



HOUSE OF COMMONS  
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CANADA

# **DE-RISKING THE ADOPTION OF CLEAN TECHNOLOGY IN CANADA'S NATURAL RESOURCES SECTOR**

## **Report of the Standing Committee on Natural Resources**

**James Maloney  
Chair**

**JUNE 2017**

**42<sup>nd</sup> PARLIAMENT, 1<sup>st</sup> SESSION**

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# **THE STANDING COMMITTEE ON NATURAL RESOURCES**

has the honour to present its

## **SIXTH REPORT**

Pursuant to its mandate under Standing Order 108(2), the Committee has studied Clean Technology in Canada's Natural Resource Sectors and has agreed to report the following:





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# DE-RISKING THE ADOPTION OF CLEAN TECHNOLOGY IN CANADA'S NATURAL RESOURCES SECTOR

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## INTRODUCTION

Canada's clean technology industry is comprised of close to 800 firms, mostly small to medium-sized enterprises (SMEs), providing more than 50,000 direct jobs across the country.<sup>1</sup> Clean innovation opportunities span the entire economy. They give rise to new industries, while helping traditional ones, such as forestry and mining, pursue more efficient and environmentally friendly products and processes.<sup>2</sup> The Canadian green building sector alone (which is largely based on clean technology) represented approximately \$23 billion in gross domestic product (GDP) by the end of 2014, with about 300,000 full-time jobs in construction, design and green building operation nationwide.<sup>3</sup> Meanwhile, the oil and gas industry has been a major investor in clean innovations to improve operational efficiency and environmental performance, and is championing research and development (R&D) initiatives through industry partnerships such as Canada's Oil Sands Innovation Alliance (COSIA).<sup>4</sup> The Standing Committee on Natural Resources ("the Committee") heard that, in 2016, fossil fuels represented \$1.45 billion of the \$2 billion invested in clean technology R&D in the energy sector, including a \$219 million expenditure from COSIA.<sup>5</sup>

With a fast-growing international market valued at more than \$1 trillion,<sup>6</sup> the clean technology sector represents significant trade opportunities for an export-driven economy like Canada's.<sup>7</sup> The Committee heard that Canada is already a global leader in a broad range of established and emerging clean technology industries, including nuclear power generation, renewable energy, and carbon capture, utilization and storage (CCUS) technologies. Canada ranks 7<sup>th</sup> globally for installed wind power capacity, 14<sup>th</sup> for solar capacity, is among the top three for hydropower generation,<sup>8</sup> and has a competitive

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1 The House of Commons Standing Committee on Natural Resources (RNNR), [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 21 February 2017 (Frank Des Rosiers, Assistant Deputy Minister, Innovation and Energy Technology, Department of Natural Resources).

2 RNNR, [Evidence](#) (Des Rosiers, NRCan); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 7 March 2017 (Patrick Bateman, Policy and Research Advisor, CanSIA); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 February 2017 (Michelle Brownlee, Director, Policy, Smart Prosperity Institute).

3 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 11 April 2017 (Thomas Mueller, President and Chief Executive Officer, Canada Green Building Council).

4 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 13 April 2017 (Mark A. Scholz, President, Canadian Association of Oilwell Drilling Contractors); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 March 2017 (Cody Battershill, Founder and Spokesperson, Canada Action Coalition Ltd.).

5 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 11 April 2017 (Alex Ferguson, Vice-President, Policy and Performance, Canadian Association of Petroleum Producers).

6 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 7 March 2017 (Sarah Petrean, Senior Policy Advisor, Clean Energy Canada).

7 RNNR, [Evidence](#) (Petrean, Clean Energy Canada).

8 RNNR, [Evidence](#) (Battershill, Canada Action).

advantage in emerging carbon dioxide (CO<sub>2</sub>) utilization technologies, which could generate \$1 trillion of new revenue by 2030, based on recent predictions by McKinsey Consulting.<sup>9</sup> According to Robert Niven of CarbonCure Technologies, “about nine of the 27 semi-finalists in the Carbon Xprize, a \$20-million global CO<sub>2</sub> utilization challenge, are Canadian companies.”<sup>10</sup>

The Committee heard that continued investment in clean technology would advance both the economic competitiveness and environmental performance of the natural resources sector.<sup>11</sup> For example, Alex Ferguson of the Canadian Association of Petroleum Producers (CAPP) stated that, in view of the projected increase in the global demand for oil over the next two decades, “clean technology investments in the oil and natural gas sector will mean that Canada can and should competitively supply the world with [Canadian fossil fuel] products.”<sup>12</sup> On the other hand, the Committee heard that capital-intensive innovations and/or technology transfers can present certain business risks for natural resource companies. In a sector comprised mostly of capital equipment industries, characterized by volatile commodity prices that create boom and bust cycles, there is a general propensity to risk-aversion with regards to the adoption of untested innovations. Many larger companies are concerned that taking on a new technology risk would disrupt their production, while SMEs struggle to finance capital-intensive projects.<sup>13</sup>

In view of these challenges, the Committee invited a wide range of experts from government, industry, academia and civil society in order to discuss policy instruments designed to de-risk the adoption of clean technology in Canada’s natural resources sector. This report presents the Committee’s findings according to five themes: 1) market regulation; 2) technology development through the commercialization gap (the so-called “valley of death”); 3) federal subsidies and services; 4) cross-sectorial and international cooperation; and 5) recommendations to the Government of Canada. The Committee is pleased to present its report, which concludes its study on clean technology.

