Canada's International Technology Partnerships

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COP 11/MOP 1
Montréal
November 30th, 2005

Why International Energy S&T? Addressing Common Energy Challenges

- All countries are facing energy issues: energy availability and affordability, energy security, mitigation of GHGs, air quality
  - Some challenges are country specific
  - Others are common to several nations

Energy Efficient Oil Sands Production

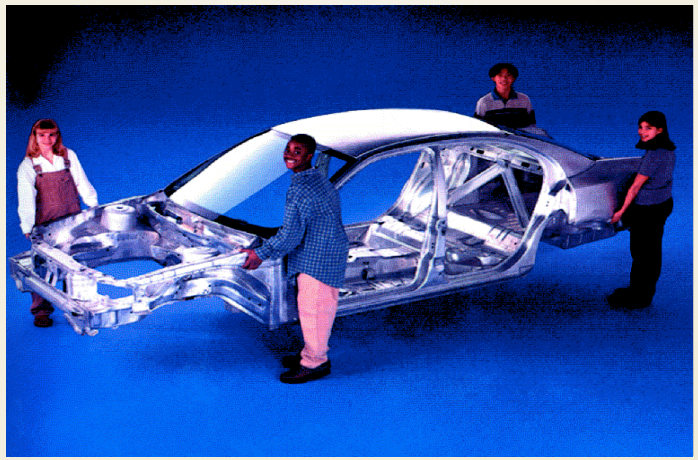
- A broad range of S&T expertise, experience, capacity and resources exists in the world
  - But most countries have a small share of the world's investments, knowledge and expertise

- Collaborative S&T mechanisms create channels to work on common issues, create synergies

Why International Energy S&T? Many Benefits

- To learn about policies, programs and technologies in other countries
- To share S&T expertise and knowledge
- To partner to work on common issues
- To influence S&T policies, programs in international organizations
- To make new technologies available to markets at home, abroad

Lightweight Materials



- The federal government works with other countries, international organizations and networks around the world in energy technologies
  - Lead department for the federal government in energy technology is Natural Resources Canada

- Expanding scales: bilateral, continental and international, "technology-specific"

How We Work Together Internationally
Bilateral Collaboration – Examples

- **Bilateral agreements to implement Canadian technology abroad …**

- Small hydro turbines	Poland
- Small hydro control systems, site rehabilitation	China
- Solar crop drying	Brazil
- Natural gas vehicles	Romania
- Super E (energy efficient manufactured housing)	Japan, Germany
- Energy efficiency capacity (training, tools, demos)	Russia
- Waste gasification	Spain
- Biomass gasification	China

- **Technology Promotion Officers (TPOs) working abroad**
  - **TPOs in India, Mexico, Poland**

Fuels Derived from Biomass-Ethanol

International Collaboration With Neighbours On Our Home Continent

- Many opportunities exist to advance each country's energy objectives through closer collaboration with neighbours on our home continent
- Can achieve synergies in energy supply, sharing technology and expertise, enhance energy security and reliability
- Two examples …
  - US - Canada Memorandum of Understanding on Energy R and D
  - Mexico - US - Canada North American Energy Working Group
- NAEWG has an S and T Working Groups, with active projects in …
  - Affordable energy efficient housing
  - Hydrogen

Technology Collaboration Through International Organizations

- International organizations open many opportunities - technology collaboration, pooling resources, sharing information, finding partners, providing analytical capacity
- Open to participation by both member and non-member countries
- International Energy Agency (IEA)
  - 41 Implementing Agreements - in energy efficiency, renewables, clean fossil fuels, fusion energy, information sharing
- Asia-Pacific Economic Cooperation (APEC)
  - Experts groups on renewables, clean fossil energy
- Climate Technology Initiative (CTI)
  - Technology transfer initiatives, workshops

Working Together
Particular High-Priority Technologies

- International work underway focused on particular energy technologies that are high priority to participating countries
- Collaboration organized through new and existing international partnerships
- Examples …
  - Hydrogen
    - International Partnership for the Hydrogen Economy (IPHE)
    - IEA Implementing Agreements in Hydrogen, Advanced Fuel Cells
  - Carbon Dioxide Capture and Storage
    - Carbon Sequestration Leadership Forum (CSLF)
    - IEA Greenhouse Gas R and D Programme

