

CANADA'S  
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# Canada's next energy frontier: Shale oil and gas

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Roundtable summary report

**JANUARY 2016**



CANADA'S  
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Natural Resources  
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Ressources naturelles  
Canada



Council of Canadian Academies  
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## Introduction

Shale gas and tight oil are revolutionizing world energy markets. New drilling methods and technologies have suddenly given North America access to vast deposits of oil and natural gas stored in shale and tight rock formations.<sup>1</sup> These resources, largely inaccessible only a decade ago, represent a significant source of economic growth, jobs and tax revenue. Abundant resources, such as those located in British Columbia and Alberta, have contributed to Canada's position as one of the largest energy producers outside of the Organization of Petroleum Exporting Countries (OPEC).

In March 2015, the Public Policy Forum brought together private, public, non-profit and academic leaders in Ottawa to identify research and development (R&D) partnership opportunities to better understand Canada's shale energy industry challenges.

Roundtable participants provided insights on a series of key questions confronting the public, private, academic and non-profit sectors, including:

- What barriers limit innovation, opportunities and cross-sector collaboration?
- What priority issues have to be addressed to enable secure, responsible and economically viable development of shale oil and gas in Canada?
- What can the research community and other stakeholders do – individually and collectively – to increase energy literacy and address issues of public confidence?

This report synthesizes the roundtable discussion and proposes a path forward for governments, industry and Canadians. The Forum does not aim to provide a scientific assessment of shale energy development. Rather, this report presents practical solutions in plain language that stakeholders (i.e. research bodies, governments, regulators, industries and non-governmental organizations) can implement to improve Canada's shale energy industry through R&D partnerships and other means. Given the significance of the current economic, political and social context surrounding the production and development of shale resources, the report includes contextual considerations in Appendix II and III.

Focused research, leadership and collaboration may make it possible to expand Canada's shale operations while meeting high ethical, environmental and social standards. Such an outcome would contribute to this country's continued prosperity and potentially help bring new advances in Canada's shale energy operations.

<sup>1</sup> In this document the term "shale" is used to refer to both *shale* and *tight* oil and gas.



# Enhancing Canada's shale oil and gas operations: Toward a more collaborative approach

Roundtable participants agreed that shale oil and gas can play a stronger role in the Canadian economy, and that progress can be made on public concerns about its development. The industry can help shape these important opportunities by taking steps developed by roundtable participants. The steps outlined below include: collaborate on R&D; enhance communication of R&D results; cultivate non-traditional relationships; identify credible champions to communicate scientific knowledge; and promote R&D inter-governmental coordination.

## Collaborate on R&D

Improving Canada's shale energy R&D ecosystem will require greater multi-sector coordination that allows stakeholders to improve how they share information, resources and expertise. Advancing research on the resources' life cycle, quantity, location and impact is required to ensure their safe and sustainable development and maximize recovery. Given that technical expertise takes time to develop, shale energy stakeholders share a responsibility to ensure that research is streamlined and widely shared.

Concerns surrounding shale oil and gas development may require that stakeholders use a new research approach, according to roundtable participants. Research programs could be designed around the most pressing implementation risks and the development and commercialization of technology instead of traditional research themes. This approach could focus on identifying perceived and real risks and the best ways to manage them and improve efficiencies while cutting the industry's environmental footprint.

Greater focus and coordination are needed to enhance stakeholders' research. A new, risk-focused, research paradigm may better address the different concerns relating to shale oil and gas development while reducing duplication in geoscience research. This approach could help leaders improve projects, identify risks, and strengthen industry competitiveness.

Also, new methods could be explored to share intellectual property on new technologies and solutions. This would be especially helpful for sharing information and tools to mitigate the environmental risks of hydraulic fracturing (also known as fracking).

Engaging local communities and interested stakeholders, including environmental non-governmental organizations (ENGOS), will also be important to ensure R&D results meet the expected outcomes. Open and sustained engagement could assist with risk identification and developing safer projects.

## Enhance communication of R&D results

Shale oil and gas extraction is a complex operation and highly technical, making it hard to dispel myths and communicate information to a broader audience. Stakeholders should consider working together to craft accessible language to communicate effectively with the general public.

