



# A SHARED VISION FOR ENERGY IN CANADA

August 2007



THE COUNCIL  
OF THE FEDERATION







# CONTENTS

INTRODUCTION	1
A SHARED VISION FOR CANADA'S ENERGY FUTURE	3
THE CHALLENGES AND OPPORTUNITIES	4
MOVING FORWARD: A SEVEN POINT ACTION PLAN	9
IN CONCLUSION	15
APPENDIX I	16





## INTRODUCTION

Canada is blessed with large quantities of diverse sources of energy, including hydro, wind, solar, oceans (tidal and wave), biomass, uranium, oil, natural gas, coal, oil sands-bitumen, and coal bed methane. Canada is an “energy superpower” on the world stage. We generate more hydro-electric power and produce more uranium than any other country on earth and rank second in natural gas exports. Canada has some of the largest and safest nuclear generating stations in the world and several important nuclear research facilities. With proven oil reserves second only to Saudi Arabia, Canada is the 8th largest oil producer - and growing. Canada is the largest supplier of energy to the United States for all energy commodities except coal, and there is increasing interest in our fossil fuels from consumers in Asia.

We are one of the few countries in the world that is not only energy-rich, but also fully capable of increasing its energy production in an environmentally and economically sustainable manner. These resources, combined with the intellectual and technological skills possessed by Canadians, have made Canada’s domestic and export energy sector one of its biggest economic drivers.

The energy sector provides significant employment and economic opportunities, and contributes greatly to the lifestyle that Canadians have come to enjoy and expect. The importance of the energy sector to Canada cannot be overstated. For example:

- In 2006, the sector represented 5.9% of the national GDP, fueled by energy production and generation with over 345,000 people employed in the oil and gas and electricity sectors alone.<sup>1</sup>
- In 2003, energy savings in Canada resulting from energy efficiency programs in place since 1990 amounted to \$13.4 billion,<sup>2</sup> creating an estimated 160,000 jobs in direct and indirect employment.<sup>3</sup>
- In 2006, capital investment in the oil industry alone was \$53 billion,<sup>4</sup> while electricity sector investment was \$13 billion.<sup>5</sup> Energy exports (at \$99 billion) accounted for 22% of the value of all exports.<sup>6</sup>

<sup>1</sup> *Canadian Energy Overview 2006: An Energy Market Assessment* (Calgary: National Energy Board, 2007): 3.

<sup>2</sup> Office of Energy Efficiency, *The State of Energy Efficiency in Canada, Report 2006* (Ottawa: Natural Resources Canada, 2006): 3.

<sup>3</sup> Based on Statistics Canada unpublished data.

<sup>4</sup> *Canadian Energy Overview 2006: An Energy Market Assessment* (Calgary: National Energy Board, 2007): 9.

<sup>5</sup> “Canada’s Infrastructure Challenge: Building Our Electricity Future,” *Canadian Electricity Association, Electricity 07*, vol. 78 no. 1 (2007): 6.

<sup>6</sup> *Canadian Energy Overview 2006: An Energy Market Assessment* (Calgary: National Energy Board, 2007): 3.

- The energy sector is also a major contributor to provincial treasuries and potentially to territorial treasuries. In 2005, petroleum companies and electrical utilities contributed over \$31 billion<sup>7</sup> in royalties, bonuses, fees, dividends, and taxes to Canadian provinces and territories which supports critical programs such as health and education.
- Canadians spent almost \$135 billion in 2004 on energy to heat and cool their homes and to operate their appliances, cars and industrial processes.<sup>8</sup>

Many other Canadians benefit indirectly from energy sector developments, through activities such as manufacturing steel and pipe, supplying mining equipment to oil sands plants and coal mines, and transporting these goods to where they are needed.

Canada is fortunate to have a strong and diverse energy sector, but like most countries, we face a number of energy challenges as well. Energy demand is increasing nationally and internationally, fueled by population and economic growth. While Canada's conventional energy sources like oil, natural gas and coal, still have significant potential to meet demand over the short to medium term, these non-renewable energy sources are becoming more difficult to find and costlier to extract, and therefore, new sources must be developed.

