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Re: Natural Gas Fact-Finding (UM 2178) Draft Report

Please find below comments from the Natural Resources Defense Council submitted to the OPUC UM 2178 docket.

As we and other participants urged in February, we need to see a process that makes transparent and measurable the tradeoffs and risks facing NW Natural and its ratepayers in the company's various planned mechanisms to comply with CPP requirements, together with the opportunity costs to customers and the community of a failure to shift to space heating and cooling alternatives that would be less cost- and environmentally-risky. The failure to enable this shift will lock gas customers long-term into reliance on a fuel – fossil methane gas – and a technology – combustion – that are unsuited for a climate change-limited future.

NW Natural's presentations for the last two years and more have proposed a strategy of progressively replacing its fossil gas with Renewable Natural Gas (RNG) from biological sources (human + animal waste/manure, vegetable matter, wood) and, further down the road, with "green" hydrogen (H2) electrolyzed from water (H2O) using excess renewable energy generation.

Here's what the Commission should question about this approach.

1. Near term the company would comply with a combination of RNG and limited introduction of H2 into its supply and service to customers. We believe, based on data detailed below, that the maximum non-fossil gas that could be so supplied would comprise 12% RNG and 7% (by energy content) H2. The company would still be delivering over 80% fossil gas. Even this near-term solution raises question about pipeline capacity (H2 requires 20% of pipeline capacity to deliver its 7% energy contribution). And questions about supply sufficiency of both RNG and H2 remain.

2. Longer term, the company apparently plans to back out the balance of fossil gas with H2 (plus efficiency savings and Community Climate Investments (CCI's)). There are multiple risk factors – availability, cost, competition for the fuel, redesign and replacement of existing pipeline materials and home appliances for handling higher (than 20%) quantities of H2, potential for large stranded investment in transportation/distribution pipeline and storage facilities – that handicap this plan.

3. In contrast, reliable and affordable electric heat pump technology exists today to substitute for fossil gas to meet space and water heating loads. The technology has become increasingly able to operate efficiently at lower (to +15º F or below) temperatures, reducing the need for backup electric resistance or gas units. And, of course, heat pumps will cool in summer as well as heat in winter, an extra dimension gas cannot manage except by recourse to gas heat pumps, a much less advanced and available technology that will still generate emissions.

In sum the choices in this proceeding are:

(a) near-term reliance on a continuing predominantly fossil gas supply; and longer-term, on a high cost, high risk strategy of sourcing, delivery and use of H2 in lieu of fossil gas; or

(b) ***systematically replacing existing gas furnaces and water heaters with existing, reliable, cost-effective, proven electric heat pump technology that will also supply cooling in hot weather.***

A. NW Natural's 2018 IRP Strategies for Reducing GHG Emissions

NW Natural's 2018 IRP instructively considers these alternative gas fuel sources. It assumes a 15% reduction in expected load from energy efficiency (EE) by 2037, but also projects that gas deliveries will continue to rise throughout the 20-year planning period net of EE savings. It then plausibly estimates that RNG will contribute no emissions reductions until at least 2028, with a maximum contribution of ± 12% by 2037.

Significantly, over the duration of this same period NW Natural's IRP shows cumulative net ***positive*** GHG emissions, with a temporary reprieve as RNG resources come online in 2035, but then beginning to rise again to 2037.

In developing its 2022 IRP, the company appears to acknowledge the very considerable near-term availability and risk factors associated with sourcing and introducing such substantial quantities of RNG into the company's system, while H2's contribution remains uncertain due to cost, availability and competition for limited supplies, and adaptability to the existing infrastructure possessed by the company and its customers. The maximum H2 contribution under discussion appears to be introducing up to 20% (by volume) / 7% (by energy content) H2 into the system at a date so far unspecified. The combination of the two low carbon resources then would yield a maximum GHG reduction of 19%, sometime post-2035 (per the 2018 IRP). With further reductions from success in delivering on an ambitious EE agenda, NW Natural emissions for most or all of the 2018-2037 period (per the 2018 IRP) will fall decidedly short of the 50% GHG reduction by 2035 required under the DEQ CPP.

B. Do the Math

While it is possible that technologies and fuel availability could accelerate faster than NW Natural's assumed levels, there are multiple factors which make shortfalls more likely even from this non-compliant base case. Put simply, NW Natural's math does not and cannot add up. This is so even before assigning risk/probability values to the strategy and weighing these against technically-proven electrical alternatives that exist today – not out 15 years or more – and that are reliable and cost effective for meeting residential and commercial space and water heating loads.

Our analysis begins with some basic availability and cost (fuel + infrastructure) factors.

