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MAINE CHAPTER

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To: Energy, Utilities, and Technology Committee
From: Ania Wright, Political & Legislative Specialist, Sierra Club Maine
Date: 5/2/2023
Re: **Testimony in opposition to LD 1775:** ***An Act to Establish a Clean Hydrogen Pilot Program***

Senator Lawrence, Representative Ziegler, and members of the Energy, Utilities, and Technology Committee, I am testifying on behalf of Sierra Club Maine, representing over 22,000 supporters and members statewide. Founded in 1892, Sierra Club is one of our nation's oldest and largest environmental organizations. We work diligently to amplify the power of our 3.8 million members nation-wide as we work towards combating climate change and promoting a just and sustainable economy. To that end, we urge you to vote 'Ought Not to Pass' on L.D. 1775.

As written, the Sierra Club opposes LD 1775 because it allows for the future use and development of hydrogen that is not classified as 'clean'. I appreciate the bill sponsor mentioning our policy in her testimony - The Sierra Club only supports the use of green hydrogen—hydrogen made through electrolysis that is powered by renewable energy. Even in the case of green hydrogen, other conditions must be met for its use to be a good idea:

- Green hydrogen is a promising solution only for uses that cannot otherwise directly rely on clean electricity, which is much more efficient.
- Green hydrogen should not be used to justify a buildout of facilities that otherwise increase pollution or fossil fuel use.
- If green hydrogen is being used, the goal should be to switch to 100 percent green hydrogen once the technology is available. We should not support projects that label themselves as "sustainable" because their fuel source includes a small fraction of hydrogen when the lion's share of it is fracked gas.[1] Hydrogen projects need to be generated with renewables, time matched to the hydrogen production and geographically located. That does not include fracked gas, biomass, or biogas.
- Hydrogen leaks must be prevented or offset by the removal of greenhouse gasses given that hydrogen interferes with nature's destruction of methane, making it, in effect, an indirect but powerful greenhouse gas.[2]

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[1] https://www.sierraclub.org/articles/2022/01/hydrogen-future-clean-energy-or-false-solution

[2] Scientists have long known and cautioned that hydrogen has indirect warming impacts (Ehhalt et al., 2001; Derwent et al., 2001, 2006, 2020; Prather, 2003; Schultz et al., 2003; Warwick et al., 2004, 2022; Colella et al., 2005; Wuebbles et al., 2010; Derwent, 2018; Paulot et al., 2021; Field and Derwent, 2021). When it escapes into the atmosphere, hydrogen has two main fates: around 70 %–80 % is estimated to be removed by soils via diffusion and bacterial uptake, and the remaining 20 %–30 % is oxidized by reacting with the naturally occurring hydroxyl radical (OH), yielding an atmospheric lifetime of around a few years (Rahn et al., 2003;

There are some ways in which green hydrogen use could be part of getting to zero emissions economy-wide. Green hydrogen has the potential to help store intermittent renewable energy, be converted to a "zero-emissions" fuel for maritime shipping and aviation, be used in high-heat industrial processes that cannot otherwise be electrified, or, be used as a feedstock in some industrial processes, like steel production. Green Hydrogen is likely most appropriate for hard-to-decarbonize sectors, like long-haul freight trucking or large energy intensive facilities like Dragon Cement, and we discourage looking to green hydrogen as a large scale solution to reduce emissions[3].

As currently written, L.D. 1775 would allow for both green hydrogen and blue hydrogen, and possibly others. Blue hydrogen is a steam methane process that uses methane gas and creates hydrogen and carbon dioxide. Some of the carbon dioxide is released into the atmosphere as greenhouse gas emissions[4].

In order for L.D. 1775 to only allow green hydrogen, it would need to be defined as electrolytic, or at least lower the emissions threshold to the highest level of the IRA production tax credit (<0.45 kg CO2e/kg H2) that is virtually impossible for hydrogen from fossil feedstocks to meet.

Additionally, we are aware that the State is currently involved with a hydrogen hub[5], and there is funding available through the Inflation Reduction Act[6] for regional development. For these reasons, we don't see the need for a pilot as outlined in L.D. 1775 at this point. If the committee does deem L.D. 1775 necessary after consulting with the Governor's Energy Office, then we urge the committee to amend the language to apply only to zero emissions green hydrogen focused on industrial sectors that are difficult to decarbonize.

Below we have included additional information for the committee including potential amendment language and more considerations for the pursuit of hydrogen in Maine. Thank you for your time and consideration.

