BRITISH COLUMBIA
Canada

Hydrogen
Fuelling the low-carbon future

British Columbia, *Naturally.*

BritishColumbia.ca

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 a global leader in fuel cell innovation and hydrogen technology, with more than half of Canada's companies active in this sector based 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, 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, 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 renewable sources, creating a pathway for producing low-carbon hydrogen through electrolysis. Our province's wind reserves can also be used to produce low-carbon hydrogen, and biomass gasification offers potential as a renewable source of hydrogen from the province's waste forestry residues.

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.

The B.C. Hydrogen Strategy estimates that B.C. could produce

over 2.2 million tonnes of hydrogen annually

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 vehicles have distinct advantages over electric vehicles, including greater range, 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 fuelling infrastructure

Canada's first retail hydrogen fuelling station opened in Vancouver in 2018 with support from the Government of British Columbia. By early 2022, there were four 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. 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. is developing 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

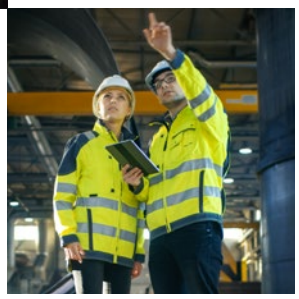
The Government of British Columbia has identified locations for other hydrogen hubs — such as seaports, industrial sites and urban locations — where hydrogen production and end-use applications can be co-located. Hydrogen hubs are planned for Metro Vancouver and Prince George.

The University of British Columbia will be 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.

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.

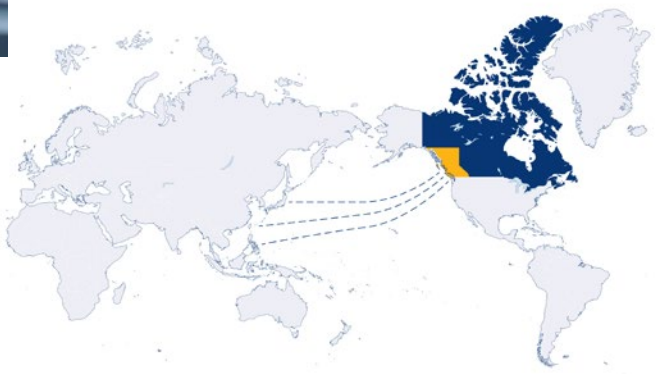
Supportive government policies and programs



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 discounted provincial electricity rate for customers of BC Hydro (a Crown corporation that generates and delivers electricity to 95% of B.C.'s population) who produce renewable or low-carbon fuels like hydrogen at new plants.
- 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.
- The Hydrogen Strategy for Canada, which aims to increase the percentage of Canada's energy system fuelled by hydrogen. Green Energy Tax Incentives were announced in Budget 2023.
- A B.C. Low Carbon Fuel Standard (LCFS), which spurs growth in low carbon fuel production in B.C.
- A BC Energy Regulator responsibilities to include hydrogen, methanol and ammonia.



BC Hydrogen Office

In the spring of 2022, the provincial government announced the creation of the BC Hydrogen Office, a one-stop shop to streamline the development of hydrogen projects from proposal to construction.

Access to markets

Our extensive transportation networks and ports connect the province to the global hydrogen fuel market, which is predicted to be worth more than $305 billion by 2050. 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.

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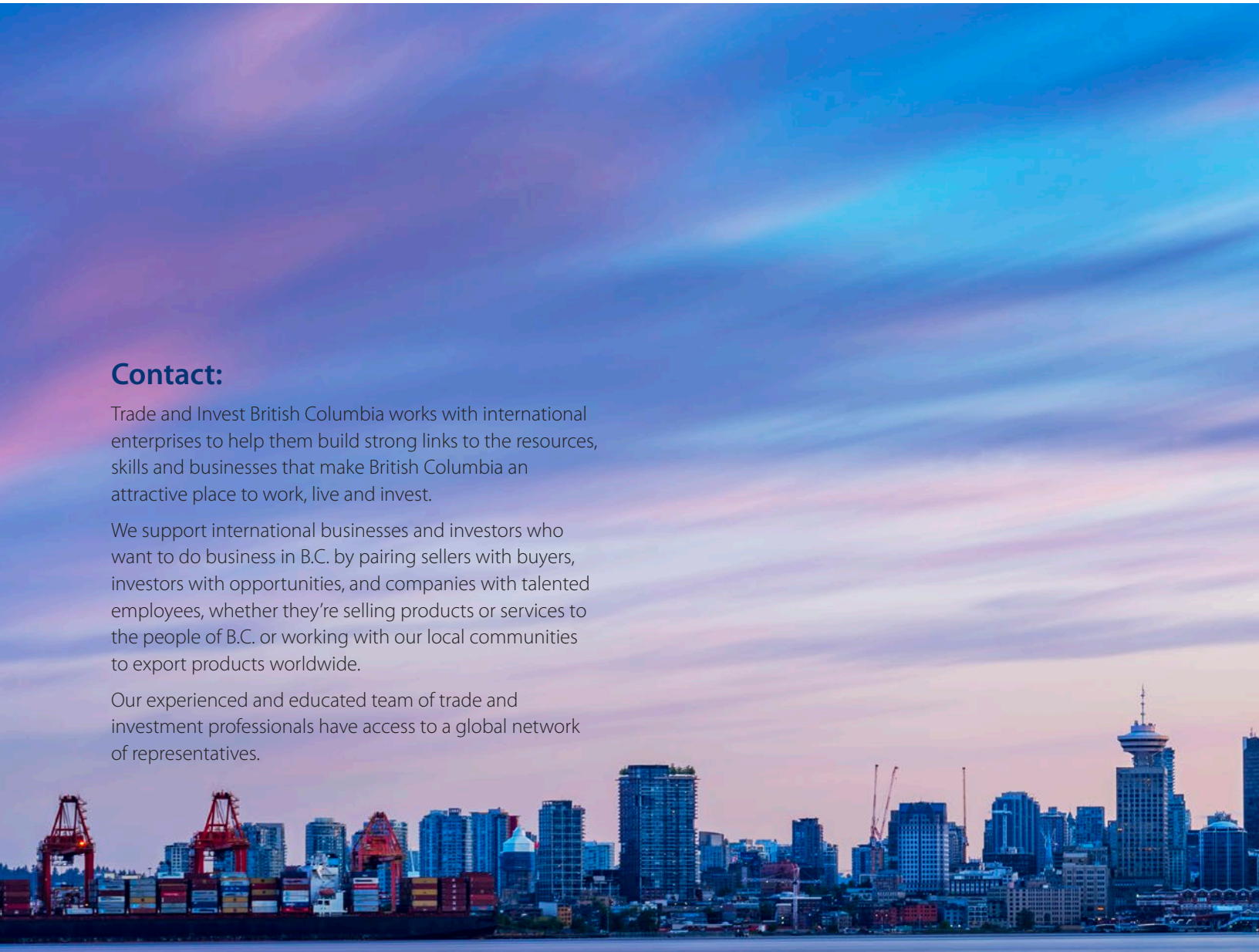

Contact:

Trade and Invest British Columbia works with international enterprises to help them build strong links to the resources, skills and businesses that make British Columbia an attractive place to work, live and invest.

We support international businesses and investors who want to do business in B.C. by pairing sellers with buyers, investors with opportunities, and companies with talented employees, whether they're selling products or services to the people of B.C. or working with our local communities to export products worldwide.

Our experienced and educated team of trade and investment professionals have access to a global network of representatives.

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