



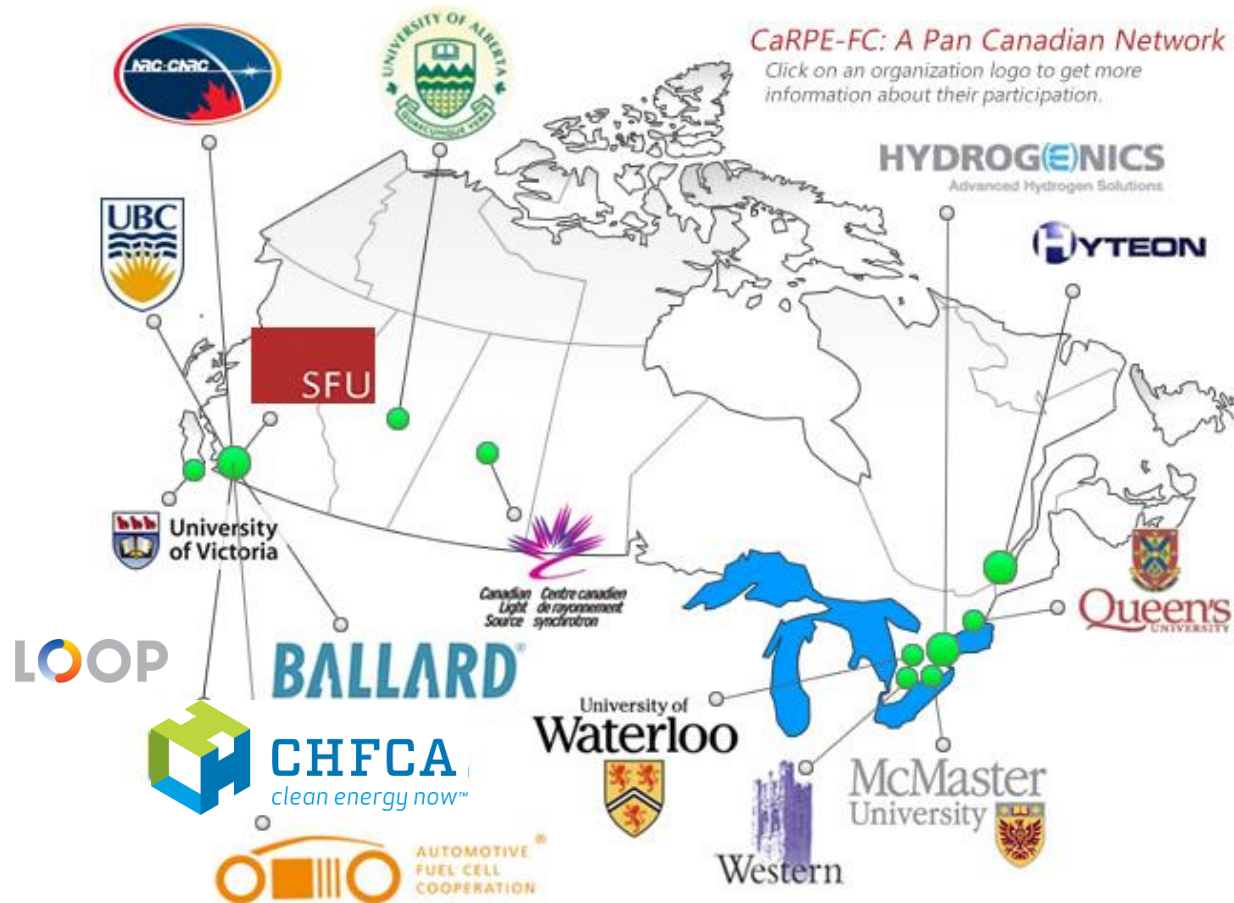
Country Update: Initiatives on Hydrogen and Fuel Cells

March 2018

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Ballard Power Systems, Member of the Canadian Hydrogen and Fuel Cells
Association

Canadian industry and research leaders



The sector employs 2,000 Canadians in **highly-skilled, clean-tech jobs**

Strong international demand, 90% of Canadian hydrogen and fuel cell technology is exported.

National development of hydrogen economy

20 FCEV

1 FC Bus

400 FC Forklifts

Infrastructure:

1 operational public HRS (British Columbia)

Projected 5 HRS in Ontario

Projected 7 HRS in British Columbia



Credit: Andrew McCredie, Driving, Feb 2015
<http://driving.ca/hyundai/tucson/reviews/road-test/road-test-2015-hyundai-tucson>, Accessed March 2018

Canadian hydrogen sector timeline: The beginning



Canada Initiates Development of PEM Fuel Cell Technology

National Defense – contract to Ballard to develop a low-cost PEM fuel cell.