Improving scientific communications and the dissemination of research results should also be a joint priority of shale energy stakeholders. Concerted efforts are needed to make information more readily accessible by simplifying communications and tailoring them to target audiences, as well as promoting energy literacy.

Leaders who wish to enhance their communications and engagement will need to account for the many perspectives that shale energy touches. Canada's geographic diversity means that industry leaders need to tailor their outreach based on who they want to inform and influence. Urban communities may require different messages and forums than rural ones. Working with First Nations, Métis and Inuit peoples also requires respect and a keen understanding of culturally-sensitive practices. Industry leaders should consider working with local actors and ENGOS to help determine the approaches and language that works for particular communities.

Improve R&D communication among stakeholders and the general public.

Improving energy literacy requires specific and sustained efforts. Governments and industry leaders should consider developing partnerships with educators to help advance a better understanding of energy resource development. Teaching young Canadians about shale oil and gas could help this generation become familiar with, and talk about energy issues. Colleges and universities could consider offering new programs that foster energy literacy among students and help develop future innovators and researchers.

## Identify credible champions to communicate scientific knowledge

The industry needs to identify credible champions to talk about shale oil and gas development in order to address misinformation and advance a more precise, nuanced and productive dialogue based on scientific evidence.

Roundtable participants said that the research community may be well-placed to use its independent position to enrich the national debate on shale oil and gas. Researchers in Academia represent credible intermediaries and can provide independent perspectives that in return, could help increase trust between industry and interest groups. Sharing independent and accurate information would also be a valuable public service and is consistent with the R & D sector's mandate to further knowledge and understanding.

Governments are also well positioned to play a champion role since they are responsible for informing and representing the views of ordinary Canadians. Political leaders and government officials could build on their efforts to communicate the issues, risks and potential benefits of shale oil and gas. Ongoing priorities for the industry remain correcting misconceptions and identifying areas to further clarify. Roundtable participants cautioned that the public's approval of governments— and therefore its credibility – can fluctuate depending on the political context, therefore risking the viability of government champions.

Closer cooperation among stakeholders could make it easier for ENGOs to publicly support potential components of shale energy projects that may meet their expectations. Industries that develop meaningful relationships with their critics may find areas of common interest that could benefit all stakeholders.

Effective champions are individuals who can inform and influence the general public. Their opinions are credible and untainted by personal interests. To help overcome many challenges facing the industry, champions will be essential for building public knowledge of, and confidence in, Canada's shale energy operations.

## Promote R&D inter-governmental coordination

Provincial and territorial leaders should consider better coordinating their research priorities to inform respective regulatory frameworks. This approach could help clarify the role and importance of shale energy in the Canadian economy. Developing a more coordinated government consultation on science to efficiently inform decision makers is highly desirable.

Strengthening the inter-governmental response to shale oil and gas based on sound science is a pressing public policy priority. Through focused leadership, federal and provincial/territorial decision-makers may inform their respective policies and regulations surrounding Canada's energy sector in general, and shale operations in particular.

## Cultivate non-traditional partnerships

According to roundtable participants, industry leaders should seek relationships, credibility and trust with key interest groups, including ENGOs. Working closely with traditional critics and opponents could help overcome suspicions and concerns.

While this concept was not discussed in detail at the roundtable, it is important to note that industry leaders and environmental organizations have a mutual interest in continually working together on issues they can potentially agree on. A focus on easily attainable goals as an initial step may help both sides develop relationships and trust to address contentious issues.

Cultivating non-traditional partnerships needs flexible leaders who make reasonable compromises to develop deeper relations. Working with opponents may not be easy. However, the ability to overcome entrenched differences promises to generate greater benefits for stakeholders and the country. It is an approach that should be pursued by all sides.

Additionally, partnerships with service delivery organizations and external small- and medium-sized businesses shed light on practical technologies. These interactions give the industry a better sense of how to organize research priorities, as prototype successes and failures are relayed back through the value chain.

