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Testimony in Opposition to LD 1775, An Act to Establish a Clean Hydrogen Pilot Program

To the Committee on Energy, Utilities and Technology
by Jack Shapiro, Climate and Clean Energy Program Director
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Senator Lawrence, Representative Zeigler, members of the Energy, Utilities and Technology Committee, my name is Jack Shapiro, and I am the Climate and Clean Energy Director at the Natural Resources Council of Maine (NRCM). NRCM has been working for more than 60 years to protect, restore, and conserve Maine's environment, on behalf of our 25,000 members and supporters. I'm here today to testify in opposition to LD 1775, An Act to Establish a Clean Hydrogen Pilot Program.[1]

Hydrogen will likely be an important element to help Maine reach its goal of net zero carbon pollution, as well as our national and international climate goals. While we currently have the ability to meet most of our decarbonization goals with existing technologies—essentially, renewable energy, electrified vehicles, heat pumps, battery storage, and a flexible and dynamic grid—there are some specific end-uses of energy that are more difficult to electrify and chemical feedstocks that currently come from oil and gas that will need to be replaced. For example, the Department of Energy's National Clean Hydrogen Strategy and Roadmap identifies strategic, high-impact uses for clean hydrogen as being in "the highest value applications, where limited deep decarbonization alternatives exist. Specific markets include the industrial sector, heavy-duty transportation, and long-duration energy storage to enable a clean grid."[2]

The leading candidate to generate this hydrogen is "green" hydrogen, which uses renewable energy to power electrolyzers that create hydrogen directly from water. There is an enormous amount of hype around hydrogen, and the Inflation Reduction Act has put in place a major hydrogen production subsidy. However, there are major potential pitfalls in boosting hydrogen production, and we should proceed with caution.

First, often lost in the excitement of hydrogen as a solution to our clean energy problems, is that while it creates no direct carbon emissions when it is burned, hydrogen is not benign from a global warming perspective, and has significant atmospheric effects:

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[1] https://legislature.maine.gov/legis/bills/getPDF.asp?paper=HP1138&item=1&snum=131

[2] https://www.hydrogen.energy.gov/pdfs/clean-hydrogen-strategy-roadmap.pdf

- Hydrogen leaks have a significant global warming impact through chain reactions in the atmosphere. Hydrogen has 33 times the global warming potential of an equal amount of carbon dioxide over 20 years.[3]
- Hydrogen combustion can create high levels of Nitrogen Oxide (NOx) pollution. NOx is a precursor to ground-level ozone or smog, which "can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. [It can] exacerbate bronchitis, emphysema, and asthma, reduce lung function and inflame the linings of the lungs, and repeated exposure may permanently scar lung tissue."[4] And Nitrous Oxide has a global warming potential of 265–298 times that of CO2 for a 100-year timescale.[5]
- Hydrogen also interacts with the molecule primarily responsible for breaking down methane, a potent greenhouse gas. Significant hydrogen usage could lead to a buildup of methane in the atmosphere leading to significant warming and associated negative impacts.[6]

Beyond these effects, there are several scenarios in which hydrogen production perversely increases carbon emissions in the near and medium term, whether that is powering hydrogen production with fossil fuel power generation, or using hydrogen to extend the life of the fossil gas distribution system.

Our climate goals are ambitious, and we can't afford to take steps backwards. Fortunately, there are emerging consensus policy guardrails and safeguards that can be put in place to prevent these outcomes, but unfortunately LD 1775 as printed does not include any of them.

End-uses

- Hydrogen is not suitable for uses like short-term energy storage and blending for commercial or residential heating. The round-trip efficiency of producing hydrogen and then burning it to generate electricity is far lower than other commercial short-term storage solutions like batteries.[7] Blending hydrogen into the gas system can only be done at low rates with marginal carbon emissions intensity benefits without costly upgrades to the system and to end-use appliances.[8,9] Given Maine's ambitious climate goals, any investment in or expansion of the natural gas system should be considered a future stranded cost and a threat to ratepayers unless proven otherwise. <u>The bill should limit</u>

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[3] https://www.bloomberg.com/news/features/2022-05-31/hydrogen-fuel-investments-could-risk-making-global-warming-worse

[4] Maine Climate Council. Scientific and Technical Advisory Committee. "Scientific Assessment of Climate Change and Its Effects in Maine." https://www.maine.gov/future/sites/maine.gov.future/files/inline-files/GOPIF_STS_REPORT_092320.pdf

[5] https://www.epa.gov/ghgemissions/understanding-global-warming-potentials

[6] https://www.sciencedaily.com/releases/2023/03/230313162740.htm

[7] https://www.greentechmedia.com/articles/read/the-reality-behind-green-hydrogens-soaring-hype

[8] https://www.cesa.org/wp-content/uploads/Offshore-Wind-to-Green-Hydrogen-Insights-from-Europe.pdf

[9] https://energyinnovation.org/wp-content/uploads/2022/04/Assessing-the-Viability-of-Hydrogen-Proposals.pdf

end-uses to ensure Maine is not subsidizing inappropriate uses of hydrogen that will not substantially reduce emissions.

Technology specificity

- Green hydrogen is created using electrolysis. "Blue hydrogen," or hydrogen created from natural gas and utilizing carbon capture, is not technologically mature, incentivizes fossil fuel production, and has higher rates of GHG emissions.[10] The bill should specify that only hydrogen produced using electrolysis is eligible for the pilot program.

Power source emissions

- Hydrogen's usefulness is tied to its ability to store energy. The flip side is that Hydrogen is extremely energy intensive to produce. If hydrogen is produced using electrolysis, the associated emissions are tied to where the electricity comes from. Consensus is forming that there are three pillars that can ensure that hydrogen production does not have the perverse outcome of increasing emissions: Additionality, deliverability, and hourly matching.[11]
    - Additionality means sourcing the electricity used for hydrogen production from new renewable sources.
    - Deliverability means these sources must be located near the production facility, i.e., within the regional grid and without transmission constraints.
    - Hourly matching means that the production facility must use electricity when its additional supply is producing electricity. Otherwise, it will increase overall grid demand which will be served by fossil fuel plants, increasing emissions.
- As an example, a hydrogen production facility purchasing power from the grid would be incentivized to run as often as possible, including adding to load during peaking events where oil plants like Wyman station are activated, increasing costs for everyone, and elevating emissions. Subsidizing hydrogen production that increases emissions is unacceptable: The bill should tie eligibility for the pilot project to demonstrate additionality, deliverability, and hourly matching.

NRCM does not oppose the production or use of hydrogen as part of our move toward clean energy, but we believe that this bill as printed would likely result in the perverse outcome of increasing Maine's greenhouse gas emissions and undermining our climate progress. This bill could be amended to gain our support, but we must urge the committee to oppose the bill as it is written. We'd be happy to participate in a work session on this bill and I would be happy to try to answer any questions that you have.

Thank you.

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[10] https://www.smithsonianmag.com/smart-news/blue-hydrogen-20-worse-burning-coal-study-states-180978451/

[11] https://www.nrdc.org/sites/default/files/2023-03/joint-letter-45v-implementation-20230223.pdf