities to model realistic electrification scenarios, as it will be important for all stakeholders and the Commission to understand the risks associated with business-as-usual operations and subsidizing new gas hook-ups for gas companies under these scenarios; and
4. Ultimately follow-up this proceeding with an integrated analysis of our gas and electric system that will identify least-cost pathways to deep decarbonization that would minimize customer bill increases and protect the public interest.

I. <u>We continue to have significant concerns about the NGFF Compliance Model process and design.</u>

While we applaud the state and the OPUC's decision to dive into this crucial issue, we remain concerned about this proceeding's process and the proposed model's scope. While we appreciate the OPUC Staff's willingness to extend the proceeding's timeline and add additional opportunities for participation after hearing stakeholder input, we still feel that the process has been inherently flawed.

As we stated in our previous comments, the OPUC has given the gas utilities a concerning amount of leeway and control over this proceeding by allowing them to design and run the models. As further explained below, it is not in the gas companies' financial interest to truly investigate and model potential decarbonization trends and scenarios that could undermine their current business model. Exploring alternative options to the scenarios presented by the gas industry will be critical to serve ratepayers' best interests and identify the most cost-effective and realistic outcomes.

Further, as multiple stakeholders raised in the July 20, 2021 stakeholder meeting and again in written comments,[6] we are concerned that the timing and format of the meeting prevented stakeholders from sufficiently weighing in on these important issues. Although the format of Workshop #3 was an improvement over Workshop #2, the nature of an 8-hour meeting during regular work hours prevents many stakeholders from participating. If the OPUC Staff's sincere intention is to proactively assess and

[6] *See* Comments by Climate Solutions et al., *Re: Natural Gas Fact Finding Session 2*, Oregon Public Utilities Commission Docket No. UM-2178 (July 26, 2021).

address equity implications of Climate Protection Program (CPP) compliance by the gas utilities, the perspectives of environmental justice and impacted communities are essential to achieving that aim, and the process should be tailored to ensure those voices are heard.

Thus, we recommend the OPUC Staff 1) adjust the format of all future stakeholder meetings so that non-gas-utility parties can meaningfully participate, including re-enabling the participant video and chat functions, 2) commit to having dedicated listening sessions and meetings with environmental justice organizations if these all-day meetings are not enabling participation, and 3) guarantee transparency of all model inputs and the basis for these inputs to allow for meaningful and diverse stakeholder participation.

Additionally, despite multiple calls for transparency, stakeholders have not received clear information regarding the model inputs or the sources for these inputs. Indeed, Northwest Natural did not cite the majority of sources for their assumptions during the September 14 presentation. We have outlined some data and source gaps below, but ultimately the lack of data and model transparency prevents stakeholders from effectively evaluating gas companies' inputs and assumptions, which in turn makes it virtually impossible to sufficiently assess model results.

Finally, after seeing the utilities' presentations, we remain concerned that the models do not consider the CPP pathways' impacts on other sectors. Different sectors, like electricity generation or transportation, draw from a common pool of physical resources, so the choice by one sector to use a resource affects other sectors. For example, and as will be explained further below, consuming all available biomethane to provide low-temperature heating services, where there are other cost-effective, more efficient options, denies potentially valuable biomethane to other sectors, such as marine propulsion, high-temperature industrial heating, and long-duration seasonal electricity storage. The same may be true for other gas utility compliance tools, like green hydrogen. Gas utilities' CPP pathways should be examined using economy-wide modeling, such as that conducted by Evolved Energy Research on behalf of Renewable Northwest, the Clean Energy Transition Institute, and GridLab,[7] or E3 for the California Energy Commission.[8] Only in this way can the state account for linkages among sectors and develop CPP compliance pathways that are, as near as possible, optimal for Oregon.

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[7] *See* EVOLVED ENERGY RESEARCH, OREGON CLEAN ENERGY PATHWAYS FINAL REPORT (June 15, 2021), https://uploads-ssl.webflow.com/5d8aa5c4ff027473b00c1516/60de973658193239da5aec7b_Oregon%20Clean%20Energy%20Pathways%20Analysis%20Final%20Report.pdf.

[8] *See* DAN AAS ET AL., THE CHALLENGE OF RETAIL GAS IN CALIFORNIA'S LOW-CARBON FUTURE: TECHNOLOGY OPTIONS, CUSTOMER COSTS, AND PUBLIC HEALTH BENEFITS OF REDUCING NATURAL GAS USE, Energy and Environmental Economics, Inc. & University of California, Irvine (2019), https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-055-F.pdf.

II. **After seeing the utilities' presentations, we have significant concerns about the model inputs and findings.**

Customer Growth/Decline Scenarios

All of the utilities anticipate growth in the number of gas users in their territories. Expecting customer growth on the gas system runs counter to logic for a few reasons, which we go into further below but include:

- Recent climate-driven disasters and public awareness will drive consumer choice away from fossil fuels;
- Local governments (as well as state and federal policies) will likely increasingly implement measures to encourage electrification; and
- Gas prices may go up with increased CPP regulatory costs, causing some customers to defect from gas service.

Additionally, because properly forecasting the customers on each of the utility's systems is at the crux of producing an accurate assessment of costs, the methodologies the utilities use to predict the number of future customers expected on their systems is key. The utilities must better support their assertions that they will continue to grow.

After a year of climate-driven disasters near and far, including deadly high temperatures, calamitous fires and floods, and ubiquitous news coverage about the impacts of climate change, continued business-as-usual growth in the gas system is highly unlikely. Even if ratepayers are not seeking fuel-switching options on their own, limiting or eliminating new and existing methane gas hookups will continue to present an option to local communities searching for avenues to meet their climate goals. Communities on both sides of the country are exploring, or have adopted, building electrification measures and the trend is only going to spread. The 50th city in California adopted local gas ban/building electrification policies on September 23, 2021, joining cities from Seattle to San Francisco to New York.[9] This is one of many clean energy trends coming to Oregon, and local cities and counties are already considering such a move.

Further, assuming consumers in a utility's service territory remain unconcerned about reducing their own carbon footprint, the cost of a product is always a profound motivator in moving customers to a competitor. Increased customer growth in the gas sector is unlikely with the expected additional costs associated with Climate Protection Program compliance, especially in conjunction with the expensive planned emissions-reduction products on which the utilities are relying to meet their obligations. While the gas industry models average bill impacts to be lessened due to massive expenditures on energy efficiency measures, those effects will be unevenly distributed. This means that some customers will likely choose to leave the gas system when faced with gas prices that are two to three times current prices rather than pay for those expensive and only modestly-effective efficiency upgrades.

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[9] *See* Rob Nikolewski, Encinitas bans natural gas in new buildings, including homes, Los Angeles Times (Sept. 23, 2021), https://www.latimes.com/california/story/2021-09-23/encinitas-electric-ordinance.

We specify our questions and concerns as to each utility's model results below.

Northwest Natural (NW Natural)

Northwest Natural anticipates that between now and 2050 it will gain over 185,000 new residential customers in Oregon and nearly 100,000 new customers in Washington. Northwest Natural provides no support for the evidence it used to come to these projections.