## Recommendations for key stakeholders

Over the course of the Forum's roundtable discussion, participants identified the following recommendations that industry, government, non-profit and academic leaders should consider when seeking to strengthen shale energy R&D in Canada. This also includes additional recommendations that are based on the roundtable but that were not explicitly discussed.

- Support and enhance research data sharing among industry, government and academic partners
- Develop open and early engagement processes that integrate public concerns and feedback into future R&D planning
- Communicate scientific information and risk assessment/management practices with the public
- Strengthen relationships with communities and ENGOs
- Engage non-traditional partners to build R&D partnerships, align interests and share research
- Support innovative research, policy and regulatory options
- Better communicate the regulations that govern shale oil and gas exploration and development, including information around risk management
- Clarify and communicate the role of shale oil and gas development in Canada's economy as well as scientific information related to solutions that will minimise environmental impacts
- Provide leadership that identifies and aligns research priorities
- Report publicly on research results, environmental advances and strategic priorities in plain language
- Work with industry and government leaders to design research programs on pressing real and perceived development risks.
- Support the development of energy literacy programs at all levels of learning
- Enhance conversations across disciplines, including between geoscience, engineering and the social sciences

### Principles for collaboration

- Work together to align interests, research, technical innovation and communication with the public's concerns
  - Share and leverage resources to minimize costs and duplication
  - Engage small and medium-sized enterprises known to foster innovation
  - Establish joint strategies, protocols and mechanisms to better share scientific evidence and research results
  - Develop effective approaches to work with interested stakeholders, especially when conducting research and outreach to local communities
- 
- Work within and across sectors to identify shared interests, areas of consensus and potential partnership opportunities
  - Lead research initiatives that shed light on shale operation processes and risks
  - Facilitate and participate in public consultations and engagement sessions to help share information with stakeholders and the general public
  - Explore whether and how aspects of the U.S. Government Federal Multiagency Collaboration on Unconventional Oil and Gas Strategy could be adapted in the Canadian context<sup>2</sup>

<sup>2</sup> This recommendation was not explicitly discussed at the roundtable, but is referenced in Appendix II. Please see page 12 for more details.



## Conclusion and next steps

Canada is well endowed with world class natural gas deposits. As demonstrated in British Columbia, Alberta and the United States, shale energy is a significant source of economic growth, jobs, and tax revenue. Yet, achieving these important outcomes will depend on stakeholders' ability to improve multi-sector coordination as well as developing the sound science to address public concerns.

Canadian leaders may not be able to influence global oil prices but they can take decisive steps to ensure the industry is better positioned when prices rise. Improving R&D collaboration could mitigate health, environmental and productivity concerns. And fostering non-traditional partnerships and champions could lead to new research and export opportunities. It is possible for the shale industry to emerge from this era of low oil prices in a stronger position. But it will require that all stakeholders overcome key challenges. Through greater coordination and collaboration, the Canadian shale oil and gas resource development can continue to grow as a significant part of our economy.



# Appendix I: Roundtable agenda and list of participants

## Shale Oil and Gas Development Opportunities and Challenges for Collaboration in Energy Geoscience and Geo-Engineering

### Ottawa roundtable

Thursday, March 26, 2015

08:00 a.m. – 11:30 a.m.

Sheraton Ottawa, O'Connor Room, Main Floor

150 Albert St., Ottawa, ON

### Agenda

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8:00 a.m.	<b>Arrival and networking</b> Breakfast
8:15 a.m.	<b>Welcome and introductions</b> David Mitchell, President and CEO, Public Policy Forum
8:25 a.m.	<b>Tour de table</b>  <b>Remarks</b> Paul MacKay, President and CEO, Shale Petroleum Ltd.  <b>Remarks</b> Professor Monica Gattinger, Chair, Collaboratory on Energy Research and Policy, University of Ottawa  <b>Facilitated discussion</b> Roundtable participants were asked to discuss the following key questions: <ul style="list-style-type: none"><li>• What priority issues have to be addressed in the fields of geoscience and geo-engineering to enable secure, responsible and economically viable development of shale oil and gas in Canada?</li><li>• What are the barriers to innovation and opportunities for more effective cross-sector collaboration in the fields of energy geoscience and geo-engineering?</li><li>• There is an acknowledged need to foster more constructive conversations based on concrete evidence and scientific facts. What could be done by stakeholders, individually and collectively, to increase energy literacy and address issues of public confidence?</li></ul>
11:15 a.m.	<b>Remarks</b> Frank Des Rosiers, Assistant Deputy Minister, Innovation and Energy Technology, Natural Resources Canada
11:25 a.m.	<b>Closing comments</b> David Mitchell, President and CEO, Public Policy Forum
11:30 a.m.	<b>Adjourn</b>

