

Jan 20th, 2023

Sara Hardgrave
Acting Commission Secretary
Regulatory Services
British Columbia Utilities Commission
900 Howe Street
Vancouver, BC V6Z 2N3

Dear Ms. Hardgrave,

RE: Hydrogen BC Comments on the Inquiry into the Regulation of Hydrogen Energy Services

As part of the British Columbia government's commitment to achieving net-zero emissions by 2050, The Province aims to accelerate the production and use of renewable and low-carbon hydrogen.

British Columbia is home to 51% of hydrogen and fuel cell companies in Canada, making it the province with the largest hydrogen and fuel sector in the country.

Moreover, the B.C. government has been a strong supporter of hydrogen and fuel cell innovation, demonstrated by The Province's commitments and initiatives. For instance in 2020 the Canadian Hydrogen and Fuel Cell Association, with the support of the Government of British Columbia, established Hydrogen BC, a provincial affiliate of the association. Hydrogen BC represents more than 30 world-leading B.C. organizations across the hydrogen value chain.

Together, the Province and organizations across different sectors (private, public, and non-profit) are working to accelerate the adoption of hydrogen products and services.

This inquiry into the regulation of hydrogen energy services comes at an appropriate time, as the industry is expected to grow significantly. We are pleased to work with the B.C. Utilities Commission (BCUC), other associations, stakeholders and rightsholders to provide our insights and feedback.

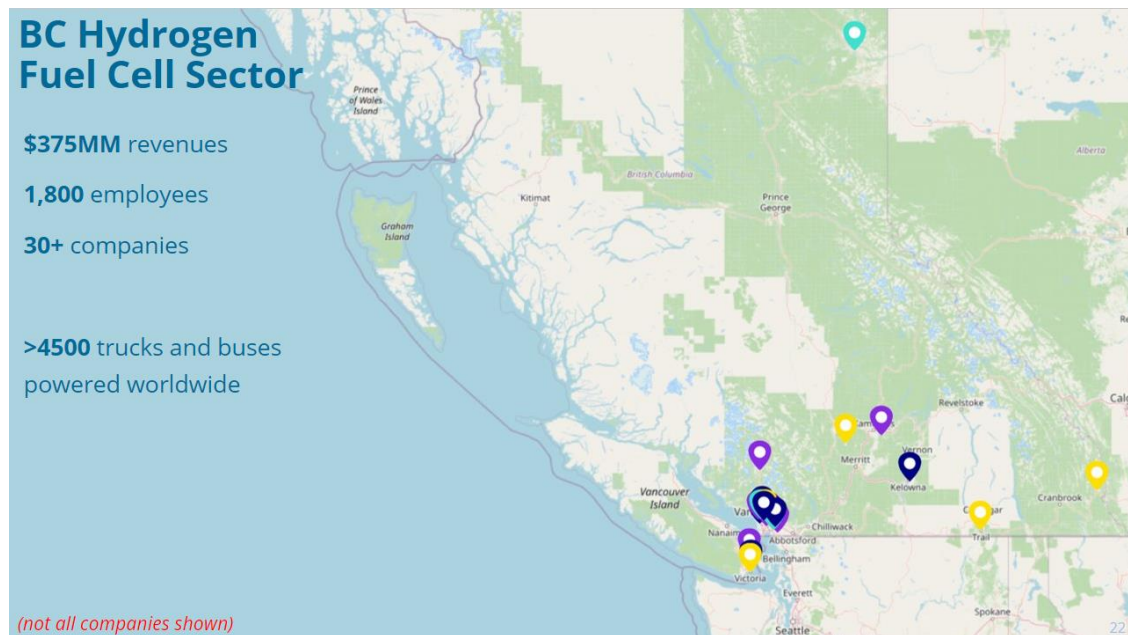
Hydrogen BC and its members broadly believe that emerging market competition will benefit consumers and facilitate the sector's growth; and that as utilities begin providing hydrogen energy services, appropriate regulations can be developed for the public benefit. We have organized our feedback into sections according to BCUC's inquiry document, below.

Hydrogen BC encourages BCUC to consider our responses and remains available for further discussion at your convenience. We thank BCUC for the opportunity to participate in this inquiry process.

Topic 1 - Development of the Hydrogen Services Industry

a) What is the status and anticipated development of the Hydrogen Energy Services industry in BC, including size of market, number and types of providers, and number and types of customers?