First, we request a breakdown of customer growth by region, as Avista provided. The Portland metropolitan area is the heart of Northwest Natural's service territory; both the City of Portland and Multnomah County recognize carbon reduction efforts taken to date have not been sufficient to meet the region's climate goals. With the adoption of 100% Clean Electricity for All (HB 2021), local governments and residents will be looking for ways to move away from direct use of natural gas, which in Multnomah County is the third major source of local carbon emissions.[10] Multnomah County has already passed a resolution to stop constructing new county buildings with gas and other fossil fuels. Northwest Natural serves other cities with firm plans to reduce emissions, like Eugene. For a period of time, the Eugene Water & Electric Board offered incentives to EWEB customers to convert from existing natural gas or oil-burning heating systems to an electric heat pump or hot water heater.[11] Granular data about whether and how many of Northwest Natural's customers either defected from the utility or reduced consumption by region could be helpful in predicting how future policy changes might impact the utility. Similarly, customer growth in new buildings versus the number of existing buildings that switch from natural gas could be useful to see if policies in different regions are impacting customer choice.

Second, again, as Avista provided, customer trends by month could be useful to evaluate whether warming trends have impacted customer choice. Replacing gas furnaces (accounting for 4.7% of gas use in Northwest Natural's territory), with electric heat pumps that also have the ability to cool seems all but assured. According to the U.S. National Oceanic and Atmospheric Administration, this summer tied for the hottest on record. Did Northwest Natural see any differences in customer growth this past summer?

With respect to its expected commercial customer growth, it would be helpful to know what trends Northwest Natural has observed, and why it anticipates its commercial customer base will increase.

Avista

Avista currently serves 362,000 customers. Although recognizing the threat of electrification to its business, it, too, anticipates customer growth. Like NW Natural, Avista's territory encompasses

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[10] *See* City of Portland and Multnomah County, *2015 Climate Action Plan Final Progress Report*, p. 20 (2020), available at https://www.portland.gov/sites/default/files/2020-06/2015-climate-action-plan-final-progress-report-single-pages-v8.pdf.

[11] *See* Eugene Water & Electric Board, *Pre-Meeting Q&A from the Board* (Aug. 17, 2018), http://www.eweb.org/about-us/board-of-commissioners/2018-board-agendas-and-minutes/08-07-18-board-agenda/08-07-18-commissioner/staff-qanda.

communities with climate action plans, such as Ashland[12] and Talent,[13] both of which have proposed to eliminate methane gas in their communities. While Avista provides a breakdown of its customer forecasts by region, data related to customer growth and gas use per customer for Avista customers in the Ashland and Talent areas might better forecast trends as customers become more concerned about climate change.

Cascade

Cascade delivers natural gas to 299,000 total customers. Like the other utilities, Cascade expects increased growth in its system. As with NW Natural and Avista, Cascade's service territory encompasses at least one community with a climate action plan. Meanwhile, Bend intends to reduce its fossil fuel use by 40% by 2030 and 50% by 2050.[14] Customer trends, including customer growth by region and customer growth in new buildings versus the number of existing buildings that switch from natural gas, could be useful to see if policies in different regions are impacting customer choice.

Energy Efficiency

In their latest revision to their compliance model, it appears NW Natural is proposing spending an additional $4.2 billion on energy efficiency incentives between 2022 and 2050 as part of overall CPP Compliance Costs. [15] In some years the annual spending on energy efficiency costs was projected to **exceed $150 million per year.**[16] This is a significant increase compared to the $24 million NW Natural contributed to Energy Trust of Oregon (ETO) energy efficiency programs in 2020.[17]

There is no doubt that increasing the energy efficiency of heating solutions is critical to achieving the level of carbon emissions reductions that are required to achieve a net-zero emissions future. It is also true that reducing demand for fossil methane gas is essential to lower carbon emissions from the methane gas industry. Large increases in ratepayer-funded spending on energy efficiency are likely to be warranted to achieve state decarbonization goals. However, the key questions should be:

- *What are the most cost-effective efficiency solutions to fund in order to achieve this reduction in gas consumption?*
- *Which solutions position Oregon best for a zero-carbon future?*
- *How are those energy efficiency dollars best spent to enable low income ratepayers to benefit from lower energy costs?*
- *Which solutions best serve the interest of all ratepayers? In other words, what else could that much ratepayer investment be spent on to achieve the optimal outcomes for ratepayers?*

[12] *See* City of Talent, *Comprehensive Plan, Appendix A: Talent Clean Energy Action Plan 2018-2030*, p. 8, http://www.cityoftalent.org/SIB/files/Planning/Development_Codes/8-1%20Comprehensive%20Plan-(Effective%2012-20-19).pdf.
[13] *See* Ashland Climate and Energy Action Plan, p. 52, https://ashlandor.org/wp-content/uploads/Ashland-Climate-and-Energy-Action-Plan_pages.pdf.
[14] *See* City of Bend, Community Climate Action Plan, p. 5, https://www.bendoregon.gov/home/showpublisheddocument/43462/637073547937400000
[15] NW Natural provided this revised data via the docket list on September 24, 2021, *the day that public comments were due*.
[16] NW Natural Revised Presentation at 48.
[17] *See* Energy Trust of Oregon, Report of Independent Auditors and Financial Statements, December 31, 2020.

To this end, ratepayer funding for energy efficiency expenditures and incentives should take into account the following realities:

1. **Gas-fueled appliances will never operate emissions-free.** While the gas-fueled heat pump technologies under development that NW Natural showcased would reduce fuel consumption, their reduction impacts are modest – 20 to 50% lower than existing gas appliances. Lower carbon intensity gas solutions like RNG and Hydrogen are not carbon neutral, as documented below. In the NW Natural model, even with optimistic assumptions about the availability of low carbon gas alternatives, there is still 20% of the gas supply coming from fossil gas in 2050. Therefore, even these slightly more efficient gas appliances will still be emitting carbon in 2050.
2. **Incentives for gas appliances lock-in customers to the gas infrastructure system for decades.** In order for a gas appliance incentive to fully depreciate, the receiving customer would have to stay on the gas system for 10 to 20 years. This may be attractive to the gas industry to preserve customers, but alternative and lower-cost methods to reduce demand should be explored including shifting customers away from gas and toward available, cost-effective, carbon-free heating solutions especially as gas rates are expected to increase significantly.
3. **Gas distribution systems will continue to leak methane.** Renewable natural gas is still methane and when it leaks into the atmosphere it has the same impacts as unburned fossil methane. The Gas Index, a recent study on gas leaks in cities across the US, showed that Portland, OR had leakage rates of over 5% - *much higher than the national average* and making the emission impacts from methane consumption in Portland worse than coal.[18] Gas appliance efficiency will not overcome this fundamental flaw with gas distribution systems.
4. **Gas-fueled heat pump technology is not ready to scale whereas electric heat pumps are a mature technology and are already scaling**. The gas heat pump devices that were showcased are in development, but not available on the market. From their presentation, NW Natural seemed to assume that a significant percentage of customers would have gas-fueled heat pumps by 2025. It is unrealistic that a technology that is not yet on the market would replace a significant percentage of NW Natural's existing gas furnaces within the next 3 years. For reference, electric heat pump water heater development has taken 15 years of concerted effort from manufacturers and utilities to achieve a modest share of the water heater market today and those devices offer much more dramatic energy savings than gas heat pump water heaters will be able to deliver. Therefore, it is likely that it will take decades before these gas devices are readily available in the market and adopted by consumers. It also remains to be seen whether customers will see the value in unproven, expensive appliances that only offer modest efficiency gains over conventional gas appliances – even with incentives. Electric heat pumps for water and space heating have been on the market for decades, are cost-effective today, and operate with fewer emissions as the grid accelerates to 100% clean energy.
5. **Gas appliance efficiency gains do not offset the increased cost of methane gas.** Despite billions of dollars of spending on energy efficiency incentives for unproven gas heat pump