Anyone who has entered the biomass-to-energy project cycle is quickly faced with the difficulties in developing reliable, robust fuels production and delivery. The fuel sources cited above are often diffuse and dispersed geographically; are often of low BTU/volume energy densities; and are often laden with water content that must be extracted and disposed of. There are generally contaminants that must be "scrubbed" with special equipment before the gas is pipeline ready. The sources are often distant from gas utility loads.

Collection and conversion costs can range widely depending on the availability and accessibility of the feedstock (e.g., dairy manure may be easily collectible or scattered; forest wood fuel loadings may be not accessible in winter [snow] or summer [fire danger] months; etc.). Cost estimates vary but are consistently above historical prices for fossil gas.

For these reasons, estimates of usable RNG as a percentage of load range from: American Gas Foundation: 5% to 12% of US gas demand; NRDC, 3% to 7% of US gas demand (using the same AGF demand data). Note that for these comments we use the AGF "high" estimate with its commensurately higher associated risk factors.

H2 is more problematic still as a scalable substitute for fossil gas. Sourcing "green" H2 – via electrolytic conversion from fresh water – is technically easier than sourcing RNG feedstocks. Overgeneration of wind and solar energy can be directed to electricity storage or to electrolytic conversion facilities where the water molecule (H20) is broken apart releasing the oxygen and directing the hydrogen into storage or gas transportation facilities for transport to thermal loads.

However, costs of H2 relative to natural gas (CH4) depend greatly on the feedstock source and conversion process. Today, H2 produced by steam reformation (that is, "blue hydrogen" that uses natural gas as the feedstock) costs approximately triple the price of fossil gas per MMBTU. Costs of green hydrogen) vary greatly with the cost of the electricity – and especially with whether "overgeneration" electricity (wind and solar power that's greater than can be used by current loads) becomes available in large quantities. The cost of electrolyzer equipment, today at ± $700/kW, is projected to drop to ± $200/kW by 2030, allowing H2 production for high-value-added loads (e.g., industrial high temperature process heat; transportation; power grid integration). It remains an open question whether enough green hydrogen will then be produced and can be priced to satisfy the sum of these higher value-added loads and also low-value-added loads like space and water heat.

There are physical risks during H2 transport although equipment standards and operating protocols exist to manage those risks, at a cost. This higher transportation cost will be less of a factor with concentrated industrial loads, and will weigh most heavily on smaller, dispersed loads such as home and commercial space and water heating and cooking, where more investment in pipelines and storage vessels are required per MMBTU of load, and where infrastructure and appliances will have to be refit or replaced to make use of hydrogen gas in excess of the 20% (by volume) quantities proposed by NNG. It is generally acknowledged that leakage and other management/blending difficulties arise once the presence of H2 in fossil gas supplies exceeds 20% by volume.

Thus to maintain just equivalent service to existing loads may require a substantial and costly increase in pipeline throughput size to deliver enough H2 to offset its lower energy density.

While costs of delivered hydrogen are anticipated to decline as production increases and conversion/storage technologies improve, these costs in the foreseeable future – as with RNG – are likely to exceed the costs of delivered fossil gas in the US at least through 2030. Competition from higher-value-added applications for limited supplies will tend to keep prices higher even then.

Residential and commercial space and water heating will either continue to rely on fossil gas or gravitate to proven, cost-effective alternatives.

The company argues that it will be able to deliver 100% H2 to industrial gas loads (e.g., metallurgy) requiring the high process temperatures H2 can support, and this will augment its compliance mix of fossil and non-fossil gas. The company has not demonstrated this outcome with analysis of markets, of accessible and reliable H2 sources, and of delivery capabilities and facilities that will offer a combined cost-competitive price to these customers.

The additional pipeline volume requirements of H2 necessary just to meet current industrial thermal loads will require additional investment in more capacious high-integrity pipelines, at still unspecified additional sites with attendant costs, just to stay even with present industrial loads.

C. Risk and Uncertainty of RNG and H2 Investments versus Electric Heat Pumps

At the same time, electricity-driven heat pumps are gaining in energy efficiency and temperature range while capital and operating costs are declining. As more customers respond by shifting their heating loads from gas to electricity, the costs to maintain the gas production and delivery infrastructure will be spread among fewer customers and declining loads, increasing costs to those remaining on the system.

One can see the gas company's math problems beginning to accumulate.

If NW Natural optimizes for least carbon (and using the more generous AGF estimate of available RNG), it may acquire and blend up to 12% RNG into its fossil gas. If NW Natural also opts for the maximum H2 blend share (7%) that will not incur wholesale infrastructure replacement, it can reach around 19% carbon-free gas. This leaves the utility far short of the 50% level set by Oregon DEQ for 2035, and even further from the 90% reduction by 2050. If H2 costs do not drop dramatically, and production/transport for H2 scale equally dramatically, the company would then have to make up the difference from a combination of emissions reductions through efficiency investments and purchase of Community Climate Investment (CCI) payments to DEQ for the residual fossil gas balances after compliance – 16% in 2035 and 71% in 2050.