Sincerely,

Ania Wright
Legislative and Political Specialist
Sierra Club Maine Chapter

Derwent, 2018; Paulot et al., 2021; Warwick et al., 2022). The oxidation of hydrogen in the atmosphere leads to increasing concentrations of greenhouse gases in both the troposphere and stratosphere, as described in Fig. 1 (Derwent, 2018; Derwent et al., 2020; Paulot et al., 2021; Field and Derwent, 2021; Warwick et al., 2022)."-- from Ocko, I. B. and Hamburg, S. P.: Climate consequences of hydrogen emissions, Atmos. Chem. Phys., 22, 9349–9368, https://doi.org/10.5194/acp-22-9349-2022, 2022. (https://acp.copernicus.org/articles/22/9349/2022/).

[3] https://earthjustice.org/wp-content/uploads/hydrogen_earthjustice_2021.pdf

[4] https://www.sierraclub.org/articles/2022/01/hydrogen-future-clean-energy-or-false-solution

[5] https://www.maine.gov/energy/initiatives/infrastructure/cleanhydrogenhubs

[6] Section 45V of the IRA includes clean hydrogen production credit for projects that commence construction before the end of 2032 paid for all production over the first ten years of operations: https://www.irs.gov/inflation-reduction-act-of-2022

Potential amendment language

- 4 1. Definitions. As used in this section, unless the context otherwise indicates, the following terms have the following meanings.
    - ~~6 A. "Clean hydrogen" means hydrogen produced through a process that results in a life 7-cycle greenhouse gas emissions rate of not greater than 4 kilograms of carbon dioxide 8 or carbon dioxide equivalents per kilogram of hydrogen generated, as determined by 9 the commission in accordance with IRS production tax credit regulations.~~
    - A.“The terms Green and clean hydrogen” means hydrogen produced with electrolysis powered by renewable energy, and no fossil fuels are used or the lifecycle emissions threshold, including, but not limited to, the indirect warming effects of leaked hydrogen as it interferes with methane oxidation, threshold is equal to or lower than the highest level of the IRA production tax credit (<0.45 kg CO2e/kg H2).
- (2) Prioritize facilities with lower emissions associated with the electricity supply, including demonstrated contracts for new renewable energy supplies in the New England region, other than hydroelectric dams in any region, and commitments to match production with renewable energy supply on an hourly basis.
- 34 (32) Choose facilities the commission finds are in the public interest and are 35 reasonably likely not to cause significant costs for gas or electric ratepayers;
- (4) Demonstrate end-uses that are consistent with high-value applications where limited deep decarbonization or electrification alternatives exist, such as industrial uses, heavy-duty transportation, maritime shipping, or long-duration energy storage.
- Require real time monitoring of leaks of hydrogen to, in and from facilities handling it, as well as rapid correction of the leaks and offsetting of the estimated climate impacts of the leaked hydrogen.

Further considerations:

Blended hydrogen in power plants:

- Renewable energy remains a cleaner, safer, and more affordable alternative to blending hydrogen in gas plants.

- Currently, gas turbine technology can handle between 5 and 20 percent hydrogen blended with gas, with newer technologies, close to commercialization, reaching 30 percent. At these low blending rates, emissions of carbon are only minimally reduced by the use of hydrogen, given hydrogen’s low energy density.

- Burning a gas/hydrogen blend would likely increase NOx emissions. Blending gas with hydrogen, even green hydrogen, should not be used to mask existing gas plants as “clean,” nor to justify investment in new gas plants.

Blended hydrogen in buildings:

- Hydrogen is not a reasonable replacement for gas in heating and cooking appliances in buildings. Electrification is a better option; it is already available, more efficient, more cost-effective, and provides cleaner indoor air than gas.
- Gas appliances can only handle hydrogen blending of 5 to 20 percent by volume, which severely limits the potential for emissions reductions. Hydrogen use in buildings beyond that level would require all new appliances to be installed for safety and emissions control.
- Hydrogen is also extremely flammable and can catch fire even in small concentrations. One study found that if hydrogen were used in homes to replace gas, the annual predicted number of explosions would more than quadruple, which would subsequently increase injuries.

Equity and Justice concerns and hydrogen:

- Blending hydrogen with gas still results in significant gas pollution in communities in addition to safety concerns related to transporting and burning the combination of these combustible fuels. This is a concern for Maine citizens living near gas facilities[7].
- Blending gas with hydrogen requires upgrades to existing gas plants to allow them to burn the blended fuel. We know for a fact that the gas plants are disproportionately located near marginalized communities. In Maine, 42% of our power plants are neighboring communities that are low income or marginalized[8]. That means we would be testing hydrogen/gas blends in disproportionately impacted communities.
- Blended hydrogen should not be allowed in disproportionately impacted communities, especially because the cost of upgrades to gas plants could result in the gas plant burning fossil fuels for a longer amount of time than originally planned. This would mean that the surrounding community would be forced to bear the burden of pollution from electricity generation for longer. Blended hydrogen should not extend the life of existing gas plants.

[7] https://environmentamerica.org/maine/resources/maines-dirtiest-power-plants/
[8] https://www.epa.gov/power-sector/power-plants-and-neighboring-communities#graphing (see key demographics by state section)