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Hydrogen and Fuel Cells in Canada

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Overview

- Historical Overview
- Current Actions
 - EV and Alternative Fuel Infrastructure Deployment
 - North American Alternative Fuel Station Map
 - North American Codes and Standards
 - Greening Government Operations
 - Real World Testing
- New Policy Activities
 - Zero Emission Vehicle Strategy
 - Hydrogen Pathway

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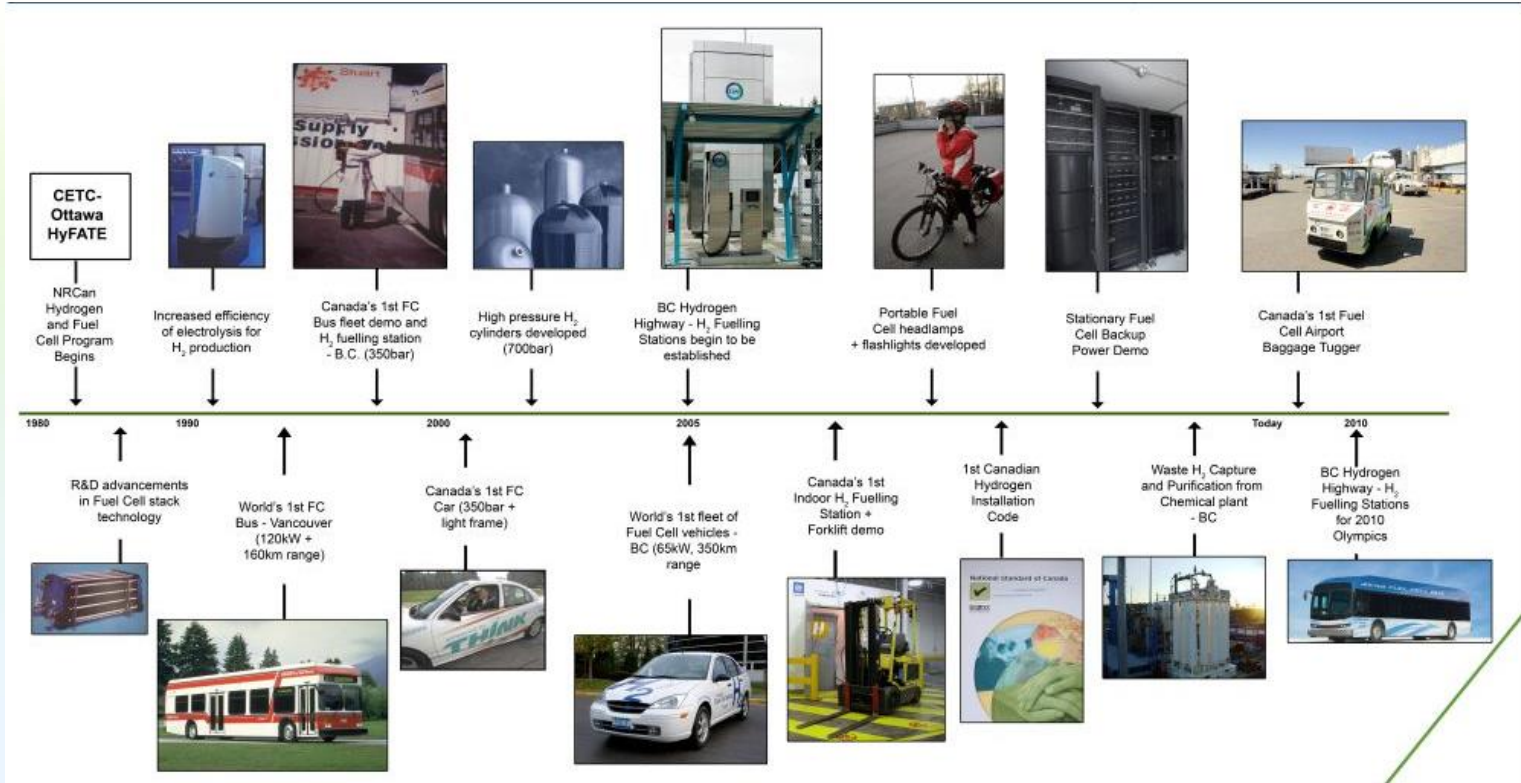


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HISTORICAL OVERVIEW



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WHAT'S HAPPENING NOW?

