

The Health Harms of Turquoise Hydrogen

Hydrogen is the most abundant molecule in the universe, but you can't dig it up like fossil fuels. Hydrogen is almost entirely found in chemical compounds like water (H₂O) and hydrocarbons, such as methane (CH₄). To make hydrogen gas, energy is used to separate hydrogen from these compounds.

Health Concerns

- 1 The American Medical Association recognizes the dangers of blending hydrogen and “natural” gas.¹**

Hydrogen may possibly lead to more emissions of nitrogen oxides, raising risks of respiratory diseases.²
- 2 Hydrogen ignites more easily and is more explosive than methane.³**

This increases the danger of explosions in buildings. Methane leaks inside residential and commercial buildings when appliances are in use and when they are turned off.⁴ Hydrogen could make these leaks more dangerous.
- 3 Hydrogen blending prolongs our dependency on fossil fuels.**

Burning methane gas produces numerous health-harming pollutants and fuels the climate crisis we are experiencing at this very moment.

What is Turquoise Hydrogen?

Hydrogen as a fuel is classified into different colors depending on the initial molecule being broken down, the energy source used to take hydrogen from it, and the byproducts of the chemical reaction. Turquoise hydrogen is produced using methane gas as a feedstock. Solid carbon is produced as a byproduct.

Safety & Costs Concerns

While hydrogen blends below 6% are generally safe, higher percentage blends added to the natural gas stream result in a greater risk of pipeline leaks, embrittlement of pipelines, stove and water heater malfunctions, and explosions.

- Source: University of California, Riverside Hydrogen Blending Impacts Study

As you get to 15% by volume blend, every mile of existing pipeline will need to be retrofitted – at an estimated cost of at least \$239,000 per mile of pipe – with rate-payers likely carrying this financial burden. Ratepayer funds are being used to fund this experiment.

- Source: HydroPel

What is NW Natural up to?

In December of 2023, NW Natural began blending small amounts of hydrogen into the natural gas system at their Southeast Portland location. Since Oregon, unlike Washington, has no regulations requiring notification of customers or regulators, customers were not made aware of the hydrogen blending experimentation.

Climate Concerns

- 1 Pyrolytic hydrogen requires significant energy for production.**
It is estimated that at least 42% of energy is lost in the transformation of methane to hydrogen.⁵ If it is substituted for uses previously served by methane gas, total demand for methane gas increases by over 70%.
- 2 Methane leaks also produce carbon emissions.**
When methane is used to produce hydrogen, leaks in production and transmission add emissions even if carbon is captured in production.⁶
- 3 Blended hydrogen has a lower energy content.**
Given the limits to hydrogen blending, and due to its lower energy content by volume than methane, a blend of 20% hydrogen and 80% methane could only reduce carbon emissions by at most 7%.⁷

Turquoise hydrogen is not efficient

The feedstock required for turquoise hydrogen is methane gas, a fossil fuel. Emissions from methane gas extraction, production, and leakage are significant. The climate impact of methane is particularly concerning because, over a 20-year timeframe, methane is 90 times more effective than carbon dioxide at trapping heat in the atmosphere.

Community Concerns

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What makes me uncomfortable is the lack of transparency. Tell us what you're doing and why you came to this decision, and what sort of data you have around it. Obviously people would have concerns, so how can you put our minds at ease.”

- Anna Reid, *resident of the Brooklyn Portland neighborhood*

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NW Natural appears to be acting without any oversight, accountability, or transparency around the amount of hydrogen being blended or the health and safety impacts that blending could have on customers.”

- Coalition of Environmental Advocates

References

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- 3 U.S. Department of Energy. *Safe Use of Hydrogen*. <https://www.energy.gov/eere/fuelcells/safe-use-hydrogen>.
- 4 Lebel, Eric D., et al. "Methane and NOx Emissions from Natural Gas Stoves, Cooktops, and Ovens in Residential Homes." *Environmental Science & Technology*, vol. 56, no. 4, Feb. 2022, pp. 2529–39, <https://doi.org/10.1021/acs.est.1c04707>.
- 5 Sánchez-Bastardo, Nuria, et al. "Methane Pyrolysis for Zero-Emission Hydrogen Production: A Potential Bridge Technology from Fossil Fuels to a Renewable and Sustainable Hydrogen Economy." *Industrial & Engineering Chemistry Research*, vol. 60, no. 32, Aug. 2021, pp. 11855–81, <https://doi.org/10.1021/acs.iecr.1c01679>.
- 6 Timmerberg, Sebastian, et al. "Hydrogen and Hydrogen-Derived Fuels through Methane Decomposition of Natural Gas – GHG Emissions and Costs." *Energy Conversion and Management: X*, vol. 7, Sept. 2020, p. 100043, <https://doi.org/10.1016/j.ecmx.2020.100043>.
- 7 Institute for Energy Economics and Financial Analysis (IEEFA). *National Grid's 20 Year Plan Should Not Rely on Hydrogen for Homes or Buildings: Comments by the Institute for Energy Economics and Financial Analysis (IEEFA) to the NYS Public Service Commission Regarding National Grid's 20 Year Plan*. 17 Sept. 2024, https://ieefa.org/sites/default/files/2024-09/IEEFA%20Comments%20to%20NYS%20Public%20Service%20Commission%20September%202024_0.pdf.