



FORWARD THINKING: An Innovation Sandbox Design Framework for New Brunswick

October 2022

QUEST 



ACKNOWLEDGEMENTS

Co-Authors

Richard Carlson, Pollution Probe
Eric Timmins, QUEST Canada

Project Team

Richard Carlson, Pollution Probe
Eric Timmins, QUEST Canada
Eddie Oldfield, QUEST Canada
Heldagardis (Helda) Renyaan, QUEST Canada
Omar Bhimji, QUEST Canada

Editors

Melissa Schweyer, QUEST Canada

Design and Layout

Kathryn Hoffart, QUEST Canada
Melissa Schweyer, QUEST Canada

Project Supporters

Suncor Energy Foundation

Project Partners

QUEST Canada
Pollution Probe

About QUEST Canada

QUEST Canada is a national non-profit that supports communities in Canada on their pathway to net-zero. Since 2007, we've been facilitating connections, empowering community champions and influencing decision-makers to implement efficient and integrated energy systems that best meet community needs and maximize local opportunities. We develop tools and resources, convene stakeholders and rights holders and advise decision-makers — all with the goal of encouraging and enabling communities to contribute to Canada's net-zero goals.



About Pollution Probe

Pollution Probe is a national, not-for-profit, charitable organization which is improving the health and well-being of Canadians by advancing policy that achieves positive, tangible environmental change. It is a leader in building successful partnerships with industry and government to develop practical solutions for shared environmental challenges.



TABLE OF CONTENTS

1	The Shift to Net Zero: The Need for Innovation
2	Overcoming Barriers to Innovation Deployment
4	What are Innovation Sandboxes?
6	How we Design Innovation Sandboxes for New Brunswick
7	New Brunswick Opportunities and Barriers
9	An Innovation Sandbox for New Brunswick
13	Next Steps



The Shift to Net Zero: The Need for Innovation

In April 2022, the federal government released its Emissions Reductions Plan, detailing how Canada intends to hit its target of at least a 40% reduction in GHG emissions by 2030. Developing the clean-tech industry and deploying innovation are key components of the plan.

New Brunswick released a climate change action plan in September 2022 that established targets for total provincial GHG emissions of 10.7Mt by 2030 and net-zero by 2050. In addition, the plan details the following specific measures:

- Collaboration with Indigenous communities to reduce emissions and increase resiliency
- Development of a New Brunswick-specific carbon pricing system
- Development of a Net-Zero Strategy for the province by 2025
- Aspirational target of 50% of light-duty vehicles to be zero emissions by 2030
- Development of a Clean Electricity Strategy by 2025 for achieving a net-zero electricity system by 2035, including the development of a small modular nuclear reactor, deployment of renewable energy and the introduction of efficiency performance targets
- Adoption of the most current version of the National Energy Code of Canada for Buildings and the National Building Code of Canada.¹

The provincial energy sector has clear targets, but more is needed to move to net-zero. Yet the current pace at which change is occurring in the energy system is far from sufficient, and innovation will be needed to achieve the above mentioned objectives. Given the government's plan to develop an Expert Advisory Committee to contribute to a Net-Zero Blueprint and a Clean Electricity Strategy by 2025, now is the time to consider what measures could help the province move to net-zero.

The reassuring news is that we already have readily available technologies that can dramatically reduce greenhouse gas emissions^{2,3}—the difficulty is in overcoming the so-called “valley of death” when trying to move from demonstration to deployment.

¹ Government of New Brunswick (September 2022). Our Pathway Towards Decarbonization and Climate Resilience: New Brunswick's Climate Change Action Plan 2022-2027. Retrieved from: <https://www2.gnb.ca/content/dam/gnb/Corporate/Promo/climate/climate-change-action-plan.pdf>

² Canadian Institute for Climate Change (2021). Canada's Net Zero Future. Retrieved from: <https://climatechoices.ca/reports/canadas-net-zero-future/>

³ International Energy Agency (2021). Net Zero by 2050: A Roadmap for the Global Energy Sector. Retrieved from: <https://www.iea.org/reports/net-zero-by-2050>

While New Brunswick and Canada have a history of energy innovation, current policies and programs in the energy sector are falling short. A recent report by Pollution Probe and QUEST Canada found that current policies and programs across Canada — including New Brunswick—don't provide the necessary support to develop the new business models and services needed to introduce innovation and meet our net-zero targets.⁴

The challenge then is to develop the policies, programs, and regulatory tools that would enable the deployment and scaling of available technologies to enable the province to meet its emissions reduction targets. As part of a multi-year Innovation Sandbox Initiative, Pollution Probe and QUEST Canada are working together to understand how “Innovation Sandboxes” can help propel low-carbon innovation into the energy sector. This report is the outcome of two virtual workshops held with 16 energy-sector stakeholders in New Brunswick during the summer of 2022, which explored the barriers to energy-innovation in the province and how the design of an innovation sandbox can help overcome these barriers.

