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Canada

# Energy Innovation Roundtables Report

August 2014

Canada

*Aussi disponible en français sous le titre : Rapport des tables rondes sur l'innovation énergétique, août 2014*

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Cat No. M34-18/1-2014E-PDF (Online)  
ISBN 978-1-100-24897-4

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# 1. Introduction and purpose

**Innovation plays a key role in supporting Canada's energy advantage.** Energy innovation is important for Canada. It supports economic growth that contributes to a high standard of living while ensuring responsible resource development that helps reduce environmental impacts.

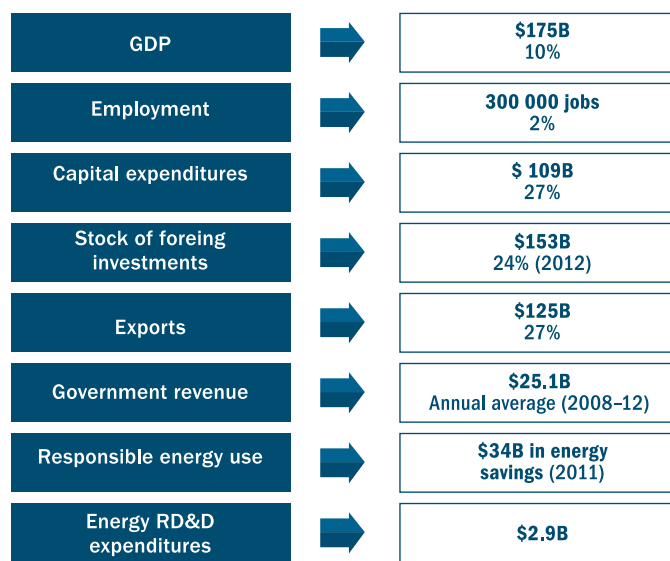
**The purpose of this report is to summarize the major themes raised during the Energy Innovation Roundtables organized by Natural Resources Canada (NRCan).** Five thematic roundtables and a national roundtable, co-chaired by the Honourable Greg Rickford, Minister of Natural Resources Canada and Minister for the Federal Economic Development Initiative for Northern Ontario, and Jim Balsillie, Chair, Sustainable Development Technology Canada, took place between fall 2013 and summer 2014. These roundtables announced by the NRCan minister in August 2013 at the Energy and Mines Ministers' Conference, brought together more than 100 senior executives from industry, academia, associations, utilities, governments, non-governmental organizations and the financial community to solicit views on barriers and opportunities to advance Canadian energy innovation. The roundtables were intended to identify opportunities to strengthen collaboration and better align efforts among key players to maximize the impacts of existing investments, and support Canada's energy innovation and competitiveness domestically and globally.

# 2. Current state of energy and innovation in Canada

**Canada has an enviable energy resource advantage.** Canada is a leader in energy production and ranks fifth among countries in oil production, fifth in natural gas production, and third in hydro production. Energy is a key pillar of Canada's economy by driving growth, creating jobs and attracting investment and commercial opportunities, as well as by enhancing our standard of living. The global market alone for clean technologies is estimated to exceed \$2 trillion by 2022.<sup>1</sup> As the world demands better environmental performance, technology innovation will continue to play a key role in addressing environmental concerns, particularly in reducing greenhouse gas (GHG) emissions.

**Canada's innovation performance:** In 2011, the International Energy Agency (IEA) ranked Canada in fifth place for intensity of public expenditures on energy research, development and demonstration (RD&D), ahead of the United States, the United Kingdom and Germany. In 2011-12, federal direct expenditures accounted for 29 percent of total Canadian spending on energy RD&D with provinces contributing 14 percent<sup>2</sup> and industry spending 57 percent.<sup>3</sup> Over the years, universities have played an increasingly important role in Canada's energy innovation system, with more than 30 dedicated Canada Research Chairs in energy and eight Centres of Excellence for the

Figure 1. Canadian Energy Indicators



B=billion

<sup>1</sup> Analytica Advisors, 2014 Canadian Clean Technology Industry Report.

<sup>2</sup> IEA, Annual Survey of Public RD&D Expenditures, 2013.

<sup>3</sup> Statistics Canada.

