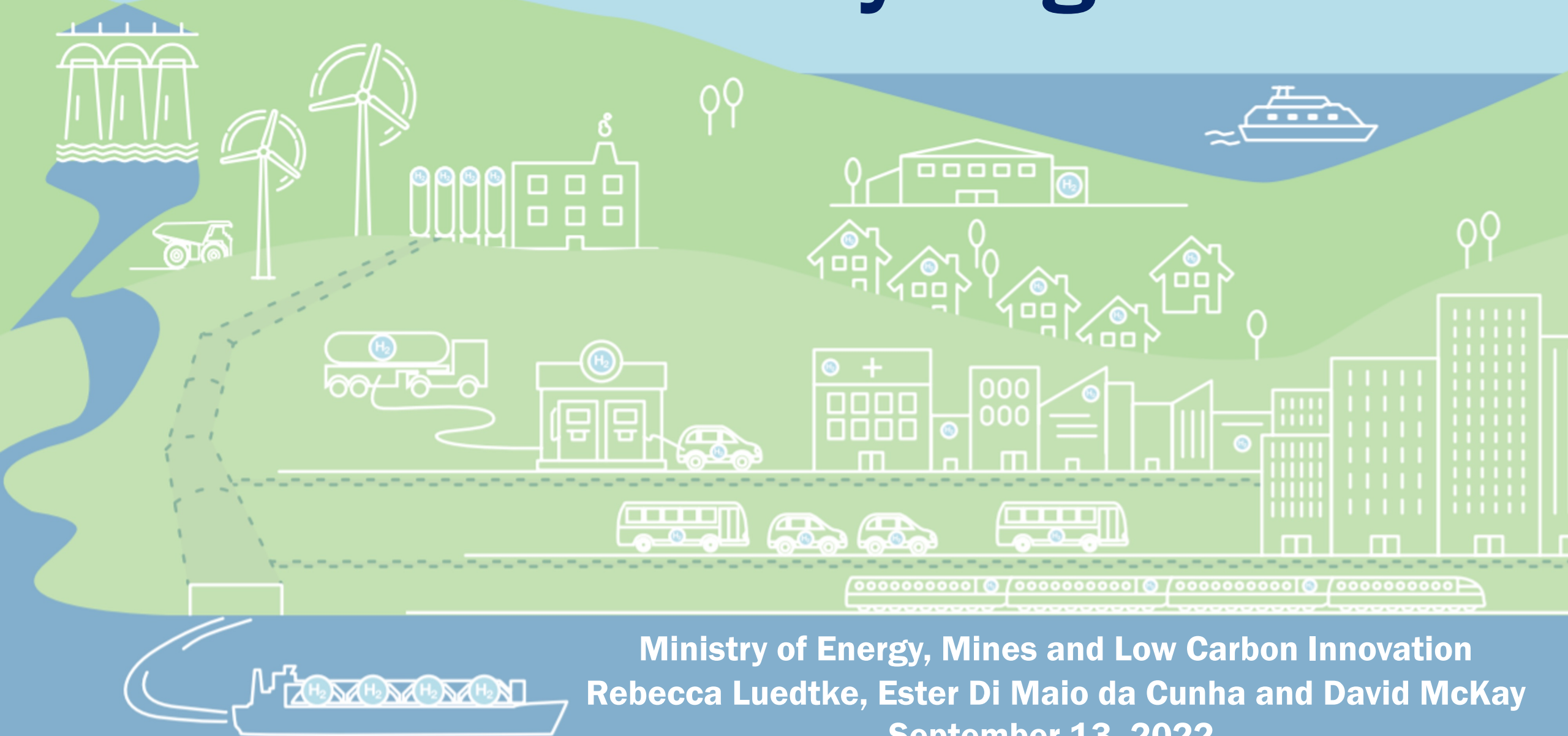


B.C. Hydrogen Sector

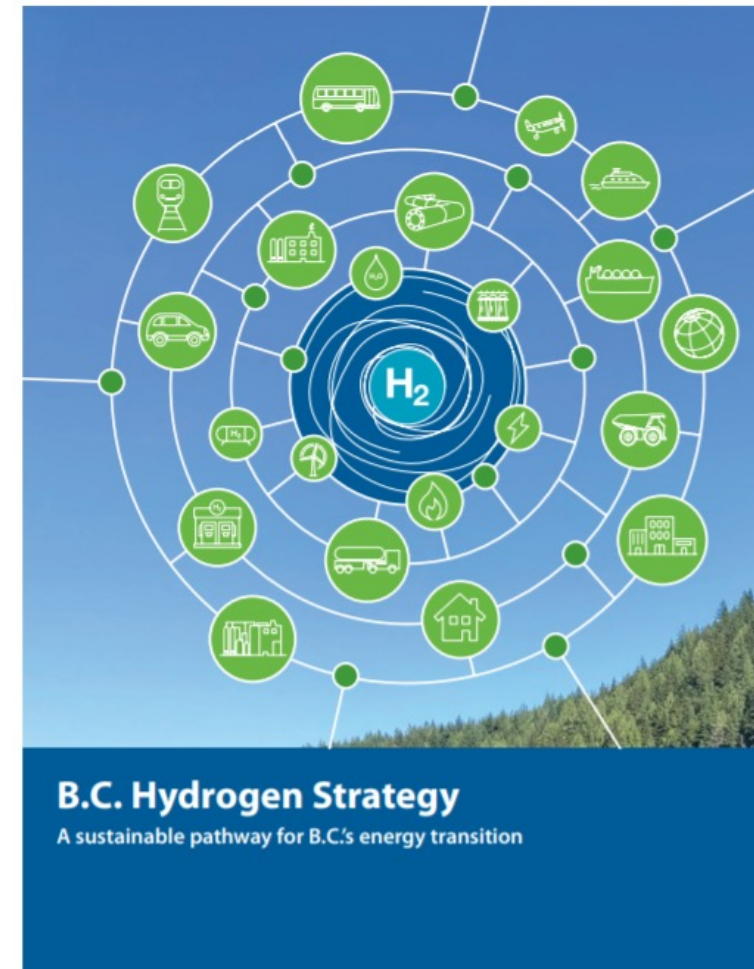


Ministry of Energy, Mines and Low Carbon Innovation
Rebecca Luedtke, Ester Di Maio da Cunha and David McKay
September 13, 2022



Agenda

- B.C. Hydrogen Strategy
- Proposed Projects
- Safety
- Clean Transportation and Hydrogen





B.C. Hydrogen Strategy

- B.C. Hydrogen Strategy was released in July 2021 and is a CleanBC commitment.
- Clarifies how B.C. will promote, incentivize, and support the development of hydrogen production, use and export over the next 10 years and beyond.
- Initial Implementation Plan 2022:
 1. Identify **legislative and regulatory gaps** for project development.
 2. Establish a declining **carbon intensity** threshold for low-carbon hydrogen.
 3. Develop a **CO₂ storage atlas** for Northeast B.C. for natural gas based hydrogen.
 4. Plan and establish regional **hydrogen hubs**.



Indigenous Collaboration and Engagement

- Hydrogen's diverse value chain provides a variety of opportunities for Indigenous participation in the sector.
- The Indigenous Clean Energy Opportunities (ICEO) partnership was launched in November 2021, followed by a workshop in March 2022 to identify priority areas.
- Working to establish an engagement plan for priority areas.

Indigenous Clean Energy Opportunities



BC First Nations Energy
and Mining Council



British Columbia
Assembly of First Nations



First Nations
Summit



Ministry of
Energy, Mines and
Low Carbon Innovation



BC Hydrogen Advantages – Policy Support

B.C. Carbon Tax	\$50/tonne in 2022 ⇒ \$170/tonne in 2030
B.C. Low Carbon Fuel Standard	30% reduction in carbon intensity of supplied fuel for transport by 2030
B.C. Zero Emission Vehicle mandate for light-duty vehicles	100% of new light-duty vehicles by 2035
CleanBC Clean Industry and Innovation Rate	Discounted electricity rates to encourage the use of B.C. clean electricity
GHG Reduction Standard	Establish emissions cap for natural gas utilities for 2030
Greenhouse Gas Reduction Regulation	Allowing utilities to reduce emissions by acquiring renewable gases
80% reduction of diesel consumption in remote communities by 2030	Replacing diesel use in B.C.'s remote communities



Using Hydrogen in B.C.