At present, British Columbia's clean hydrogen industry encompasses more than 30 businesses, 1800 employees, and \$375 million in annual revenues.¹ At present this is dominated by the Province's world-class hydrogen fuel cell cluster. It should be emphasized that the Total Addressable Market for hydrogen fuel cells is a subset of the Total Addressable Market for clean hydrogen energy services.



Size of Market

Canada's clean hydrogen sector is expected to grow dramatically in the coming decades, as clean hydrogen is a key pillar of Net Zero commitments at both the provincial and the federal level. For example, by 2050, it is projected that Canada's clean hydrogen sector could encompass up to 358,000 jobs generating over \$47,000,000,000 in annual revenue.

Focusing on British Columbia and the nearer 2030 timeframe, the BC Hydrogen Study (2021) estimated that B.C. demand for hydrogen for transportation could be in the range of 4,400 to 23,000 tonnes per year. This is equivalent to daily consumption of approximately 12 to 63 tonnes per day.

¹ CHFCA and MNP, Canadian Hydrogen and Fuel Cell Sector Profile (June 2022).

For context HTEC's recently announced project to capture and liquefy clean by-product hydrogen from a chemical facility in North Vancouver, is for 15 tonnes per day.²

By 2030 British Columbia's consumption of clean hydrogen for gas energy – displacing natural gas and its concomitant emissions – has the potential to be in the range of 25 to 50 PJ/year.³ This is equivalent to approximately 210,000 to 420,000 tonnes per year. As this hydrogen would be distributed through existing gas energy utilities (FortisBC, PNG) regulatory oversight consistent with that provided for natural gas energy services may be appropriate.

World-scale hydrogen export projects in development could also produce substantial quantities of clean hydrogen by 2030. As this hydrogen would not be sold within province, its production volumes would probably not be of relevance to BCUC.

Number and types of providers

At present HTEC supplies the hydrogen used for the Province's four hydrogen filling stations.⁴ The hydrogen is generated through electrolysis. Metro Vancouver's hydrogen and fuel cell cluster largely relies on liquid hydrogen imported from industrial gas companies in the United States, with at least one facility using on-site electrolyzers for their hydrogen needs. HTEC and Hydra Energy plan to capture by-product hydrogen from chemical facilities in the coming years. A methane pyrolysis pilot plant in the province has been announced and could be brought to full scale in the 2025-2026 timeframe.⁵

Moving forward it is expected that independent power producers may generate hydrogen. They may be joined by project developers focused on biomass gasification (such as wood waste). When geoscience certification and regulatory frameworks for British Columbia's underground pore space are developed, some producers may produce "blue hydrogen" pairing methane reforming with carbon management.

Merchant gas producers – companies such as Canadian Hydrogen and Fuel Cell Association (CHFCA) members Air Liquide, Air Products, Linde, and Messer – may choose to generate hydrogen within-province as well.

Number and types of customers for hydrogen production and storage

Near-term customers of hydrogen can be divided into multiple categories. Utilities and merchant gas producers may procure hydrogen, though their business model is to supply it to end users.

² <https://www.htec.ca/htec-announces-agreement-with-erco-worldwide-to-purchase-land-and-co-locate-a-15-tpd-clean-hydrogen-plant-in-north-vancouver/>

³ Envint Consulting and CBER, [B.C. Renewable and Low-Carbon Gas Supply Potential Study](#) (dated 28 January 2022).

⁴ 7 stations are expected to be operational by end-Q1 2023, and about 18 by end-2025.

⁵ <https://biv.com/article/2022/07/fortisbc-pilot-low-carbon-hydrogen-production-plant>

Small scale end users may include small businesses and members of the public, and would be numerous. They may purchase from a variety of providers, as would be the case with transportation fuel, or they may purchase from a regulated utility, as would be the case when they procure gas energy services.

Larger customers of hydrogen would include companies in the Metro Vancouver fuel cell cluster and operators of off-road vehicles such as locomotives, mining trucks or marine vessels. There are efforts around the world to evaluate the feasibility of using clean ammonia or clean methanol as fuels instead of hydrogen; in this case there would be a market for these two hydrogen carriers as well.

The largest end users of hydrogen in British Columbia are likely to be large industrial facilities; cement plants and refineries could be examples.