As the world has turned its attention to the critical issue of climate change, it is increasingly important to develop, transport, and use energy resources in an environmentally responsible manner. We must also recognize that many stakeholders, communities and Aboriginal peoples are seeking increased opportunities to provide input into energy policy and resource management.

Charting a sustainable energy future is a fundamental priority for our country. As the owners and managers of Canada's natural resources, provinces and territories must take a leadership role in creating innovative energy policies. Building on energy plans developed or updated by individual provinces and territories over the past few years, *A Shared Vision for Energy in Canada* sets out a seven point action plan that strikes a balance between a secure energy supply, environmental and social responsibility, and continued economic growth and prosperity.

Implementing this strategy will require focused and collaborative action by governments in partnership with all Canadians. It is essential that we all work together to transform *A Shared Vision for Energy in Canada* into a reality.

<sup>7</sup> "2005 Net Cash Expenditures of the Petroleum Industry" in *CAPP Statistical Handbook* (Calgary: Canadian Association of Petroleum Producers, 2006); Navigant Consulting, "Canadian Utility Sources" (Montreal, 2006), unpublished.

<sup>8</sup> *Improving Energy Performance in Canada - Report to Parliament Under the Energy Efficiency Act For the Fiscal Year 2005-2006* (Ottawa: Natural Resources Canada, 2006): 5.



## A SHARED VISION FOR CANADA'S ENERGY FUTURE

Premiers envision an energy future for Canada that:

- **Ensures a secure, sustainable, reliable and competitively-priced supply of energy** that meets the domestic and economic needs of Canadians.
- **Embodies a high standard of environmental and social responsibility**, with an emphasis on reducing greenhouse gas and other emissions and maintaining our world-class protection measures that limit the impact of energy projects and infrastructure on the environment, while engaging all Canadians.
- **Contributes to continued economic growth and prosperity** by encouraging innovation and maintaining and enhancing Canada's position as a leader in international energy markets, including those for conventional, renewable and emerging energy resources, technologies, and practices.



## THE CHALLENGES AND OPPORTUNITIES

Canada's energy sector faces several significant challenges. However, there are also many opportunities to be innovative in ensuring that Canada has a secure supply of energy, continues to grow and prosper, and meets environmental, economic, and social goals.

### MEETING DEMAND FOR ENERGY

Domestic energy demand is increasing. Canada, however, has a number of additional energy resources that could be developed to help meet this demand, including oil sands, unconventional gas (for example, coal bed methane) and frontier oil and natural gas resources in offshore British Columbia and eastern Canada, and the North. Renewable, biomass, and nuclear energy already play an important role in meeting Canadian energy demand. As well, provinces and territories could harness additional hydro, wind, ocean (tidal and wave) and other resources to provide critically needed electricity for domestic use and export. Further developments in energy efficiency must also be considered a means of meeting future energy needs.

### CONSERVING AND USING EXISTING ENERGY MORE EFFICIENTLY

Developing Canada's energy resources is not the only solution to meeting energy demand. Energy efficiency and conservation must play a greater role in ensuring our energy security and reducing our impact on the environment. Energy efficiency could contribute to a significant reduction in forecast energy demand across residential, commercial and industrial sectors in Canada.

The benefits from energy efficiency and conservation are environmentally, socially and economically significant. Energy efficiency decreases greenhouse gas emissions and pollutants, mitigates consumer vulnerability to price increases and supply disruptions and creates employment.

Governments can maximize energy efficiency through strong leadership in public policy and by encouraging greater adoption of energy efficient products, programs and practices. Canada has proven to be a leader in a number of energy efficiency technologies and management tools. There is an immense opportunity to expand our energy efficiency industry and develop technologies and services that can be marketed both nationally and internationally.



## DEVELOPING NEW AND INNOVATIVE ENERGY TECHNOLOGIES

Canada's energy sector, while advanced, can be substantially enhanced through the development and deployment of new technologies required to commercialize new energy resources, and to maintain production of conventional energy resources while reducing their environmental impacts.