Commercialization of Research.<sup>4</sup> The Council of Canadian Academies has noted that with 0.5 percent of the world's population Canada produces 4.1 percent of all scientific papers.<sup>5</sup>

However, challenges exist as Canada works to increase innovation and enhance productivity. Our level of business expenditure on research and development (BERD) has been declining relative to other industrialized countries. In 2012, Canada ranked 21st in the Organization for Economic Co-operation and Development (OECD).<sup>6</sup> At 1 percent of gross domestic product (GDP), Canada's BERD intensity is well below the OECD average of 1.6 percent and has declined steadily since the peak of the "tech boom" in 2001, whereas OECD countries on average have seen an increase since 2004.<sup>7</sup> In addition, since 1984, labour productivity in Canada's business sector has fallen from 90 percent of the United States level to 76 percent in 2007, with Canada ranking 15th out of 18 comparable OECD countries; this poor productivity growth is a measure of the effectiveness with which labour and capital are used in the economy and can be attributable to weak business innovation.<sup>8</sup>

According to the World Economic Forum, increasing business investment in innovation has been identified as a key opportunity for Canada to boost its global competitiveness.<sup>9</sup> To ensure that investments in Canadian energy technologies are well placed, NRCan sought out independent expertise to help map out future possibilities for investment.

### 3. Deepening our understanding of energy innovation

#### A) Opportunities for Canadian energy technologies

**In 2012, NRCan commissioned McKinsey & Co. to undertake an in-depth analysis of opportunities for Canadian energy technologies in global markets by 2020.** McKinsey & Co. indicated that the benefits associated with Canada realizing its full potential in energy technology could be significant and estimated that a concerted focus on energy technology policy and innovation had the potential to increase growth in the energy sector by upwards of 2 percentage points. In Canada this would translate into, according to McKinsey & Co., approximately \$74B in incremental GDP and 500 000 new jobs by 2020.<sup>10</sup>

The McKinsey & Co. *Opportunities for Canadian Energy Technologies in Global Markets* report identified conditions for success where governments can create an enabling environment that supports energy technology:

- **Ensure access to markets:** Create stronger domestic demand through policy and provide additional support to companies exporting to emerging (e.g. Asia, Africa) and competitive (e.g. United States, European Union) markets.
- **Ensure access to capital:** Help coordinate provincial and federal financing vehicles (e.g. venture capital, government "prize" competitions) to address a broader range of opportunities.
- **Ensure access to talent/capacity:** Cultivate domestic talent and ensure access to international sources, as required.
- **Ensure effective coordination of government institutions/bodies:** Create a highly coordinated network of government institutions, such as research centres and start-up incubators, to support technology developers along the entire innovation chain.

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<sup>4</sup> IEA, 2012.

<sup>5</sup> Canadian Council of Academies, *The State of Science and Technology in Canada, 2012*.

<sup>6</sup> OECD, Main Science and Technology Indicators: 2012/2, January 2013.

<sup>7</sup> Innovation Canada: A Call to Action, *Review of Support to Research and Development – An Expert Panel Report*, 2011.

<sup>8</sup> Council of Canadian Academies, *Innovation and Business Strategy: Why Canada Falls Short*, 2009.

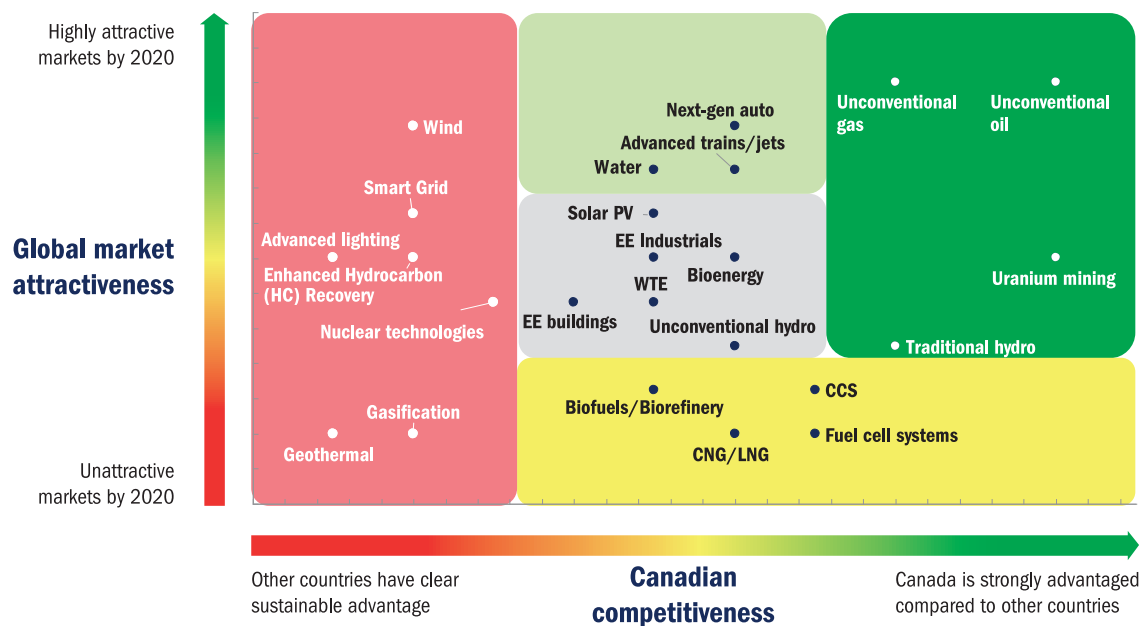
<sup>9</sup> World Economic Forum, *The Global Competitiveness Report 2013–2014*.