# Shale Oil and Gas Development Opportunities and Challenges for Collaboration in Energy Geoscience and Geo-Engineering

## Ottawa roundtable

### List of participants

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#### Roundtable facilitator:

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President and CEO  
Public Policy Forum

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Producers

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**Paul McKay**

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SAIT Polytechnic

**Trevor Williams**

Dean, School of Energy  
British Columbia Institute of Technology

**Melinda Yurkowski**

Assistant Chief Geologist, Petroleum Geology  
Saskatchewan Geological Survey

## Appendix II: Some important contextual considerations

### Energy and Mine Ministers establish the Shale Cluster Action Plan

At the 2015 Energy and Mines Ministers' Conference (EMMC) in Halifax, Canadian ministers issued the *Taking Action: Moving forward together on energy research, technology and innovation* report to improve intergovernmental collaboration on energy.<sup>3</sup> A key component of the report is the Shale Cluster Action Plan, which lays out “[shared] technology innovation priorities, [identifies] existing activities, and [proposes] specific collaborative actions across jurisdictions for the coming year, with a follow-up report on progress planned for ministers at EMMC 2016.”

#### Shared priorities and current actions on shale energy:

- Reducing emissions and protecting ambient air quality through research and technology innovation
- Improving water protection and management through sharing and development of new knowledge and technology innovation
- Improving the environment and economic performance of resource recovery through research, development and demonstration
- Advancing knowledge of induced seismicity from hydraulic fracturing operations through baseline data accumulation and knowledge sharing

#### Four collaborative actions that Canadian governments will work towards:

1. **Technology roadmap on wellbore integrity:** A multi-jurisdictional roadmap will be developed to “identify and provide a plan for addressing research- and technology-based gaps related to wellbore integrity.”
2. **Identifying geoscience and geo-engineering R&D gaps:** Based on a series of multi-sector workshops NRCAN convened across Canada, a summary report will be produced to synthesize key findings, particularly around the “specific knowledge and technology gaps relating to shale resource development.” The report will serve as a resource for federal, provincial and territorial governments to address gaps within their jurisdictions.

3. **Environmental baseline data on shale resource development:** Cluster members agreed to work together to develop a “broader understanding on the range of methodologies for collecting and analyzing environmental baseline data related to shale resource development across Canada.”
4. **Participation in a flaring and venting regulators forum:** Cluster members agreed to explore the possibility of broadening government participation at the Canadian Flaring and Venting Regulators Forum.

#### U.S. Government develops a strategy for greater multi-agency coordination:

In July 2014, the U.S. Government developed a strategy to enhance intra-governmental coordination on energy R&D. *The Federal Multiagency Collaboration on Unconventional Oil and Gas Research* strategy “identifies a set of priority research needs, and describes a process through which the [federal] Agencies will support relevant collaborative research to develop these resources while protecting human health and the environment.”<sup>4</sup>

More specifically, the Strategy outlines how the Department of Energy (DOE), Department of the Interior (DOI) and Environmental Protection Agency (EPA) will work together in the following areas of particular interest to the U.S. Government:

- Understanding the scale and nature of U.S. unconventional oil and gas
- Water quality
- Water availability
- Air quality and greenhouse gas (GHG) emissions
- Effects on human health
- Ecological effects
- Induced seismicity

To better understand how this Strategy will work in practice, the Strategy requires that the DOE, DOI and EPA complete six “Flagship Projects” using the new multi-agency collaborative process.

The Government of Canada may wish to explore whether and how aspects of this Strategy could be adapted in the Canadian context.