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[18] *See* MASON INMAN ET AL., THE GAS INDEX, Global Energy Monitor, (2020), https://thegasindex.org/wp-content/uploads/2020/12/Gas-Index-report-2020-final.pdf?hsCtaTracking=17ccb21f-c72b-42fe-a465-fccbcc037407%7C0537ae90-a261-4dd1-a4bf-cfc78d6c4c69.

appliances, all of NW Natural's models showed that residential and commercial gas bills were still expected to rise by 20–60% due to the high cost of low carbon gas fuels.[19]

6. **Electric heating solutions will be emissions-free by 2040.** While the prototyped gas-fueled heat pump technologies would produce slightly fewer carbon emissions once they hit the market, all-electric heating solutions will operate 100% emissions-free by 2040, and 90% emissions-free by 2035, and 80% emissions-free by 2030 due to HB 2021, Oregon's recently passed 100% clean energy law. This means that a new electric appliance purchased today will likely be operating close to emissions-free in its useful lifetime. The most recent study comparing electric heat pumps to gas heating showed that even with the existing electric grid, emissions for residential heating are reduced by 70% by employing electric heat pumps today.[20]
7. **Electricity from wind and solar is now the cheapest form of energy, whereas low carbon methane alternatives are much more expensive than fossil gas.** Even in the optimistic forecasts from NW Natural, methane gas costs would triple by 2050 due to the expense of creating lower-carbon gas alternatives.[21] On the contrary, the cost of generating electricity with wind and solar continues to decline year after year and is forecast to decline further.[22]
8. **The most cost-effective way to reduce methane consumption is through electrification, not slightly more efficient gas appliances.** Multiple studies by universities and energy research organizations all reach the same conclusions: the most cost-effective way to reduce carbon emissions from buildings in the Northwest is to rapidly electrify water and space heating. The recently published Oregon Clean Energy Pathways study by Evolved Energy showed that a clean energy scenario with "slow demand-side electrification results in a significant increase in costs" compared to rapid electrification scenarios.[23] Just as gasoline-powered cars with slightly improved fuel economy will not solve the transportation emissions problem, slightly more efficient methane burning appliances will not decarbonize buildings.
9. **Weatherization programs are critical for many low-income and rural ratepayers to benefit from energy efficiency.** Many older homes in Oregon need envelope improvements to bring them up to code and enable reduced energy consumption. In some cases, more efficient appliances are not effective without these upgrades. Weatherization improvements reduce energy usage regardless of fuel choice.
10. **Efficient, electric heating options exist even for industry.** NW Natural proposes a large industrial and commercial energy efficiency effort.[24] It is critical that efforts to increase efficiency also prepare Oregon well for deep emissions reductions; locking customers into technology that can only achieve modest emissions reductions would be suboptimal when there are other options

[19] NW Natural Presentation at 52, 60, 64, 68, 72.

[20] *See* Theresa Pistochini, *Greenhouse gas emission forecasts for electrification of space heating in residential homes in the United States* (webinar presentation), UC DAVIS WESTERN COOLING EFFICIENCY CENTER, https://ucdavis.app.box.com/s/dqja4itdlh1wwicyjh6wag5yswwf97tc.

[21] NW Natural Presentation at 41.

[22] *See* LAZARD LEVELIZED COST OF ENERGY VERSION 14.0 (October 2020), https://www.lazard.com/media/451419/lazards-levelized-cost-of-energy-version-140.pdf.

[23] *See* EVOLVED ENERGY RESEARCH, OREGON CLEAN ENERGY PATHWAYS FINAL REPORT (June 15, 2021), https://uploads-ssl.webflow.com/5d8aa5c4ff027473b00c1516/60de973658193239da5aec7b_Oregon%20Clean%20Energy%20Pathways%20Analysis%20Final%20Report.pdf.

[24] NW Natural Presentation at 18.

available, such as commercial induction cooking and commercial/industrial-scale heat pumps. Electric heat pumps are well-positioned to efficiently serve commercial/industrial heating needs below 150 degrees Celsius, which accounts for a substantial portion of the greenhouse gas emissions of commercial/industrial heating, as detailed in a recent report.[25] Incentives should be directed to low-greenhouse gas emissions technologies, and before embarking on a huge industry-focused gas efficiency effort, alternative efficient, electric technologies should be examined.

11. **Continued gas heating will frustrate achieving greenhouse gas emission goals.** Methane releases result in 86+ times the atmospheric warming effects of carbon dioxide over 20 years—the period during which global emissions must be brought under control to hold to a 1.5º C planetary warming. Fugitive emissions from wells and pipelines contribute significantly (1% to 9% of throughput per Union of Concerned Scientists),[26] in addition to the CO2 emissions from the gas when 100% combusted. While the leakages might be brought under control, there is little evidence this is taking place across the industry. At the same time, electric utilities are rapidly phasing out coal power plants and, in Oregon, required by statute to 100% reduction in greenhouse gas emissions (by 2040). Gas-fueled building space and water heating contribute 12% of Oregon's GHG emissions (not counting upstream fugitive wellhead/pipeline emissions), while industrial combustion of gas adds another 5%.[27] Even if we assume the state achieved 100% emissions elimination elsewhere, the state cannot meet its GHG reduction goals without reducing natural gas combustion.[28] Given the availability of low to zero emissions electricity and conventional heat pump technology, there is no rationale for continuing to burn natural gas.

For these reasons, **it is essential that Oregon's energy efficiency budgets be optimized for deep energy savings and refocused toward weatherization and high-efficiency electric heat pump solutions for water and space heating**.

Proposed modeling scenarios around energy efficiency should put most of NW Natural's planned energy efficiency spending toward weatherization and building envelope efficiency measures, especially for hard-to-reach segments like multifamily housing. It would also be appropriate to shift funding for incentives for natural gas appliances toward incentives for electric water and space heating solutions. This would be a much more prudent use of ratepayer money and would result in more carbon emissions reductions and lower overall energy expenditures for customers.

Demand Side Options

It is evident from the utility modeling presentations that demand reduction will be necessary to comply with the CPP even with their optimistic forecasts for availability of RNG and Hydrogen.

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[25] *See* PETER ALSTONE ET AL., TOWARD CARBON-FREE HOT WATER AND INDUSTRIAL HEAT WITH EFFICIENT AND FLEXIBLE HEAT PUMPS, Schatz Energy Research Center (August 2021), http://schatzcenter.org/pubs/2021-heatpumps-R1.pdf.