<sup>10</sup> McKinsey & Co., *Opportunities for Canadian Energy Technologies in Global Markets*, 2012.

McKinsey & Co. assessed 24 technology areas, mapped them against national strengths and identified five key technology clusters where Canada is considered to have a strategic advantage, namely in the areas of:

- **Distributed power generation:** Unconventional hydro; bioenergy; waste to energy; solar
- **Next-generation transportation:** Next-gen auto; compressed and liquid natural gas
- **Energy efficiency:** Buildings, industrials; water
- **Long-term research and development (R&D) opportunities:** Carbon capture and storage; fuel cell systems; biorefineries and biofuels
- **Unconventional oil and gas:** Unconventional oil; unconventional gas

Figure 2. Technology assessment based on global markets and Canadian competitiveness



The different color groupings in the figure above represent technology areas where:

- Canada has a clear/established advantage in global markets
- Canada could increase its global competitiveness
- Canada could take lead in emerging market
- Potential long-term opportunity for Canada with global markets not expected to mature until post-2020
- Other countries have clear sustainable advantage over Canada

**Technology area acronyms:**

- HC: hydrocarbon
- EE: energy efficient
- WTE: waste-to-energy
- CCS: carbon capture and storage
- CNG: compressed natural gas
- LNG: liquefied natural gas

SOURCE: McKinsey & Co., 2012



## 4. Opportunities to maximize the impacts of RD&D investments

A number of common messages emerged from the Energy Innovation Roundtables, namely:

- A) Mobilizing key players around shared objectives and common outcomes;
- B) Improved alignment, collaboration and partnerships;
- C) Bridging gaps along the innovation chain; and
- D) Creating a supportive enabling environment.

The following section highlights some of the key messages expressed by participants of the Energy Innovation Roundtables and does not necessarily reflect the positions of the Government of Canada.

### A) Mobilizing key players around shared objectives and common outcomes

**Engaging key players to establish and deliver on shared objectives and common outcomes:** Identifying shared energy innovation objectives and common outcomes across jurisdictions and mobilizing key players within governments, industry, academia and others to address them are needed to advance energy innovation in Canada. Articulated priorities and identified medium- to long-term outcomes would help pool resources and talent and strengthen synergies across Canada's energy innovation landscape.

**Market-driven portfolio approach focussed on targeted priority areas:** A portfolio approach focussed on key energy strengths could deliver benefits in the medium- to long-term to enhance Canada's global competitiveness. Such an approach would take into account strategic technology domains and energy endowments where Canada has an opportunity to strengthen its global market share (i.e. unconventional oil and gas) as well as build on niche areas where there is a unique domestic market opportunity (i.e. applications for northern and remote communities). A market-driven approach would help identify breakthrough technological pathways, agents and processes, including inducement prize competitions to achieve transformational rather than incremental change.

**Convenor role:** Governments can be natural champions that are able to bring different stakeholders together across the value chain to identify common goals and objectives to stimulate innovation. They can play a convenor role in encouraging organizations to work more closely together, promoting increased collaboration

### Innovation in Canada's North

For northern communities and mining sites, the use of diesel fuel for electricity generation is commonplace and very costly.

In the Nunavik region of Quebec, where the wind blows long and strong, adding wind generation and energy storage to diesel generation will displace diesel consumption while providing a stable energy supply and reducing emissions.