<sup>3</sup> Resources Canada, “Taking Action: Moving Forward together on energy research, technology and innovation,” July 22, 2014, [http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/www/pdf/publications/emmc/15-0163%20EMMC-Taking%20Action\\_access\\_e.pdf](http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/www/pdf/publications/emmc/15-0163%20EMMC-Taking%20Action_access_e.pdf)

<sup>4</sup> Multi-Agency Collaboration on Unconventional Oil and Gas Research, “Federal Multiagency Collaboration on Unconventional Oil and Gas Research – A Strategy for Research and Development,” March 19, 2015, <http://unconventional.energy.gov/>

## Appendix III: External pressures facing North America's shale energy industry

Economic, social and environmental issues are limiting the potential of Canada's shale oil and gas industry. Whereas British Columbia and Alberta have promoted investments in shale energy operations, other provinces have taken a step back to further evaluate their development approaches. Concerns over the environmental impacts of hydraulic fracturing have led the Governments of New Brunswick<sup>5</sup> and Nova Scotia<sup>6</sup> to impose moratoria on shale energy operations, pending further study. In December 2014, a report by the Bureau d'audiences publiques sur l'environnement found that, in Quebec, the environmental "risks [of hydraulic fracturing] outweighed the economic benefits."<sup>7</sup> In response, Premier Philippe Couillard announced that the province would not participate in shale oil and gas development.<sup>8</sup>

The different approaches across Canadian jurisdictions and strict limitations on shale energy have created uncertainty in the sector. These domestic challenges are significant, and have led some industry leaders to question the future role of shale energy development in Canada.

Current global trends have also negatively impacted Canada's shale oil and gas industry.<sup>9</sup> OPEC's decision to maintain high oil production despite weak global demand has created an oversupply of fossil fuels in the market, leading to a precipitous decline in crude oil prices.<sup>10</sup> This has made it less profitable for shale oil producers to run projects. Despite showing resilience over the past year, North America's shale oil producers are becoming more hesitant to pursue new projects and some experts suggest that job cuts could soon follow.<sup>11,12,13</sup>

### Public concern about environmental degradation

The long-term success of shale oil and gas greatly depends on the industry's response to the general public's environmental concerns.. Oil and gas producers should consider investing in research and consultations to better understand how their operations affect people and local communities and to ensure they have the scientific facts to answer to community concerns.

According to a recent report by the Council of Canadian Academies, it may be possible that some producers are proceeding without the ability to anticipate or understand the real or perceived impact their projects have on surrounding communities. As a result, the report suggests, current shale operations may pose environmental threats "for which even existing best practices cannot assure long-term prevention...[and] these potential impacts are not being systematically monitored, predictions remain unreliable, and approaches for effective and consistent monitoring need to be developed."<sup>14</sup>

The abundance of shale oil and gas is helping to push down petroleum prices, adding further criticism that higher production is discouraging people from transitioning towards environmentally-friendly fuel sources, such as solar, geothermal and biofuel. On the other hand, low natural gas prices are encouraging more people to convert to clean burning natural gas. Alternative uses such as in transportation (trucks and ferries) are also displacing diesel with higher emissions, and gas fired power generation is displacing other more GHG intensive power sources.

<sup>5</sup> "Fracking commission appointed to study shale gas conditions," *CBC News*, March 24, 2015, <http://www.cbc.ca/news/canada/new-brunswick/fracking-commission-appointed-to-study-shale-gas-conditions-1.3006938>

<sup>6</sup> Michael Macdonald, "Nova Scotia moves ahead on onshore fracking ban," *The Globe and Mail*, September 30, 2014, <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/nova-scotia-to-ban-high-volume-hydraulic-fracturing/article20860189/>

<sup>7</sup> Bureau d'audiences publiques sur l'environnement, "Les enjeux liés à l'exploration et l'exploitation du gaz de schiste dans le shale d'Uticades basses-terres du Saint-Laurent," November 2014, <http://www.bape.gouv.qc.ca/sections/rapports/publications/bape307.pdf>

