BRITISH COLUMBIA
Canada

# Hydrogen
## Fuelling the low-carbon future

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# A sustainable and *natural* pathway for the energy transition

Our world is transitioning to clean energy — and hydrogen can play a critical role in enabling industries and jurisdictions to meet their greenhouse gas reduction targets. British Columbia (B.C.) is home to the largest hydrogen and fuel cell sector in Canada, with 51% of companies located here.


We also offer a significant opportunity to produce low-carbon hydrogen for local use and export, thanks to our province's low-cost, clean and renewable power, as well as our vast natural gas reserves and carbon sequestration potential.

Whether you are looking to invest in growing the province's hydrogen production capabilities and hydrogen technologies, or seeking products and services for your own jurisdiction, British Columbia is the place to invest in the future of hydrogen as a clean energy carrier.

**As the first Canadian province** to release a hydrogen strategy in July 2021, British Columbia is committed to growing its hydrogen economy. We are well positioned to do so, with our abundant natural resources, commitment to reconciliation with Indigenous Peoples, long history of innovation in hydrogen fuel cells and technology, and existing fuelling infrastructure.


## Hydrogen production

There are several ways to produce low-carbon hydrogen in B.C., including from clean electricity, natural gas processes, and by-product capture from industry and biomass. Each production method has its own advantages in terms of cost, efficiency and environmental impact.

Hydrogen can be produced in large commercial quantities using natural gas as a feedstock. B.C.'s annual natural gas production represents more than one-third of Canada's total production, and we have an estimated 525 trillion cubic feet of natural gas reserves. Saline aquifers and depleted natural gas reservoirs offer the potential for carbon capture and sequestration, which would reduce the carbon intensity of hydrogen produced from natural gas.

Hydrogen can also be produced through electrolysis, which splits water into hydrogen and oxygen. More than 98 per cent of the electricity produced in B.C. is from clean or renewable sources, creating a pathway for producing low-carbon hydrogen through electrolysis. Our province's wind resources can also be used to produce low-carbon hydrogen, which offers potential as a renewable source of hydrogen from the province's waste forestry residues.

Salish Elements is a majority Indigenous-owned company developing green hydrogen production and infrastructure for use in heavy-duty transport, remote community power, ports and airports. In June 2024, Salish Elements announced an agreement with the Xaxli'p in B.C. to develop a 25MW green hydrogen production facility. The Xaxli'p facility is part of Salish Elements' vision of an Indigenous owned B.C. hydrogen economy to supply local and North American markets with low-cost, reliable, and sustainable green hydrogen fuel.

## Storage and transportation

Hydrogen is a versatile energy source that can be compressed or liquefied for storage and distribution. B.C. companies are developing innovative technologies and products for hydrogen storage and transportation.

Hexagon Purus, for example, is a world-leading provider of high-pressure cylinders for hydrogen storage and is an integrator of electric and fuel cells for the medium- and heavy-duty commercial vehicle industry.

Westport Fuel Systems supplies advanced alternative fuel delivery components and systems to the transportation industry worldwide. The system can run on biogas, natural gas, hydrogen, and other alternative fuel products. Westport Fuel Systems and Volvo Group announced their partnership at University of British Columbia on June 3rd, 2024 to promote, develop and accelerate the commercialization of their HPDI fuel system operating on renewable fuels and hydrogen.

## The elements of success

British Columbia has all the elements in place to support a growing hydrogen sector, from supportive provincial policies and access to export markets to strong collaborative partnerships and a stable investment climate.


## Fuel cells are decarbonizing the transportation sector

Hydrogen fuel cells can power the future of transportation for trucks, planes, trains and ships that require energy-dense fuel and are not as suited to battery-electric solutions. Hydrogen-powered medium- and heavy-duty vehicles have distinct advantages over electric vehicles, including shorter refuelling times and the ability to operate at lower temperatures without sacrificing range or performance.

B.C.-based Ballard Power Systems is one of the world's leading suppliers of hydrogen fuel cell products and services, and its fuel cell products are powering zero-emission buses, trucks, trains, marine vessels, forklifts and more. Established in 1979, Ballard has products in operation worldwide, helping decarbonize the transportation and industrial sector.