Supported by NRCan's ecoENERGY Innovation Initiative, TUGLIQ Energy Co. intends to demonstrate just that at Glencore's Raglan Mine in Nunavik – the Canadian Arctic's largest consumer of diesel for mining operations. The project will demonstrate a 3-megawatt (MW) wind turbine to be installed in the Canadian Arctic and a three-stage energy storage system to provide electricity when needed.

and improved information sharing, and establishing platforms to allow connections to take place.

For instance, the Government of Canada has facilitated and supported the development of several technology roadmaps in areas such as wind, marine and electric vehicles. The roadmaps, which are industry-led, provide clear direction and goals for the sector, defining action items, both short- and long-term, that address industry needs to capitalize on Canada's strengths and achieve the sector's full potential. The Government of Canada helped to facilitate the process, drawing together an Industry Roadmap Steering Committee, organizing workshops attended by government, industry and



academia to discuss the state of the industry and decide upon priorities for action items, as well as providing financial support to enable the process.

More recently, in response to the issues raised by senior industry executives at the Energy Innovation Roundtable held in Calgary in 2014, NRCan and Alberta Energy have taken on a convenor role to discuss a long-term outlook focussed on innovation to enhance the productivity of Canada's oil sands while reducing environmental impacts. Since then, NRCan and Alberta Energy have convened key stakeholders to support a dialogue on innovative next generation technologies and processes to improve the sector's overall competitiveness.

## **B) Improved alignment, collaboration and partnerships**

**R&D efforts need to be better connected and closely aligned with industry needs:** Despite the significant amount of R&D taking place across the country, there is a need to better connect industry, academic and government R&D efforts and to improve awareness of and linkages to existing R&D initiatives undertaken by stakeholder groups. A systematic approach to better align related research activities and initiatives in the sector and look at ways to align the timing and focus of RD&D investments to support shared priorities would enable better leveraging of resources.

Securing industry participation early on in collaborative R&D is important. Academic-industry partnerships offer a unique opportunity to help advance R&D efforts and a means to directly support industry through stronger alignment in priority research areas. Companies pooling together to support academic chairs is one way to create stronger synergies between academic institutions and industry. Strengthening the ties across each of the stages of innovation helps de-risk technology RD&D.

New technologies typically pass through a series of stages that drive an innovative idea from basic science to a marketable solution (Figure 4).

## **Climate Change and Emissions Management Corporation**

The Climate Change and Emissions Management Corporation (CCEMC), a not-for-profit organization, provides funding to support the discovery, development and deployment of transformative technologies that will reduce GHGs, focussing in areas such as renewable energy, clean energy production and energy efficiency.

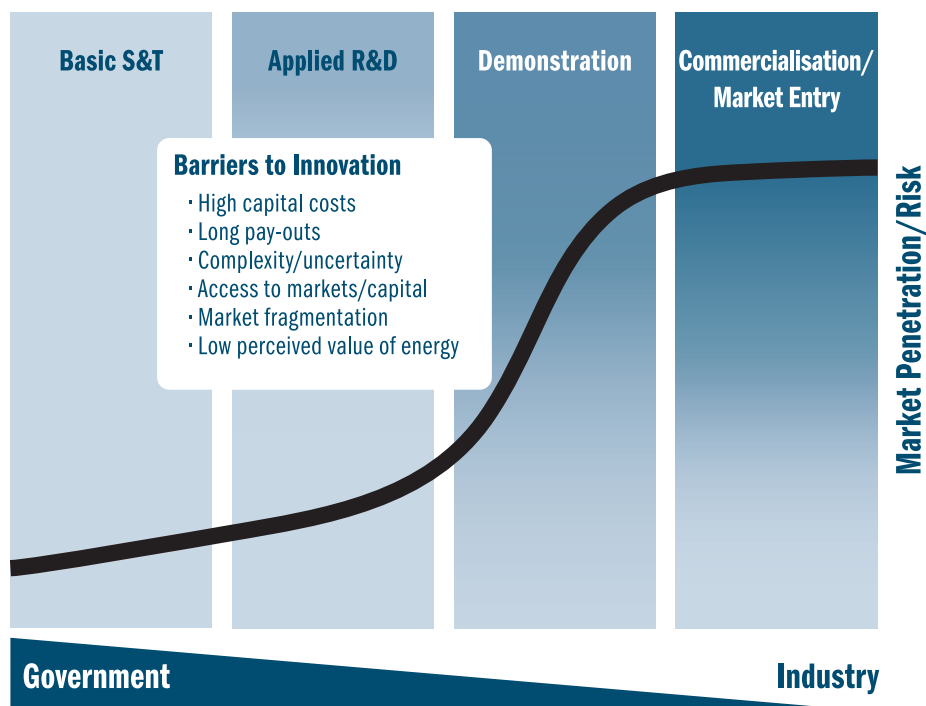
CCEMC is funded by the Government of Alberta through its *Specified Gas Emitters Regulation*. Companies failing to reduce emissions intensity targets have three compliance options:

- Improve the energy efficiency of their internal operations;
- Buy carbon credits from other Alberta-based organizations; or
- Pay \$15 into the Climate Change and Emissions Management Fund for every tonne they exceed the allocated limit.