Number and types of customers for hydrogen distribution

Hydrogen distribution in the form of transmission and distribution networks would serve end use clients of British Columbia's gas energy utilities.

Hydrogen distribution in the form of liquefied hydrogen would likely serve transportation and logistics – LNG bunkering is analogous – and other customers requiring on-site hydrogen storage, including companies in the local hydrogen fuel cell cluster and potentially the merchant gas sector.

Number and types of customers for sale to end-use customers

End users are discussed in the above two sections.

b) What Hydrogen Energy Services are being or will be provided in BC?

The primary hydrogen energy service currently being provided in BC is that of transport fuel service. As gas energy utilities work to decarbonize their energy services, hydrogen will represent a portion of the gas energy services they provide, whether for residential heating or cooking, restaurant or other commercial use, and for light or heavy industry.

More broadly, British Columbia will see activity across the hydrogen value chain, ranging from a variety of production methods to storage and distribution (tanks, pipelines). Liquefaction or chemical carriers may be also used to facilitate storage and distribution. Clean hydrogen may be used as a fuel or as a chemical feedstock, though the latter might not be defined as an energy service.

Hydrogen's primary uses worldwide are for ammonia production and hydrocarbon refining, but these are not substantial industries in British Columbia.

c) Where do you anticipate participating in the Hydrogen Energy Services market?

Hydrogen BC will participate in the hydrogen sector through member representation, provincial advocacy, and outreach.

Topic 2. Hydrogen Energy Services Markets

a. Which Hydrogen Energy Services industry sectors are (anticipated to be) competitive markets?

Hydrogen BC understands competitive markets as marketplaces with numerous buyers and sellers, in which no single buyer or seller has enough influence to affect market clearing prices. Competitive markets do not typically have significant barriers to entry, and involve homogeneous products.

With more than 30 members of Hydrogen BC, and others in the sector who are not yet members, the hydrogen energy services market in the Province has numerous potential sellers across different points of the hydrogen value chain. Hydrogen molecules are identical to each other, and in hydrogen's use case as a transportation fuel, barriers to entry should not generally stop aspiring new vendors from trying to provide hydrogen energy services more cheaply than incumbents.

The significant growth that is foreseen for the sector should also draw many new participants, as should federal and provincial policies and incentives. The resulting competition should benefit consumers.

b. Which Hydrogen Energy Services sectors have (or are anticipated to have) limited competition?

A degree of regulation may be appropriate for some hydrogen energy services. Gas transmission and distribution networks tend to be natural monopolies. As such regulating delivery charges (reflecting maintenance cost of transmission and distribution networks) and gas energy prices (based on observed commodity prices) may be appropriate.

Topic 3. BCUC Regulation

a) Where there is competition in offering Hydrogen Energy Service sectors, what BCUC regulation, if any, would be appropriate and why?

b) Where there is no or limited competition, how should BCUC regulation be structured and why?

While disclaiming policy and regulatory expertise, Hydrogen BC and its members broadly believe that market competition will benefit consumers, helping sector growth. As utilities begin providing these services, regulations can be developed accordingly.

We understand this approach to be in alignment with BCUC's principle on determining the need for regulation; that it should be used only where required and should not impede competitive markets. With respect to hydrogen energy services, Hydrogen BC and members broadly believe regulation is appropriate when natural monopoly characteristics are present, and there is a need to regulate to

protect the public interest. Multiple members have expressed the desire to avoid overregulation, which may slow the sector's progress in British Columbia, even as worldwide interest continues to scale up.

The Alternative Energy Services Report defines natural monopolies as occurring in sectors of the economy in which extreme economies-of-scale mean the monopoly firm can provide service at a lower cost than two or more competing firms. The report lays out market conditions which result in natural monopolies. Except for the case of incumbent gas transmission and distribution infrastructure, Hydrogen BC does not believe there are significant barriers to entry for new participants across British Columbia's hydrogen value chain.

To that end Hydrogen BC would request that the BCUC apply the principle of regulating when natural monopoly characteristics are present in reference to Hydrogen Energy Services.

Closing Remarks

Hydrogen BC appreciates the opportunity to provide input to the B.C. Utilities Commission in its inquiry with respect to hydrogen energy services and reiterates our availability for further discussion or consultation at the Commission's convenience.

Best regards,

Matthew Klippenstein, Hydrogen BC Executive Director

Pranav Chandrasekar, Hydrogen BC Member Engagement Coordinator