For example, while Canada has coal resources sufficient to meet hundreds of years of Canadian demand at current levels, new technologies, such as the capture of CO<sub>2</sub> to minimize the environmental impact of coal-fired generation, need to be developed. Substantial opportunities also exist to maintain output in the oil and natural gas sector through new enhanced recovery technologies with reduced environmental impact. Technology development is also important for renewable fuels to expand supply and reduce cost in areas such as cellulosic ethanol, tidal energy and solar photovoltaics. By the same token there are enormous opportunities for technologies that facilitate demand-side control, such as advanced metering, that allow users to reduce their energy use or process integration to improve energy use in manufacturing facilities.

Advancements in technology and innovation are essential for responsible and sustainable development of Canada's vast energy resources. The development of new energy technologies will facilitate new energy sources, minimize cost increases to the consumer and assist in reducing the environmental footprint of development, including water use and greenhouse gas and other emissions.

New technologies and innovations in clean/green energy and advances in energy efficiencies will help secure and advance Canada's interests and global leadership, and offer significant economic, social and environmental opportunities.

## MOVING TO RENEWABLE, GREENER AND CLEANER ENERGY SOURCES

The growing energy demand in Canada and internationally and the increasing costs of producing traditional energy sources have led to rising prices. At the same time, growing awareness of the long term impact on the environment from the intensive use of traditional fossil fuel energy sources is leading governments and consumers to turn to greener and renewable sources.

In many regions of Canada, clean and renewable sources of power have great potential. These include hydroelectricity, tidal power, wind power, biomass, wood waste, solar power, recovered waste heat, and biofuels.

- Power generated by hydroelectric stations represented 58.5% of total power produced by all sources in 2004.
- Tidal power has been on stream in Canada since 1984. Electrical generation from the rise and fall of waves is another promising ocean energy technology.
- Canada has some of the best wind resources in the world, due to its large land mass and lengthy coastlines. Provinces and territories currently have over 1,500 MW of installed capacity from wind.
- A substantial portion of biomass energy is used in heating and steam production. Moreover, an increasing amount is transformed into ethanol for use in the transportation sector.
- Wood waste from forest product production is used for electricity production in some regions.
- Biofuels, such as biodiesel which is commonly made from canola, animal fat and/or used restaurant oil, reduces emissions and provides added lubricity when blended with petroleum diesel fuel.

A wide variety of sources are in use to produce green and clean energy and others are in various stages of research and development. These include: hydroelectricity, wind, oceans (tidal and wave), biomass, solar power, hydrogen, waste heat and biofuels. While the use of these renewable green and cleaner energy sources is already significant in some jurisdictions and plays a major role in Canada's energy portfolio, there is a great potential for further development and increased consumer access to these energy sources.



## IMPROVING TRANSMISSION AND TRANSPORTATION CAPACITY

As energy demand grows, so does the need for additional energy production, and the transmission and transportation infrastructure to deliver that supply to consumers. Insufficient infrastructure capacity prevents development of some resources, jeopardizes security of supply and could result in higher consumer prices.

Canada's provinces and territories have enormous developed and undeveloped energy resources and vast and complex east-west and north-south energy pipeline and transmission networks. However, some regions seek to diversify their supply, some export surplus energy, while other regions have significant undeveloped energy resources. These needs can be addressed through new and enhanced production and transmission infrastructure and, in the case of crude oil and natural gas, new and expanded pipelines. These investments will also expand opportunities for exports.

Investments required to ensure adequate production, transmission and transportation infrastructure will promote energy security and reliability, enable development of new sources of renewable and cleaner energy sources, reduce regional supply/demand disparities and benefit both producing and consuming provinces and territories.

New transmission and transportation capacity can be built by either the public or private sector consistent with established trade and industry regulatory frameworks. Currently, there is significant interest in building electricity, oil, refined petroleum products, and natural gas transmission and transportation infrastructure.



## IMPROVING REGULATORY APPROVAL PROCESSES

Environmental assessment and regulatory processes are vital to maintaining the balance between protection of the environment and energy development. However, the efficiency of these processes has been reduced by a complex web of government environmental assessment and regulatory approval processes.

While these regulatory processes have met a number of objectives, with the escalating pace of energy project development, deficiencies in these processes have become more apparent. Issues identified include duplication and overlap in provincial, territorial and federal regulatory reviews; the discretionary nature of federal decisions on scope of project and review process; uncertainty around some approval timeframes and process steps; and the capacity of regulators to process a rapidly growing number of project applications.