### **Key facts**

- By June 2013, CCEMC had committed funding to 53 innovative technology projects. Together, these projects will combine to reduce emissions by an estimated 13 megatonnes (Mt) over 10 years – the equivalent to removing about 2.6 million (M) cars from the road.
- In 2013, CCEMC launched a \$35M open international innovation challenge to identify multiple technologies that could provide significant reductions in GHG emissions by transforming carbon from a liability into an asset.
- This Grand Challenge competition is the first initiated by a Canadian organization, and the winner of the final round will receive a grant of \$10M to commercialize their technology.

Figure 4. Innovation chain – From idea to marketable solution



### Federal organizations supporting innovation

**in Canada:** There are a number of key federal organizations actively engaged in fostering innovation in Canada to de-risk and promote the development and application of new innovative energy technologies. These organizations, among others, form an integral part of Canada's innovation system:

- NRCan is a primary centre of expertise and key source of funding for public energy RD&D in Canada. Through CanmetENERGY, NRCan works with industry, universities and other government departments as well as leading international organizations in developing clean energy programs, policies, technologies, tools and software, regulations, codes, and standards.
- The Natural Sciences and Engineering Research Council of Canada (NSERC) is the largest funder of science and engineering research in Canada and largely supports basic R&D. NSERC leads the Industrial Research Chairs to assist universities in pursuing research of interest to industry. NSERC supported more than 5 400 projects between

businesses and academia, working with more than 2 400 companies.<sup>11</sup>

- With the National Research Council's refocused mandate, it has become a business-driven, industry-relevant research and technology organization to further enhance private sector R&D. For instance, the Industrial Research Assistance Program (IRAP) provides direct support to small and medium-sized enterprises (SMEs) to develop technologies and successfully commercialize them in a global marketplace.
- Sustainable Development Technology Canada (SDTC) is an arm's length, not-for-profit foundation that funds the development and demonstration of new technologies to promote sustainable development. As of December 2013, SDTC had allocated a total of \$684M to 269 projects and had attracted another \$1.8B in funding from project partners.
- Export Development Canada and SDTC have partnered to help promising Canadian clean technology companies expand into new markets.

<sup>11</sup> NSERC, *Strategy for Partnerships and Innovation Interim Report*, December 2012.

**Alignment across Canadian jurisdictions:** Jurisdictions have distinct priorities and capabilities that reflect their particular mix of energy sources and use. At the same time, most jurisdictions are making innovation investments across a broad portfolio of technology areas. There are a number of federal, provincial, territorial and municipal policies and programs to support innovation across the country; however, they are somewhat fragmented. An opportunity exists to better align the timing and focus of government investments to support shared priorities. Federal, provincial and territorial governments engage in a continued dialogue on energy innovation that culminates in an annual conference attended by energy and mines ministers to take stock of progress, identify areas for stronger partnership and set a collaborative agenda for the following year.

**The importance of strategic partnerships:** Innovation cannot be done in isolation. Partnerships across the private and public sectors help to focus limited capacity and resources on areas where Canada has an opportunity to excel. Linking SMEs with larger capital-intensive firms, for example, increases the likelihood of technology adoption. Strategic alliances and partnerships, including with non-traditional partners and across different sectors, are vital to ensuring Canada's energy innovation competitiveness.

The Bio-pathways Project is a key success in forging partnerships across multidisciplinary sectors. Led by the Forest Products Association of Canada in cooperation with FPIInnovations and NRCAN, the project involved a comprehensive investigation of opportunities to produce a wide range of bio-products from wood fibre, which will enhance the competitiveness of both the forestry and energy sectors.