## ADDRESSING MARKET DISTORTIONS

The Committee heard that many clean technologies are financially unfeasible because the market does not account for the environmental cost of pollution.<sup>14</sup> In other words, clean technology companies are creating solutions that have no direct market

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9 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 March 2017 (Robert Niven, Founder and Chief Executive Officer, CarbonCure Technologies Inc.).

10 RNNR, [Evidence](#) (Niven, CarbonCure).

11 According to Frank Des Rosier of NRCan (RNNR, [Evidence](#)), the natural resources sector is a major generator of economic wealth for Canada, representing roughly one fifth of the country’s GDP, but also accounts for “the vast majority” of national greenhouse gas (GHG) emissions.

12 RNNR, [Evidence](#) (Ferguson, CAPP).

13 RNNR, [Evidence](#) (Des Rosiers, NRCan); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 9 March 2017 (Simon Irish, Chief Executive, Terrestrial Energy Inc.); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 21 March 2017 (Miriam Tuerk, Co-Founder and Chief Executive Officer, Clear Blue Technologies Inc.).

14 RNNR, [Evidence](#) (Thériault, CBOC); [Evidence](#) (Des Rosiers, NRCan); [Evidence](#) (Bak, Analytica Advisors); RNNR, [Evidence](#) (Brownlee, Smart Prosperity Institute); [Evidence](#) (Popp, SU).

value,<sup>15</sup> or a negative value if fossil fuel subsidies are taken into account.<sup>16</sup> As Ms. Bak of Analytica Advisors put it:

Clean technology firms operate in areas in which prices for the commodities they replace, including energy derived from oil and gas, are volatile and in which prices for the externalities they reduce, including carbon, are in fact still negative.... This is because in Canada we have tax expenditures in the form of subsidies to the fossil fuel industry, ... [which] under the most conservative method of calculation, are estimated to be \$3.5 billion in direct fiscal subsidies and \$3 billion in publicly funded loans.<sup>17</sup>

The Committee heard that all OECD countries provide some level of public funding for clean technology development to account for these market realities.<sup>18</sup> Mr. Des Rosiers explained that, given the “clear market failure” in the clean technology sector, companies, especially SMEs, would be unlikely to invest in, let alone benefit from, clean innovations without some kind of public support.<sup>19</sup>

Some witnesses called for market-based approaches to internalize the environmental footprint of natural resource products and allow companies to choose the most suitable clean technologies for their business.<sup>20</sup> According to Brady Yauch of the Consumer Policy Institute, “the best move that federal legislators could make would be to allow the benefits of competition and markets that have served Canadians so well, in so many other areas of the economy, to be the driving force behind clean energy adoption in the resource sector.” He argued that the government's role should be “to regulate the market, ensuring that it's fair and enlightened, not to micromanage it.”<sup>21</sup> Similarly, Michael Binnion of the Quebec Oil and Gas Association stated that “recent history and economic research both have shown that evidence-based, regulated targets that allow the market to choose and have the best solutions to attain them is the most efficient solution for problems of the commons.”<sup>22</sup>

Professor David Popp advocated for broad-based, technology-neutral policies that allow companies to choose the most cost-effective, and thus most “market-ready,” technologies available to them. He mentioned carbon pricing, emissions trading, and/or “sector-specific policies that do not explicitly favour one technology over another, such as a renewable portfolio standard” as examples of these policies.<sup>23</sup> Similarly, Walter Kresic of

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15 RNNR, [Evidence](#) (Brownlee, Smart Prosperity Institute).

16 RNNR, [Evidence](#) (Bak, Analytica Advisors).

17 Ibid.

18 RNNR, [Evidence](#) (Thériault, CBOC); [Evidence](#) (Des Rosiers, NRCan).

19 RNNR, [Evidence](#) (Des Rosiers, NRCan).

20 RNNR, [Evidence](#) (Popp, SU); [Evidence](#) (Bak, Analytica Advisors); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 4 April 2017 (Steven Martin, Chief Executive Officer, Pond Technologies Inc.); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 February 2017 (Brady Yauch, Executive Director, Consumer Policy Institute); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 11 April 2017 (Walter Kresic, Vice-President, Pipeline Integrity, Enbridge Inc.); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 11 May 2017 (Michael Binnion, Chairman, Quebec Oil and Gas Association).

21 RNNR, [Evidence](#) (Yauch, CPI).

22 RNNR, [Evidence](#) (Binnion, QOGA).

23 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 February 2017 (David Popp, Professor, Syracuse University).

