Government of Canada | Gouvernement du Canada

Canada
Member Statement

International Partnership for the Hydrogen Economy (IPHE)

3rd Steering Committee Meeting

26-27 January 2005
Paris, France

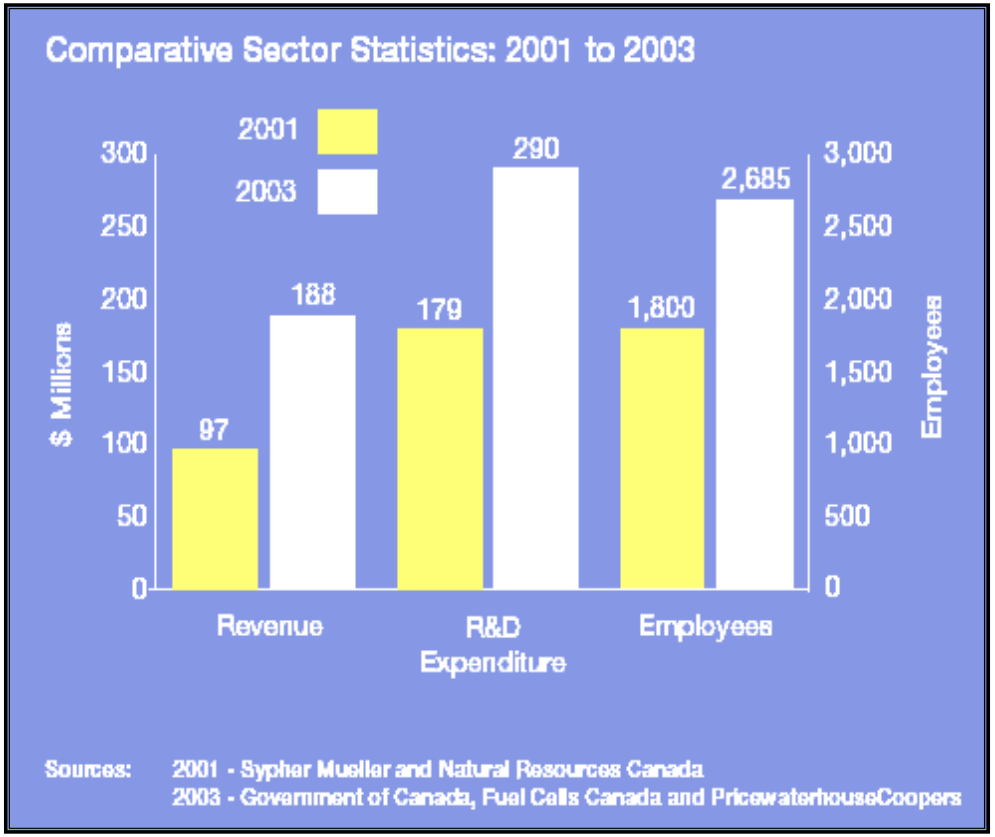
Canada

Outline

- Canadian Industry Profile
- Canadian Hydrogen Related Research and Development Programs and Expenditures
- Canadian Hydrogen Technology Demonstration Projects
- Domestic/International Hydrogen Conferences, Workshops, and Other Events and Activities
- Canadian Industry Issues

Canada's Fuel Cell and Hydrogen Industry

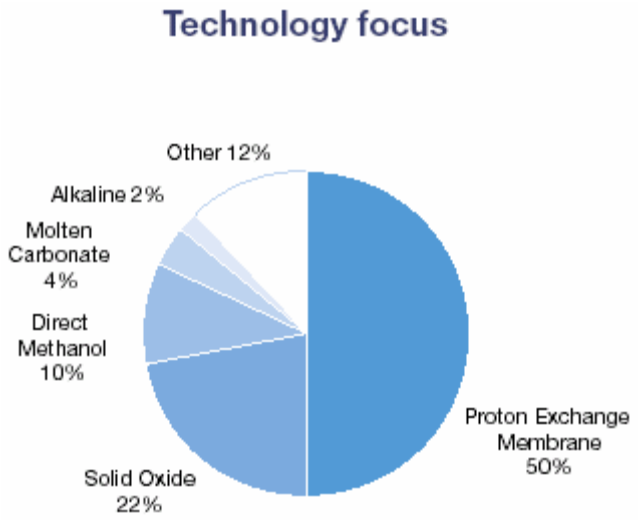
- **Revenue** has grown 94%—from $96.9 million in 2001 to $188 million in 2003.
- **R&D expenditures** have increased over 62% to $290 million per year and have stabilized at just over $100,000 per employee.
- **Employment** stands at 2,685 - an increase of 49% from 2001.