[26] *See* UNION OF CONCERNED SCIENTISTS, ENVIRONMENTAL IMPACTS OF NATURAL GAS (June 2014), https://www.ucsusa.org/resources/environmental-impacts-natural-gas

[27] Measured as a CO_2 equivalent effect.

[28] *See* EVOLVED ENERGY RESEARCH, OREGON CLEAN ENERGY PATHWAYS RESULTS (May 2021), https://www.cleanenergytransition.org/projects/oregon-clean-energy-pathways-analysis (where modeling analysis concluded that reaching Oregon's "80% below 1990 GHG emissions" goal by 2050 requires fully electrified buildings by 2035 plus whole-building efficiency measures).

NW Natural proposes reducing demand through massive efficiency spending, and Avista and Cascade show gaps between their emissions reductions forecasts and the targets that could only be met by reducing demand due to the limited availability of low carbon gas alternatives.

One fundamental question to be addressed in this Future of Gas proceeding is how to reduce demand in a way which is cost effective and equitable and consistent with the goal of a zero-carbon emissions future. Whether it makes environmental technical and economic sense to make further investments in gas systems for space and water heating, or whether there is an alternative future based on electrification of these loads that performs better for customers and for compliance with state climate policies and priorities. The gas utilities have offered speculative futures that assume outcomes, with respect to availability and cost-competitiveness of zero-carbon gas fuels and gas-fueled technologies (distribution systems; gas-fueled heat pumps), that are not in evidence today. In contrast, electric heat pumps for space and water heating and cooling are conventional technologies that have been commercialized for decades, are cost-competitive with gas-fueled technology today, and are already widely used. Moreover, electric heat pump technologies are themselves continuing to evolve to address an ever-wider range of climates and temperatures and to allow retrofits for spaces that may not have pre-existing ductwork.

As is the case with many of the other compliance solutions mentioned in the gas utility offerings, it is difficult to evaluate the utility proposals based on the limited details presented. However, it is clear that the demand-side options offered by the gas utilities so far are at best myopic, at worst intentionally misleading in citing <u>only</u> technologies that will perpetuate the gas utility business model regardless of the cost to Oregon energy customers or to the state's climate goals. For instance, Avista only lists "electrification" as a risk to its compliance modeling.[29]

The following recommendations are based on the "Incremental Demand Reduction Options" listed on Northwest Natural's presentation,[30] all of which would necessitate the ongoing existence and maintenance of the methane pipeline system.

<u>The Commission Should Consider Demand-Side Options that Do Not Rely on Methane Pipe</u>

None of the demand-side solutions contemplated in the utility proposals reduce the need for the existing gas system, nor the cost of gas system infrastructure. Industrial decarbonization is an ambiguous concept that needs to be better defined, but stakeholders are left to assume that, like electric heat pumps with gas back-up, gas heat pumps, and end-use carbon capture and storage, all customer connections to the gas utility system are expected to remain intact. Reducing the throughput of fuel going through the system without shrinking the size of the infrastructure would cause sharp increases in the cost of gas in Oregon, likely increasing the speed of electrification of wealthier customers and leaving those least able to switch fuels on their own to cover the cost of the entire expensive system. This is a risky bet, especially given the uncertainties with the proposed supply-side compliance solutions we discuss later in our comments.

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[29] NW Natural Presentation at 10.
[30] *Id.* at 17.

Full electrification can accomplish similar or greater emissions reductions without the need to continue building and paying for an entire fossil fuel pipeline system. In the limited cases where electric heat pumps might need backup systems other than electric resistance, the Commission should evaluate delivered fuels as an alternative to maintaining the pipeline system.

Utilities Should Have to Justify Incentivizing Gas Heat Pumps when Electric Heat Pumps are Significantly More Efficient and are Commercially Available and Cost Competitive Today

- **Existing electric heat pumps are more efficient than gas heat pumps.** Today's electric heat pumps are three to five times more efficient than conventional space and water heating equipment and retain a nearly equal efficiency margin over the gas heat pumps cited in the utility presentations. Best-in-the-market heat pump water heaters are rated with upwards of 4.0 Uniform Energy Factors (UEFs), with most manufacturers currently producing models rated at 3.5 UEF—nearly three times the 1.2 UEF achieved by gas heat pumps in the five-site demonstration cited by Northwest Natural.[31] For space heating, electric heat pump efficiencies are even higher. The demonstration examples offered by Northwest Natural claim performance efficiencies between 120% and 150% depending on outdoor air temperature; equivalent electric heat pumps can be over 400% efficient.[32]
- **Electric heat pumps are commercially available and proven; gas heat pumps are a speculative and unnecessary technology.** 80,000 electric heat pump water heaters are produced and sold each year in the US. According to some experts, the earliest methane gas heat pumps are projected to be commercially available is 2023.[33] The product is still at the demonstration stage of the commercialization process, meaning that the Commission will have no reliable product and installation cost or at-scale performance information for a robust assessment of the technology for at least several years. There is no reason for Oregon to rely on this subpar, unproven, and possibly much costlier technology when other solutions are readily available today.
- **Electric heat pump technology is cost-competitive with gas and beats combined gas heating and air conditioner cooling.[34]** While electric heat pumps will generally carry higher equipment and installation costs than conventional gas furnaces, the life cycle costs (capital + fuel + maintenance) for existing electric heat pumps providing heat and cooling are projected by many studies to be lower than gas furnaces plus electric air conditioning under likely future gas and electricity prices.[35] As heat events in Oregon and across the country have demonstrated, cooling homes and commercial spaces is rapidly becoming a public health necessity. Adding the state's goal of economy-wide deep decarbonization, and assuming the electrical grid continues its current decarbonizing trajectory, the case for electric heat pumps over any gas future is more

[31] *Id.* at 20.
[32] *See* ASA S. HOPKINS ET AL., DECARBONIZATION OF HEATING ENERGY USE IN CALIFORNIA BUILDINGS: TECHNOLOGY, MARKETS, IMPACTS, AND POLICY SOLUTIONS, Synapse Energy (October 2018), https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf.
[33] According to NEEA representative comment during Workshop #3 ("18 months" projection for availability).
[34] *See* Alex Hillbrand and Alejandra Mejia Cunningham, *Thinking of Buying an Air Conditioner? Consider a Heat Pump*, NATURAL RESOURCES DEFENSE COUNCIL (August 19, 2021), https://www.nrdc.org/experts/alex-hillbrand/thinking-buying-air-conditioner-consider-heat-pump
[35] *See* SHERRI BILLIMORIA ET AL., THE ECONOMICS OF ELECTRIFYING BUILDINGS, RMI (2018), https://rmi.org/insight/the-economics-of-electrifying-buildings/.

compelling still.[36] Heat pump water heating has also been found to be lower cost than gas-fueled alternatives, with savings across the industrial, commercial, and home water heating board. These savings are especially helpful to low-income households.[37]

- **Cold climate electric heat pump technology continues to improve and is already providing heat efficiently to zero degrees Fahrenheit and below.** While heat pump efficiencies by definition decline as outside air temperatures descend, advances in technology (e.g. dual compressors) have enabled cold weather applications not possible with earlier designs. Efficiency Maine cites evidence from "tens of thousands "of heat pump installations (ducted and ductless) across its state of units operating and providing heat "even below -15º."[38] Clean BC describes "cold weather heat pumps "built to work efficiently in conditions down to -25º C, with some systems maintaining an efficiency of over 200% at -18º C (0ºF)."[39]

Given the availability and efficiencies of air-source heat pumps, together with ongoing technology gains and life-cycle paybacks for space heating and cooling, the only rationale for accepting the gas utilities' speculative projections is to perpetuate the supply and use of gas, notwithstanding the dispositive evidence and arguments that such an outcome is unnecessary, costly, and slows progress toward climate goals. In light of the current performance limitations and cost uncertainties of the technology, the utilities should be required to make a truly compelling argument for why their preferred gas heat pumps should be subsidized by Oregon consumers. Propping up the current gas utility model is not enough of a reason. Until that argument can be made, the Commission should instead invest in the proven, highly efficient electric technologies that are already on the market.