Enbridge Inc. told the Committee that market-based approaches, namely carbon pricing, would foster innovation in his industry. He stated that carbon pricing mechanisms “can drive economically efficient environmental solutions by providing incentives for businesses to invest in conservation and technology that reduces greenhouse gas emissions,” adding that Enbridge views the policy as “a way for organizations to drive efficiency.”<sup>24</sup>

With regards to the design of Canada’s announced plan for a national carbon price, Mr. Binnion urged the government to take into account the possibility of “carbon leakage,” where firms would transfer their production (and thus, emissions) to other countries with less stringent emission standards.<sup>25</sup> The Committee heard that carbon pricing revenue could get reinvested directly in industry in order to assist with further innovation<sup>26</sup> – for example, through carbon allowances or incentives that are “directly related to a company’s investment in pre-commercial clean technology.”<sup>27</sup> In the words of Pierre Desrochers, “if you let people keep more of the money they’ve earned, ... the history of technology shows plenty of evidence of people then taking chances on things that seemed off the wall and that would never meet the kind of criteria that a government program might require.”<sup>28</sup>

Other witnesses highlighted the role of codes, standards and performance targets in de-risking markets for new innovations.<sup>29</sup> Performance-based targets have been increasingly common in provincial programs on energy efficiency: governments set the level of performance and leave it up to the private sector to decide how best to meet these targets.<sup>30</sup> As Mr. Kresic explained, such targets allow engineers and technologists to set goals and create measurable systems to track progress, and can help industry advance through difficult periods.<sup>31</sup> Simon Irish of Terrestrial Energy emphasized the need to level the playing field for all technologies that meet objective environmental standards, stating that “one technology should not be favoured over another if they achieve the same goal, namely a cleaner industry and a cleaner electricity grid.”<sup>32</sup>

Finally, the Committee heard that markets favour stable fiscal and regulatory environments. Uncertainty regarding a government’s policy agenda leads to uncertainty in

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24 RNNR, [Evidence](#) (Kresic, Enbridge).

25 RNNR, [Evidence](#) (Binnion, QOGA).

26 RNNR, [Evidence](#) (Battershill, Canada Action).

27 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 21 March 2017 (Gordon Fraser, President and Chief Executive Officer, Reponsible Energy Inc.).

28 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 February 2017 (Pierre Desrochers, Director, Institute for Management and Innovation, University of Toronto Mississauga).

29 RNNR, [Evidence](#) (Des Rosiers, NRCan); [Evidence](#) (Bak, Analytica Advisors); [Evidence](#) (Mueller, CaGBC); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 13 April 2017 (Marie-Hélène Labrie, Senior Vice-President, Government Affairs and Communications, Enerkem).

30 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 9 March 2017 (Peter Love, President, Energy Services Association of Canada).

31 RNNR, [Evidence](#) (Kresic, Enbridge).

32 RNNR, [Evidence](#) (Irish, Terrestrial Energy Inc.)

the market and underinvestment in clean innovation, especially given the long-term and capital-intensive nature of natural resource equipment.<sup>33</sup> As David Popp put it:

Within the natural resources sector, we're often looking at equipment that may be used for 20 or 30 years. This means that investors want to know not just what will be in place today but what policies will remain in place for the future. It's important to think about what signals the government can provide that the policy in place today will exist through the lifetime of the investment.<sup>34</sup>

## BRIDGING THE COMMERCIALIZATION GAP

The Committee heard that access to patient capital is one of the biggest barriers facing clean technology developers in the natural resources sector, especially through the so-called commercialization gap – i.e., the period between a technology's R&D phase and large-scale commercialization, when companies can expect to start making profit (also known as “the valley of death”).<sup>35</sup> Many clean technology innovations in the sector are capital-intensive and require long-term financing. For example, research indicates that new technologies in the oil and gas sector take an average of 16 years (sometimes up to 31 years) to develop from concept to commercialization.<sup>36</sup> The cost to natural resource companies of switching to a new technology is relatively high compared to other sectors, and requires big up-front investments.<sup>37</sup> Furthermore, there is concern that policies “may lead to the lock-in of currently affordable technologies that make it difficult for a new technology to come online.”<sup>38</sup>

Some witnesses explained that Canada is good at funding clean technology R&D, but not the riskier phases that follow, namely demonstration and commercialization.<sup>39</sup> Accessing capital through the commercialization gap is a major challenge, especially for SMEs, because financial institutions are often reluctant to support new, untested and/or capital-intensive innovations.<sup>40</sup> As Brent Gilmour of Quality Urban Energy Systems of Tomorrow (QUEST) put it:

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33 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 13 April 2017 (Germain Belzile, Economist, Montreal Economic Institute); [Evidence](#) (Brownlee, Smart Prosperity Institute); RNNR, [Evidence](#) (Popp, SU).

34 RNNR, [Evidence](#) (Popp, SU).

35 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 7 March 2017 (Lyle Thorsen, Director of Strategic Planning, MEG Energy Corp.); [Evidence](#) (Thériault, CBOC); [Evidence](#) (Petrevan, Clean Energy Canada); [Evidence](#) (Labrie, Enerkem); [Evidence](#) (Des Rosiers, NRCan); [Evidence](#) (Niven, CarbonCure); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 March 2017 (Barak, Vice-President Business Development, eCAMION Inc.).

36 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 9 May 2017 (Jason Switzer, Executive Director, Alberta Clean Technology Industry Alliance); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 7 March 2017 (Leah Lawrence, President and Chief Executive Officer, Sustainable Development Technology Canada).

37 RNNR, [Evidence](#) (Popp, SU).

38 Ibid.

39 RNNR, [Evidence](#) (Labrie, Enerkem); [Evidence](#) (Barak, eCAMION); [Evidence](#) (Niven, CarbonCure); [Evidence](#) (Fraser, Reponsible Energy).