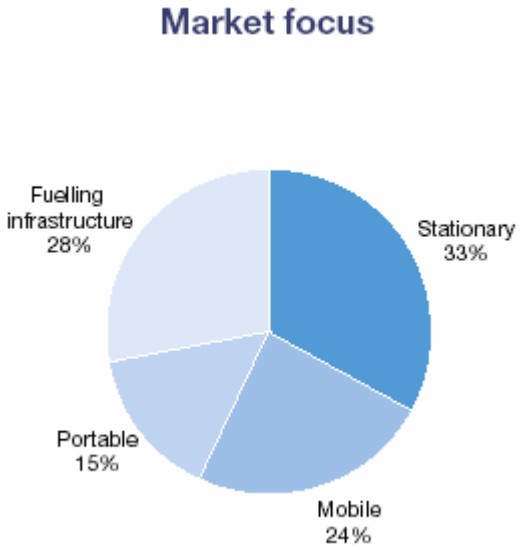


Canada

Canada's Fuel Cell and Hydrogen Industry

- Half of Canadian sector focused on proton exchange membrane (PEM) technology
- Market focus split mainly between stationary and mobile applications and fuelling infrastructure

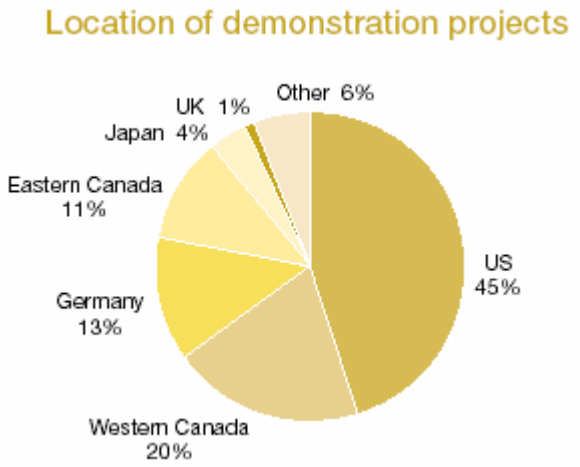


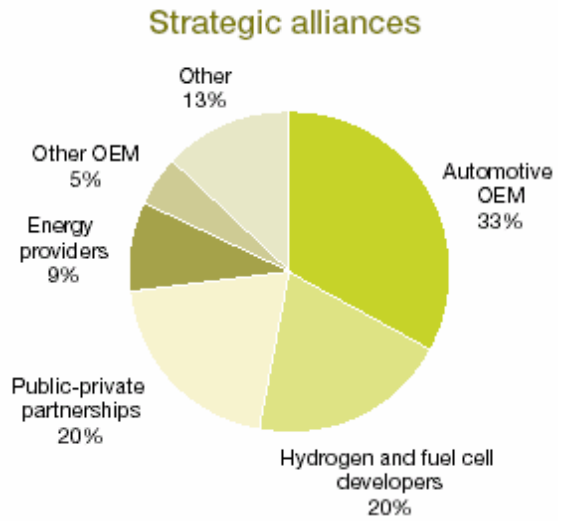


Canada

Canada's Fuel Cell and Hydrogen Industry

- A 232% increase in the level of participation in demonstration projects from 2002
- A 90% increase in strategic alliances and partnerships from 2002
- 581 patents reported in 2003 – up from 433 in 2002





Canada

R&D Priorities

Hydrogen Production - Develop low-cost, highly efficient and clean hydrogen production technologies that have a positive GHG impact and will reduce or eliminate other harmful emissions

Hydrogen Storage - Develop safe, efficient and cost effective hydrogen storage materials, components and systems

Utilization - Develop improved fuel cell technologies to lower costs and increase reliability and lifetime for mobile and stationary fuel cells

Codes, Standards, Policy and Outreach - Undertake R&D that supports the development of codes and standards; R&D that will provide input into policy and decision-making; Support outreach activities

Canada

Federal R&D Programs and Expenditures for 2004-05

National Research Council of Canada (NRC)

- $14M of research related investment in 2004-2005
  - $13M on research activities aligned with Canada's fuel cell industry
  - $1M in facilities investment – Completion and opening of Hydrogen Technology Environmental Chamber (Vancouver) and fuel cell lab upgrades in Vancouver and Ottawa

Natural Resources Canada -Hydrogen and Fuel Cell R&D Program

- $5.5M in 2004/05 for support of research, development and demonstration projects.
  - Funding is mainly from the Program on Energy Research and Development and the Technology and Innovation Program, which also supports work done in National Defence, Transport Canada, and Environment Canada.