We strongly urge the Commission to broaden the universe of demand-side compliance options to reduce reliance on today's methane gas pipeline system, deprioritize the role played by unproven fossil fuel technologies, and include the advanced electric systems already commercially available.

RNG/Biomethane

Biomethane can play a role in reducing the greenhouse gas intensity of gas service as throughput declines and customers defect to cleaner, more efficient, electric options. But utilities, particularly NW Natural, plan an intensive reliance on biomethane, without properly accounting for its greenhouse gas intensity,

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[36] *See* NEW JERSEY ENERGY MASTER PLAN, developed by Evolved Energy and RMI (2020), https://rmi.org/new-jersey-charts-a-practical-affordable-course-to-a-decarbonized-economy/ (Rewiring America found that electric heat pump space and water heating would reduce monthly energy bills for 103 out of 121 million households across America in every US county and across many different climate conditions, saving $37.3 billion annually).

[37] A Schatz Energy Research Center study found that "80% of residential customers, 70% of industrial customers and 60% of commercial customers would pay less for electricity to power a heat pump water heater than they currently pay for gas-fueled water-heating. . .." *See, e.g.*, PETER ALSTONE ET AL., TOWARD CARBON-FREE HOT WATER AND INDUSTRIAL HEAT WITH EFFICIENT AND FLEXIBLE HEAT PUMPS (August 2021), https://www.researchgate.net/publication/353902434_Toward_Carbon-Free_Hot_Water_and_Industrial_Heat_with_Efficient_and_Flexible_Heat_Pumps.

[38] *See* Efficiency Maine, *Heat Pumps*, https://www.efficiencymaine.com/heat-pumps/.

[39] *See* Clean BC: Better Homes, *What is a cold climate heat pump?* (2021), https://betterhomesbc.ca/products/what-is-a-cold-climate-heat-pump/.

and despite its limited supply.[40] Moreover, NW Natural seeks to bury the costs of its intensive biomethane reliance.

Below are specific concerns about modeling inputs:

1. **NW Natural improperly treats its actions to implement SB 98 as part of "business as usual," and thus does not include SB 98 costs when tallying the impact on customers of its preferred, biomethane-heavy, strategy for complying with the CPP.**[41] This is improper because SB 98 is unquestionably intended to aid utilities in reducing greenhouse gas emissions (whether it could successfully reduce greenhouse gas emissions is discussed below): regardless, ORS 757.390(2)(c) makes it clear that the policy justification for using biomethane is its impact on greenhouse gas emissions. Furthermore, the quantity targets in ORS 757.396 are phrased as permissive "mays," rather than prescriptive "shalls," indicating that the Commission should examine potential benefits of biomethane procurement along with potential costs. A thorough reckoning of the cost of gas utilities' preferred decarbonization strategy requires understanding the entire cost of NW Natural's biomethane procurement, not just the "additional to SB 98" amount. Even better would be a comparison of the costs of this overall strategy to alternative strategies, best examined in economy-wide modeling, as discussed earlier in the introduction.
2. **Northwest Natural makes aggressive biomethane supply assumptions, tied to ICF's High Resource Potential Scenario.**[42,43] This scenario includes power-to-gas methane, gasified dedicated energy crops, and even the non-biogenic fraction of municipal solid waste, which is not even a renewable resource and will likely be counted as a source of anthropogenic GHG emissions for CPP compliance purposes. The inclusion of power-to-gas methane in this supply assessment means Northwest Natural is potentially double counting the available supply of this resource, which appears in the Company's "Base Case CPP Compliance Strategy." Not all potential supplies of biomethane can be considered sustainable, as is detailed in the report "'Renewable' Gas – A Pipe Dream or Climate Solution?"[44] In that paper, the author estimates a sustainable biomethane availability of around half ICF's estimate in the high case, and 40 percent less than ICF's in the low case. Northwest Natural also assumes that the state can get double its population share of the national resource. While this may be a reasonable assumption in the near term, it is over-optimistic in the long term; other states are likely to be taking aggressive action on climate in the 2030s and 2040s, and biomethane supplies may be needed for hard-to-decarbonize

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[40] For background on this issue, *see, generally,* Michael Hiltzik, *'Renewable natural gas' is the latest sham from the oil & gas industry,* LOS ANGELES TIMES (September 24, 2021), https://www.latimes.com/business/story/2021-09-24/renewable-natural-gas-oil-gas-industry?_amp=true&__twitter_impression=true.

[41] *See* NW Natural Presentation at 38. Note "Renewable Supply Costs" only appear in 2031, though biofuels appear in 2022 in the "Draft CPP Compliance Strategy Summary", Presentation at 36.

[42] *See* ICF, RENEWABLE SOURCES OF NATURAL GAS: SUPPLY AND EMISSIONS REDUCTION ASSESSMENT, American Gas Foundation (December 2019), https://drive.google.com/file/d/1AOJ4yUsYTRobxScfKfj03HBKWpZsEDA8/view?usp=sharing, https://www.gasfoundation.org/wp-content/uploads/2019/12/AGF-2019-RNG-Study-Full-Report-FINAL-12-18-19.pdf.

[43] *See* NW Natural Presentation at 23 and 25 ("Current State of the RNG Market: Supply" and "Biofuel RNG Assumptions" slides).