40 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 February 2017 (Brent Gilmour, Executive Director, Quality Urban Energy Systems of Tomorrow); [Evidence](#) (Des Rosiers, NRCan); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 9 May 2017 (Brian St. Louis, Coordinator, Ontario Cleantech Materials Group).



Most proponents find it extremely difficult to attract financing from investors either because they are too small to warrant the cost of due diligence by the investor or because their project does not meet the risk profile required by investors, meaning the project has just gone out of the preconstruction stage, which can include prefeasibility, environmental permitting, engineering design, and so forth. Possibly the most significant hurdle is scale. The average transaction cost for an investment of scale last year was \$440 million by institutional investors.... Further down the investor scale, clean-tech investors [or “commercial investors”] are often looking for projects of greater than \$50 million. For most community-scale projects ..., the scale of investment is much less—from hundreds of thousands to \$25 million.<sup>41</sup>

Furthermore, Mr. Des Rosiers explained that Canada’s capital markets are relatively small, which means that many firms need to rely on alternative sources of funding (namely government assistance) or seek capital in other countries. He added that access to capital is particularly problematic during the demonstration phase, given the sheer number (and high cost) of technologies that need to be demonstrated: “Often [private investors are] reluctant to jump in unless governments are willing to shoulder the cost, especially for the first of a kind, because the technology risks are significant and delays are often occurring, so nobody wants to be first and everybody is waiting for one another.”<sup>42</sup>

Lyle Thorsen of MEG Energy argued that governments are in a good position to bridge the commercialization gap because they “can invest more patiently, with longer return horizons, than private investors, [and] have the ability to share the financial risk of new technology development through policy and regulatory intervention to achieve long-term benefits.”<sup>43</sup> Organizations like Sustainable Development Technology Canada (SDTC), FedDev and the Business Development Bank of Canada (BDC) are attempting to address that challenge, but more support is needed.<sup>44</sup> The witnesses recommended the following additional measures by which government could help bridge the clean technology commercialization gap in the natural resources sector:

- **Funding the full clean technology innovation cycle, especially for SMEs, with more emphasis on commercialization activities.** Marie-Hélène Labrie of Enerkem pointed out that, in the absence of full-cycle financing, there is a risk that intellectual property would leave Canada past the R&D stage.<sup>45</sup> David Popp argued that early support for SMEs makes it more likely for emerging technologies to become profitable because it helps companies develop demonstration and proof of concept for their innovations.<sup>46</sup> The Committee also heard that governments should allocate more funding to pre-commercialization activities. For example, Chelsey Reschke of Young Women in Energy recommended that the federal

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41 RNNR, [Evidence](#) (Gilmour, QUEST).

42 RNNR, [Evidence](#) (Des Rosiers, NRCan).

43 RNNR, [Evidence](#) (Thorsen, MEG Energy.)

44 RNNR, [Evidence](#) (Fraser, Reponsible Energy); [Evidence](#) (St. Louis, OCMG); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 February 2017 (Bryan J. Watson, Managing Director, CleanTech North).

45 RNNR, [Evidence](#) (Labrie, Enerkem).

46 RNNR, [Evidence](#) (Popp, SU).



government spend 15% of its clean technology subsidies on R&D and 40% on projects that are closer to commercialization.<sup>47</sup>

- **Expanding the Scientific Research and Experimental Development (SR&ED) and flow-through programs to include commercialization incentives.** Currently, the SR&ED applies to investments related only to R&D activities, and the flow-through tax credit covers mostly exploration projects. By extending these tax incentives to support capital-intensive commercialization activities, the Committee heard that the government could help improve the chances of success and speed of market adoption of new technologies. Furthermore, Mr. Fraser stressed that tax incentives are favourable policy tools because they allow each industry to invest in its own pre-commercial technologies.<sup>48</sup>
- **Providing new financial instruments to cover the performance risk of new technologies.** Ms. Bak used the example of the Canada Mortgage and Housing Corporation (CMHC), which allows Canadians to guarantee their mortgages by taking on the last part of risk in their bank loan. She recommended that the federal government create a similar fund to cover the performance guarantee for low-emission technologies, arguing that such a fund would have the additional benefit of teaching financial institutions how to underwrite performance risks, something they currently do not do, according to Ms. Bak.<sup>49</sup> Other witnesses suggested that the federal government offer complimentary support to private funders (a practice already in place in Quebec),<sup>50</sup> or create a new bank, similar to the BDC, that focuses on clean technologies, namely energy storage and renewable energy systems.<sup>51</sup>
- **Establishing a clean technology development program to help new projects attract private capital.** Examples of this approach include: 1) Climate Investor One, a global initiative designed to facilitate the financing of renewable energy projects in emerging markets, with a primary focus on early-stage project development; and 2) the Global Green Growth Institute (GGGI), which works with governments to establish financing projects that can unlock debt capital. In India, a US\$30-million GGGI fund to de-risk off-grid energy projects through the pre-construction phase attracted US\$430 million in private investment. Mr. Gilmour recommended that the government support clusters of related projects simultaneously to

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47 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 9 May 2017 (Chelsey Reschke, Member, Young Women in Energy).

