Country Update
CANADA

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Canada

Presentation Outline

- Funding Overview
- Research and Development Activity Update
- Demonstration Program Update
- Other Industry Activities

Funding Overview

- **NRCan Funding Programs:**
  - Program of Energy Research and Development (PERD)
    - Funding for R&D by federal departments/laboratories
    - Collaboration with industry and universities
    - Approximately $2.5 million/year (on-going)
  - ecoENERGY Technology Initiative (ecoETI)
    - 2008-2011
    - Funded 10 H2&FC demonstration projects
    - Approximately $9 million/3 years
  - Clean Energy Fund (CEF)
    - Part of a broader 5-yr funding initiative, ending March 2012
    - Funding for R&D by federal departments/laboratories
    - Internal call for proposals closes on Sept 24
    - Total of $22 million for 4 technology areas, including H2&FC
    - Call for proposals closes September 24; funding decisions Oct/Nov

R&D Activity Update (1)

- PERD is currently funding 15 research projects and activities
- R&D areas include:
  - Hydrogen production (2)
    - Develop clean, efficient technologies for hydrogen production which can reduce GHG and criteria air contaminants on a lifecycle basis
  - Hydrogen storage (4)
    - Develop efficient and cost effective hydrogen storage materials, components and systems
  - Utilization (5)
    - Reduce fuel cell costs while increasing reliability and lifetime
  - Safety, Codes and Standards (4)
    - Develop risk management techniques, testing methodologies, test data, and targeted information products that will facilitate the accelerated adoption of hydrogen systems

R&D Activity Update (2)

Highlights:

- dPoint Technologies developed a low-cost Proton Exchange Membrane (PEM) fuel cell humidifier that resulted in a drastically reduced cost: from $2,500 to $60 per humidifier. The new low-cost humidifier has been supplied to over 65 fuel cell companies in 15 different countries.

dpoint technologies

- Hydrogenics Corporation has demonstrated an increase in the continuous operation of their PEM water electrolyzer: from 8,000 to 19,800 hours. This is now approaching Hydrogenics's requirements of 20,000-40,000 hours that is needed to be competitive with traditional H2 generation technologies.

HYDROGENICS CORPORATION

Demonstration Program Update

Ongoing

Completed (2010)

Completed (2009)

PEI Hydrogen Shuttle Bus & Fuelling Station
Charlottetown, PEI

•BC Hydrogen Highway
•Vancouver Fuel Cell Vehicle Program
•Integrated Waste Hydrogen Utilization Project
•Airport Project (Vancouver)
•Pacific Spirit Station
•BC Transit Hydrogen Fuelling Station

Saskatchewan Highway
Saskatoon

Airport Project
Vancouver & Montreal

Hydrogen on the Hill - Ottawa

Hydrogen Village
Greater Toronto Area

Canada

B.C. Hydrogen Highway: H_2i Campaign Results

- 20 hydrogen fuel cell electric buses, the world's largest fleet running in one location, Whistler, B.C. which ran throughout the 2010 winter Olympic games
- 15 additional fuel cell vehicles (Ford, GM, and Mercedes) were used to transport visiting media, dignitaries, VIPs and the general public
- 8 total fuelling stations in Victoria, Whistler, and Vancouver were used to fuel the demonstration vehicles
- Coverage on television networks (CNBC, NBC Today Show, Discovery Channel, Reuters, CBC, among others), outreach to over 300 domestic and international reporters, and over 80,000 public introductions to hydrogen and fuel cell technologies