[44] *See* Borgeson, Merrian, *'Renewable' Gas – A Pipe Dream or Climate Solution?*, NATURAL RESOURCES DEFENSE COUNCIL (June 2020), https://www.nrdc.org/sites/default/files/pipe-dream-climate-solution-bio-synthetic-gas-ib.pdf.

sectors in those states. Notably, Avista makes the more reasonable assumption that it can access a portion of the national biomethane resource equal to its share of national gas sales.[45]

3. **Northwest Natural appears to assume that biomethane and methanated resources like power-to-gas or gasified biomass are all zero-carbon resources.** In fact, the greenhouse gas intensity of biomethane resources depends on several factors, including:[46]
    a. Whether the methane would have existed without the biomethane activity. For example, agricultural anaerobic digesters are engineered in a manner so that more methane is produced from a volume of animal waste than would have been produced had that waste been left in pasture;[47]
    b. What would have otherwise happened to the biogas being used to produce biomethane? In its regulatory lifecycle analysis of the GHG emissions of biomethane, for example, the EPA assumes that biomethane from landfill gas and digesters would have otherwise been flared, because this assumption leads to a conservative estimate of GHG emissions benefits, because the landfills most able to produce biogas are those that already have the collection and flaring infrastructure in place, and because flaring is typical in municipal wastewater treatment facilities;[48]
    c. Whether alternative management strategies could have prevented methane from forming or being released to the atmosphere, particularly in a policy environment like Oregon's where economy-wide GHG emissions reduction is a priority;
    d. How much methane leaks from the production of biomethane through final disposition and use by customers. Estimates for methane leakage from biogas production and upgrading facilities suggest that leakage is in the 2 percent to 4 percent range, up to as much as 15 percent;[49] and
    e. How end-use customers could otherwise access energy services, particularly in Oregon's GHG-reducing policy environment. Customers may be able to use clean electricity or other fuels to serve the same end-use at lower emissions.

The biogas supplies able to be accessed by NW Natural or Avista likely have positive greenhouse gas emissions, and biomethane production leakage levels have been so high as to make the resulting greenhouse gas intensity of the biomethane higher than that of fossil gas, as detailed in the above-cited Grubert paper. Utilities should assume positive greenhouse gas emissions from biomethane, and consider modeling a range.

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[45] Avista Presentation at 14.

[46] *See* Emily Grubert, *At scale, renewable natural gas systems could be climate intensive: the influence of methane feedstock and leakage rates*. ENV'T. RES. LETTERS 3 (2020), https://iopscience.iop.org/article/10.1088/1748-9326/ab9335/pdf.

[47] About 1 percent of the carbon in animal waste left in pasture converts to methane, while the conversion factor is up to 85 percent in an anaerobic digester. *See* Han, et al., *Waste-to-Wheel Analysis of Anaerobic-Digestion-Based Renewable Natural Gas Pathways with the GREET Model*, ARGONNE NATIONAL LABORATORY, ENERGY SYSTEMS DIVISION, tables 2 and 4, (September 2011), https://greet.es.anl.gov/publication-waste-to-wheel-analysis.

[48] *See* US EPA, REGULATION OF FUELS AND FUEL ADDITIVES: RFS PATHWAYS II, AND TECHNICAL AMENDMENTS TO THE RFS STANDARDS AND E15 MISFUELING MITIGATION REQUIREMENTS, Section IV(B)(3)(b), Flaring Baseline Justification (July 18, 2014).

[49] *See* Charlotte Scheutz and Anders M. Fredenslund, *Total Methane Emission Rates and Losses from 23 Biogas Plants*, WASTE MGMT at 38-46 (September 1, 2019), https://doi.org/10.1016/j.wasman.2019.07.029; Semra Bakkaloglu et al., *Quantification of Methane Emissions from UK Biogas Plants*, WASTE MGMT 124: 82–93 (2021), https://doi.org/10.1016/j.wasman.2021.01.011.

4. **Leakage of biomethane has potent warming impacts.** The state should be very concerned about biomethane production pathways that create methane that would otherwise not have existed, because methane is a potent greenhouse gas, production and system leakage is non-zero, and all methane emissions will be global warming positive. Instead, NW Natural appears to assume "power-to-gas" hydrogen will first, automatically be derived from otherwise-curtailed renewables, with a production process also powered by renewable resources, and second, experience zero leaks on the path to ultimate consumption by the user. Gasification of dry biomass must similarly account for leakage along the path from production to consumption, and the GHG emissions from the production process itself.

Hydrogen

As with RNG, developing a realistic sense of the potential role of green hydrogen[50] and its limitations, including its public health and climate impacts, is essential to evaluating the role that hydrogen could play in our future energy system. Indeed, as this proceeding has progressed, new research continues to expose hydrogen's risks and limitations, as this resource is nascent and incompatible at high levels with our current energy infrastructure.[51]

Despite broadly acknowledged realities about hydrogen's limitations, all three gas utilities presented future scenarios in which 20% of their product by volume would be green hydrogen. They presented hydrogen blending as an opportunity to do so. But we urge the OPUC Staff to be skeptical of promises of high levels of hydrogen blending and of using green hydrogen in buildings.

High levels of hydrogen blending are unrealistic

First, promises of higher blend potentials with methanated hydrogen -- which requires a "steady and low cost"[52] source of carbon dioxide to create -- are unrealistic in Oregon. The gas utilities have not presented information of any guaranteed source of such captured carbon dioxide for methanation. Meanwhile, as NW Natural pointed out (slide 28), existing hydrogen projects are extremely limited and largely not approaching 20% blending. For example, as NW Natural pointed out, in Toronto, Enbridge is using 2% hydrogen. In Edmonton, ATCO is using only 5%.

Limited green hydrogen resources should be prioritized 1) for replacing hydrogen currently sourced from fossil fuels and 2) for niche, hard-to-electrify sectors - not for heating buildings and water.

As we outlined in our previous comments, the availability of green hydrogen will be very limited and the best use of this limited resource will be in hard-to-electrify sectors such as aviation fuels and specialized industrial uses, not for the vast majority of energy uses. Green hydrogen also has some promising

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[50] "Green hydrogen" refers to hydrogen produced using electricity from renewable energy sources. Today, nearly all of the United States' hydrogen supply comes from fossil fuels. *See* MARK F. RUTH ET AL., THE TECHNICAL AND ECONOMIC POTENTIAL OF THE H2 @ SCALE CONCEPT WITHIN THE UNITED STATES, National Renewable Energy Laboratory at 7 (2020), https://www.nrel.gov/docs/fy21osti/77610.pdf.
[51] *See* SASAN SAADAT AND SARA GERSEN, RECLAIMING HYDROGEN FOR A RENEWABLE FUTURE, Earthjustice and Right to Zero (August 2021), https://earthjustice.org/sites/default/files/files/hydrogen_earthjustice_2021.pdf.
[52] NW Natural Presentation at 30.

potential as a source of energy storage; electrolyzers can convert excess renewable electricity into hydrogen that can be stored and used to generate electricity when wind and solar power is not available. For such uses, extensive pipelines, with the challenging technical obstacles discussed below for distribution gas utilities, could be avoided by adjacent production, storage and power generation facilities. But cost and source availability will significantly limit transport and distribution for use, making it an unrealistic fit for space and water heating in buildings as we decarbonize in the coming decades.