1983

Hydrogen Village (Greater Toronto Area)

Demonstration project in Ontario for hydrogen production and delivery platforms and FC for stationary and transportation applications.

2004

Olympics – World's Largest Fleet of Hydrogen FC Buses

Whistler, 20 fuel cell powered buses delivered (CHIC)

2010

1993

World's First FC Bus Debuted

Shuttle bus, which could carry up to 20 people.

1994

First FC Car Utilizing Canadian Technology

Daimler-Benz' s NECar, needed 12 fuel cell stacks to generate 50 kW of power.

Canadian hydrogen sector timeline: **Until now**



First Fuel Cell Electric Vehicle (FCEV) Delivered

Hyundai's zero-emissions, hydrogen-powered Tucson Fuel Cell Electric Vehicles (FCEV) in 2015 in British Columbia, 2016 in Ontario and Quebec

2015

Pan-Canadian Framework on Clean Growth and Climate Change

2017

Clean Energy Vehicle Program in BC

2018

2012

First Automated Fuel Cell Plant Opens

Mercedes-Benz opened the world's first automated fuel cell manufacturing plant in Burnaby, British Columbia.

2015

Hydrogen Fueling Infrastructure Program

Expand the network of publicly accessible HFS in BC. Call for projects was initiated in 2015 and a second public hydrogen fueling station is expected to be completed by 2018.

Policy Initiatives at Federal Government

December 2016 - Pan-Canadian Framework on Clean Growth and Climate Change.

- Carbon pricing
- National ZEV strategy by 2018
- National fuel standard
- Funds for HRS

Federal budgets March 2017 & March 2018

+4 B CAD in clean tech support for research, demonstration and infrastructure

Policy Initiatives at Federal Government

Infrastructure and FCEV deployment

- \$1.65M for the HRS in Greater Toronto Area
- \$4.3m fund for zero-emission vehicles

Codes and Standards – Canadian Standards Association (CSA)

- Work with the North American Hydrogen Codes and Standards Forum
 - Developing current codes for hydrogen gas vehicles (HGVs) and infrastructure in Canada
 - Harmonizing requirements with the United States

Investment in key technologies in hydrogen and companies, through:

- Sustainable Development Technology Canada (SDTC)

Actions at Provincial Level

ONTARIO

2018 – 5 New HRS

2018 - Province moves ahead with pursuit of trains powered by hydrogen fuel cells for GO Transit



Credit: (STEVE RUSSELL / TORONTO STAR FILE PHOTO), The provincial government has decided to pursue potentially groundbreaking clean train technology, June 2017,

<https://www.thestar.com/news/queenspark/2017/06/15/ontario-looks-at-hydrogen-powered-trains-for-go-transit.html>

Accessed March 2018

Actions at Provincial Level

QUEBEC

Acquisition of 50 FCEV by
Quebec Government

2018 – Toyota starts to sell their
vehicles to the public



Credit: CBC, The Toyota Mirai retails for \$57,000 U.S. in California. The carmaker hasn't yet revealed the purchase price in Canada. The Quebec government plans to test a fleet of 50, January 2018,
<http://www.cbc.ca/news/canada/montreal/75th-annual-montreal-auto-1.4494138> Accessed March 2018

Actions at Provincial Level

BRITISH COLUMBIA

Largest cluster of hydrogen and fuel cell companies

GoC will spend \$4.3M on EV chargers, hydrogen stations in B.C.

Clean Energy Vehicle for BC (CEVforBC™), Sale Incentive Program for clean energy vehicles



The screenshot displays the CEVforBC website interface. At the top, the logo 'CEV for BC' is accompanied by the tagline 'Clean Energy Vehicles for British Columbia'. A financial summary box shows 'Funds Reserved' at \$2,855,830, 'Funds Dispersed' at \$19,159,999, and 'Incentive Funds Available' at \$16,533,004. A navigation menu includes 'CEV Program', 'Charging & Re-Fueling Locations', 'Dealers', 'Manufacturers', 'Events', and 'Green Star Dealer Awards'. The main content area features 'Clean ENERGY' with icons for 'BATTERY ELECTRIC', 'FUEL CELL', and 'PLUG-IN HYBRID ELECTRIC VEHICLES'. A 'Find A DEALERSHIP' section includes a 'FIND NOW >' button and links for 'View Eligible VEHICLES', 'About The PROGRAM', and 'Frequently Asked QUESTIONS'. A green sports car is featured with a red banner that reads 'Changes to PST on Program Incentives!'.

<https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/clean-energy-vehicle-program/cev-for-bc>

Summary



- Industry & Academic leaders
- Export-oriented, currently low degree of domestic market development
- Renewed emphasis on developing national industry and infrastructure
- Support for research and innovation in clean technologies