48 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 11 May 2017 (Nathan Neufeld, Chief-Executive Officer, Evergreen Solutions Corp.); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 9 May 2017 (Gregory Bowes, Founding Member, Ontario Cleantech Materials Group); [Evidence](#) (St. Louis, OCMG); [Evidence](#) (Fraser, Responsible Energy); [Evidence](#) (Bateman, CanSIA).

49 RNNR, [Evidence](#) (Bak, Analytica Advisors).

50 RNNR, [Evidence](#) (St. Louis, OCMG).

51 RNNR, [Evidence](#) (Barak, eCAMION).

help accelerate the rate of new technology adoption (a process known as “batch-mentoring”).<sup>52</sup>

- **Stimulating clean technology markets through government procurement.**<sup>53</sup> The Committee heard that government procurement of goods and services is valued at about \$16 billion annually (or close to 10% of Canada’s GDP), which represents a powerful policy tool to advance the commercialization of clean technology, especially for SMEs.<sup>54</sup> Examples of best-practice policies include the Build in Canada Innovation Program,<sup>55</sup> the Federal Buildings Initiative (FBI) program, and Alberta’s capital borrowing regulation under the *School Act*, which encourages school boards to borrow money for energy efficiency with a performance guarantee.<sup>56</sup> Peter Love of the Energy Services Association of Canada told the Committee that the FBI concept, which procures energy efficiency improvements for federal facilities, is gaining traction in several provinces. He further noted that a recent report in Alberta recommended that the provincial government extend the borrowing regulation to include other public entities, such as hospitals and universities.<sup>57</sup>
- **Negotiating bilateral reciprocity for SME procurement with the United States under the North American Free Trade Agreement (NAFTA).** Ms. Bak explained that the United States has had an SME procurement policy since 1958. Giving our southern partners access to Canada’s SME procurement market would have an “overall innovative impact on the economy, because SMEs are the ones that are investing in innovation.” Meanwhile, Canadian SMEs would have access to a procurement market 10 times bigger than Canada’s.<sup>58</sup>

The Committee also heard that intellectual property (IP) policy, namely patenting, is one way of increasing the value of Canadian innovations. According to Leah Lawrence of SDTC, patents ensure that the ownership of the ideas related to clean technologies have a market value. She stated that Canada is “doing very well in research and probably leading in many sectors, but [needs] to convert that into patenting, both in the academic and the industrial sectors.”<sup>59</sup> On the other hand, Jason Switzer of the Alberta Clean Technology Industry Alliance argued that, in some cases, IP protections could decelerate the

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52 RNNR, [Evidence](#) (Gilmour, QUEST).

53 RNNR, [Evidence](#) (Thériault, CBOC); [Evidence](#) (Lawrence, SDTC); [Evidence](#) (Petrevan, Clean Energy Canada); RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 4 April 2017 (Alison Thompson, Chair of the Board, Canadian Geothermal Energy Association).

54 RNNR, [Evidence](#) (Petrevan, Clean Energy Canada).

55 RNNR, [Evidence](#) (Watson, CleanTech North).

56 RNNR, [Evidence](#) (Love, ESAC).

57 Ibid.

58 RNNR, [Evidence](#) (Bak, Analytica Advisors).

59 RNNR, [Evidence](#) (Lawrence, SDTC).

development of new technologies if companies act to defend their research advantage against competitors, instead of marketing their innovations in a way that could benefit other industry stakeholders.<sup>60</sup>

## MAXIMIZING THE IMPACT OF FEDERAL SUBSIDIES AND SERVICES

Government financing accounts for a significant portion of the investment in Canada's clean technology sector. According to Analytica Advisors, about 28% of the R&D for the country's 800 clean technology firms in 2015 was publicly funded.<sup>61</sup> At the federal level, there is a wide range of programs and institutions that fund clean technology R&D, commercialization and export, including NRCan, SDTC, the National Research Council, Export Development Canada (EDC), the SR&ED tax incentive program, and the Investments in Forest Industry Transformation (IFIT) program. Budget 2016 allocated approximately \$200 million for clean technology development, mostly in the energy sector, including a \$50-million oil and gas demonstration fund, \$62 million for electric vehicles and \$80 million for energy R&D.<sup>62</sup> Furthermore, the federal government allocated \$1.8 billion to the EDC and BDC in Budget 2017, including \$450 million to fund "first-of-a-kind commercial projects" through the EDC.<sup>63</sup>

Considering the many benefits of federal investments, the witnesses discussed ways by which the government's grant system could be further improved. For example, by:

- **Establishing a navigation support system (or a "one window approach") to help firms, especially SMEs, make the best use of the resources and services available to them.**<sup>64</sup> A recent online consultation by NRCan revealed the need for a single point of contact to guide companies through the government's multiple programs, departments and acronyms.<sup>65</sup> As Peter Christou of Swirltex explained, this practice is already in place in Scotland, where he was assigned one government appointee to help him find the most suitable grant for his firm.<sup>66</sup> Bryan Watson of CleanTech North called for an industry-wide, cross-sector ecosystem navigation support system that would also include private R&D partners, academic research programs, and clean technology end-users.<sup>67</sup>

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60 RNNR, [Evidence](#) (Switzer, ACTia).

61 RNNR, [Evidence](#) (Bak, Analytica Advisors).

62 RNNR, [Evidence](#) (Des Rosiers, NRCan).

63 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 9 May 2017 (Tom Rand, Senior Advisor, Cleantech, MaRS Discovery District).