Delays and uncertainty increase the risk that key energy projects in Canada will be held up, cost more, or not be built at all. It is imperative that the timeliness and certainty of regulatory processes for all parties be improved to ensure that energy projects are developed as needed to meet domestic demand and international market opportunities while continuing to maintain rigorous protection of the environment and the public interest.

## MEETING DEMAND FOR A SKILLED AND AVAILABLE WORKFORCE

Development of new energy projects, construction of new or expanded infrastructure, creation of new technologies, and development and implementation of energy efficiency measures will require an educated, skilled and available workforce.

Skilled labour shortages and human resource issues are an ongoing concern for many sectors of the Canadian economy. In the energy sector, these shortages have contributed to project delays and increased energy development costs. In addition, these shortages will impact the ability of the country to mitigate environmental issues resulting from energy development and use through technical innovation.



In July 2006 the Council of the Federation released *Competing for Tomorrow: A Strategy for Postsecondary Education and Skills Training in Canada*. This Strategy identified many of the challenges in the area of post-secondary education and skills training economy-wide, and focused on the following five priorities:

1. Improve Access
2. Enhance Quality
3. Increase Participation in the Skilled Labour Force
4. Skills for the 21<sup>st</sup> Century Workplace
5. Expand Research and Innovation

Enhanced labour mobility for skilled trades, increased immigration of qualified workers and increased investments by industry in training programs will help the energy sector address these challenges.

## FORMALIZING THE ROLE OF PROVINCES AND TERRITORIES IN INTERNATIONAL ENERGY DISCUSSIONS

As provinces and territories further increase energy development, a formal federal-provincial/territorial agreement on their role in international negotiations, agreements and forums remains a critical issue.

The federal government enters into international discussions and negotiates international agreements or treaties but, at the same time, implementation of agreements or treaties and obligations must be in accordance with the constitutional division of powers. Consequently, only provinces and territories have the authority to implement these agreements or treaties in areas of provincial/territorial jurisdiction. It therefore makes sense that provinces and territories have the opportunity to fully participate in Canada's international activities that impact provincial/territorial jurisdiction.

This is certainly the case when the international activity concerns natural resources. Under Canada's Constitution, provinces are the owners of their natural resources, and have exclusive jurisdiction in relation to development, conservation and management of natural resources. The Yukon has

exclusive administration and control over natural resources while Nunavut and the Northwest Territories are in the process of negotiating the same. This authority or prospective authority justifies provincial/territorial participation in discussions on this matter. Provinces and territories are closely linked to international energy markets and have a vital role to play in developing Canada's international energy agenda. It is therefore imperative that a coordinated approach be taken to Canada's international activities in relation to energy.

Participation by the provinces and territories in international discussions on energy will not only ensure that the views and expertise of the resource owners and managers will be directly expressed, but also help ensure that Canada will be able to implement any commitments that might emerge from those discussions.

## MOVING FORWARD: A SEVEN POINT ACTION PLAN

Energy is an essential foundation of Canadian society and is critical to our prosperity, security and environmental and social well-being. However, the major challenges and tremendous opportunities described in the previous section require concrete solutions and actions if the full potential of Canada's energy sector is to be achieved.

In response, Premiers have developed a Seven Point Action Plan to achieve *A Shared Vision for Energy in Canada*. The seven specific actions are:

### 1. Promote energy efficiency and conservation.

Canada has been a leader in energy efficiency technology and has made real progress in moving it into the market place. To ensure Canada's continued leadership in energy efficiency, provinces and territories will:

- a. Provide a pan-Canadian strategic approach and present a base of "best practices" from which governments and stakeholders can select for implementation;
- b. Identify opportunities for bilateral and multi-lateral initiatives to realize greater energy efficiency investment to encourage the further development of the energy efficiency industry in Canada;



Provinces and territories will be investing over \$450 Million in energy efficiency measures in 2007-08. These investments complement those by the private sector and other governments. A number of innovative programs and management practices have been developed by provinces and territories which contribute to public savings, reduced consumption and reduced greenhouse gas emissions.