Hydrogen Production

Successful Transfer of Technologies Into International Markets

- To achieve widespread impact, new promising technologies need to get out into the market - to "bridge the gap between the laboratory and the marketplace"
- Several "best practices" to help make this happen
  - Create partnerships with industry from the outset
  - Solicit expert input from industry advisors
  - Analyze needs of industry, market - domestic and international
  - Support across the innovation chain – suite of programs
  - Prepare key players early – providers of venture capital, regulators
- Recently launched a "Technology to Market" initiative
  - Analyze needs of selected high-priority technologies
    - more R and D? demonstration? ready for commercialization?
  - Analyze markets – at home and abroad
  - Design next stages of the technology program accordingly

Opportunities to Strengthen Technology Collaboration

- **Opportunities for further collaboration are at hand to accelerate the development and widespread deployment of clean energy technologies**

- **Two-way flow – information, ideas, best practices, opportunities, projects**

  - **Sharing information and lessons learned on policy initiatives**

  - **Identifying "best practices" to promote the use of best available technologies**

  - **Establishing innovative mechanisms to stimulate the exchange of S&T knowledge and expertise between countries**

  - **Exploring ways of increasing financing for energy research, development and demonstration initiatives**

  - **Making the best use of existing networks to connect all players**
    - **Examples: African Energy Policy Research Network (AFREPREN/FWD), Latin American Network (LAMNET)**

Annex 7
Technology Early Action Measures (TEAM)

- A program that supports the transfer of innovative Canadian GHG reduction technologies to other countries

  - A pilot-scale landfill gas (LFG) utilization system at the Canabrava landfill site in Salvador, Brazil

- The lights at the local soccer field are powered by the electricity produced from landfill gas

http://www.climatechange.gc.ca/team

Annex 8
Clean Energy Portal

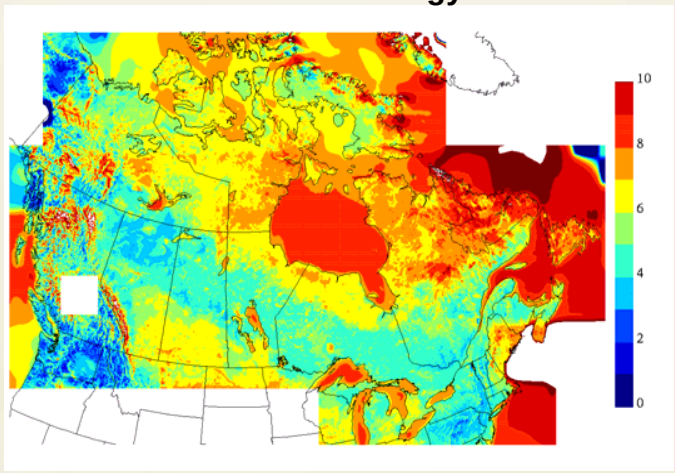
- **The Clean Energy Portal is a repository of information related to Canadian climate change mitigation expertise and relevant Canadian or international organizations, initiatives and events**

http://cleanenergy.gc.ca/index_e.asp

Closing Observations

- Canada places high value on international engagement in energy S&T
- An important part of our overall effort in energy S&T
- We aim to make the best use of existing networks and mechanisms, and then design and open up new channels as needed
- Resources are limited, opportunities are many
- We welcome dialogue – new technologies, “best practices”, meeting particular needs, getting technologies deployed in markets at home and abroad

Canadian Wind Energy Atlas



Annex: Additional Information Re Canada's Technology Collaboration Programs and Outreach Initiatives

Collaboration Within Our Home Continent:

1. North American Energy Working Group

Collaboration Within International Organizations:

2. International Energy Agency (IEA)
3. Asia-Pacific Economic Cooperation (APEC)
4. Climate Technology Initiative (CTI)
5. "G8 Plus Five" Action Plan
6. Collaboration on Particular Technologies

Outreach to International Markets:

7. Technology Early Action Measures (TEAM)
8. Clean Energy Portal
9. Climate Change Technology Promotion Officers

Annex 1
North American Energy Working Group

- **Many opportunities exist to advance each country's energy objectives through closer collaboration with neighbours on our home continent**
  - **Synergies in energy supply, sharing technology and expertise, enhance energy security and reliability**
- **An example in North America: the North American Energy Working Group – Canada, United States, Mexico**
- **Objectives - to enhance the continental North American energy trade and interconnections consistent with the goal of sustainable development**
- **The NAEWG is composed of six sub-groups:**
  - **North American Energy Picture, Cooperation on - Electricity Regulatory Issues, Energy Efficiency, Natural Gas, Critical Infrastructure Protection Forum, Energy S&T**
- **Examples of the achievements of the Energy S&T Group:**
  - **Casa Nueva - Designs for affordable, energy efficient housing, showcasing sustainable renewable technologies and practices, independent of limited infrastructure**
  - **High Penetration Wind-Diesel Power - Assess wind resource potential at an isolated fishing island community in Mexico for the possible application of wind-diesel technology to supply electricity**

