INTERNATIONAL PARTNERSHIP FOR
HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update May 2016: Canada

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1. New Policy Initiatives on Clean Technologies and Clean Energy

Federal government: On March 22, 2016, the Canadian Federal Minister of Finance, Bill Morneau, presented the federal budget. A number of budget items reinforce the federal government`s position that a competitive economy and environmental protection are linked. Currently there are no federal government policies and measures focuses specifically on Hydrogen & Fuel Cells (HFCs). However, there are framework policies that can apply to HFC technologies, and, clean technologies are a top priority for Canada. Relevant commitments that have recently been made include:

- $5 billion over 5 years for investments in clean infrastructure projects which include climate change mitigation.
- $2 billion over 2 years, starting in 2017-18, to establish a Low Carbon Economy Fund, to support provincial and territorial actions that will measurably reduce greenhouse gas (GHG) emissions;
- $1 billion over 4 years to support future clean technology investments in the natural resource sector (forestry, fisheries, mining, energy and agriculture);
- $130 million over 5 years to support clean technology research, development and demonstration activities;
- Alternative fuel vehicles (including HFC) and electric vehicle industry supported with $62.5 million, over two years, committed to encourage infrastructure development along with technology demonstrations.
- $345.3 million has been committed to address air pollution over five years;
- Strengthening of Canada's discovery research area with an additional $95 million;
- $128.8 million over 5 years to develop energy efficiency policies and programs;
- $100 million per year to Canada`s six regional development agencies to support clean technology activities;
- $20 million over eight years to create two additional Canada Excellence Research Chairs in fields related to clean and sustainable technologies;
- An additional $125 million over two years to enhance Canada`s Green Municipal Fund; and
- Accelerated capital cost allowances expanded to include clean energy vehicle charging stations and electric energy storage ($19M in tax credits).

Provincial governments

In December, 2015 **British Columbia** (BC) committed $100M in Venture Capital funding to address a growing gap in early stage technology funding in BC. This is the single largest investment in venture capital in the history of the province.

In February, 2016, the **BC and Federal Governments** committed approximately $120,000 towards an assessment of the province's Clean Energy Vehicle (CEV) sector. The study is

intended to inform the design of a new provincial funding program to be called the Advanced Research and Commercialization (ARC) Program. The objective of this program is to help advance the CEV industry in BC by supporting job training, R&D and commercialization of CEV technologies in BC.

On March 2, 2016, the **Government of BC** announced that it was prepared to invest an additional $6.89 million into the provinces CEV product purchase and infrastructure development incentive program. FCVs are eligible for a $6,000 rebate and EVs $5,000. Funds are also available to support the development of a public Hydrogen Refuelling Station (HRS) in the Vancouver area.

CEVs with only one occupant are able to use high occupancy vehicle (HOV) lanes in BC.

The **Ontario Government** updated its EV Incentive Program (EVIP) to make Electric Vehicles (EVs) more affordable. Incentives range from $3,000 - $13,000 depending on purchase price, seating capacity and the vehicle's range. FCVs are not currently available for sale in Ontario therefore are not eligible at this time.

In March 2016 the **Quebec Government** revised its policies to include hydrogen as a source of energy. FCVs are not currently available for sale/lease in the province to date. Like in British Columbia, the province of Quebec has an abundant source of hydroelectricity. Hydro Quebec and the Université du Quebec a Trois-Rivières (UQTR), have extensive hydrogen research experience.

2. Hydrogen and Fuel Cell R&D Update

On May 3 and 4, 2016, the Catalysis Research for Electrolyte Fuel Cells Network (Carpe-FC) hosted a conference in Vancouver discussing their latest research in catalyst layers for polymer electrolyte fuel cells, with an aim to lower the level of platinum group metal requirements. This is a Pan-Canadian academic network with active participation from 8 universities, 4 SMEs, an industry association, and three government departments. It comprises of a multi-disciplinary team of 20 researchers from universities and government laboratories across Canada, who work closely with participating industry partners.

3. Demonstration and Deployments Update

Tugliq Energy's Hybrid Wind-Storage-Diesel hybrid project at Glencore's Raglan mine in Nunavit, Quebec is operational. To date, this larger scale renewable energy (3MW wind turbine) with energy storage system (hydrogen, batteries, flywheel) has broken the national record in terms of availability (99.4% in 2016) and production (14.75 GWh). Over the past 21 months this hybrid energy system has displaced 3.78 million litres of diesel and reduced GHGs by 10,530 tons.

The 1st commercial FCV was delivered to a customer in Ontario.

Ballard Power Systems has delivered the 1st of 330 FC buses (FCB) to customers in China.

Ballard, in partnership with New Flyer Industries and Siemens have also developed a 60 foot (18 Meter) articulated bus which will be put into service by AC Transit (US). This FCB is powered by a seventh generation FC module, has a capacity of over 120 passengers and a target range of 250 miles (400 KMs). Funding was provided by the US Federal Transit Administration's (FTA) National FC Bus program.