- c. Build on current practices in individual jurisdictions and the work of various groups including the federal/provincial/territorial Council of Energy Ministers to identify opportunities for expanding these initiatives to all jurisdictions in a manner which meets the unique needs and circumstances of each;
- d. Develop model standards and codes which each jurisdiction may choose to adopt or adapt; and,
- e. Engage citizens, communities and industry in identifying and adopting appropriate energy efficiency and conservation measures.

## **2. Accelerate the development and deployment of energy research and technologies that advance more efficient production, transmission and use of clean and conventional energy sources.**

Advanced technology is essential to the responsible and sustainable development of Canada's energy needs. Major investment in energy research and technology is required to ensure Canada achieves its energy potential in an environmentally sustainable way. Provinces and territories will lead the implementation of a proactive approach to:

- a. Identify shared priorities by technology area and by jurisdiction and implement technology and research priorities for the Canadian energy sector through public and private collaboration;
- b. Strengthen a network of centres of excellence for energy research and promote the sharing of information among jurisdictions. Potential areas of interest for, and existing, centres of excellence in each province and territory are outlined in Appendix I; and,
- c. Work towards the broader commercialization of currently under-utilized "near commercial" technologies.

## **3. Facilitate the development of renewable, green and/or cleaner energy sources to meet future demand and contribute to environmental goals and priorities.**

The demand for energy in Canada is increasing along with a growing awareness of the environmental impacts of conventional energy sources. To ensure that renewable, green and cleaner energy resources are developed to increase security of supply and support sustainable development, provinces and territories will:

- a. Promote greater intergovernmental collaboration for development and implementation of new and expanded renewable, green and cleaner energy sources and technologies;
- b. Promote the creation of a network of centres of excellence for renewable, green and cleaner energy to encourage Canadian and international experts to participate and share best practices, and to develop partnerships within Canada and globally; and,



- c. Support the establishment and expansion of domestic and international trade opportunities for the development and sale of renewable, green and cleaner energy and related technologies.

**4. Develop and enhance a modern, reliable, environmentally safe, and efficient series of transmission and transportation networks for domestic and export/import sources of energy.**

Canada's growing demand for energy, in particular electricity, oil, petroleum products, and natural gas, has created concerns with respect to the adequacy of its electricity and natural gas transmission and transportation infrastructure to meet current and future demand. To address this concern, provinces and territories will work to:

- a. Improve access to existing transmission and transportation infrastructure by working to reduce jurisdictional barriers that limit the freer trade of electricity within Canada; and work with the private sector to ensure Canada's oil, petroleum products, and natural gas pipelines, gathering systems and infrastructure continue to meet domestic energy needs and supply export markets;

- b. Maintain and improve existing transmission and transportation infrastructure by ensuring reliable and adequate transmission and transportation capacity for current and forecasted energy demand; ensure investments are made in infrastructure to deliver energy; make ongoing investments in transmission and transportation research and technology; and ensure investments are made in oil and natural gas transportation infrastructure to protect against spills and other environmental damage;
- c. Develop additional transmission and transportation capacity by encouraging additional investments in production and transmission infrastructure, including east-west transmission infrastructure; and encourage development of new oil, petroleum products, and natural gas supply and distribution infrastructure for domestic and export markets;
- d. Ensure efficient and effective regulation for the construction, operation and decommissioning of transmission and transportation assets by:



- remaining compliant and continually assessing and meeting evolving North American transmission reliability standards and ensuring that any purchase or sale of electricity between provinces respects market rules and occurs on a commercial basis;
- working with the federal government, industry and regulators to harmonize and streamline regulations to ensure onshore and offshore exploration and development processes are effective, efficient, open and transparent; and,
- developing competitive and progressive public policy for third party access to infrastructure, including tolls, tariffs and processing practices to increase access to energy transmission and transportation systems, to improve security of supply, to enhance sustainable development, and to optimize economic rents from existing and future petroleum resources, especially in Canada's frontier areas.