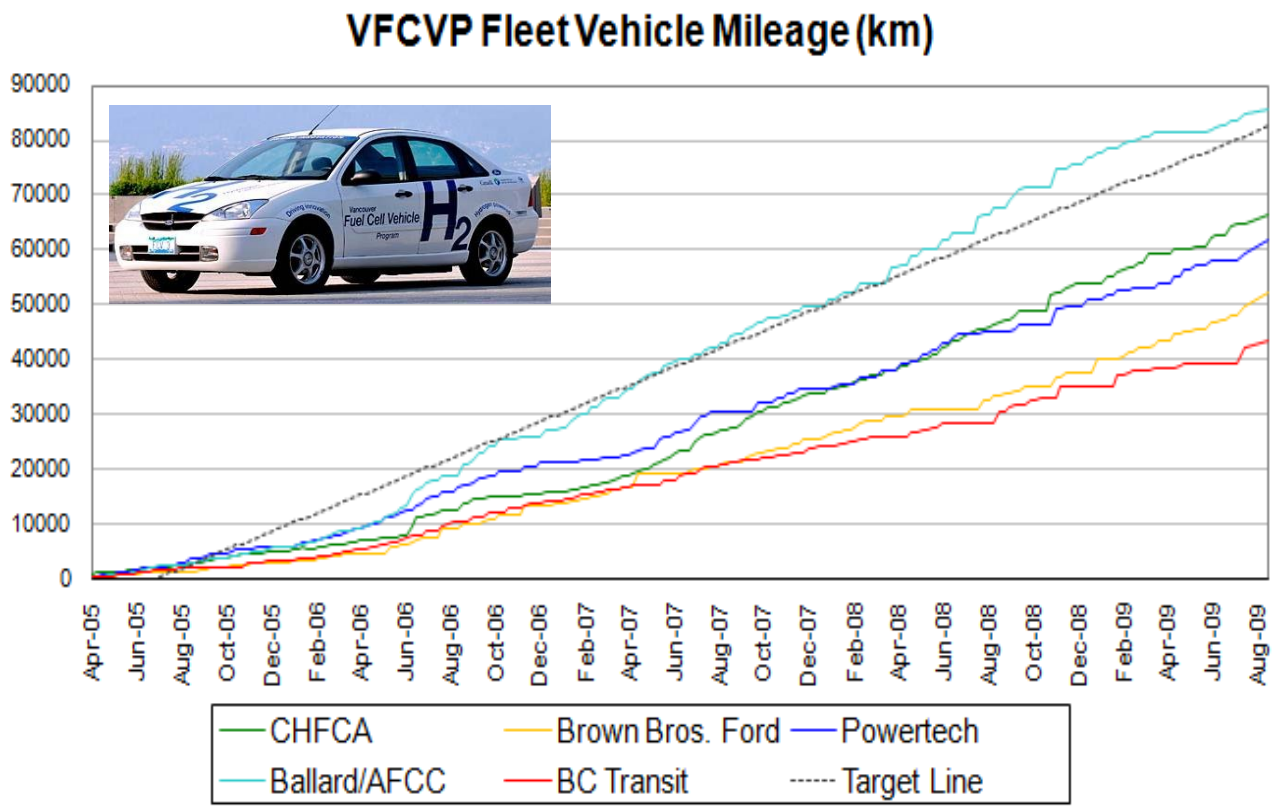
IWHUP Results

Integrated Waste Hydrogen Utilization Project (IWHUP)

- Purified hydrogen from a waste stream
- A total of 35,000 kg of Hydrogen safely delivered during IWHUP
- Over 5,000 kg dispensed to two Ford Hydrogen Internal Combustion Engine (H2ICE) shuttle buses, running a total mileage of 54,450 km

Vancouver Fuel Cell Vehicle Program Results

- 5 Ford Focus fuel cell vehicles, in operation since 2005
- On average, each vehicle was driven 14,000 km per year
- The fleet achieved a collective mileage of over 350,000 km
- GHG reduction of 47% for FCVs compared to identical gasoline vehicles



Canada

Hydrogen on the Hill Results

Natural Resources Canada

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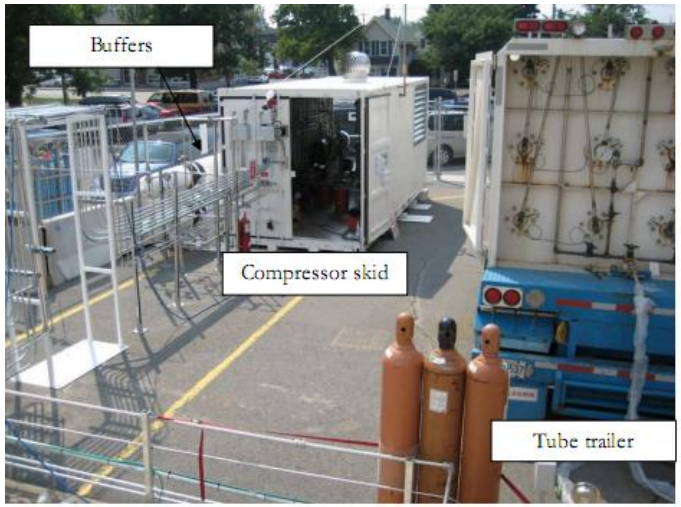
CANADA



- A 350 bar Air Liquide fuelling station dispensed a total of 5,650 kg of hydrogen over the course of the project
- 3 hydrogen internal combustion engine (H2ICE) shuttle buses used as part of the Senate's transportation fleet on Parliament Hill

Pacific Spirit Station Project Results

- A total of 1,050 fuelling events were logged
- Approximately 2,640 kg of hydrogen was dispensed
- Each fuelling event took approximately 5 minutes
- No safety incidences or injuries during the 5-year project

PEI Hydrogen Bus & Fuelling Demonstration

- 2 Ford hydrogen ICE shuttle buses travelled over 8,000 km each per year, totalling a combined 32,000 km over the two year project
- One fuelling station is currently active in Charlottetown, with another in North Cape to be commissioned shortly

Other Industry Activities

- Hydrogen Assisted Renewable Power (HARP), Bella Coola, B.C
  - Partnership with the Federal Government, BC Hydro, Powertech, and G.E.
  - Energy storage system that converts excess off-peak electricity from a renewable source (run-of-river) into hydrogen via an electrolyser, to be used during peak hours
  - Estimated decrease in the town's diesel consumption by 200,000 L/year, and 600 tonnes of GHGs/year

- New Wal-Mart Distribution Centre, Balzac, Alberta
  - Fleet of 75 H2FC forklifts (first DC fleet in Canada to be powered entirely by fuel cells)
  - Wal-Mart estimates the fuel cells will reduce GHG emissions by 530 tonnes/year and save the DC $2 million in operating costs over seven years
  - Air Liquide contracted to supply the hydrogen and dispensers

Thank you