Annex 2
International Energy Agency

- **Member and non-Member governments pool resources to advance research, development and deployment of energy technologies:**
  - **S&T collaboration via four Working Parties**
    - **Fossil fuels, renewable energy, end-use, fusion power**
  - **And 41 Implementing Agreements**
    - **Joint research, development and deployment studies, works or experiments – example, Bioenergy**
    - **Exchange of information on scientific and technological developments – example, Centre for the Analysis and Dissemination of Demonstrated Energy Technologies (CADDET)**
- **More information on technology activities at:**

http://www.iea.org/Textbase/techno/index.asp

OPEN Energy Technology Bulletin

http://spider.iea.org/impagr/cip/index.htm

Annex 3
Asia-Pacific Economic Cooperation (APEC)

- A forum for facilitating economic growth, cooperation, trade and investment in the Asia-Pacific region.

- Opportunities for S&T collaboration through various committees such as the Energy Working Group
  - Seeks to maximize the energy sector's contribution to the region's economic and social well-being, while mitigating the environmental effects of energy supply and use

- Example of collaboration: Expert Group on Clean Fossil Energy
  - Carbon dioxide capture and storage projects - storage assessments (Canada) and public education and outreach (Canada and Australia)

http://www.apec.org

Annex 4
Climate Technology Initiative

- Multilateral initiative, comprising 10 developed countries from Europe, Asia and North America operates as an Implementing Agreement under the IEA
- Objective : To foster international cooperation in the accelerated development and diffusion of climate-friendly and environmentally-sound technologies and practices among developed, transition and developing countries
- Linked to the United Nations Expert Group on Technology Transfer (EGTT)
- CTI activities support of UNFCCC objectives, in particular the Framework for Technology Transfer established by the Marrakesh Accords (2001)
- 80 events organized to date, comprising key technology transfer activities:
  - Technology needs assessments
  - Seminars and symposia in capacity building, technology information, institutional issues, and project development and financing
  - Technology implementation activities
  - Training courses on a range of subjects reflecting CTI's mission

www.climatetech.net

Annex 5
G8 + Five Countries – An Action Plan

- **Fosters collaboration between G8 countries plus Brazil, China, India, Mexico and South Africa**
- **International Energy Agency and World Bank are involved**
- **Action plan - Climate Change & Sustainable Energy:**
  - **Facilitating best practice operation of existing power plants**
  - **Promoting the use of best available technology in new power plants**
  - **Facilitating deployment of CO_2 capture and storage and engagement with emerging economies**
  - **Promoting the use of bioenergy**
  - **Electricity grids**
  - **Gas networks**
  - **Making the most of energy - buildings, appliances and vehicles**
  - **Exploring opportunities for greater efficiency in aviation**
  - **Increasing financing for energy efficiency in industrial processes**
  - **Enhanced international financial institutions lending targets**
  - **Clean energy markets for emerging economies**

Annex 6
Collaboration on Particular Technologies

- There exits a number of international collaboration fora to promote and create synergies between developed countries, developing countries, and countries with economies in transition
- Carbon Sequestration Leadership Forum (CSLF)
  - A US-led forum for facilitating development and deployment of clean carbon technologies

http://www.cslforum.org

- International Partnership for the Hydrogen Economy (IPHE)
  - An international institution to accelerate the transition to a hydrogen economy

http://www.iphe.net

- Methane to Market Partnership
  - The initiative focuses on cost-effective, near-term methane recovery and use as a clean energy source

http://www.epa.gov/methanetomarkets

- Gen IV International Forum
  - The forum serves to coordinate international research and development on promising new nuclear energy systems for meeting future energy challenges

http://gen-iv.ne.doe.gov/

Annex 7
Technology Early Action Measures (TEAM)

- **Supports the transfer of innovative Canadian GHG reduction technologies to other countries**
  - **A pilot-scale landfill gas (LFG) utilization system at the Canabrava landfill site in Salvador, Brazil**

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Annex 9
Climate Change Technology Promotion Officers

- A program in targeted markets to facilitate the expansion of market opportunities for Canadian climate change technologies and expertise

- Initial markets: India, Mexico and Poland

- Key objectives:
  - Provide a focal point on climate change technologies, within the targeted market
  - Develop contacts and relationships with private sector and government officials.
  - Promote partnerships between local and Canadian companies
  - Support joint technology projects and provides advices/guidance on financing and negotiations

- This has been accomplished by:
  - Use of local engaged officers and support staff.
  - Installation of the Technology Promotion Officers within the Canadian embassy, as part of the Canadian trade team