**Strengthening international partnerships:**

Canada needs to position itself internationally as an innovative player if we are to successfully compete in global markets. Support for Canadian developers to demonstrate their technologies in international settings is a key component to creating export opportunities, particularly for SMEs. Targeting important partners and export markets (e.g. United States, China, India, Israel and South Korea) and strategically engaging in multilateral fora, such as the IEA, will create opportunities to pool collective learnings and support innovative transformation. Attracting international

## Energy savings for industry

Process Integration (PI) is a powerful systems approach to achieve superior energy efficiency gains and increase profitability in Canadian industries. Since the inception in 2004 of the NRCAN Process Integration Incentive Program, more than 60 industrial facilities country-wide have benefited from their PI studies in various industries, including pulp and paper, food and beverage and petrochemicals.

### Program highlights

- PI projects are saving enough thermal energy to heat 100 000 homes.
- PI projects allowed participating pulp and paper companies to increase their renewable electricity production by 460 000 megawatt-hours (MWh) per year.
- PI projects cut GHG emissions of Canadian industry by 390 000 per year, equivalent to the emissions of 100 000 cars.
- The program generated economic benefits of \$74M per year with an average payback period of 1.5 years.



Pulp and paper mill

capital through enhanced engagement with international financial institutions will also be important to support Canada's export-driven SMEs.

The Canada-Israel Energy Science and Technology Fund is a good example of strategic partnership to promote greater collaboration between Canadian and Israeli industry, universities and research institutes.

This partnership is intended to support the development and/or commercialization of innovative energy technologies and processes to enable the responsible development of unconventional oil and gas resources, including applications to address environmental challenges. Other critical energy sources of interest to both countries will also be considered.

### **C) Bridging gaps along the innovation chain**

**Scaling-up demonstrations:** There is a clear need to increase opportunities for technology demonstrations and to provide platforms for Canadian technology developers to demonstrate their technologies both domestically and abroad. Without adequate demonstration opportunities many SMEs are generally unsuccessful in penetrating markets. Global investors often look for strong demonstration of a technology in host countries before investing.

Programs such as NRCan's ecoENERGY Innovation Initiative and SDTC's SD Tech Fund™ help to de-risk technologies and support SMEs by financing Canadian demonstrations. Successfully demonstrating technologies is key for SMEs in particular as it improves productivity and efficiencies and reduces the environmental footprint of operations. Successful demonstrations, particularly at home, help accelerate the pace of technology development and provide credible validation to other companies and potential domestic and international buyers.

**Improving access to capital:** Lack of access to capital for RD&D projects is a major financial barrier forcing companies to other jurisdictions and limiting innovation in Canada. SMEs in particular struggle to raise capital. Many are forced to go to the United States and elsewhere to raise the necessary levels of financing to support technology development.

Financing and monetary innovations will be critical to moving energy technologies and solutions forward for

### **Canada's Oil Sands Innovation Alliance**

Canada's Oil Sands Innovation Alliance (COSIA) is an alliance of 13 oil sands producers that account for 90 percent of all the oil sands production in Canada. COSIA focuses on accelerating the pace of improvement in environmental performance in Canada's oil sands through collaborative action and innovation.

COSIA brings together leading researchers from industry, government, academia and the wider public to improve measurement, accountability and environmental performance in the oil sands in the following four priority areas: tailings, water, land and GHGs.

#### **Key highlights**

Since its inception in 2012, COSIA's member companies have established the legal framework for unprecedented collaboration in a market economy that enables independent-minded, competitive companies to work together in areas of common interest.

COSIA has initiated 185 projects and shared more than 560 distinct technologies and innovations that have cost more than \$900M to develop.

Canadian companies. Bringing in potential investors at the R&D phase rather than the commercialization phase and connecting innovative companies to risk-tolerant venture capital organizations are key. Federal and provincial governments can help to address this by working closely with banks and lenders to reduce the perception of risk and educating these institutions about the value of investing in innovative energy technology initiatives.

## D) Creating a supportive enabling environment

### Regulations, codes and standards facilitate market adoption:

Regulations, codes and standards are needed for significant market adoption to provide the investment certainty needed to achieve market transformation. Governments play an important function in developing codes, standards and regulations, which are essential to keep pace with technology development, both at home and abroad. Involving standards bodies and regulators earlier on in the development phase could help ensure technologies do not get stranded along the innovation chain, particularly as they approach scale-up and commercialization. The importance of aligning and harmonizing Canadian regulations, codes and standards with those in the United States and other key markets cannot be overlooked, and would enable Canada to achieve the greatest return on economic and environmental performance.