Lower-
carbon
natural gas



Zero-emissions
transportation



Low-carbon or
synthetic fuels



Power
generation
and storage

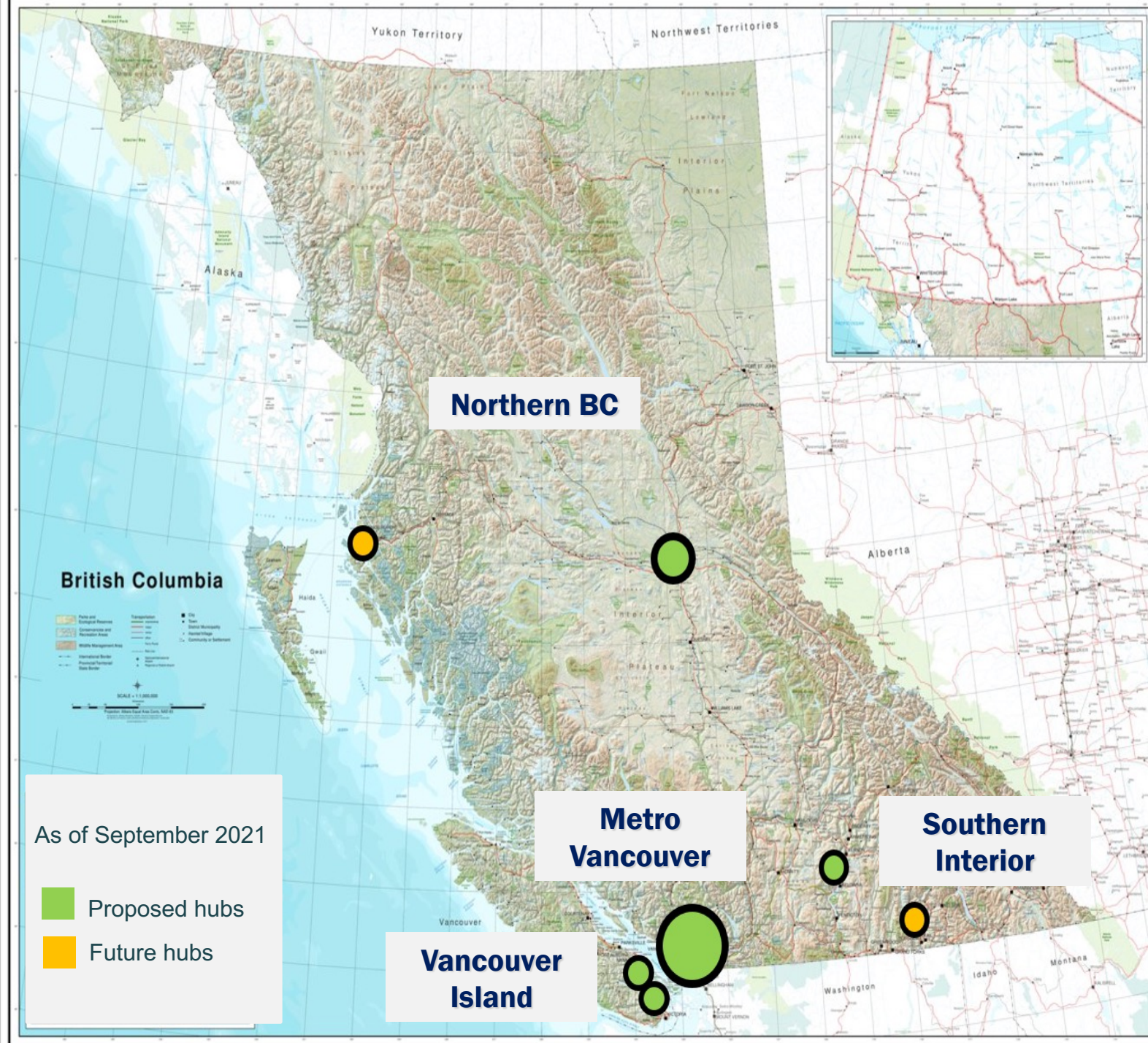


Industrial
processes



Export





Hydrogen Hubs in B.C.