Mixing hydrogen gas into existing methane gas infrastructure would require significant upgrades and costs

Even if there were sufficient supplies that were not cost-prohibitive, relying on high percentages of hydrogen gas would require significant upgrades to existing infrastructure. As was outlined in the recent Earthjustice report "Reclaiming Hydrogen for a Renewable Future," to safely inject hydrogen into the gas distribution system could pose a variety of safety and reliability risks. Hydrogen can cause strain and damage to pipeline components (including embrittlement for hard steel piping), and hydrogen molecules themselves are smaller than methane, making leaks more prevalent.[53] As hydrogen carries less energy per volumetric unit, including up to 20% hydrogen by volume will either reduce the energy content of gas throughput or require new and larger pipes to maintain present levels of energy density[54]. Indeed, current research suggests existing gas pipes and appliances can only support a small portion of hydrogen (5-10%) before they would have to be replaced.[55] Further, at about 25% hydrogen blending, there is a risk of explosion in residential gas-fired appliances.[56]

In addition to infrastructure and safety concerns, blending hydrogen and methane may also increase public health risks. California utilities, as highlighted by Earthjustice in their comments to the CPUC last month, have acknowledged that hydrogen blending "may yield *higher NOx emissions than natural gas* because hydrogen burns faster than natural gas, which increases combustion temperatures and reduces ignition lag. . . . therefore, additional emissions testing should be completed with natural gas end-use equipment operating with hydrogen blends."[57] These NOx emissions ultimately contribute to increased levels of respiratory and heart conditions.

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[53] *See* SASAN SAADAT AND SARA GERSEN, RECLAIMING HYDROGEN FOR A RENEWABLE FUTURE, Earthjustice and Right to Zero (August 2021) at 27, https://earthjustice.org/sites/default/files/files/hydrogen_earthjustice_2021.pdf.

[54] *See* Paul Martin, *Is Hydrogen the Best Option for Replacing Natural Gas in the Home?*, CLEANTECHNICA (December 14, 2020), https://cleantechnica.com/2020/12/14/can-hydrogen-replace-natural-gas-looking-at-the-numbers/.

[55] *See* Julie McNamara, *What's the Role of Hydrogen in the Clean Energy Transition?*, UNION OF CONCERNED SCIENTISTS (December 9, 2020), https://blog.ucsusa.org/julie-mcnamara/whats-the-role-of-hydrogen-in-the-clean-energy-transition/.

[56] *See* Jeff St. John, *Green Hydrogen in Natural Gas Pipelines: Decarbonization Solution or Pipe Dream?*, GREENTECH MEDIA (Nov. 30, 2020), https://www.greentechmedia.com/articles/read/green-hydrogen-in-natural-gas-pipelines-decarbonization-solution-or-pipe-dream.

[57] *See* Earthjustice Comments *Re: Docket No. 21-IEPR-05, Hydrogen to Support California's Clean Energy Transition* (quoting Prepared Direct Test. of Kevin Woo et al. on Behalf of Southern Cal. Gas Co. et al., at 17, A.20-11-004 (Cal. P.U.C. Nov. 2020), https://www.socalgas.com/sites/default/files/2020-11/H2_Application-Chapter_4-Technical.pdf).

Hydrogen blending would not provide significant emissions reductions

Oregon utilities are not alone in claiming they will reach a high penetration of hydrogen blending -- and implying high percentages of decarbonization gains -- in their gas infrastructure, but that does not mean that OPUC should be any less critical of these claims. Southern California Gas Company and San Diego Gas & Electric Company recently proposed "groundbreaking" research that could help them deliver gas with a 20% hydrogen blend. But as Earthjustice pointed out in their recent report debunking these claims, even if they can do so safely, their gas system would still be a "major climate threat."[58] **With 20% penetration of hydrogen, because of the molecule's low energy density, carbon dioxide emissions would only be reduced by about 7%.**

Ultimately, issues concerning the compatibility of hydrogen with existing gas infrastructure and appliances, and the health and safety of burning hydrogen in the existing gas system, remain unresolved. To achieve a clear and unbiased view of the practical, technical. economic and greenhouse gas abatement potential of utility hydrogen, the OPUC should retain expert technical consultation to assess implications for 1) equipment replacement (or degradation of existing equipment and public safety risk), 2) added technical requirements (e.g., higher pressurizing compressors), 3) public safety (leakage; hydrogen incompatibility with "stenching" agents -- e.g., added sulfur odors to identify leaks), and 4) system costs. These should be compared with existing available alternatives for space and water heating proposed elsewhere in these comments, which would also supply space cooling and have greater GHG reduction potential per customer dollar invested.

Further, as with costs of RNG, the need for a holistic understanding of hydrogen's costs and benefits is critical from an equity standpoint. To ensure minimum harmful impacts to ratepayers, OPUC Staff cannot ignore the potential energy burden impacts of investing in hydrogen relative to other options, including electrification and efficiency.

III. Alternative Scenarios for Regulatory Tools Discussion

From a regulatory perspective, the compliance model results using IRP projections for customer and load growth do not provide the OPUC with any information requiring new regulatory approaches. There are many technology and market challenges that the utilities will face with such a compliance pathway, but these are issues of cost and supply that are manageable under existing OPUC regulations.

The OPUC needs to understand the risks of a gas future in which few new customers sign up for gas and existing customers leave the gas grid, either quickly or gradually over time. The OPUC also needs to understand where the gas utilities need to adjust their business models to focus on serving their remaining core customers, which are likely to be large industrial consumers of natural gas with applications that are not easily electrified. These hard-to-electrify industries will eventually need to transition to a clean alternative, such as green hydrogen or synthetic fuels. Further, the seasonal storage capacity that our natural gas system currently provides will also need to be transitioned to a clean alternative that has

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[58] *See* SASAN SAADAT AND SARA GERSEN, RECLAIMING HYDROGEN FOR A RENEWABLE FUTURE, Earthjustice and Right to Zero at 27 (August 2021), https://earthjustice.org/sites/default/files/files/hydrogen_earthjustice_2021.pdf.

similar long-term storage potential, again green hydrogen fits that storage requirement. These are the real issues in decarbonizing our energy system we need to understand and plan for.

The current Customer Growth sensitivity is a mild step in this direction, but it only results in a 13% drop in total customers and doesn't distinguish between residential, commercial, and industrial customers.

We suggest the OPUC consider, among other things, the following regulatory pathways which would result in increasing the speed of electrification:

<u>Customer Growth - Slow Electrification Sensitivity</u>

- The fraction of new buildings (residential and commercial) using gas goes from its present share to zero in 2030 and stays zero thereafter.
- The fraction of existing buildings converting to electricity goes from its present share to 90% in 2050
- Light industry converts to 90% electricity by 2050
- Heavy industrial customers convert to 90% hydrogen or synthetic fuels by 2050
- Utilities invest in hydrogen storage for hydrogen-fired peaking plants

<u>Customer Growth - Fast Electrification Sensitivity</u>

- The fraction of new buildings (residential and commercial) using gas goes from its present share to zero in 2025 and stays zero thereafter.
- The fraction of existing buildings converting to electricity goes from its present share to 90% in 2040
- Light industry converts to 90% electricity by 2040
- Heavy industrial customers convert to 90% hydrogen or synthetic fuels by 2040
- Utilities invest early in hydrogen storage and hydrogen-fired peaking plants

<u>Cost of Gas to Existing Customers - Without Curbing of Gas Infrastructure Under Fast Electrification Sensitivity</u>

- The fraction of new buildings (residential and commercial) using gas goes from its present share to zero in 2025 and stays zero thereafter.
- Throughput to existing buildings is reduced by 90% in 2040 (due to high installation of high-efficiency gas equipment and electric equipment with gas backup)
- Light industry converts to 90% electricity by 2040
- Heavy industrial customers convert to 90% hydrogen or synthetic fuels by 2040
- Utilities invest early in hydrogen storage and hydrogen-fired peaking plants

We also suggest the OPUC model alternative scenarios with protections for low- and moderate-income customers, as well as changes to energy efficiency funding:

<u>Low-Income Ratepayer Protection Sensitivity</u>

- Low and Moderate Income (LMI) qualified residential ratepayers see no increases to rates (or only inflation-adjusted increase to rates) due to the CPP program. All increases in costs are shifted to non-LMI residential customers and commercial and industrial customers.
- Residential ratepayer bill impacts are modeled and reported for LMI and non-LMI ratepayers separately.

