Canada's Domestic Energy Technology Partnerships

CoP 11/MoP 1

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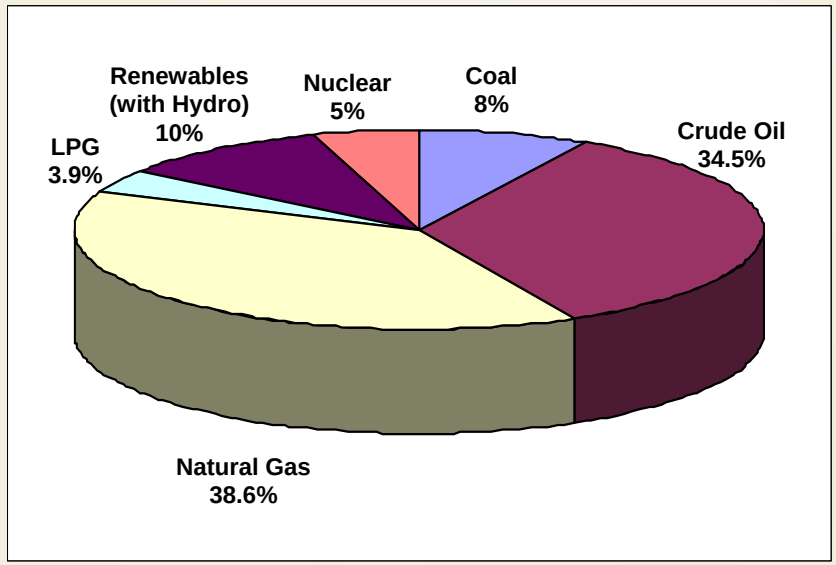
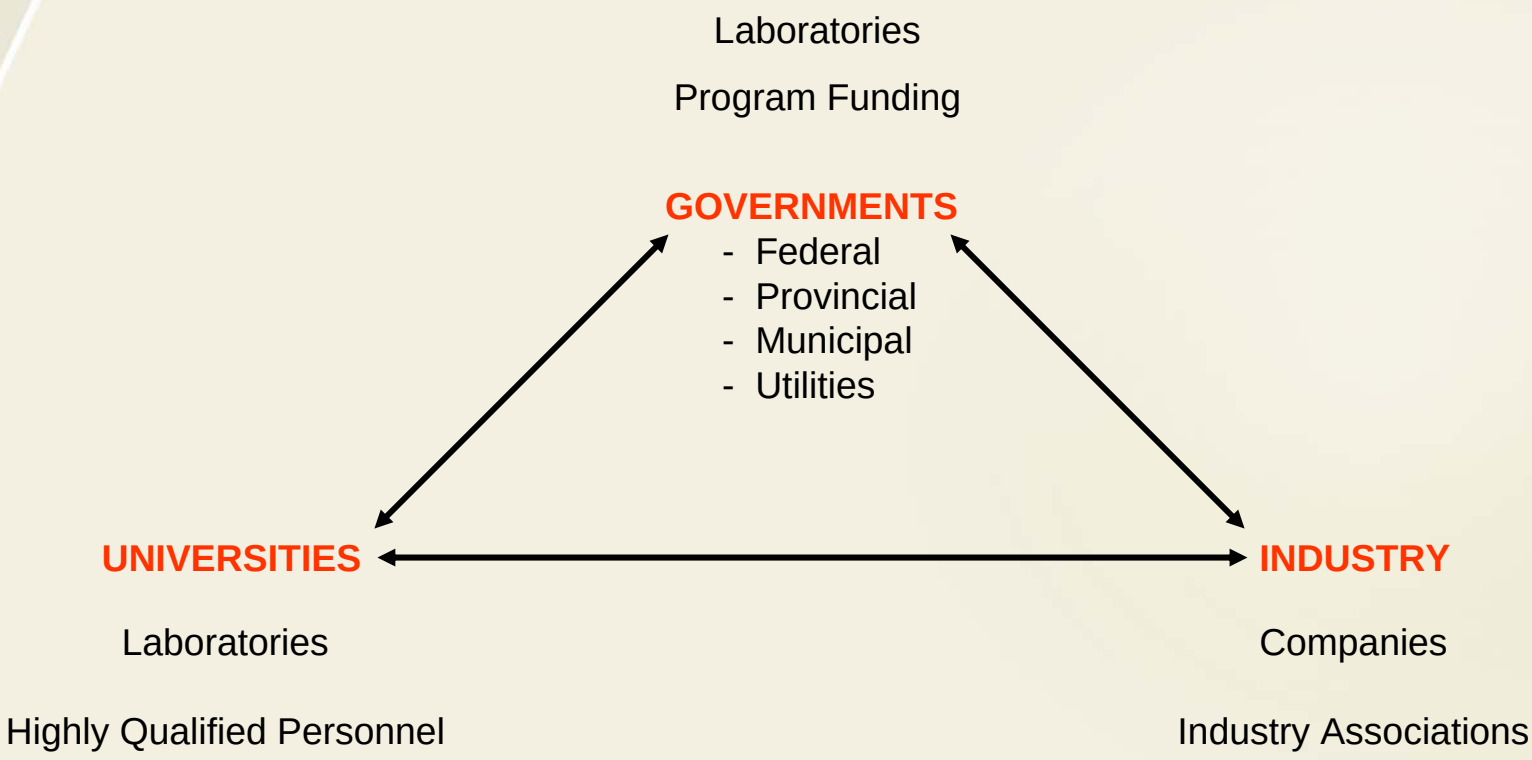
Canada's Energy Mix