Natural Science and Engineering Research Council (NSERC)

- $5M in support of basic research and partnerships with industry and government in 2004-05

Defence R&D Canada (DRDC)

- $1.2M for fundamental and applied R&D on hydrogen storage/production and fuel cells(includes PERD and T&I contribution)
- $2M awarded to two fuel cell projects/contracts with industry through the Defence Industrial Research Program (DIRP)

hydrogen chamber

- Temperature: -60°C to 140°C (-76°F to 284°F); 2°C/minute (3.6°F/min) ramp rate
- Humidity: 5 to 95% RH between -10°C and 65°C (14°F to 149°F)
- Altitude: 3000 m or 70 kPa absolute pressure (10,000 ft or 10 psia)
- Heat rejection: 25 kW at -60°C and 100 kW at -40°C (85 kBTU/hr at -76°F and 340 kBTU/hr at -40°F)
- Dynamometer: 187 kW (250 Hp) maximum intermittent power; 100 kph (60 mph) max speed
- Dimensions: 3 m (10 ft) wide x 3 m (10 ft) high x 7.6 m (25 ft) long unobstructed space
- Load capacity: 3400 kg (7500 lb) with a stress point capacity of 2 MPa (300 psi)

Canada

Demonstration Priorities

- Integration of hydrogen and hydrogen-compatible technologies
- Development and evaluation of hydrogen infrastructures
- Development of skills and supply chain in the hydrogen industry
- Development of codes and standards for the hydrogen industry
- Increase in performance, reliability, durability and economical viability of hydrogen and hydrogen-compatible technologies
- Increase of public, consumer and investor awareness and acceptance of the hydrogen capability

HYDROGEN HIGHWAY CANADA

HYDROGEN Village

Canada

Hydrogen Early Adopters (h2EA)

- $50M over 5 years
- 4 rounds of submissions completed and over 50 proposals received
- Supports up to 50% of eligible costs
- $7.3M awarded to 3 projects involving more than 13 Canadian organizations in 2004-05 so far

Technology Partnerships Canada

Fuel Cell Technologies - Installation of four 5kW solid oxide fuel cells to provide electricity and for domestic hot water and area heating for 6 townhouse-style student residences at the University of Toronto through a “mini-grid” network

Hydrogenics - Demonstration of a hybrid fuel cell battery delivery vehicle, fuel cell for utility work vehicles, back-up power system and a refuelling station coupled with a wind turbine

Ballard - Demonstration of a hydrogen fuelled uninterruptible power supply for load in commercial\industrial buildings, telecommunications and server-room back-up, based on Ballard’s PEM fuel cell technology

Canada

Sustainable Development Technology Canada

- $350 over 5 years to support demonstration of clean technologies - $50M allocated to hydrogen
- The ratio of industry-partner contributions to SDTC investment is approximately 3:1
- $11.8M awarded to 3 hydrogen projects in 2004-05

SUSTAINABLE DEVELOPMENT TECHNOLOGY CANADA™

Sacré Davey – Development and demonstration of hydrogen fuel refining, storage, distribution, and infrastructure

Questair – Demonstration of the recovery of hydrogen in oil refining applications

Atlantic Hydrogen – Demonstration of commercially viable grid-connected energy systems integrating hydrogen delivery system with ICE and fuel cells

Canada

Canadian Transportation Fuel Cell Alliance

- $33M over 7 years
- $17M allocated to projects to date
- $7M awarded in 2004-05

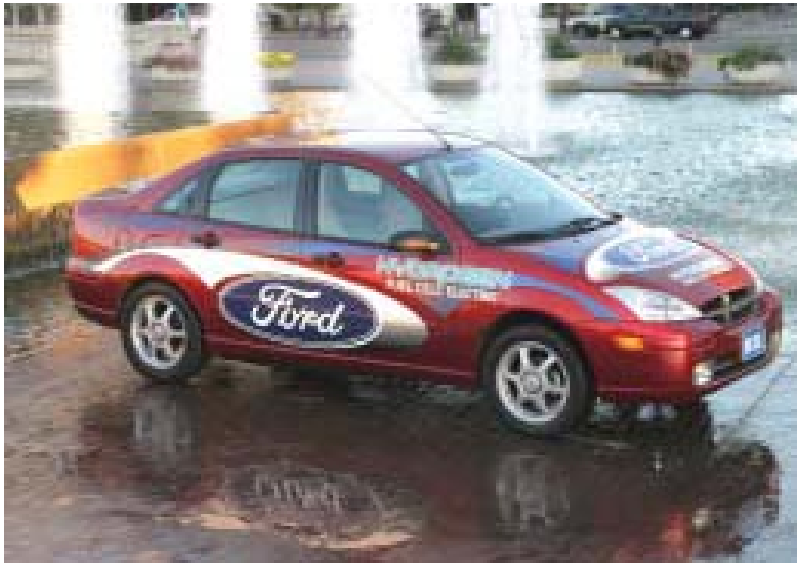
16 fuelling stations completed as prototypes, installed or under development