64 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 7 March 2017 (Carl Broder, Chairman, BFH Corp.); [Evidence](#) (Des Rosiers, NRCan); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 23 March 2017 (Peter Christou, President, Swirltex); [Evidence](#) (Watson, CleanTech North); [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 11 May 2017 (Jonathan Dueck, Vice-President Technology, Evergreen Solutions Corp.).

65 RNNR, [Evidence](#) (Des Rosiers, NRCan).

66 RNNR, [Evidence](#) (Christou, Swirltex).

67 RNNR, [Evidence](#) (Watson, CleanTech North).

- **Reducing the paperwork and cost of grant applications, especially for SMEs.**<sup>68</sup> The Committee heard that, despite the benefits of the federal grant system, certain processes are so long, paperwork-intensive and costly that some companies, especially SMEs, decide not to pursue them.<sup>69</sup> According to Peter Christou of Swirtex, smaller companies find it difficult to apply for larger federal grants without hiring a grant writer, which can be too expensive. He explained that the amount of paperwork is the same for small and large projects, meaning that “only the larger companies can afford to go through [the] process.”<sup>70</sup> Miriam Tuerk of Clear Blue Technologies urged the government to introduce simpler financial incentives with easy math and clear formulas that make the eligibility criteria clear enough for companies to figure out on their own.<sup>71</sup>
- **Adapting program timelines to the practical needs of businesses and technology developers.** Elad Barak of eCAMION explained that the timeline of grant applications is sometimes too short for projects that require approvals from other partners and regulators (e.g., utilities or other levels of government) that often need “more than a month or two to approve a deal of high value.”<sup>72</sup> On the other hand, Bryan Watson of CleanTech North told the Committee that many effective programs that support early-stage clean technologies are too slow for the pace of business: “They often have a year-long application cycle and by that point a lot of the projects people hoped to undertake have had to begin regardless of the grants.”<sup>73</sup>
- **Accelerating the regulatory approval process for new technologies based on environmental performance.** One way to speed up the adoption of clean technology, according to the Alberta Clean Technology Industry Alliance, is to prioritize the regulatory approval for cleaner and/or breakthrough technologies, rather than assess applications on a first-come, first-serve basis.<sup>74</sup> Furthermore, Simon Irish of Terrestrial Energy recommended reducing licencing fees for new innovations, namely in the nuclear sector, stating that the current Canadian Nuclear Safety Commission (CNSC) fees “may be reasonable for licensing on an ongoing basis, but when licensing a new and novel concept ... act as a brake upon private sector-led innovation.”<sup>75</sup>

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68 RNNR, [Evidence](#) (Broder, BFH Corp.); [Evidence](#) (Tuerk, Clear Blue); [Evidence](#) (Christou, Swirtex).

69 RNNR, [Evidence](#) (Tuerk, Clear Blue); [Evidence](#) (Christou, Swirtex).

70 RNNR, [Evidence](#) (Christou, Swirtex).

71 RNNR, [Evidence](#) (Tuerk, Clear Blue).

72 RNNR, [Evidence](#) (Barak, eCAMION).

73 RNNR, [Evidence](#) (Watson, CleanTech North).

74 RNNR, [Evidence](#) (Switzer, ACTia).

75 RNNR, [Evidence](#) (Irish, Terrestrial Energy Inc.).

- **Streamlining federal regulations with those of provincial and municipal governments.** According to Michael Carter of Canadian Solar Solutions, the federal government can help de-risk the adoption of capital-intensive clean technologies by streamlining its goals and practices with local utilities and provincial/territorial regulators. In his discussion of ways to de-risk the adoption of renewable technology assets for natural resource development, he recommended that governments facilitate offtake agreements with local utilities for power generation in surplus of original contracts between renewable energy companies and natural resource developers.<sup>76</sup>
- **Engaging scientists and innovators in policy decisions and regulatory approvals.** Ms. Bak explained that, unlike in the United States, Canada has no requirement to consult with innovators, scientists, academic researchers or technology firms to ensure that environmental assessments and performance standards reflect state-of-the-art innovations and technologies. She told the Committee that regulators often need to rely on precautionary principles and legacy technology to assess new, or unfamiliar innovations, which can lead to unnecessarily lengthy regulatory approvals.<sup>77</sup>

Finally, the Committee heard that the federal government has the opportunity to champion the measurement and classification of clean technology across Canada and internationally.<sup>78</sup> As Ms. Reschke explained, there is no globally accepted definition of clean technology. She urged the government to engage industry experts and economists in the development of an objective definition, based on measurable performance targets (e.g., GHG emission levels).<sup>79</sup> Tom Rand of MaRS Discovery District indicated that a “fairly robust” definition of clean technology is forthcoming.<sup>80</sup>

## FOSTERING CROSS-SECTORIAL AND INTERNATIONAL COOPERATION

Clean technology applications span the entire economy, and more than 87% of Canadian clean technology firms self-identify as “export-focused.”<sup>81</sup> The Committee heard that Canada would benefit from stronger industry networks and cross-sectorial/intergovernmental partnerships to spur innovation, de-risk new technology adoption and foster trade opportunities both nationally and internationally.<sup>82</sup> As Jason Switzer of the Alberta Clean Technology Industry Alliance put it, partnerships “are the

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76 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 21 March 2017 (Michael Carter, Business Development Manager, Canadian Solar Solutions Inc.).