- Canada has an abundant, diversified energy mix
- Oil – growing supply from offshore and huge oil sands resource
- Natural gas – world's third-largest producer
- Coal – plentiful and cheap
- Nuclear – world leader in uranium production, unique CANDU technology
- Renewables – Hydroelectricity, Bioenergy, Wind, Solar and Geothermal – vast, high-quality resource potential

Total Primary Energy



Domestic Partnerships



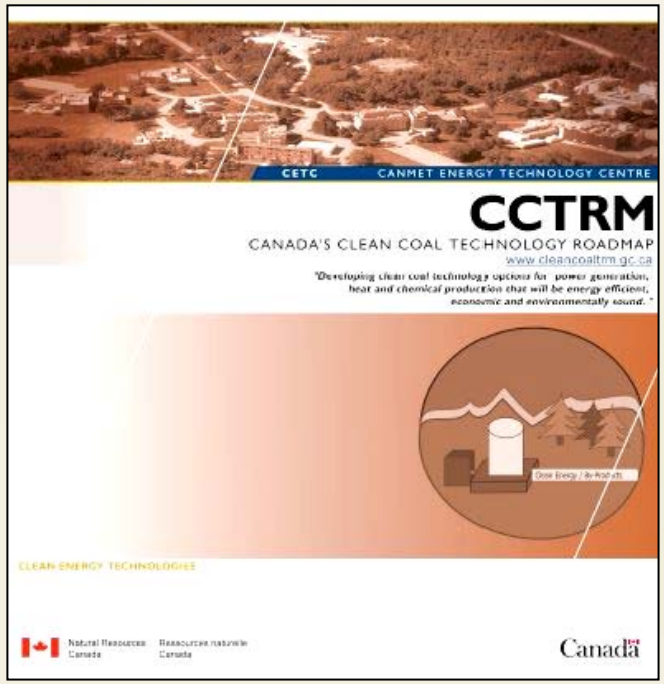
Canadian Technology Priorities

1. **Built Environment** – building energy technologies; communities and neighbourhoods
2. **Power Generation** – hydro; renewables, including grid interconnection and biomass
3. **Transportation** – alternative transportation fuels; hydrogen and fuel cells
4. **Fossil Fuels and Oil Sands** – clean coal; CO_2 capture and storage; natural gas cogeneration
5. **Industry** – industrial process energy efficiency
6. **Nuclear**

Technology Roadmaps – Developing Common Strategies

Technology Roadmaps

- An analytic tool to chart future directions, plan technology developments, provide input to policy
- Involves all players in a particular sector
- Principles: 1) industry must take ownership
  2) market pull involving users
  3) action oriented
  4) knowledge-sharing
  5) flexible process



Energy Technology Roadmaps

- Bio-based Feedstocks
- Electrical Power
- Fuel Cells
- Hydrogen
- Clean Coal
- CO_2 Capture and Storage
- Oil Sands

Technology Partnership – Federal and Provincial Governments / Industry

Fuel Cell and Hydrogen Technology Roadmaps identified:

- R&D to improve performance and reduce cost
- Infrastructure development:
  - Hydrogen Highway: 8 - 10 stations planned in time for the 2010 Olympics
  - Demonstrating 5 Ford fuel cell vehicles and other stationary and mobile projects