<u>Energy Efficiency Measures Sensitivities</u>

- No incentives for gas appliances beginning 2025: Gas utility payments into ETO incentive programs continue, but all ETO incentives promote electric appliances and weatherization solutions-only beginning in 2025
- Early incentives for heat pump-based AC systems with existing gas furnaces
- No fuel switching limitations on ETO incentive programs
- Line extension policies are adjusted to stop subsidizing new gas customers and continue supporting new electric customers.

Ultimately, we expect to have further feedback once we see what the OPUC presents in the regulatory tools discussion.

IV. Electrification: Suggestions for Inputs and Methodology

The preliminary modeling analysis from each natural gas utility uses the same resource selection approach, where the assumed future gas demand is filled exclusively by methane gas or hydrogen options with no (or with minimal) regard to fuel switching. While this is understandable given the study guidelines, and the traditional OPUC rate-making process, an analysis that ignores less expensive fuel-switching options is of no value except to illustrate how expensive this compliance strategy would be. Multiple studies by multiple organizations have shown that much less costly emission reduction pathways exist compared to the ones identified by the gas utilities. The analysis performed to support the development of the Climate Protection Plan modeled Oregon's integrated energy system allowing competition between gas and electric options. Those results show natural gas consumption declining in all policy scenarios by 59 to 63% compared to more than 9% growth in the reference scenario. **The OPUC has authority over both gas and electric utilities, and we request the OPUC, as a follow-on assessment, embark on an integrated analysis of our gas and electric system that will identify least-cost pathways to deep decarbonization while ensuring system reliability during extreme weather events.**

The recently released Oregon Clean Energy Pathways Analysis study by Evolved Energy Research[59] defined rapid building electrification to mean "fully electrified appliance sales by 2035" in their modeling. They defined their slow building electrification scenario to mean "75% electrified appliance sales by 2045". The slow electrification scenario "results in significant increase in costs" to achieve climate goals due to "fuel conversion technologies needed to supply greater overall energy demands than in a largely electrified energy system in the form of decarbonized fuels."

Moving forward, there must be scenarios modeled that attempt to reflect reality and therefore surface the trade-offs and risk assessment that are looming for the OPUC and Oregonians reliant on the gas system today. As stakeholders, community members, ratepayers and Oregonians, we need to be able to have real discussions about the major questions, impacts and transitions facing gas utilities today and into the future as they are required to reduce their greenhouse gas emissions more dramatically and electrification trends grow. If the scenarios fail to do more than mimic the gas utilities' pipedreams, the Commission will be hampered from having those desperately-needed conversations and policy decisions based on the reality on the ground that is looming.

In conclusion, we urge Commission staff to revisit and challenge the gas utilities' underlying data and assumptions, as well as the combined inputs and scenarios, in order to model scenarios that more accurately reflect reality.

Thank you for your consideration of our comments and we look forward to continuing in this process.

Signed,

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[59] *See* EVOLVED ENERGY RESEARCH, OREGON CLEAN ENERGY PATHWAYS FINAL REPORT (June 15, 2021), https://uploads-ssl.webflow.com/5d8aa5c4ff027473b00c1516/60de973658193239da5aec7b_Oregon%20Clean%20Energy%20Pathways%20Analysis%20Final%20Report.pdf.

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Appendix A: Summary Table of Model Concerns and Questions

	Utility-provided data	**Data or source concerns**	**Select remaining questions**
Customer Demand	NW Natural: 185K new residential customers in OR by 2050; 100K new customers in WA	NW Natural provides no support for the evidence it used to come to these projections.	Is there a customer growth breakdown by region, or by month (to understand whether warming trends impact customer choice)?
Efficiency	NW Natural: Proposed spending an additional $4.2 billion -- or as much as $150 million per year -- on efficiency incentives between 2022 and 2050.	NW Natural does not provide support for these inputs. Current ETO efficiency spending for NW Natural is only approximately $24 million per year	What support can NW Natural provide for these projections? What would the necessary efficiency spending be under alternative (re: electrification or low growth) scenarios? What are the best uses for this efficiency spending?
Demand Side Options	Utilities offer limited demand-side options that do not reduce the need for the existing gas system (e.g., gas heat pumps)	Electric heat pumps are significantly more efficient, commercially available, and cost competitive today. Utilities failed to provide compelling evidence as to why they would exclusively model demand side options that are reliant on gas.	
RNG/biomethane	NW Natural makes aggressive biomethane supply assumptions, including power-to-gas methane.	NW Natural is potentially double-counting the available supply of power-to-gas methane. Not all sources of biomethane can be considered sustainable.	What is the source of NW Natural cost estimates for power-to-gas methane and biomass gasification biomethane? Provide these cost estimates.

	NW Natural assumes the state can get double its population share of the national biomethane resource. NW Natural assumes biomethane and methanated resources are zero-carbon.	This assumption is overly-optimistic in the long term; other states taking aggressive action on climate will mean limited biomethane supplies may be needed for hard-to-electrify sectors in those states. In fact, the GHG intensity of biomethane resources depends on several factors. According to recent research (Grubert 2020), biomethane production leakage levels are often so high as to make the resulting GHG intensity even higher than that of fossil gas.	
Hydrogen	All three utilities assume 20% green hydrogen blending	High levels of hydrogen blending are unrealistic; there is no guaranteed source of carbon dioxide for methanation process; existing hydrogen projects are extremely limited and not approaching 20% blending. Even if supply were available, high percentages of hydrogen would require significant upgrades to existing infrastructure. Current pipes and appliances can only support a small amount (5-10%) of hydrogen before having to	How does NW Natural anticipate it will source this green hydrogen? Where will the CO2 for methanation come from? How much money would need to be spent on pipeline and other infrastructure upgrades to support 20% hydrogen blending? Will the OPUC, using expert independent third-party reviewers, examine the credibility of the cost, timing, access to fuel, and

		be replaced. Hydrogen blending also comes with risks of explosions (with significant risks at 25% for residential appliances), leaks, and NOx pollution. With 20% penetration of hydrogen, because of the molecule's low energy density, carbon dioxide emissions would only be reduced by about 7%.	compatibility of the existing NG compression/delivery/use system and equipment to a hydrogen conversion greater than 20% (by volume) blend? If a hydrogen component to customer gas flow is limited to 20% (by volume; less by energy value) blend, and Renewable Natural Gas (RNG) supplies are limited to quantities available within Oregon (per ODOE), can the gas utilities meet even the proposed CPP emissions targets, let alone the 100% carbon-free target the state has set for the electric utilities?