77 RNNR, [Evidence](#) (Bak, Analytica Advisors).

78 RNNR, [Evidence](#) (Reschke, Young Women in Energy); [Evidence](#) (Neufeld, Evergreen Solutions).

79 RNNR, [Evidence](#) (Reschke, Young Women in Energy).

80 RNNR, [Evidence](#) (Rand, MaRS Discovery District).

81 RNNR, [Evidence](#) (Petrean, Clean Energy Canada).

82 RNNR, [Evidence](#) (Kresic, Enbridge); [Evidence](#) (Gilmour, QUEST); [Evidence](#) (Niven, CarbonCure); [Evidence](#) (Switzer, ACTia); [Evidence](#) (Des Rosiers, NRCan); [Evidence](#) (Petrean, Clean Energy Canada); [Evidence](#) (McQuade, MEG Energy).

magnets around which [clean technology] ecosystems [or clusters] can form.”<sup>83</sup> The Committee also heard that there is a need to better link clean technology producers and end-users. Julie Sunday of NRCan pointed out that clean technology solutions are not always compatible with natural resource development processes, stating that “government’s convening of conversations between the producers of the clean technologies and the larger industrial players [is] a gap that ... could certainly be bridged.”<sup>84</sup>

Examples of innovation networks include COSIA; the Carbon Conversion Technology Centre, a partnership between NRCan and the Government of Alberta to support the development of CCUS technologies; and the Low Carbon Partnership, which plans to “engage 4,000 businesses in over 300 communities from now to 2025, delivering about \$150 million in cost savings to SMEs across Canada, and aiming to reduce greenhouse gas emissions from half a tonne to one to two tonnes by 2025.”<sup>85</sup> Canada is also part of Mission Innovation (MI), a global initiative of 22 countries and the European Union with the aim of doubling investments in clean energy research and development (R&D) over the next five years. Global leaders have committed to increasing multilateral collaboration and private sector investment in the area of clean energy innovation.<sup>86</sup>

## RECOMMENDATIONS

Based on the evidence presented in the previous sections, the Committee recommends the following:

- 1) The Committee recommends that the Government of Canada work with provincial and territorial governments to develop market-based, technology-neutral policies that create a market value for the environmental and social benefits of clean technology, while allowing companies to choose the most suitable innovations for their respective industries, according to their own expertise and market research.**
- 2) The Committee recommends that the Government of Canada work with industry and provincial/territorial governments to ensure that the forthcoming national price on carbon pollution is evidence-based and transparent, can drive innovation and productivity, and can support the competitiveness and profitability of Canada’s natural resources sector.**
- 3) The Committee recommends that the Government of Canada work in collaboration with industry, provincial/territorial governments, and the**

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83 RNNR, [Evidence](#) (Switzer, ACTia).

84 RNNR, [Evidence](#), 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 21 February 2017 (Julie Sunday, Director General, Policy and Planning Branch, Innovation and Energy Technology, Department of Natural Resources).

85 RNNR, [Evidence](#) (Gilmour, QUEST).

86 RNNR, [Evidence](#) (Des Rosiers, NRCan).

**financial sector to de-risk the development of clean technology through the commercialization gap, by:**

- a) **continuing to fund the full clean technology innovation cycle with more emphasis on commercialization activities;**
  - b) **supporting programs, such as the Scientific Research and Experimental Development (SR&ED) and flow-through programs to include commercialization incentives;**
  - c) **supporting existing and new financial and policy instruments with the explicit purpose of mitigating the financial risk of new clean technologies – for example, through project development programs designed to help firms, especially SMEs, attract private capital to demonstrate and/or scale up their new innovations, or by covering the performance risk of new technologies; and**
  - d) **stimulating clean technology markets through government procurement, especially for SMEs, and ensuring transparency and accountability of public investment and project life-cycle performance reviews based on measurable performance targets.**
- 4) The Committee recommends that the Government of Canada improve the efficiency, accessibility and transparency of clean technology funding and taxation incentives, by:**
- a) **establishing a navigation support system to help clean technology firms, especially SMEs, make the best use of the resources and services available to them; and**
  - b) **ensuring that grant applications are simple, accessible, and adaptable to the practical needs of different businesses and technology developers.**
- 5) The Committee recommends that the Government of Canada work with other governments and regulators across Canada to streamline regulatory approval processes and environmental assessments.**
- 6) The Committee recommends that the Government of Canada work with industry, scientists and research institutions to ensure that all policy decisions and environmental assessments are based on scientific evidence and reflect state-of-the art technologies and practices.**
- 7) The Committee recommends that the Government of Canada work with industry, scientists and research institutions to more clearly define clean technology and to ensure that Canada is a global leader in championing holistic evidence-based measurement and adoption of clean technology.**



- 8) Finally, the Committee recommends that the Government of Canada work with industry, Indigenous governments and communities, provincial/territorial governments, and international governments/organizations to foster stronger cross-sectorial and international clean technology partnerships and clusters.