**5. Improve the timeliness and certainty of regulatory approval decision-making processes while maintaining rigorous protection of the environment and public interest.**

The current regulatory frameworks that govern the Canadian energy sector have affected the pace of energy developments in certain jurisdictions, leading to uncertainty about energy supply availability and hampering economic development. To ensure timely, effective and efficient regulatory approval processes, provinces and territories will:

- a. Complete their work with the federal government through the Canadian Council of Ministers of Environment to improve the timeliness, certainty and predictability of Environmental Assessment processes as quickly as possible;
- b. Call upon the federal government to act swiftly on implementing its March 2007 commitment to streamline regulatory process for natural resource projects at the federal level and to involve provinces and territories in the implementation of the Major Projects Management Office and other recently announced initiatives;



c. Adopt as many of the following strategic actions as appropriate:

- Implement single window or integrated approaches to streamline internal and multi-jurisdictional regulatory approval processes;
- Examine opportunities to mandate or legislate approval timeframes where appropriate;
- Make appropriate resources available to regulators;
- Develop legislation and/or agreements to enable delegation or substitution arrangements between jurisdictions;
- Share best practices in regulatory processes;

- Invest resources in planning tools such as strategic environmental assessments for frontier energy projects/emerging technologies.

## 6. Develop and implement strategies to meet energy-sector human resource needs now and well into the 21<sup>st</sup> century.

Building on the July 2006 Council of the Federation postsecondary education and skills training strategy, *Competing for Tomorrow*, with a particular focus on energy-related disciplines and opportunities, provinces and territories will:

- a. Strive to continually improve access and training for Canadians, notably for those traditionally under-represented in the work force, such as Aboriginal peoples, youth, women, persons with disabilities, visible minorities, and older workers;





- b. Encourage industry to increase investments in energy sector training programs, developed in partnership with governments;
- c. Enhance labour mobility for skilled trades in Canada and increase immigration of qualified workers through bi-lateral and multi-lateral agreements/initiatives; and,
- d. Work to develop energy sector skills for the 21st century workplace and to support expanded capacity for energy, research and innovation.

**7. Pursue formalized participation of provinces and territories in international discussions and negotiations on energy.**

Premiers continue to emphasize that a written agreement is essential to ensure that provinces and territories have an opportunity to fully participate in international activities that affect their jurisdiction. Recognizing that this is the case with natural resources and energy, provinces and territories will:

- a. Continue to pursue the creation of a framework agreement that provides a formal mechanism to allow the full participation of provinces and territories in Canada’s international activities related to provincial/territorial jurisdiction, including those related to the energy sector. This agreement should:
  - Contribute to bringing certainty and predictability to international energy policy and relationship matters, as compared to the *ad hoc* situation that exists today; and,
  - Improve effectiveness, whereby provinces and territories would be given timely advance notice of the activities covered in the framework agreement and have an opportunity for a full and fair exchange of views and positions amongst all governments prior to the establishment of a Canadian position;
- b. Urge the federal government to enter into negotiations and to move quickly to finalize this agreement.

# IN CONCLUSION

Energy plays a fundamental role in the lives of all Canadians. Canada is richly endowed with diverse energy resources, and is a major participant in international energy markets.

Ensuring that all Canadians continue to benefit from Canada's rich energy resource endowment and maintaining Canada's place as a global energy leader will require immediate action and sustained efforts by all, including investments from the public and private sectors. At the same time, we must ensure that resource development is done in a manner which respects the environment and the views of Aboriginal people and all Canadians.



Premiers therefore invite the participation and input of all energy stakeholders, including the federal government, to help move this strategy forward and ensure a sustainable and secure energy future for Canada, continued economic growth and prosperity and enhanced environmental and social responsibility.

## A SHARED VISION FOR ENERGY IN CANADA

A secure, sustainable, reliable and competitively-priced supply of energy  
A high standard of environmental and social responsibility  
Continued economic growth and prosperity

## THE SEVEN POINT ACTION PLAN

1. Promote energy efficiency and conservation
2. Accelerate the development and deployment of energy research and technologies that advance more efficient production, transmission and use of clean and conventional energy sources
3. Facilitate the development of renewable, green and/or cleaner energy sources to meet future demand and contribute to environmental goals and priorities
4. Develop and enhance a modern, reliable, environmentally safe, and efficient series of transmission and transportation networks for domestic and export/import sources of energy
5. Improve the timeliness and certainty of regulatory approval decision-making processes while maintaining rigorous protection of the environment and public interest
6. Develop and implement strategies to meet energy-sector human resource needs now and well into the 21st century
7. Pursue formalized participation of provinces and territories in international discussions and negotiations on energy