<sup>8</sup> Geoffrey Vendeville, "Couillard rules out fracking," *Montreal Gazette*, December 16, 2014, <http://montrealgazette.com/news/local-news/couillard-rules-out-fracking>

<sup>9</sup> Robert Tuttle, "Drop in oil prices means no drilling in Canada's biggest shale reserves," *The Globe and Mail*, Accessed December 16, 2015,

<http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/drop-in-oil-prices-means-no-drilling-in-canadas-biggest-shale-reserves/article24630811/>

<sup>10</sup> Larry Elliott, "Opec bid to kill off US shale sends oil price down to 2009 low," *The Guardian*, Accessed December 16, 2015, <http://www.theguardian.com/business/2015/dec/07/opec-plan-kill-us-shale-oil-price-down-seven-year-low>

<sup>11</sup> Shawn Tully, "The shale oil revolution is in danger," *Fortune*, Accessed December 16, 2015, <http://fortune.com/2015/01/09/oil-prices-shale-fracking/>

<sup>12</sup> "US oil production from shale may drop by 118,000 b/d in December: EIA", *Platts McGraw Hill Financial*, Accessed December 16, 2015,

<http://www.platts.com/latest-news/oil/americas/us-oil-production-from-shale-may-drop-by-118000-21440268>

<sup>13</sup> Robert Tuttle, <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/drop-in-oil-prices-means-no-drilling-in-canadas-biggest-shale-reserves/article24630811/>

<sup>14</sup> Cherry, John et al. (2014). *Environmental Impacts of shale Gas Extraction in Canada*. Council of Canadian Academies. Ottawa. Accessed online at: <http://bit.ly/1fST52p>, p. xii

<sup>15</sup> Cherry, et al., *Environmental Impacts*

## Perceived health and public risks

Little is known about the impact that shale projects have on the health of local communities in Canada.<sup>15</sup> The possibility of leaked chemicals and wastewater into underground aquifers pose a potentially significant public health issue. Yet, the absence of comprehensive research on the subject makes the human cost of shale energy operations and accidents difficult to gauge. As a result, some observers have suggested that “industry advocates can claim the practice has never been shown to cause serious environmental problems while opponents can fan public fears with anecdotal evidence and preliminary studies that suggest grave dangers.”<sup>16</sup>

Other concerns related to hydraulic fracturing include the potential risks surrounding fracking-induced earthquakes. In December 2015, the BC Gas and Oil Commission confirmed that fluid injection during hydraulic fracturing in northeast BC last August triggered a 4.6 magnitude earthquake, the largest induced seismic event ever recorded in the province.<sup>17,18</sup> There is evidence that high-rate injection can induce earthquakes and can increase their number and magnitude. While the growing number of earthquakes<sup>19</sup> do not pose a risk to public safety - as most induced earthquakes are low in magnitude and do not cause any damage<sup>20</sup> - regulators are closely monitoring incidents and working with scientists to better understand mechanisms that may trigger earthquakes.

## Significant fluctuation in global oil prices

The petroleum industry has experienced a very turbulent decade in relative terms. Following the 2008 global financial crisis, the price of oil rose above \$120 per barrel. This period generated record high profits for producers

that subsequently fueled the rise of shale energy projects in North America. Thousands of jobs were created and economic prosperity was shared across the continent. This period of high prices made it more affordable to launch shale exploration and extraction projects. However, an era of lower gas prices could negatively impact the profitability of shale energy projects, creating new challenges for the industry.

The results of the 2015 federal election also provide a new opportunity for Ottawa to re-engage with industry leaders, environmental groups, organized labour and others to overcome divergent attitudes, processes and policies. By acting as a facilitator and broker, the federal government could help Canada develop a more coordinated approach to shale energy R&D and innovation.