Hydrogen Highway

Technology Partnership – Federal and Provincial Governments / Utility / University

The Atlantic Wind Test Site (AWTS) is the national wind turbine test facility

North Cape, Prince Edward Island

Technology Partnership – Federal and Provincial Governments / Industry / Utility

Refrigeration

- An entirely new approach to commercial refrigeration system, technology and operating practices pioneered at Natural Resources Canada's CANMET Energy Technology Centre (CETC) in Varennes, Quebec
- Innovative two-loop system with environmentally friendly fluids (Ethylene Glycol, Potassium Formate, Propylene Glycol)
- In new facilities and retrofits
- 25% reduction in energy consumption
- 75% reduction in GHG emissions

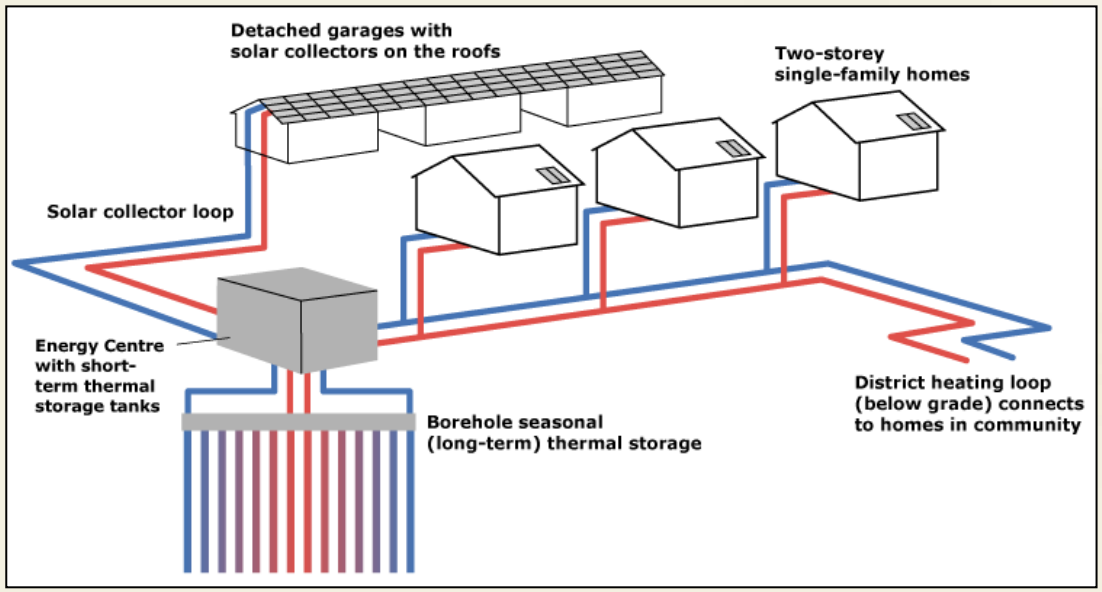
Loblaws supermarket - Repentigny, Québec

Innovative two-loop refrigeration system

Technology Partnership – Federal, Provincial and Municipal Governments / Industry