Hydrogen Project Profiles

Total Projects:

Total Investment:

49

\$ 5B

**Production
Pathways**

**Total
Production**

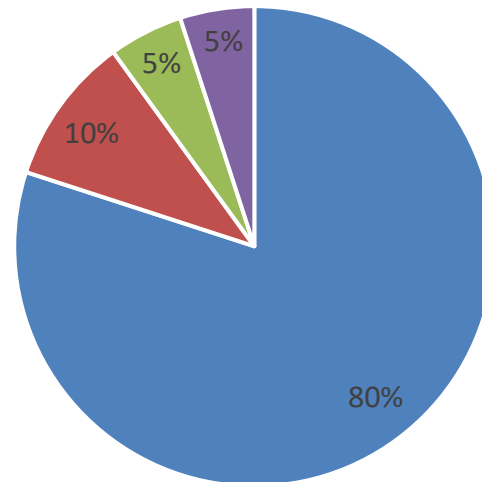
Electrolysis

98%

Natural gas-based

2%

Locations:



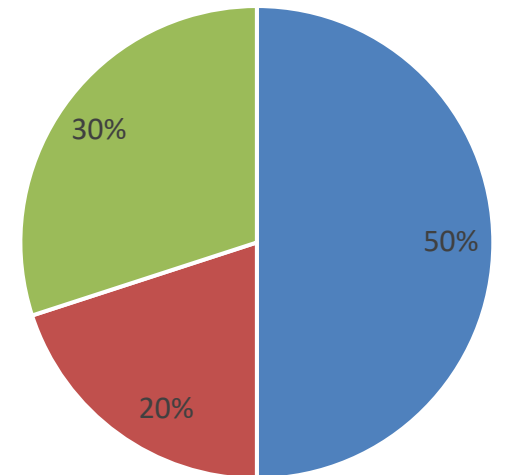
■ Metro Vancouver

■ Prince George

■ Vancouver Island

■ Okanagan

Project Types:



■ Production

■ Consumption

■ Production & Consumption



B.C. Hydrogen Office

- Established on March 31, 2022.
- One-stop-shop for facilitating and advancing all aspects of hydrogen projects and associated value chains.
- Staff is working with federal and local governments to help attract investments and simplify the permitting and regulatory processes.

