environmental defence

Comments on the Hydrogen Strategy for Canada: Draft Executive Summary

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About Environmental Defence Canada
Environmental Defence is a leading Canadian advocacy organization that works with government, industry and individuals to defend clean water, a safe climate and healthy communities.

Summary of Recommendations:

- In order to align with Canada's commitment under the Paris Agreement, a credible and robust hydrogen strategy for Canada must focus on supporting and growing the nascent green hydrogen sector through investment in research and development and the creation of a supportive regulatory and policy framework. The strategy must be explicit about a preference and focus on green hydrogen, rather than using the term "clean" to mislead Canadians and allow for fossil-fuel derived hydrogen to play a key role. Relying on developing a blue hydrogen sector and then later transitioning to green hydrogen is not an effective strategy.
- In order to align with Canada's G20 and G7 commitments to eliminate inefficient fossil fuel subsidies, Canada should not be providing any form of financial support for the development of fossil-fuel derived hydrogen. Support for research and development of natural gas for the production of hydrogen, as well as for infrastructure, falls under the international definitions for fossil fuel subsidies.
- The development of a hydrogen sector should not be coupled to the development of small modular reactors (SMR), given significant concerns with the feasibility, costs, safety and timeliness of the technology.

Environmental Defence Canada is very interested in the potential for this strategy to help Canada reach its climate commitments. We are requesting to be involved in the development of the strategy through joining the Strategic Steering Committee or Working Groups.

Rationale:

Environmental Defence Canada (EDC) recognizes the potential of hydrogen to play a critical role in decarbonizing Canada's energy systems and meeting Canada's climate commitments under the Paris Agreement, including setting Canada on a pathway to net-zero emissions by 2050.

Focus on green hydrogen

In order for Canada's hydrogen strategy to align with those commitments, the focus must be on developing the green hydrogen sector.

- **Green hydrogen aligns with the deep decarbonization required to tackle climate change.** A focus on enabling green hydrogen is the only way to have an emission-free hydrogen strategy that aligns with the profound transformation required to move Canada's energy system from one largely based on fossil fuels to renewable energy systems.
- **There is an opportunity for Canada to become a global leader in the green hydrogen industry**.
- **Green hydrogen both complements and supports the development of the renewable energy sector**. The creation of electrolysis-derived hydrogen provides a ready mechanism to allow for more rapid deployment of renewable energy. Hydrogen

can act as an energy carrier to enable increased penetration of renewables by providing time shifting and energy storage capabilities.

- **Less infrastructure is required for green hydrogen.** Fossil fuel derived hydrogen - as described below - has geographical limitations. In contrast, green hydrogen offers greater flexibility in terms of the scale of the projects and choice of location, meaning it is a sector that can be developed across the country. Due to fewer infrastructure needs, green hydrogen projects will be easier and faster to build. The modularity of green hydrogen also makes it uniquely suited to delivering distributed solutions. Co-locating small-scale production with its end-use application removes the economic and practical barriers of hydrogen transport.[1]

The federal government should look to Germany as an example: their National Hydrogen Strategy states that only green hydrogen is sustainable, signaling that other hydrogen forms, made from fossil gas, will not play a significant role in Germany's long-term energy future.[2]

EDC is deeply concerned by the focus on fossil fuel derived hydrogen in the draft executive summary.

- **Blue hydrogen is not aligned with a pathway to zero emissions economy**. Blue hydrogen relies on carbon capture and storage (CCS) technology, which is only 80-90% effective[3], thus still resulting in greenhouse gas (GHG) emissions and falling short of a zero emissions objective. In addition, CCS does not address methane leakage from the production or transportation of natural gas,[4] so there are still significant methane emissions along the supply chain.
- **Blue hydrogen requires both hydrogen and carbon storage infrastructure**. Hydrogen needs to be produced and distributed to customers, with co-produced carbon captured onsite. Then, that carbon must be transported to a site and stored forever. Development of blue hydrogen is limited to production in areas with large geological storage potential for carbon.[5]
- **Blue hydrogen's GHG footprint is dependent on unproven and expensive CCS technology**. CCS isn't yet commercially viable and would require massive scaling up. Furthermore, the only current commercial application for using captured carbon dioxide is improving the efficiency of oil wells, which in turn creates more carbon pollution. Given that carbon storage will be a scarce resource as we move towards a net-zero emissions future, its use should be prioritised towards the sectors where CCS is most needed, e.g.

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[1] https://www.petroleum-economist.com/articles/low-carbon-energy/renewables/2020/green-hydrogen-can-be-cost-competitive

[2] https://www.cleanenergywire.org/factsheets/germanys-national-hydrogen-strategy

[3] https://www.tno.nl/en/focus-areas/energy-transition/roadmaps/towards-co2-neutral-fuels-and-feedstock/hydrogen-for-a-sustainable-energy-supply/ten-things-you-need-to-know-about-hydrogen/

[4] https://www.e3g.org/wp-content/uploads/E3G_Renewable_and_decarbonised_gas_Options_for_a_zero-emissions_society.pdf

[5] https://www.e3g.org/wp-content/uploads/E3G_Renewable_and_decarbonised_gas_Options_for_a_zero-emissions_society.pdf

where there are no other decarbonization options.[6] This is not the case for hydrogen production.