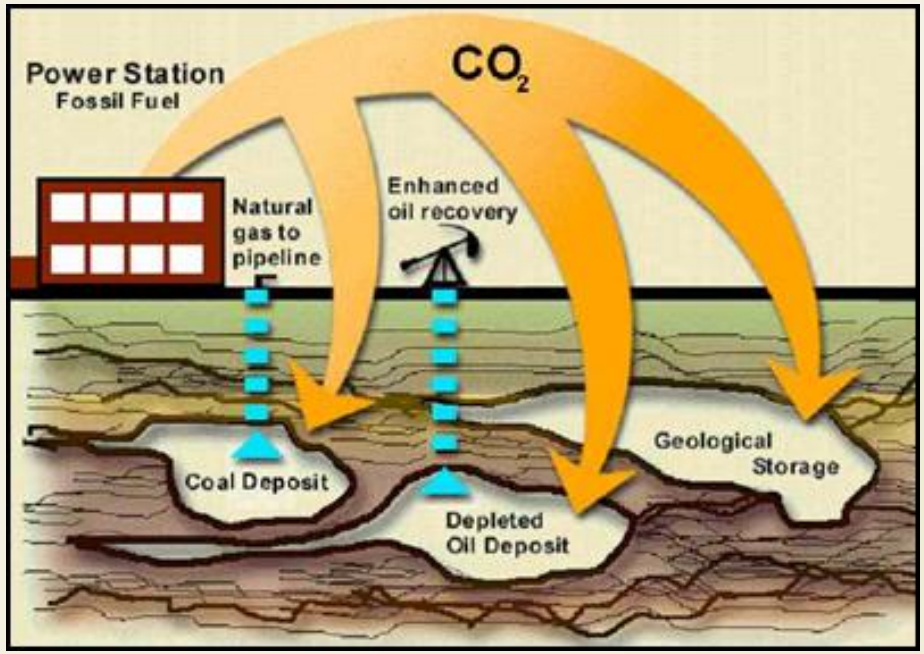
Solar-thermal energy

- In partnership with Sterling Homes, the Town of Okotoks, the Government of Alberta and others, CETC is supporting the installation of North America's first large-scale seasonal storage project
- Solar energy will provide over 90% of space heating requirements for 52 homes
- Reductions of up to 5 tonnes of GHG emissions per home



IEA Weyburn CO_2 Monitoring and Storage Project

- To predict and verify the ability of oil reservoirs to securely and economically store CO_2
- To develop measurement and verification tools, identify regulatory issues and promote public understanding of the technology
- One of Canada's energy technology roadmaps



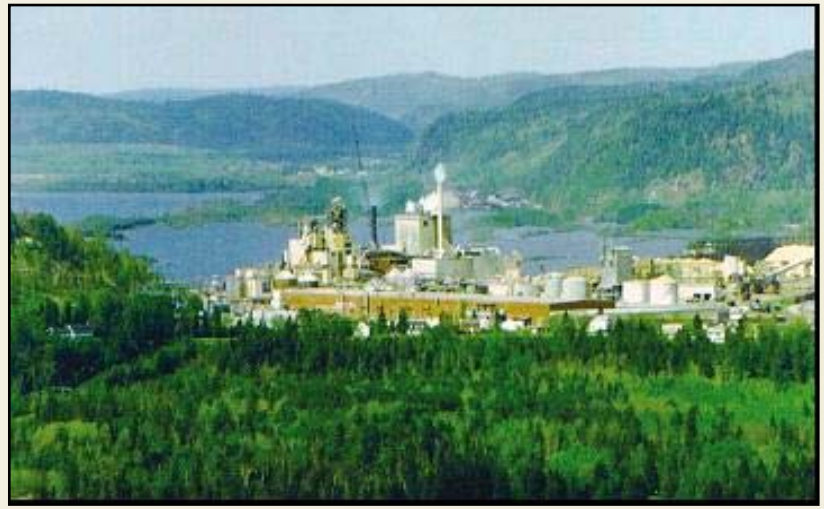
Technology Partnership – Federal Government / Industry

Process Integration

- A site-wide analysis that looks at the whole manufacturing or resource processing system, and the interactions between its different parts, rather than at individual operations
- A systematic approach to identify and correct inefficiencies in industrial processes.

Process Integration at the Smurfit-Stone pulp and paperboard mill in La Tuque, Quebec resulted in:

- CO_2 reduction of 50,000 t/yr
- Significant reductions in energy and water consumption
- $6 million in savings/year
- Payback in 10 months



Technology Partnership – Federal / US Government / Industry / Universities

Challenge X

- Sponsored by US Dept. of Energy (DOE), GM, Natural Resources Canada and others
- GM providing Equinoxes to student teams who will modify the vehicles to increase fuel economy and reduce emissions
- University of Waterloo vehicle used hydrogen and a Hydrogenics fuel cell
- 17 teams; Waterloo placed first in the June 2005 design competition (first year of 3)

North American Solar Challenge

- Sponsored by US DOE, Natural Resources Canada and others
- Austin, Texas to Calgary, Alberta in July 2005 – covering 4,000 km
- Queens, McMaster, Waterloo, Red River College and Calgary participated in this year's event with all 5 crossing the finish line

North American Solar Challenge – July 2005

University of Waterloo Solar Car Entry

Technology Partnership – Federal Government / NASA / United Nations

RETScreen

- Web-based pre-feasibility software, with user input on costs and specs
- Facilitating the implementation of roughly 320 MW of projects in Canada and 1,000 MW worldwide
- Contributing to the deployment of clean energy technologies worth approximately $750 million in Canada and $1.8 billion worldwide
- Helping stakeholders take action to reduce greenhouse gas emissions in the order of 630 kT CO_2/yr to 2004 and a projected 20 MT CO_2/yr by 2012