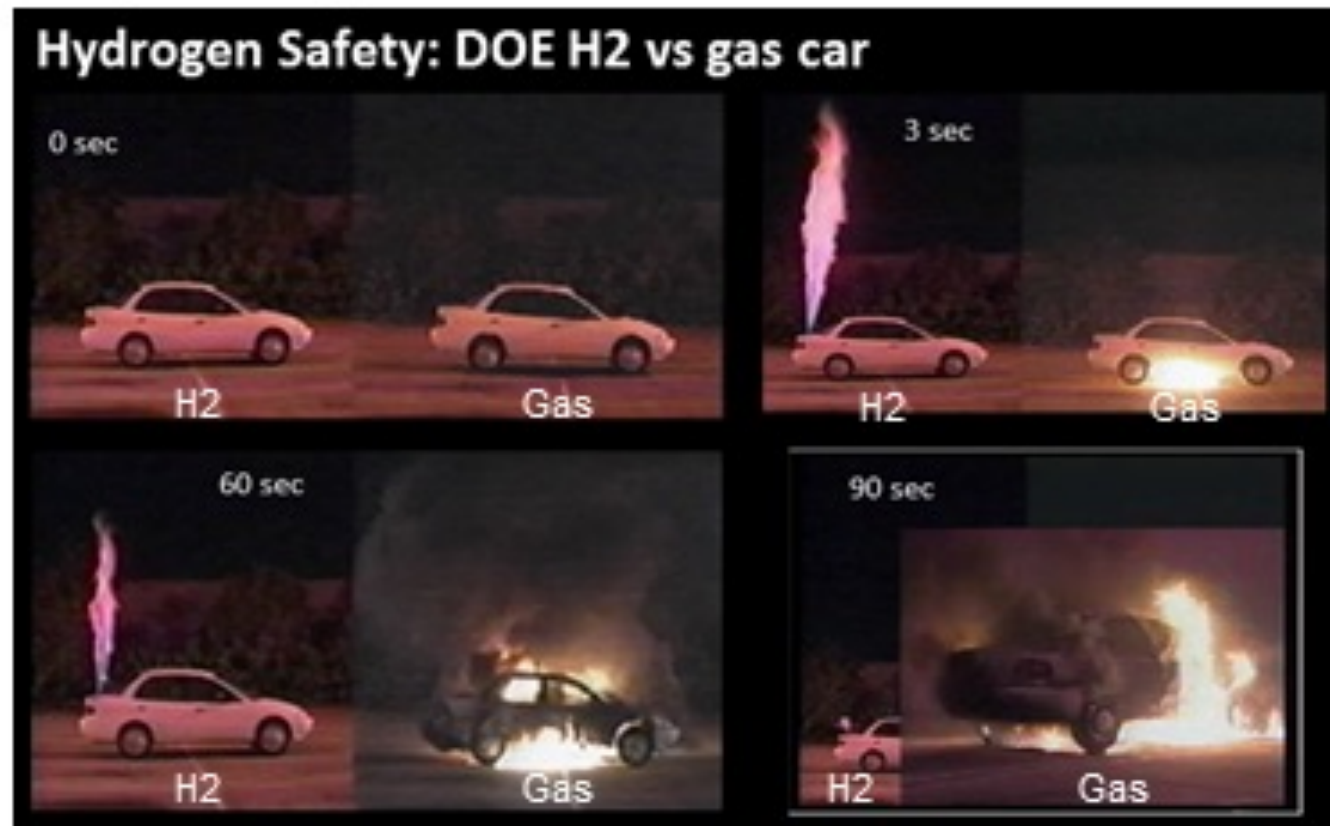


Hydrogen Safety

- In many ways, hydrogen is safer than conventional fossil fuels:
 - Unlike natural gas or propane, hydrogen is non-toxic.
 - Hydrogen is 14 times lighter than air, meaning the gas will dissipate rapidly when released.
 - The flames emit low radiant energy, meaning they are less likely to move to surrounding areas and spread fire.
- Training is a key element for ensuring the safe use of hydrogen.
 - A wide variety of online training tools for first responders exist, such as the [National Hydrogen and Fuel Cell Emergency Response Training](#)



Hydrogen Safety Test



Testing conducted by the [U.S. Department of Energy](https://www.energy.gov/) studying the burning characteristics of a vehicle with a hydrogen fuel tank (left) and a gasoline fuel tank (right).



Hydrogen Safety Measures

- Hydrogen can be managed through various safety measures such as:
 - Component design and testing,
 - Ventilation and leak detection systems, and
 - Sensors.
- Transporting hydrogen, via pipelines, also requires the appropriate safety measures:
 - Coatings for existing metal pipelines, and
 - Correct material selection for new pipelines.



Clean Transportation and Hydrogen

Topics

1. **Network Planning**
 - Hydrogen Fuelling Network Study
 - 2021 B.C. Public Light-Duty ZEV Infrastructure Study
2. **Funding Programs Supporting Hydrogen Vehicles and Infrastructure**
 - Overview of CleanBC Go Electric Programs that support the hydrogen transportation industry
3. **Tools for Supporting Hydrogen Transportation in B.C.**
 - Hydrogen Station Permitting Guidebook for B.C.
 - Hydrogen Station Finder App

