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January 18, 2021

Ministry of Environment, Conservation and Parks
Climate Change Program Development
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Attention: Michael Bishop

RE: City of Toronto Comments
ERO# 019-2709 – Ontario Low-Carbon Hydrogen Strategy Discussion Paper

In October of 2019 the City of Toronto joined hundreds of municipalities around the world, including several in the Province of Ontario, in declaring a climate emergency and advancing plans to reduce greenhouse gas emissions with the ultimate goal of reaching net zero emissions by 2050, or sooner. As part of this long term emissions reduction goal, Toronto aims to supply its energy demand with renewable and low-carbon energy systems, of which green hydrogen may play a role. The following submission addresses some of the key questions posed in the Ontario Low-Carbon Hydrogen Strategy discussion paper.

Do you support Ontario's efforts to create a hydrogen strategy?
Although hydrogen is very likely to play a contributing factor in a low-carbon future in Ontario, the potential at scale is small. Hydrogen is not an energy source, but a storage technology, which requires a significant amount of energy input making it a net-negative energy solution. The energy input required to produce liquified or gaseous hydrogen gas is greater than the energy output obtained from re-combining the compressed hydrogen gas with oxygen in a fuel cell. Due to these limitations, hydrogen is unlikely to play a large-scale role in Ontario's low-carbon future. Since there are other more critical challenges and barriers facing Ontario's energy sector, such as expanding renewable energy generation of both thermal and electricity to displace fossil fuel use in buildings, and decarbonizing the local and provincial electricity grids. Attention to and investment in hydrogen should be commensurate with its relatively modest potential for reducing GHG emissions.

What should be the key outcomes of Ontario's hydrogen strategy?
A hydrogen strategy should assist the province and municipalities in reducing GHG emissions to meet climate change targets, and as such should prioritize the development of green hydrogen. Blue hydrogen such as fossil carbon capture and storage (CCS) investments could divert limited financial resources away from renewable energy deployment back to fossil fuels. The strategy should also identify market potential and feasibility for hydrogen use by end-users, based on the pattern of hydrogen production and end user application. This should include a focus on the

GHG reduction potential of hydrogen investment, as compared to investments in other energy initiatives. As such, a life-cycle carbon approach should be applied to minimise the potential negative climate and environmental impacts of the hydrogen sector. This should include a low-carbon standard for the promotion of hydrogen production installations based on their full life-cycle greenhouse gas performance.

How should the hydrogen strategy define and measure success?

The hydrogen strategy should take a systems approach that focuses on hydrogen as part of the larger energy solution. The strategy should outline the potential for hydrogen to contribute to GHG reductions as compared to other renewable energy solutions, in line with municipal, provincial, and federal climate change goals. It should include examples of viable investment projects and should also seek to raise awareness of the potential role of hydrogen as compared to other low carbon fuels and technologies.

What are Ontario's key technology, regulatory and business opportunities in developing low-carbon hydrogen?

From a municipal perspective, a relatively small number of key opportunities exist, including:

- Assessing the technical suitability of hydrogen use in existing distribution networks (pipelines) and review of the regulatory framework for competitive decarbonised gas markets.
- Leveraging methane capture from landfill for hydrogen production.
- Investment in off-peak hydrogen production plants that can be deployed during peak-electrical hours for both electricity and heat generation. Such systems can also be integrated into utility grids, or in large districts offering ancillary services.
- Fuel Cell Electric Vehicles (FCEVs) that could complement battery electric vehicles in reducing emissions. However, low-carbon personal and commercial vehicle uptake should focus on battery electric vehicles (BEVs) and assess where FCV applications are technologically and financially competitive.

How can hydrogen support a reliable and affordable energy system, including energy storage?

Hydrogen is an energy intensive storage solution, and as such, is only as clean as the input energy source. Currently, neither green hydrogen nor low-carbon hydrogen (fossil-based hydrogen with carbon capture) are cost-competitive against fossil-based hydrogen. In addition, wind and solar in Ontario are intermittent sources without adequate storage technology. Ontario should invest in modernizing the electricity grid with additional investments in renewables and storage before investing in hydrogen storage.

What are the main risks of hydrogen use in Ontario and are there opportunities for the government to decrease these risks?

A focus on hydrogen could divert investment from other technologies and strategies that have a greater potential to assist the Province (and its municipalities) in reaching GHG reduction goals. Ontario should prioritize fundamental and scalable strategies for fuel switching away from fossil fuels, with a focus on electric vehicles, heat pumps, renewable thermal energy

generation and renewable electricity generation. Investment in hydrogen should be targeted in specific areas where technological and economic feasibility have been demonstrated.

We thank you for the opportunity to submit comments on the Provincial Hydrogen Strategy Discussion Paper. Should you have any questions or comments on this submission, please contact Jack Bolland, Program Manager, Environment and Energy Division at jack.bolland@toronto.ca.

Sincerely,

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