4 different types of fuel cell vehicles under development

4 projects related to hydrogen storage cylinder system development

2 hydrogen dispenser systems

8 major national and international codes and standards activities and a variety of *studies*

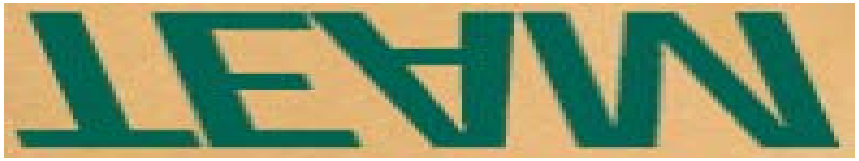


Funding support for the management expenses of the *Hydrogen Highway project*, the *Vancouver Fuel Cell Vehicle Program* in British Columbia, and the *Hydrogen Village project* in the Greater Toronto Area

Canada

Technology Early Action Measures (TEAM)

- $63M over five years (2003 -2008)
- $17M invested in 13 projects involving H2, fuel cells and supporting technologies to date
- The ratio of industry-partner contributions to TEAM hydrogen related investments is approximately 6:1
- $3.4M invested in 2004-05



Vancouver Fuel Cell Vehicle Project – Demonstration of 4 Ford Focus vehicles in Vancouver, British Columbia

Xantrex – Demonstration of inverter technology that is utilized for integrating numerous renewable/alternative technologies including fuel cells

IMW Industries - Hydrogen compressor station demonstration

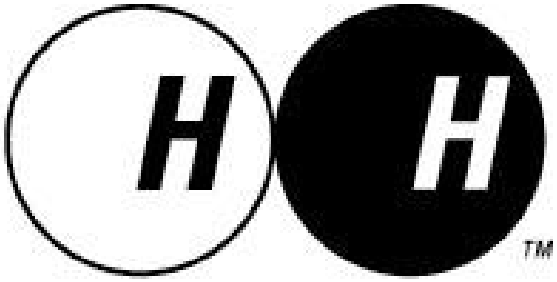
Canada

HYDROGEN Village

Vancouver Fuel Cell Vehicle Project

HYDROGEN HIGHWAY

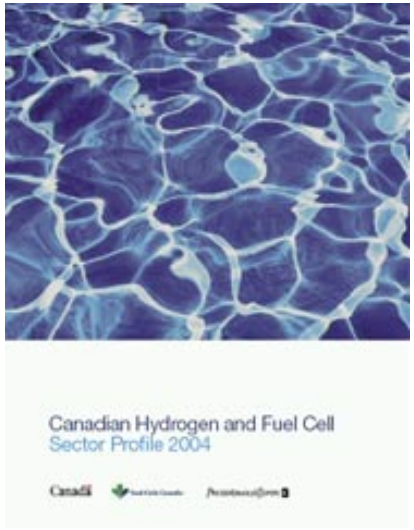
CANADA

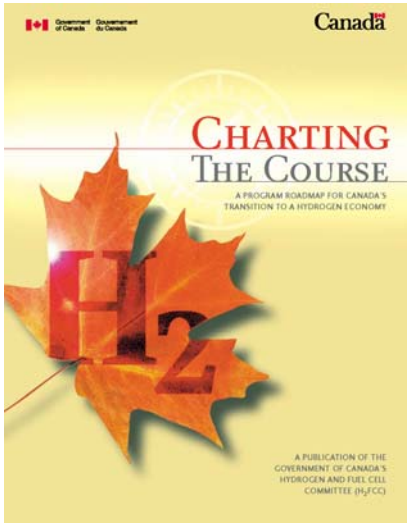


Canada

New Developments – Other

- National Hydrogen and Fuel Cell Strategy
- Hydrogen Roadmap
- Canadian bus strategy
- Federal and provincial investments in automotive sector
- Support for ongoing bilateral and multilateral fora
- 2010 Winter Olympic and Paralympic Games
- www.hydrogeneconomy.gc.ca
- Charting the Course and the Canadian Hydrogen and Fuel Cell Sector Profile 2004





Canada

New Developments – Other

- 2004 Canadian Hydrogen and Fuel Cell Conference
- Canada Pavilion at 2004 World Hydrogen Energy Conference
- Canadian delegations to India, China, and the Nordics
- Incoming delegations from Norway, Russia, Japan, France, and Germany
- National communications and codes and standards workshops
- Public Opinion Research in Canada on hydrogen and fuel cell technology
- British Columbia and Ontario sector strategies

Canadian Industry Issues

- Government Procurement
- Need for commitment to purchases of hydrogen and fuel cell products as part of green procurement policy by all levels of government
- Requires proactive governments, coordination, and leadership in demonstrating and applying technologies


Canada