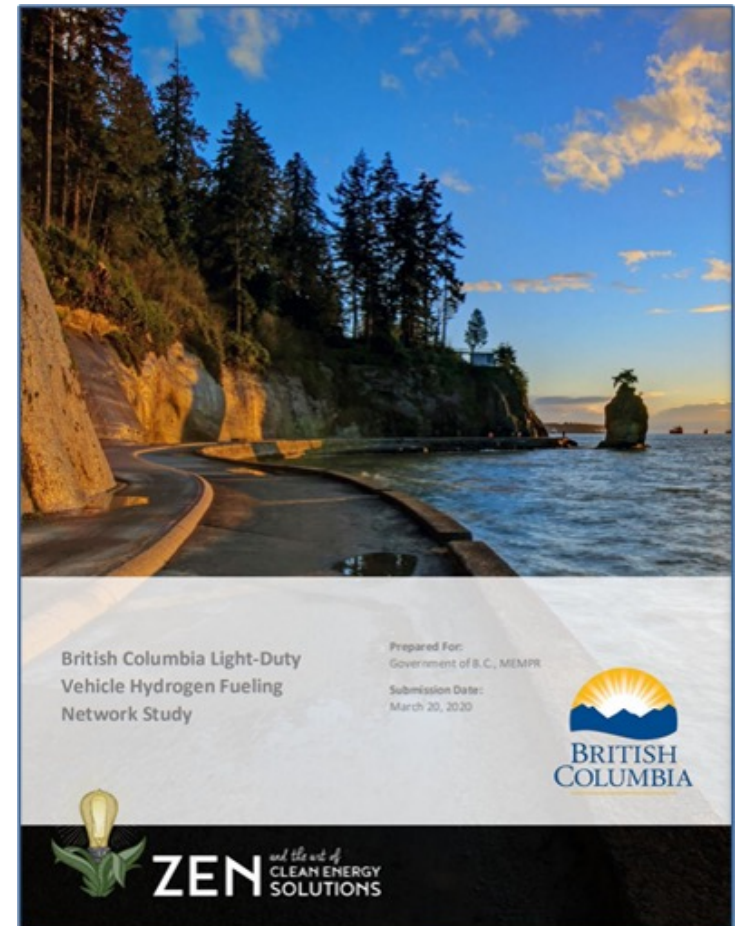


Hydrogen Fuelling Network Study

Overview

- Ministry commissioned a study to inform and guide the approach to building out Hydrogen Refuelling Station network in B.C.
- Light-duty vehicle focus
- Time periods of 2025 (10%), 2030 (30%), and 2040 (100%) in support of the *Zero-Emission Vehicles Act* targets.
- Study utilized an energy modelling tool for vehicle distance (2019 Mirai)

See the study: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/transportation/bc_public_ld_hydrogen_fuelling_network_study_final_20200320.pdf





Hydrogen Fuelling Network Study

Four station types identified:

1. **Major Clusters** 7-8 stations: Examples such the Lower Mainland, the Greater Victoria area, and the Central Okanagan.
2. **Minor Clusters** 2-4 stations: Examples such as Nanaimo, Kamloops, Prince George, Vernon, Penticton and Campbell River.
3. **Connectors**: Examples such as Hope, Merritt, and Williams Lake.
4. **Destination**: Examples such as Whistler and Tofino and transportation hubs such as ferry terminals and airports.