Other British Columbia companies of note include Loop Energy, which produces fuel cells for heavy-duty vehicles like trucks and buses. Cellcentric — a collaboration of Daimler Truck AG and Volvo Group — has a Burnaby, B.C., location from which it is developing fuel cells for use in both transportation and industrial settings, such as for emergency power supply. Greenlight Innovation Corp. is a global leader in the supply of testing and manufacturing equipment for hydrogen fuel cells and electrolysers. Greenlight has a partnership with AVL List, the world's largest powertrain development, simulation and testing technology company, to develop a co-branded, fully integrated fuel cell system testing product line. AVL also has a Canadian subsidiary, AVL Fuel Cell Canada Inc., located in Burnaby.

## Hydrogen production and fuelling infrastructure

Canada's first retail hydrogen fuelling station opened in Vancouver in 2018 with support from the Government of British Columbia. In 2024, there are five existing public stations across the province, with more stations planned through the support of the CleanBC Go Electric Hydrogen Fuelling Infrastructure Program. This infrastructure investment has created new opportunities for entrants to invest and grow in the space.

Hydrogen Technology & Energy Corporation (HTEC) has opened these retail-hydrogen fuelling stations in the province and provides customized engineering services and hydrogen production, processing, distribution and vehicle fuelling solutions.

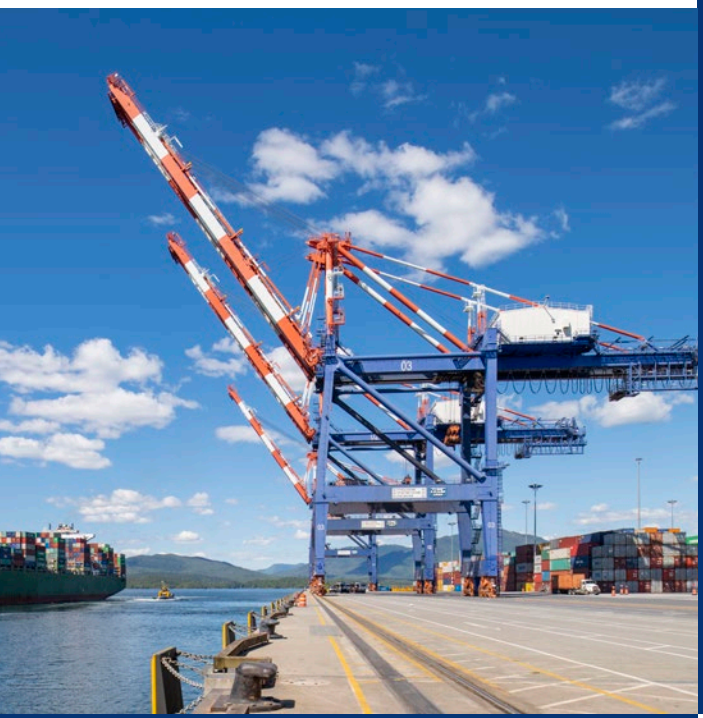
HTEC's network of stations will be supplied by 3 new clean hydrogen production facilities located in Burnaby, Nanaimo and Prince George, and a facility that liquefies 15 tonnes per day of vented by-product hydrogen in North Vancouver.

- 5 existing LD H2 Fueling Stations
- 14 planned HD H2 Fueling Stations
- 6 planned LD H2 Fueling Stations
- 1 planned H2 liquefaction facility
- 3 planned green H2 production facilities

Powertech Labs is another globally recognized leader for testing and certification of hydrogen storage solutions and for pioneering the design of turnkey hydrogen fuelling station packages.

## Leading the way in innovations

Innovation is driving the future of B.C.'s hydrogen sector. A long history of collaboration between industry, academia and government in B.C. has created a vibrant ecosystem of companies that are innovators in their fields and have the world's largest installed base of fuel cell and energy storage testing solutions. Ekona Power Inc. has developed a novel methane pyrolysis platform for hydrogen production that delivers low-cost and low-carbon hydrogen, and Ionomr Innovations Inc. is developing new membrane technology for fuel cells that improve efficiency and performance while reducing costs and environmental impact.