### Procurement policies and programs de-risk innovation:

Governments can become first adopters of technologies by strengthening their procurement policies and programs. A number of organizations, including universities and other public institutions, are already using procurement as a tool to drive and de-risk innovation. Government procurement programs for pre-commercial or early commercial technologies would help to demonstrate them in the domestic market and improve access to global markets. The United States and the European Union are good examples of government administrations that have been adopters of early technology, acting as test beds and R&D centres to help improve the technology.

The Build in Canada Innovation Program (BCIP), formerly known as the Canadian Innovation Commercialization Program, is a public procurement instrument supporting innovation. Launched in 2010, the BCIP provides Canadian innovators with the opportunity to sell their pre-commercial goods and services through a competitive procurement process to the federal government, get feedback on the use of their new goods and services in an operational setting, and enter the marketplace with a successful application.

**Access to energy information and data:** The ability to share market knowledge, energy data and technology information is critical to maximizing the value of

## Making headway in solar energy in Canada

Founded in 2001, Canadian Solar Inc. is now one of the world's largest manufacturers of solar photovoltaic (PV) modules, specialized solar PV products and solar PV power plants. In 2013, the company realized more than \$1.64B in total net revenue. The company, headquartered in Guelph, Ontario, has operations across North and South America, Europe, Africa, the Middle East, Australia and Asia. To date, Canadian Solar has delivered more than 4 gigawatts of solar modules to customers in more than 50 countries.

The company has recently entered into an engineering, procurement and construction (EPC) contract with Kingston Solar LP Inc. for the construction of a 140-MW solar PV farm to be located in Ontario. Once completed, this will be the largest EPC agreement signed by Canadian Solar.

The Kingston Solar LP 140-MW solar PV farm project is being developed by Samsung Renewable Energy Inc. The project is expected to generate 173 000 MW per hour of electricity every year, which is enough to power more than 16 000 Canadian households.



Thunder Bay Airport, Ont.

investments. The inability to access consumer and business energy-use information from utilities because of privacy and legal concerns with making the data public (since this information is customer-owned) is a barrier, particularly when looking at the application of smart grid technologies. Being able to model and predict energy use and demand and to develop active demand response that fits best with existing infrastructure is a growing concern. Some Canadian jurisdictions are already taking steps to improve access to energy data. Government could also improve its ability to anticipate and address opportunities, gaps

and barriers in the energy innovation system in a timely and strategic manner, drawing on experts and stakeholders (i.e. technology roadmaps, capability assessments and other tools for decision makers).

**Improving program design and maintaining successful programs:** There is strong support for the development of programs that support the full value chain and coordinate efforts from early R&D through to deployment. Consultation with stakeholders and all levels of government when designing a support program would help to streamline collaboration and maximize efficiency. With respect to government programs and support, there is a need to re-examine

the administrative burden associated with contribution agreements and to look for efficiencies between funding organizations and between different levels of government.

There is support for leveraging academic R&D through graduate programs that transfer knowledge from universities to innovation incubators and through to commercialization programs. NRCan's Local Energy Efficiency Partnerships initiative is another successful model that brings together researchers, manufacturers and builders to move energy-efficient housing innovation from R&D to broader commercial use.

## 5. Conclusion

Energy innovation presents an important opportunity for Canada to support economic growth and employment and to strengthen our global competitiveness while realizing environmental benefits. There is a need to use existing resources more efficiently through better synergies and alignment to yield the greatest benefits to Canadians.

A number of messages emerged from participants during the Energy Innovation Roundtables that will help guide future actions to support energy innovation:

- Sustained leadership mobilized around shared objectives and common outcomes would help foster energy innovation in Canada. Governments have a strategic role to play as a convenor bringing together stakeholders across the innovation chain to resolve challenging and persistent issues.
- A market-driven RD&D portfolio, focussed on key Canadian energy strengths, would deliver benefits in the medium- to long-term to help enhance Canada's global competitiveness.
- Public RD&D efforts could be better connected and aligned with industry needs, mindful of jurisdictions, to ensure a level of coherence across priorities and innovation system players. Strategic domestic and international partnerships and targeted funding can help to achieve this coherence, and an emphasis on demonstrations is important to showcase innovative technologies.
- A stronger enabling environment could help spur innovation and better ensure that technologies are not stranded along the innovation chain. For instance, procurement programs help de-risk innovation while accessible energy information and data support good investment decisions.
- Gaps along the innovation chain exist, and several companies struggle to access capital. Government-led initiatives, such as SDTC and IRAP, help to support industry, particularly SMEs.