4. Events and Solicitations

29th World Electric Vehicle Symposium & Exposition – EVS29: June 19-22, 2016, Montreal, Quebec. EVS is the largest international electric vehicle conference. EVS is held every 12 – 18 months and rotates between venues in North America, Europe and Asia.

Hydrogen & Fuel Cells 2017 Summit - HFC2017: June 5 – 6, 2017, Vancouver, BC. A biennial conference, hosted by the Canadian Hydrogen and Fuel Cell Association (CHFCA) to increase awareness of the economic, environmental and social benefits of hydrogen and fuel cells.

Globe Capital 2017: Fall 2017 (TBD), Toronto Ontario. Global Capital will be a clean technology and clean energy financing conference and trade show.

5. Investments: Government and Collaborative Hydrogen and Fuel Cell Funding

The BC government and the Canadian Hydrogen & Fuel Cell Association (CHFCA) released a call for proposals for a public hydrogen refuelling station (HRS) in the Vancouver region in the fall of 2015. HTEC (Hydrogen Energy Technology Corporation) and their partners where selected. Location to be determined.

The federal government is prepared to invest in two additional public HRSs over the next two years. The request for proposals was released in May 2016. Proposals are due July 8, 2016. Partners are welcome.

Sustainable Development Technology Canada (SDTC) announced over $206 million in funding for 36 clean technology projects across Canada including two HFC demonstrations: 1) Loop Energy to receive $7.5 million contribution towards the development and demonstration of an electric port drayage truck and 2) Hydrogenics Corporation to receive $2.5 million for a 5MW power-to-gas demonstration project in North America.

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Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support
Fuel Cell Vehicles[1]				
FC Bus				
Fuel Cell Trucks[2]				
Forklifts				
H_2 Refueling Stations	**Target Number**	**Current Status**	**Partnerships, Strategic Approach**	**Policy Support**
70 MPa On-Site Production				
70 MPa Delivered				
35 MPa On-Site Production				
35 MPa Delivered				

[1] Includes Fuel Cell Electric Vehicles with Range Extenders
[2] As above

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Stationary	Target Number[3]	Current Status	Partnerships, Strategic Approach	Policy Support
Small[4]				
Medium[5]				
Large[6]				
District Grid[7]				
Regional Grid[8]				
Telecom backup				
H_2 Production	**Target[9]**	**Current Status**	**Partnerships, Strategic Approach**	**Policy Support**
Fossil Fuels[10]				
Water Electrolysis[11] (PEM, Alkaline, SOEC)				
By-product H_2				

[3] Targets can be units installed and/or total installed capacity in the size range indicated
[4] <5 kW (e.g., Residential Use)
[5] 5kW – 400 kW (e.g., Distributed Residential Use)
[6] 0.3MW – 10 MW (e.g., Industrial Use)
[7] 1MW – 30 MW (e.g., Grid Stability, Ancillary Services)
[8] 30MW plus (e.g., Grid Storage and Systems Management)
[9] Target can be by quantity (Nm^3, kg, t) and by percentage of total production; also, reference to efficiency capabilities can be a target
[10] Hydrogen produced by reforming processes
[11] Please indicate if targets relate to a specific technology (PEM, Alkiline, SOEC)

Energy Storage from Renewables	Target[12]	Current Status	Partnership, Strategic Approach	Policy Support
Power to Power[13] Capacity				
Power to Gas[14] Capacity				

[12] Can be expressed in MW of Installed Capacity to use the electricity from renewable energy generation, and Annual MWh of stored energy capacity
[13] Operator has an obligation to return the electricity stored through the use of hydrogen back to electricity
[14] Operator has the opportunity to provide the stored energy in the form of hydrogen back to the energy system through multiple channels (e.g., merchant product, enriched natural gas, synthetic methane for transportation, heating, electricity)

Hydrogen Filling Stations (Nationwide) **Total of 7 hydrogen filling stations**

Station	Capacity	Dispensing Pressure	Production Method
Vancouver, British Columbia (HTEC – public station under development and location TBD)	TBD	70 MPa	Electrolysis
Surrey, British Columbia (Powertech Labs)	Storage at 45MPa: 60kg Storage at 85MPa: 60kg	35/70 MPa	On-site Electrolysis (24kg/d)
Burnaby, British Columbia (Ballard)	Storage at 25 MPa: 4700 kg Storage at 25 MPa: 2400 kg	35 MPa	Methane/Natural Gas
Toronto, Ontario (Canadian Tire – 74 FC forklifts)	TBD	35 MPa	Electrolysis
Cornwall, Ontario (Walmart – 240 FC forklifts)	TBD	35 MPa	Electrolysis
Balzac (Calgary), Alberta (Walmart – 230 FC forklifts)	TBD	35 MPa	Electrolysis
Mississauga, Ontario (Hydrogenics)	Storage at 20MPa	35 MPa	Electrolysis
Trois Riviere, Quebec (WEH Gas Technology)	TBD	70 MPa	On-site Electrolysis