## Hydrogen hubs and test beds

The Government of British Columbia is collaborating with Foresight to develop regional hydrogen hubs in the Lower Mainland, Northeast B.C., Interior B.C. (Kootenays and Okanagon) and Vancouver Island. B.C. has also partnered with the City of Prince George and Prince Rupert to develop a Northern B.C. Hydrogen Hub and North Coast B.C. Hydrogen Hub, respectively.

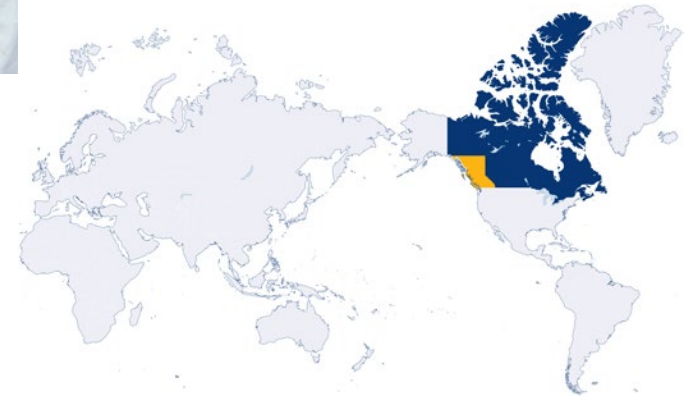
The University of British Columbia is a city-scale test bed that uses a solar array to charge electric vehicles and power a water electrolyzer; the produced hydrogen feeds a refuelling station for light- and heavy-duty fuel cell vehicles.

On May 31, 2024, Simon Fraser University (SFU) announced the new Clean Hydrogen Hub at its Burnaby Campus. The Hub is a collaborative academic-industry clean energy infrastructure project aimed at accelerating hydrogen technology innovation. The Government of Canada has committed nearly $10 million through PacifiCAN to establish the Hub, with an additional $1 million coming from B.C.'s Innovative Clean Energy (ICE) Fund.

## Supportive government policies and programs

The B.C. Hydrogen Strategy, released in July 2021, outlines specific actions for government, industry and innovators to pursue over the next three decades to accelerate the production, use and export of renewable and low-carbon hydrogen. This strategy is supported by programs and policies that include:

- The CleanBC Go Electric Program that encourages the purchase of zero-emissions vehicles and the development of hydrogen refuelling stations.
- A $35-million provincial investment to create the B.C. Centre for Innovation and Clean Energy that brings together innovators, government and researchers to accelerate the commercialization of clean energy technology and products, including low-carbon hydrogen.
- The Advanced Research and Commercialization Program, which supports companies in the net-zero vehicle sector and encourages international investment.
- The provincial Innovative Clean Energy Fund, which supports the development of pre-commercial clean energy projects and technologies, including hydrogen and fuel-cell related technologies.
- Canada's clean hydrogen investment tax credit offers tax credits between 15 and 40 percent for hydrogen projects.
- A B.C. Low Carbon Fuel Standard (LCFS), which spurs growth in low carbon fuel production in B.C.
- The British Columbia Energy Regulator is the regulator for hydrogen, methanol and ammonia.



## Clean Energy Major Projects Office (CEMPO)

In spring 2023, the provincial government announced the creation of the Clean Energy and Major Projects Office, which provides dedicated support to project proponents looking to bring clean energy projects, including hydrogen projects, to British Columbia. The former BC Hydrogen Office is now housed within CEMPO.

## Access to markets

B.C.'s expertise in exporting natural resources enables us to export hydrogen in support of international decarbonization efforts.

## Innovative research and collaborations

B.C.'s universities and technical institutes have long been at the forefront of research in the province's hydrogen sector, educating the innovators who are unlocking hydrogen's clean energy potential. The Institute for Integrated Energy Systems at the University of Victoria was Canada's first university-industry research partnership focused on fuel cells and hydrogen systems, and the University of British Columbia's Clean Energy Research Centre has world-class researchers developing solutions to climate change.

## Be part of the hydrogen future

British Columbia is committed to unlocking the potential of hydrogen to meet its net-zero emission targets by 2050. For investors and partners who want to be part of the low-carbon energy transition, look to B.C. to grow your future in the hydrogen economy.

# **British Columbia,** *Naturally.*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Published in October 2024. Every effort has been made to ensure the accuracy of this publication at the time of writing; however, the programs referred to, and data cited, are subject to change. All figures are in Canadian dollars.


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