## APPENDIX A LIST OF WITNESSES

Organizations and Individuals	Date	Meeting
<b>Department of Natural Resources</b> Frank Des Rosiers, Assistant Deputy Minister Innovation and Energy Technology Julie Sunday, Director General Policy and Planning Branch, Innovation and Energy Technology	2017/02/21	45
<b>As individuals</b> Pierre Desrochers, Director Institute for Management and Innovation, University of Toronto Mississauga David Popp, Professor Syracuse University	2017/02/23	46
<b>CleanTech North</b> Bryan J. Watson, Managing Director		
<b>Consumer Policy Institute</b> Brady Yauch, Executive Director		
<b>Quality Urban Energy Systems of Tomorrow</b> Brent Gilmour, Executive Director		
<b>Smart Prosperity Institute</b> Michelle Brownlee, Director, Policy		
<b>BFH Corp.</b> Cal Broder, Chairman	2017/03/07	47
<b>Canadian Solar Industries Association</b> Patrick Bateman, Policy and Research Advisor		
<b>Clean Energy Canada</b> Sarah Petrevan, Senior Policy Advisor		
<b>MEG Energy Corp.</b> Mikaela McQuade, Senior Policy Analyst Lyle Thorsen, Director of Strategic Planning		
<b>Sustainable Development Technology Canada</b> Leah Lawrence, President and Chief Executive Officer Carla Miner, Senior Manager		
<b>Analytica Advisors Inc.</b> Céline Bak, President	2017/03/09	48

<b>Organizations and Individuals</b>	<b>Date</b>	<b>Meeting</b>
<b>Energy Services Association of Canada</b> Jean-Pierre Finet, Vice-President Peter Love, President	2017/03/09	48
<b>Terrestrial Energy Inc.</b> Simon Irish, Chief Executive		
<b>The Conference Board of Canada</b> Louis Thériault, Vice-President Public Policy		
<b>Canadian Solar Solutions Inc.</b> Michael Carter, Business Development Manager	2017/03/21	49
<b>Clear Blue Technologies Inc.</b> Miriam Tuerk, Co-Founder and Chief Executive Officer		
<b>Responsible Energy Inc.</b> Gordon Fraser, President and Chief Executive Officer		
<b>Canada Action Coalition Ltd.</b> Cody Battershill, Founder and Spokesperson	2017/03/23	50
<b>CarbonCure Technologies Inc.</b> Robert Niven, Founder and Chief Executive Officer		
<b>ECAMION Inc.</b> Elad Barak, Vice-President Business Development		
<b>Swirltex</b> Peter Christou, President Navindra Patel, Director		
<b>Canadian Geothermal Energy Association</b> Alex Kent, Policy Manager Alison Thompson, Chair of the Board	2017/04/04	51
<b>Pond Technologies Inc.</b> Steven Martin, Chief Executive Officer		
<b>Canada Green Building Council</b> Thomas Mueller, President and Chief Executive Officer	2017/04/11	52
<b>Canadian Association of Petroleum Producers</b> Alex Ferguson, Vice-President Policy and Performance		
<b>Cylo Technologies Inc.</b> Darren Gerling, President and Chief Technology Officer Cameron Spady, Director, Business Development		

<b>Organizations and Individuals</b>	<b>Date</b>	<b>Meeting</b>
<b>Enbridge Inc.</b> Walter Kresic, Vice-President Pipeline Integrity	2017/04/11	52
<b>Canadian Association of Oilwell Drilling Contractors</b> Mark A. Scholz, President	2017/04/13	53
<b>Enerkem</b> Marie-Hélène Labrie, Senior Vice-President Government Affairs and Communications		
<b>Montreal Economic Institute</b> Germain Belzile, Economist		
<b>As individuals</b> Wayne Wissing, Electrical Engineer Ray Won, President, ISTAVA Inc.	2017/05/09	55
<b>Alberta Clean Technology Industry Alliance</b> Jason Switzer, Executive Director		
<b>Fundy Ocean Research Center for Energy</b> Tony Wright, General Manager		
<b>MaRS Discovery District</b> Tom Rand, Senior Advisor Cleantech		
<b>North West Refining</b> Ian MacGregor, President, Chief Executive Officer and Chairman		
<b>Ontario Cleantech Materials Group</b> Gregory Bowes, Founding Member Brian St. Louis, Coordinator		
<b>OpenHydro Technology Canada</b> Jeremy Poste, Country Manager		
<b>Young Women in Energy</b> Chelsey Reschke, Member		
<b>Evergreen Solutions Corp.</b> Jonathan Dueck, Vice-President Technology Nathan Neufeld, Chief Executive Officer	2017/05/11	56
<b>Quebec Oil and Gas Association</b> Michael Binnion, Chairman		



# **APPENDIX B LIST OF BRIEFS**

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## **Organizations and Individuals**

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**Bioworx Environmental Inc.**

**Canadian Federation of Independent Business**

**Marine Renewables Canada**

**Renewable Industries Canada**

**Clean Energy Canada**



# REQUEST FOR GOVERNMENT RESPONSE

Pursuant to Standing Order 109, the Committee requests that the government table a comprehensive response to this Report.

A copy of the relevant *Minutes of Proceedings* ([Meetings Nos. 45, 46, 47, 48, 49, 50, 51, 52, 53, 55, 56, 57](#)) is tabled.

Respectfully submitted,

James Maloney  
Chair