# APPENDIX I:

## Potential areas of interest for and existing Centres of Excellence for Energy Technology Research and Development by Jurisdiction

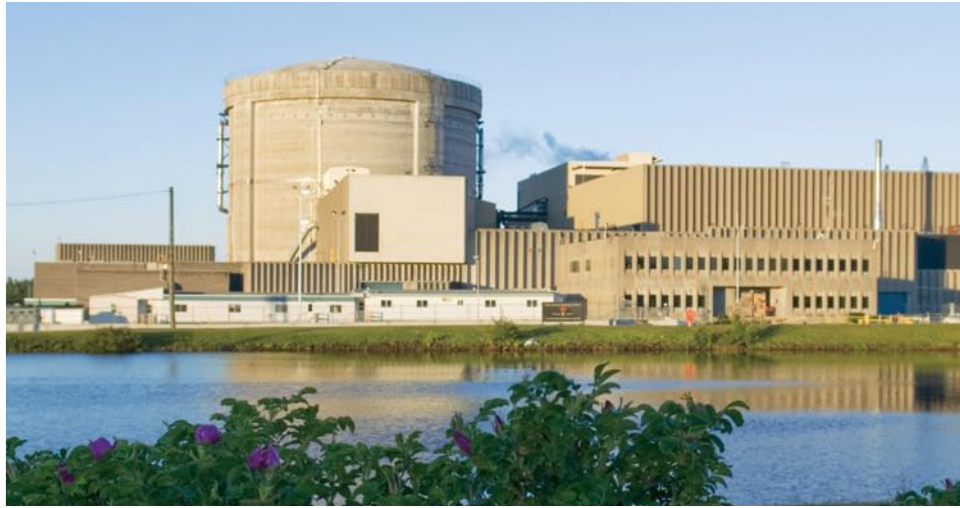
Based on their particular needs and resource endowments, some provinces and territories have identified their potential areas of interest and, in some cases, existing centres of excellence for energy research, technology and innovation.

PROVINCE/TERRITORY	CENTRES OF EXCELLENCE
ALBERTA	<p>Centres of excellence in a number of key energy technology areas including: production and conversion technologies for oil sands and low ranked coals that maximize the value of carbon and bitumen as competitive sources of power, clean fuels and specialized chemicals; and production with reduced energy demand, water consumption and environmental impact including CO<sub>2</sub> capture, transportation, long term storage and/or use.</p>
BRITISH COLUMBIA	<p>International centre for hydrogen and fuel cell technology and system research, development and commercialization, with a number of private sector players and the National Research Council Fuel Cell Innovation Centre. Centre for green building innovation, including the operational base of the Canadian Green Building Council and significant public and private sector activity.</p> <p>British Columbia has 50% of Canada’s biomass electricity generating capacity and leads the country in wood pellet production. Given British Columbia’s abundant biomass resources (including beetle-killed timber), academic talent and industry leadership, bioenergy continues to be a major focus.</p> <p>Ocean renewable energy (wave and tidal) is also a key area of interest.</p>
MANITOBA	<p>An emerging hub for leading-edge hydrogen technology. Recently tested one of the most advanced hybrid fuel-cell-powered transit buses in the world, and is a partner in the new Hydrogen Centre of Expertise, advancing the study of hydrogen applications and other new technologies, such as plug-in hybrid cars. Manitoba is the number one jurisdiction for per capita geothermal installations and for the training of ground source heat pump installers and will be a hub for green heat technologies with a focus on application to multiple dwellings, emerging heat pump technologies, and innovative financing strategies.</p>