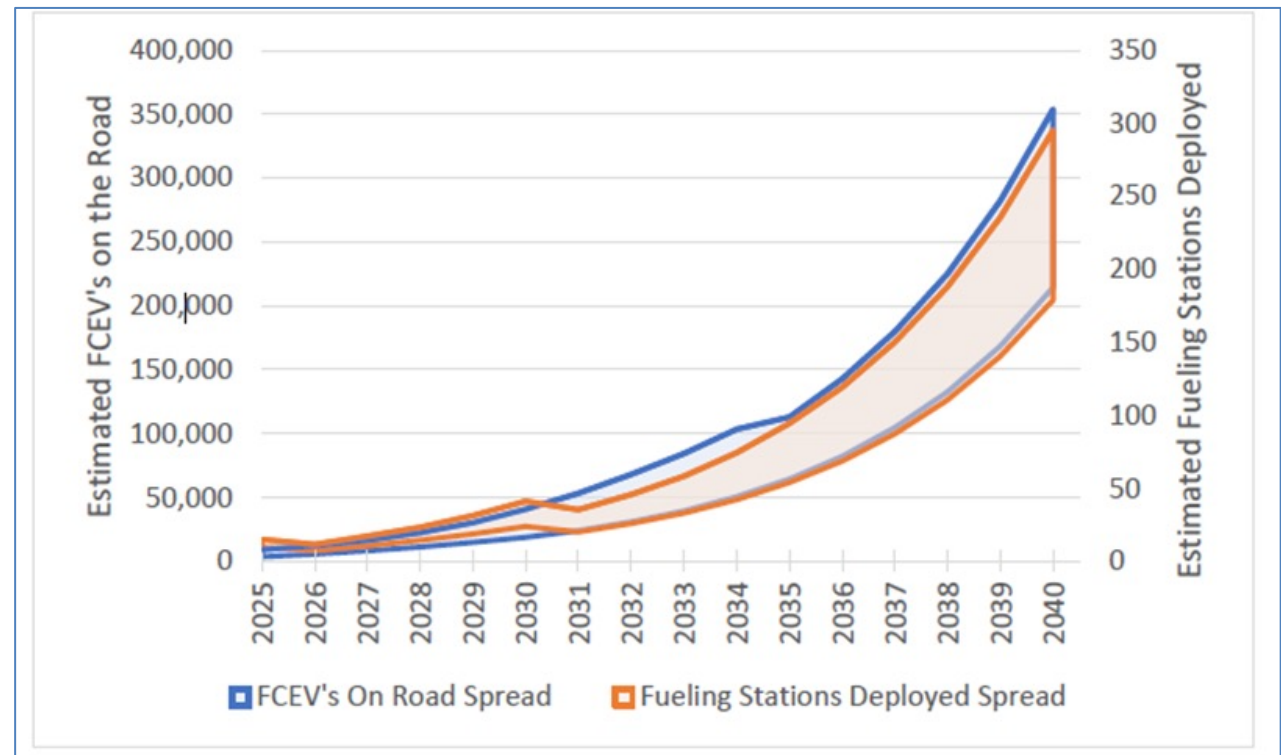


Hydrogen Fuelling Network Study

Results

- Estimate of 250,000 to 300,000 FCEVs by 2040
- 17 stations by 2025
- 55 stations by 2030
- 141 stations by 2040

150-250 stations are likely needed stations needed by 2040.