Any funding for blue hydrogen is a fossil fuel subsidy and goes against Canada's G7 and G20 commitments to eliminate inefficient subsidies.

Blue versus green hydrogen: comparing costs

Many of the arguments put forward by blue hydrogen advocates - such as the arguments that only blue hydrogen can be scaled up enough and made cost competitive - ignore key realities.

- **Fossil-fuel based technologies are expected to have limited cost reduction potential relative to the expected cost reductions for electrolysis.**[7] While most of the technologies used for blue hydrogen are already mature technologies, there is still a lot of potential for innovation and cost reduction in the green hydrogen process, as large-scale electrolysis is a novel field of application.[8]
- **Plummeting costs of green hydrogen.** The prices of renewable energy sources that power green hydrogen are falling precipitously and are now the lowest cost sources of new power in many parts of the world.[9] Investment is also climbing with global production growing by 230% between 2000 and 2018.[10] New analysis by banking giant Morgan Stanley[11] says plummeting wind energy prices, as well as ongoing reductions in the costs of electrolyser technology, could push green hydrogen to be more cost competitive by 2023 than fossil-dependent "grey", with government support.
- **Uncertain costs of blue hydrogen.** The costs of blue hydrogen are harder to gauge as they depend on the cost of adding CCS to conventional production. Though the cost of CCS is also highly uncertain, current estimates place it at about a 30% cost increase.[12] Furthermore, the development of a blue hydrogen sector requires more infrastructure.

Focusing on current metrics to dismiss green hydrogen's prospects is highly risky. Both cost trends and capacity deployment lessons from other sectors point to a future competitive environment very different from today.[13]

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[6] https://www.e3g.org/wp-content/uploads/E3G_Renewable_and_decarbonised_gas_Options_for_a_zero-emissions_society.pdf

[7] http://www.sustainablegasinstitute.org/wp-content/uploads/2017/12/SGI-A-greener-gas-grid-what-are-the-options-WP3.pdf?noredirect=1

[8] https://www.e3g.org/news/a-global-green-hydrogen-market-made-in-germany/

[9] https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/May/IRENA_Renewable-Power-Generations-Costs-in-2018.pdf

[10] https://ourworldindata.org/renewable-energy

[11] https://ieefa.org/morgan-stanley-green-hydrogen-could-be-economically-competitive-by-2023/

[12] https://www.e3g.org/wp-content/uploads/E3G_Renewable_and_decarbonised_gas_Options_for_a_zero-emissions_society.pdf

[13] https://www.petroleum-economist.com/articles/low-carbon-energy/renewables/2020/green-hydrogen-can-be-cost-competitive

A "later transition" to green hydrogen is not a practical strategy

During the stakeholder engagement session, officials from Natural Resources Canada laid out the plan to begin investing in blue hydrogen and later transition to zero-emission green hydrogen. EDC has significant concerns with this approach.

- **We will only get one chance to kick start innovation and investment in the right direction.** The economic crisis created by COVID-19 means that the ability of governments to invest "later" in green hydrogen is likely to be severely compromised.
- **By the time blue hydrogen projects can be completed, the cost of producing green hydrogen is likely to have dropped significantly, but we will be locked into a blue hydrogen industry**. It will likely take a decade to develop a blue hydrogen sector. By the time blue hydrogen clusters become operational, green hydrogen could be just as cheap and its projects just as large.[14] However, we will have locked in a less competitive blue hydrogen industry, given the significant infrastructure needs of blue hydrogen.
- **The urgency of the climate crisis leaves no time for a "later" transition.** Climate change impacts are mounting at such a rate that all new government investments must be focused on rapid transition to carbon-free energy systems.

The development of a hydrogen sector should not be coupled with SMRs

EDC is concerned about linking hydrogen to development of small modular reactors (SMR), given significant concerns with the technology.

- Unproven technology - SMRs are still conceptual, with designs only 5 – 20% complete.[15]
- Cost benefit analysis of SMRs has largely failed to address operations and maintenance costs as well as decommissioning costs satisfactorily.[16]
- SMRs will be expensive. A study commissioned by the Ontario government estimates that the cost of SMRs may range between 46 and 76 cents a kWh.[17]
- A focus on SMRs is a strategy to ensure delay in taking climate action given that SMRs will, at best, come online in the mid-2030s.

As the government rolls out its national hydrogen strategy, critical decisions about the future shape of Canada's role in the emerging hydrogen economy must be made. The oil and gas sector is pushing for governments to invest in fossil fuel derived blue hydrogen, as a way to search for a new market for their products as the world transitions away from oil. The Government of Canada must stand firm and not allow the oil and gas industry to leverage this opportunity as a last chance to create a market for its product.

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[14] https://www.petroleum-economist.com/articles/low-carbon-energy/renewables/2020/green-hydrogen-can-be-cost-competitive

[15] Canadian Nuclear Safety Commission, Presentation for Management Committee: Small Modular Reactor (SMR) Update– Readiness for Regulation, January 14, 2016. Acquired through Access to Information, A-2016-00010

[16] Mignacca, B., & Locatelli, G. (2020). Economics and finance of Small Modular Reactors: A systematic review and research agenda. Renewable and Sustainable Energy Reviews, 118, 109519. https://doi.org/10.1016/j.rser.2019.109519

[17] Hatch Ltd., Ontario Ministry of Energy SMR Deployment Feasibility Study, June 2, 2016,pg.11.