PROVINCE/TERRITORY	CENTRES OF EXCELLENCE
NEW BRUNSWICK	<p>Areas of expertise that could be potential centres of excellence include nuclear technology, marine energy technology and electricity grid integration. Nuclear technology is a priority area of interest for refurbishment projects, new design builds, and research and technology. Marine energy technology is a prime focus because of our extensive marine shoreline and renewable energy targets. New Brunswick has conducted preliminary studies on potential marine energy generation sites and is involved in the assessment of marine technology in the Bay of Fundy. New Brunswick's aggressive renewable energy policy will produce one of the world's highest percentage of intermittent generation. That, coupled with our location, make electricity grid integration a primary focus.</p>
NEWFOUNDLAND AND LABRADOR	<p>Principal areas of interest include offshore hydrocarbon recovery with a focus on developing or adopting technology to increase the hydrocarbon recovery from mature and complex fields and energy development in harsh climates with a focus on the exploration and development of sub-sea petroleum reserves and wind energy in harsh environments.</p>
NORTHWEST TERRITORIES	<p>The Aurora Research Institute, located in Inuvik, is well-positioned to undertake research and development of new energy technology and the adaptation of current technologies in Canada's North. For example, the Institute is currently working with Japanese interests in the development of methane hydrates near the community of Tuktoyaktuk and is involved in examining the feasibility of wind energy in arctic communities. In the future, working with partners, work needs to be undertaken with respect to climate change impacts and adaptation as Canada's North is widely recognized as a harbinger of the impacts of our changing climate.</p>
NOVA SCOTIA	<p>Annapolis Royal, Nova Scotia, is the site of North America's first and, so far, only tidal power generating station. It has shown that ocean renewable energy is an important opportunity for Nova Scotia. A strategic environmental assessment of ocean energy with a focus on in-stream tidal renewable energy systems is under way in the Bay of Fundy. A second area of interest is development of a steam-fractionation cellulosic ethanol process making use of forestry, agricultural and other waste and byproducts. Consequently, an In-Stream Tidal Demonstration Facility and a Centre for Agricultural Renewable Energy and Sustainability are both under consideration.</p>
NUNAVUT	<p>Nunavut will seek partnerships with circumpolar jurisdictions and the business sector to research, develop and commercialize Arctic-climate energy generation technologies, such as wind turbines.</p>

PROVINCE/TERRITORY	CENTRES OF EXCELLENCE
ONTARIO	<p>The Ontario Centres of Excellence (OCE) is a research-to-commercialization organization which supports industrially relevant R&amp;D in Ontario. The Centres work in partnership with the private sector and academic institutions to develop new technologies and bring them to market. OCE's Centre for Energy is focused on energy markets, energy systems, emerging energy technologies and skills development.</p>
PRINCE EDWARD ISLAND	<p>The Wind Energy Institute of Canada (WEICan) supports development of wind power generation in Canada and wind energy-related products and services for Canadian and export markets. The Institute's four key areas of work are testing and certification, research and innovation, technical consultation, and industry training and public education.</p>
QUÉBEC	<p>The IREQ (Institut de recherche d'Hydro-Québec—Hydro-Québec Research Institute) is a centre of excellence for electricity production and distribution. For example, one area of research is the integration of wind energy into the network. A second area of focus is cellulosic ethanol production from biomass (i.e., forest and agricultural residues and urban waste). Efforts in this area are sufficiently advanced that two demonstration plants will be under construction soon. A university research chair is being created to foster research in the area of cellulosic ethanol production from biomass. There is also a high level of research in hydrogen storage, distribution reliability and safety issues at the Institut de recherche sur l'hydrogène.</p>
SASKATCHEWAN	<p>The Petroleum Technology Research Centre has a mandate to develop world leading enhanced oil recovery and carbon dioxide storage technologies. The International Test Centre for Carbon Dioxide Capture is considered to be a world-class active research group on CO<sub>2</sub> capture and separation technologies working on advanced CO<sub>2</sub> separation technologies targeting CO<sub>2</sub> removal from flue gases and other industrial gas streams. In addition, Saskatchewan has committed to establishing two new centres of excellence for bio-products and hydrogen production.</p>
YUKON	<p>Working to develop a Yukon Cold Climate Innovation Cluster, with a focus on the development, commercialization and export of sustainable cold climate technologies and related solutions for sub-arctic regions. The Yukon is committed to establishing Yukon College as a Climate Change Research Centre for the North, and to making the College a leader in climate change research.</p>





THE COUNCIL  
OF THE FEDERATION

Council of the Federation Secretariat  
Suite 630, 360 Albert Street, Ottawa, Ontario K1R 7X7  
[www.councilofthefederation.ca](http://www.councilofthefederation.ca)