Over the past year, provincial leaders have made encouraging progress in developing a more unified energy approach. At the 2015 Council of the Federation meeting in Newfoundland, Canada’s premiers agreed to a broad energy framework to align approaches and policies. This high level agreement represents an important first step in building confidence that Canada is serious about shale oil and gas development. Importantly, the Strategy commits all 13 provincial and territorial jurisdictions to work collaboratively with each other, industry leaders and other stakeholders. It also places emphasis on continuing support for research and innovation, a factor that will be essential for strengthening the industry’s efficiency and competitiveness. By working collaboratively and deepening capacity, the Strategy seeks a country where energy is “further developed in an environmentally and socially responsible manner, our resources will get to the people that rely on them, and the changing conditions of the energy sector will be addressed well into the future.”<sup>21</sup>

<sup>15</sup> Ivan Semeniuk, “What experts say we don’t know about shale gas,” *Globe and Mail*, April 30, 2014, <http://www.theglobeandmail.com/news/national/what-experts-say-we-dont-know-about-shale-gas/article18356509/>

<sup>17</sup> BC Oil and Gas Commission. (2015). *INDB 2015-32 Seismic Event Determination*. <https://www.bcogc.ca/node/12951/download>

<sup>18</sup> Mark Hume, “Summer earthquake confirmed as largest caused by fracking in B.C.,” *The Globe and Mail*, December 17, 2015, <http://www.theglobeandmail.com/news/british-columbia/summer-earthquake-confirmed-as-largest-caused-by-fracking-in-bc/article27798765/>

<sup>19</sup> Amir Mansour Farahbod, Honn Kao, Dan M. Walker and John F. Cassidy. (2015). Investigation of regional seismicity before and after hydraulic fracturing in the Horn River Basin, northeast British Columbia. *Canadian Journal of Earth Sciences*, 2015, 52:112-122, 10.1139/cjes-2014-0162. <http://www.nrcresearchpress.com/doi/abs/10.1139/cjes-2014-0162?src=recsys&#.VnLefb-9PGJ0>

<sup>20</sup> Mark Hume, “Summer earthquake confirmed as largest caused by fracking in B.C.,” *The Globe and Mail*, December 17, 2015, <http://www.theglobeandmail.com/news/british-columbia/summer-earthquake-confirmed-as-largest-caused-by-fracking-in-bc/article27798765/>

<sup>21</sup> “Canadian Energy Strategy,” Council of the Federation, last modified July 2015, [http://www.canadaspremiers.ca/phocadownload/publications/canadian\\_energy\\_strategy\\_eng\\_fnl.pdf](http://www.canadaspremiers.ca/phocadownload/publications/canadian_energy_strategy_eng_fnl.pdf)

<sup>22</sup> Michael A. Benusic, “Fracking in BC: A public health concern,” *BC Medical Journal* 55 (June 2013), <http://www.bcmj.org/council-health-promotion/fracking-bc-public-health-concern>

<sup>23</sup> Shale Gas in Canada: Resource Potential, Current Production and Economic Implications,” Government of Canada, last modified January 30, 2014, <http://www.parl.gc.ca/Content/LOP/ResearchPublications/2014-08-e.htm#a9>

## Various government approaches across jurisdictions

Canada's provinces differ in their approach to shale energy. Endowed with large shale plays, British Columbia and Alberta are home to thousands of wells throughout their jurisdictions. BC alone has seen the development of 7,300 wells over the past decade, primarily in the Montney and Horn River Basins.<sup>22</sup> Shale oil and gas production in Alberta has also increased over the past ten years, with estimates that the province has vast resources of untapped shale gas.<sup>23</sup> Although shale energy represents a very small percentage of Alberta's overall energy output, the province's large resources suggest that the resource will be an important source of exports, jobs and growth well into the future.

Shale oil and gas development in Eastern Canada has been significantly more modest. Public concern over environmental and health implications has spurred the Governments of Quebec, New Brunswick, Nova Scotia and Newfoundland and Labrador to impose limitations and moratoria on hydraulic fracturing operations. Pending further review and analysis, Eastern Canada's large shale plays remain largely undeveloped.

Driven by different regional pressures – creating jobs in BC and Alberta, and prioritizing environmental issues in Quebec and the Maritimes – Canada has pursued two different approaches to shale energy. A more streamlined approach could provide more clarity among industry leaders and assure investors that Canada is serious about shale oil and gas development. It is imperative that government and industry leaders develop a more coherent approach in a way that respects the legitimate environmental and health concerns of Canadians.







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