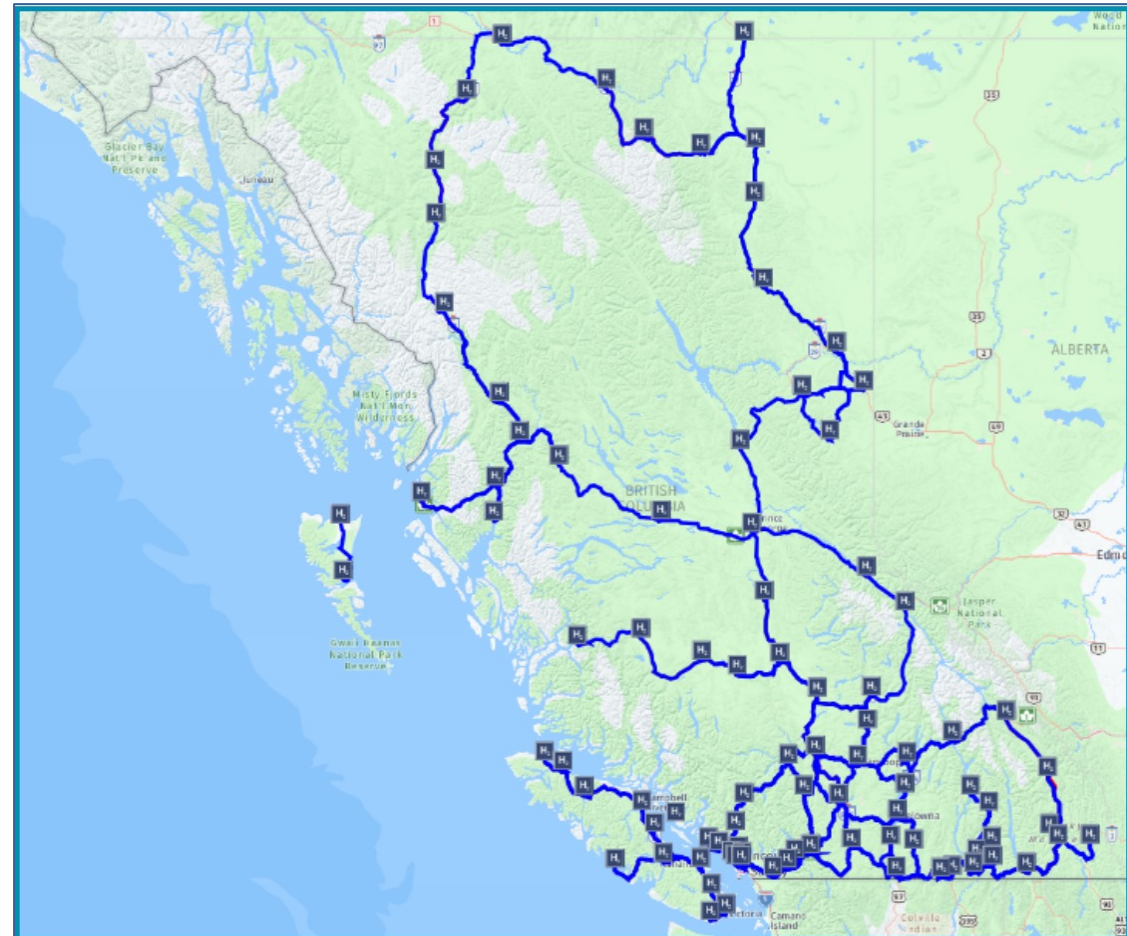




2021 B.C. Public Light-Duty ZEV Infrastructure Study

Modelling: A network model was completed to determine the minimum number and location of hydrogen fuelling sites needed to provide a minimum core geographic network.

Result: 82 hydrogen fuelling sites are required along primary and secondary highways.





CleanBC Go Electric Hydrogen Fuelling Infrastructure Program

- Lack of fuelling infrastructure is a large barrier to the adoption of FCEVs.
- Provides funding for the installation of hydrogen fuelling stations across B.C.
- Funding calls are done through an RFP.

Stats:

- Four stations are in operation.
- Three stations are under construction.
- Ten additional stations have been awarded funding through our 2021 RFP.

See the [Program page](#)



CleanBC Go Electric Hydrogen Fleets Program

Program Intentions

- Kick start the FCEV light-duty vehicle market in B.C.
- Support FCEV purchases in high visibility fleets.
- Support FCEV purchases in high vehicle-kilometres travelled (VKT) fleets.
- Gather feedback from users .

Success Story:

- A Victoria based company, Geazone Eco-Courier, has built a fleet of 20 of FCEVs with the help of rebates through the CleanBC GO Electric Hydrogen Fleets Program (full story here: <https://news.gov.bc.ca/releases/2021EMLI0071-002161>)

Learn more [here](#)



Advanced Research and Commercialization Program

Program Intent:

- Stimulate economic growth in B.C.'s zero-emission vehicle (ZEV) sector
- Provide support for B.C. companies to invest in product development and commercialization activities through long-term demonstration projects

Program Success:

- 17 companies in B.C. received funding through the most recent funding call
- Recent round of funding will help create and sustain approximately 175 full-time-equivalent jobs

Learn more: arcbc.ca



Hydrogen Station Permitting Guidebook for B.C.



Who is it for?

- Station developers, AHJs, and other stakeholders.

What is inside?

- BC's targets for reducing Provincial GHG emissions.
- Overview of hydrogen characteristics and comparison with other transportation fuels.
- Road map for municipal permitting, regulatory compliance, installation and operating permits.
- Expected to be published in the Fall of 2022.



Hydrogen Fuelling Station Finder App



Public Request for Proposals was issued in Spring of 2021.

A tool for the public

- Locate nearby stations.
- Find station information (dispenser status, hydrogen pressure, etc.).
- Informs users of any service issues.



Thank you!

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gov.bc.ca/zeroemissionvehicles

[BC Hydrogen Strategy and Reports](#)

[BC Hydrogen Office - Province of British Columbia \(gov.bc.ca\)](http://gov.bc.ca)