Note that under DEQ rules a subject emitter is limited to meeting up to 10% of its compliance obligation with CCI's in the first compliance period, a cap that increases to 15% in the second compliance period and 20% in the third.

There are additional compliance risks throughout this alternative fuel cycle that (a) sources deliver less rule-compliant fuel than expected, (b) at costs greater than expected, (c) encountering technical barriers higher than expected.

D. Heat Pumps, Lawsuits and Opportunity Costs

In sum, in this IRP the company proposes a strategy going forward that keeps it in business – emitting up to the GHG emissions it is today responsible for, and failing to meet CPP requirements through much of the 2022-2035 period – by shifting onto its customers the risks and associated costs if its problematic strategy fails. The company obviously expects the OPUC will acquiesce in this strategy.

Notwithstanding the extended litany of risks, the utility may be allowed by regulators to proceed down the RNG +H2 pathway as its least cost alternative. Proceeding down this pathway carries not only significant risks for gas utility customers but also opportunity costs. When our HVAC systems are tied to a gas line, our first impulse in the event of furnace failure (especially when these occur during cold weather months) will be to procure a replacement furnace as quickly as possible. When we do so, we incur the significant opportunity cost of foregoing replacing the failed gas unit with a more cost- and energy- efficient electrical heat pump that will also cool our house or business as summer temperatures rise and present public health problems. And we will be bound to that gas furnace for the years it will take to amortize its capital cost.

We and others participating in UM 2178 have proposed that regulators and planners first developed a combined "IRP" that begins with how loads can be met most effectively and cost-efficiently *rather than how existing companies can best meet them for their customers*. This is the cross-utility analysis that is contemplated in the UM 2178 docket. If the OPUC then invited the utilities to describe in their IRPs how they would meet those loads in the most cost- and environmentally-efficient manner, we predict the outcome would be the pre-emptive installation of electric heat pumps, bringing cost savings to customers and GHG emissions reductions to the community. We understand there would be transition challenges in moving customers from gas to electricity, but just as with electric vehicles displacing gasoline and diesel ones, the national and local economies are resilient enough to manage these in the interests of reducing GHGs and restoring a healthy climate.

E. The Bottom Line

There's the bottom-line truth: the continued corporate presence of a gas utility simply isn't of comparable societal value to GHG emissions reductions. This is especially so when that utility declines to contemplate an alternative energy services business model that would leverage its skills and capabilities for the community's benefit *and* the company's profitability.

Instead, NW Natural has taken the obstructive pathway of joining other climate-denial businesses in filing a legal challenge to DEQ's authority to develop and carry out its Climate Protection Program. NW Natural and its co-plaintiffs are digging in to defend a business-as-usual model and that model's profits today, putting at risk all the tomorrows of its customers and its community. In filing this lawsuit, NW Natural is retreating to a process challenge, and implicitly conceding the arguments in this section that there are better – lower cost, lower environmental impact – ways to meet the energy needs of the community and the emissions standards set by the state than its product; that these ways are available and proven effective; and that NW Natural's offered alternative is unproven, unlikely to be available when needed (in this decade), and laden with risks that it might never meet the needs of its customers and community at all.

We note that NW Natural continues to use its corporate advertising budget to urge continued use of methane gas upon its customers the with the misleading claim that ". . . a diversified energy system will get us to a carbon-neutral future faster and more affordably," where diversity appears to include electricity and carbon-neutral renewable gas. "Electricity," the advertising claims, "is currently responsible for nearly 3x more emissions than natural gas delivered directly to residential and commercial customers." The claim fails to note that Oregon's electric utilities have been steadily reducing their GHG emissions[1] since 2015 and that they supported Oregon legislation to reduce these emissions further still, to 80% below 2017 emissions levels by 2030 and to zero emissions by 2040. Meanwhile, NW Natural's emissions have risen by 20% (2015-2019)[2], and can be expected to continue to rise as new customers are signed up. We ask the Commission to consider carefully and fairly which

[1] PacifiCorp reduced emissions for power delivered to its Oregon customers by 13% between 2015 and 2020; PGE reduced its GHG emissions 11% between 2015 and 2020, and will see a further sharp drop in 2021 as its Boardman coal facility closed at the end of 2020, per DEQ data (see next footnote).

[2] https://www.oregon.gov/deq/aq/programs/Pages/GHG-Oregon-Emissions.aspx

pathway is more likely to lead to emissions reductions and to broadly-distributed benefits to the community?

Sincerely,

Angus Duncan

For Natural Resources Defense Council