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Pan-Canadian Framework For Clean Growth And Climate Change

Transportation Strategy:

- Setting and updating vehicle emissions standards and improving the efficiency of vehicles and transportation systems;
- Expanding the number of zero-emission vehicles on Canadian roads. **ZEV Strategy**
- Supporting the shift from higher to lower-emitting types of transportation, including through investing in infrastructure (e.g. EV and Alternative Fuel Infrastructure Deployment Initiative) ; and
- Using cleaner fuels. **Clean Fuel Standard**



Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative - Progress

Supporting the deployment of publically available electric vehicle (EV) chargers, natural gas and hydrogen refueling infrastructure, and demonstration of next-generation charging technologies

Phase 1 - Deployment and Demonstration - \$62.5M (2016-2018)

- 100 EV fast-chargers; 7 natural gas stations; 3 hydrogen stations
- 200 next generation charging technology demonstration

Phase 2- \$120M over 4 years, starting in 2018 (to be launched in Fall 2017)

- **Deployment** of a coast to coast network of electric vehicle charging, natural gas on freight corridors and hydrogen refuelling for in major metropolitan areas.
- **Demonstration** of next-generation electric vehicle charging infrastructure and innovative recharging technologies.
- **Binational codes and standards** for vehicles and infrastructure

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EV and Alternative Fuels Station locator map

Further to commitments made by Canada/U.S and Mexico, at the June North American Leaders Summit to promote electric and alternative fuel corridors:

- Canadian data will be available on the U.S.'s Department of Energy/National Renewable Energy Laboratory (NREL) Alternative Fuels Map
- Map will display information for ethanol, biodiesel, electric, hydrogen, LNG, CNG and propane refueling stations in Canada
- All data will be available on an open-source basis
- Data also available as a new alternative fuel layer on the official Government of Canada Energy Map

Update:

- Contractor is gathering and compiling data
- Map should be “live” with Canadian data in December 2017
- Longer term plan is to include Mexico

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Greening Government Operations

- Government of Canada has committed to reducing emissions for Government operations (including buildings and vehicle fleets) by 40% by 2030.
- The North American Leaders Summit and COP22 Canada committed to fostering greater ZEV deployment in Federal fleets, and committed to working with Provinces

Actions

- Fleet telematics assessment
 - Benchmarking
 - Vehicle Use Reporting
- Fleet Right-Sizing Analysis
- Low-Carbon Replacement Assessment (fuel switching)
- Behavioural change (driver training)
- GHG Reduction Reporting
- Share best practices/ lessons learned with Provinces

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Energy Consumption and Environmental Performance

- Measure real world vehicle level hydrogen consumption;
- Record performance data and calculate efficiency at temperatures ranging from -7°C to 35°C with cold start at -18°C ;
- Analyze synergies between the fuel cell system and the hybrid system;
- Generate an efficiency map of the fuel cell system; and,
- Make data publically available (April 2018).



Non-Intrusive Safety Testing

- Conduct test procedure for vehicles equipped with hydrogen gas leakage detectors.

Crashworthiness Testing

- Fuel System Integrity, Storage System Specifications, Electric Vehicle Safety and Electric Powered Vehicles: Electrolyte Spillage and Shock Protection.

WHAT NEXT?

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Zero Emission Vehicle Strategy

A commitment under the Transportation Strategy in the PCF, Government of Canada would work with Provinces, Territories, and the private sector to develop a National Strategy for Zero-Emission Vehicles (including Fuel Cell Electric Vehicles)

- **ZEV Advisory Group:** Responsible for identifying and assessing the potential ZEV penetration pathways and associated instruments that will be considered and assessed to inform options
- **Five Expert Groups** developed in-depth reports to help inform the strategy including;
 - vehicle supply; cost and benefits of ownership; charging and refueling infrastructure; public awareness and education; and, technological advancement in clean growth and clean jobs
- **Federal, Provincial and Territorial Governments will continue to collaborate**
- **Final Strategy will be delivered in 2018**

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Hydrogen Pathway

Industry, government and key stakeholders collaborate on the development of a pathway to foster greater Fuel Cell Electric Vehicle Deployment in Canada

- Five working groups:
 - State of Play
 - Production and Distribution
 - Barriers & Codes and Standards
 - Drivers and Opportunities for Expansion
 - Refuelling Infrastructure
- Identify barriers to and benefits of greater deployment of hydrogen fuel cells in the transportation sector
- Develop recommendations and identify key roles and responsibilities for all players to advance fuel cell electric vehicles in Canada
- Report to be released Summer 2018.

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THANK YOU

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