Promoting world-class energy innovation requires commitment around shared objectives, common priorities and a pooling of talent and resources. The Energy and Mines Ministers' Conference is an important platform to pursue greater alignment of priorities and discuss innovative ways to enhance collaboration on energy innovation.

Ongoing opportunities exist to ensure current and future actions take into consideration the messages heard during the Energy Innovation Roundtables, including the government developing new programs and policies to support energy innovation in Canada.

## Acknowledgements

NRCan would like to thank participants for their valuable contributions made during their Energy Innovation Roundtables. We would like to specifically acknowledge and thank the roundtable co-chairs who supported the Honourable Greg Rickford, Minister of Natural Resources Canada and Minister for the Federal Economic Development Initiative for Northern Ontario and Frank Des Rosiers, Assistant Deputy Minister, Innovation and Energy Technology:

### National roundtable

**Jim Balsillie**, Chair, Sustainable Development Technology Canada

### Thematic roundtables

**Judy Fairburn**, Executive Advisor, Cenovus Energy Inc. and Chair, COSIA Shareholder Steering Committee (Unconventional Oil and Gas Roundtable)

**Raphael Hofstein**, President and Chief Executive Officer, MaRS Innovation (Next Generation Transportation Roundtable)

**Peter Hogan**, Vice-president, Nova Scotia, Atlantic Canada Opportunities Agency (Distributed Power Generation Roundtable)

**Pierre Lapointe**, President and Chief Executive Officer, FPInnovations (Long-term R&D Opportunities Roundtable)

**Elizabeth McDonald**, President and Chief Executive Officer, Canadian Energy Efficiency Alliance (Energy Efficiency Roundtable)

### Organizations represented at the roundtables

Alberta Innovates - Energy and Environment Solutions	BC Hydro	Canadian Natural Gas Vehicle Alliance
Alberta Innovates - Technology Futures	Building Owners and Managers Association	Canadian Natural Resources Limited
Analytica Advisors	Canadian Association of Petroleum Producers	Canadian Renewable Fuels Association
Association québécoise pour la maîtrise de l'énergie	Canadian Electricity Association	Canfor Pulp
Atlantic Canada Opportunities Agency	Canadian Energy Efficiency Alliance	Cenovus Energy Inc.
Automotive Fuel Cell Cooperation Corp.	Canadian Gas Association	Change Energy Services
Ballard Power Systems	Canadian Geoexchange Coalition	Concordia University
BC First Nations Energy and Mining Council	Canadian Home Builders' Association	Council of Canadian Academies
	Canadian Hydrogen Fuel Cell Association	CrossChasm Technologies Inc.
		DANA Canada Corporation

Electric Mobility Canada	Halifax Regional Municipality	Quality Urban Energy Systems of Tomorrow
Emera Inc.	Hatch	Ryerson University
Emerald Technology Ventures	Heating, Refrigeration and Air Conditioning Institute of Canada	SaskPower
Enerkem	Hydro One Networks	Shell Canada
EnerTech Capital	Imperial Oil Resources	St. Francis Xavier University
Federation of Canadian Municipalities	Innovation Saskatchewan	Suncor Energy Inc.
Ferus	Institut de recherche d'Hydro-Québec	Sustainable Development Technology Canada
Ford Motor Company of Canada	Lignol Energy Corporation	Temporal Power Ltd.
Forest Products Association of Canada	MaRS Innovation	Université du Québec - École de technologie supérieure
FortisBC Energy Inc.	McMaster University	University of Alberta
FPIInnovations	Metrolinx	University of British Columbia
Fundy Ocean Research Centre for Energy	Natural Gas Technologies Centre	University of Calgary
General Fusion Inc.	National Research Council	University of Waterloo – Waterloo Institute for Sustainable Energy (WISE)
General Motors Canada	Natural Resources Canada	University of Windsor
Gouvernement du Québec - Ministère des Ressources naturelles et de la faune	NB Power Corp.	Urbandale Construction
Government of Alberta, Alberta Energy	Net-Zero Energy Home Coalition	West Fraser Timber Co. Ltd.
Government of Nova Scotia - Department of Energy	Nexterra Systems Corp.	Western Economic Diversification
Government of Ontario - Ministry of Energy	Ontario Power Authority	Westport Innovations Inc.
Government of Saskatchewan, Energy Resources	OMERS Venture	Wind Energy Institute of Canada
	Owens Corning Canada	
	Petroleum Technology Alliance Canada	
	Plug'n Drive	