The introduction of Innovation Sandboxes into New Brunswick's energy sector can mitigate against the potential risks associated with innovation, provide opportunities to safely learn about and trial new approaches, and reduce uncertainty. Innovation Sandboxes in the energy sector can also inform policy and regulatory changes, and enhance collaboration among diverse stakeholders.

This report provides background information on barriers to innovation and how Innovation Sandboxes could be used to overcome them, along with concrete proposals for Innovation Sandboxes in New Brunswick.

Overcoming Barriers to Innovation Deployment

In Canada, energy policy is mainly the purview of provincial and territorial governments and regulators. Research undertaken by Pollution Probe and QUEST Canada suggests that most of Canada's energy innovation policies are not adequate to ensure the rapid deployment of low-carbon innovation needed to achieve our national and provincial emissions reduction goals. By focusing predominantly on research, development, and the demonstration of emerging technologies, and relying primarily on public funding, policies and programs designed to encourage innovation in the Canadian energy sector have all but neglected the importance of deployment. Unlike research, development, and demonstration, which are technology-focused, the deployment of innovation is centered around integrating and managing new technology, changing perspectives and corporate

⁴ Richard Carlson, Mariana Eret, Michael Lee, and Aïda Nciri (November 2020). Getting to deployment: Bridging the Gaps in Energy Innovation in Canada, Pollution Probe and QUEST Canada. Retrieved from: <https://questcanada.org/wp-content/uploads/2020/11/Innovation-Sandboxes-Report-2-EN-1.pdf>

cultures, building new competencies, filling skill gaps, inventing new business models, and re-envisioning how utilities are going to be run and managed.

Innovation Sandboxes are a set of policy tools that promote innovation in a broad sense. Adopting new technology is only one aspect; Innovation Sandboxes focus primarily on innovation in business models and in the way we use energy.

Innovation Sandboxes provide the opportunity to change how processes, procedures, policies, rules and regulations are applied in a controlled manner, with the ultimate goal of creating durable and lasting systemic changes that enable innovations that benefit the energy sector, consumers, and society. They create safe and controlled spaces for innovation to be integrated into the energy system by examining real (and often perceived) barriers, as well as testing solutions in controlled, real-world environments. They allow for the development of new energy products, services, and business models that can survive without subsidies.

Innovation Sandboxes can complement existing innovation and climate policies and programs to help Canada's jurisdictions quickly and collaboratively transform their energy sectors to net-zero by overcoming non-technological barriers. They accomplish this by creating the following conditions:

1. Increasing collaboration and knowledge sharing so that everyone in the sector can work together to reduce barriers.
2. Helping innovators navigate complex energy regulatory and policy landscapes.
3. Creating space for safe, real-world trials to test and demonstrate market readiness of new technologies or business models.
4. Using lessons from innovative initiatives and pilot projects to inform policy and regulatory changes, and remove the social and economic barriers to innovation.

Canadian federal and provincial governments are no stranger to innovation sandboxes, which already exist in the financial technology sector in Canada. Programs that have sandbox-like elements have been developed in several sectors within Canada, including energy, as well as at the federal, provincial, territorial, and local government levels. The Ontario Energy Board – the province's energy regulator – introduced Canada's first energy innovation sandbox in 2019 following feedback from those in the sector about regulatory barriers to innovation.⁵ There is significant interest in using Innovation Sandboxes in the energy sector internationally as well, and Canada has been involved in international dialogues with regulators and international organizations.⁶

⁵ Richard Carlson, Mariana Eret, Michael Lee, and Aïda Nciri (November 2020). Getting to deployment: Bridging the Gaps in Energy Innovation in Canada, Pollution Probe and QUEST Canada. Retrieved from: <https://questcanada.org/wp-content/uploads/2020/11/Innovation-Sandboxes-Report-2-EN-1.pdf>

⁶ Richard Carlson and Aïda Nciri (June 14, 2021). From Consensus to Action: How to Transform Canada's Energy System. Retrieved from: <https://questcanada.org/project/from-consensus-to-action-how-to-transform-canadas-energy-system/>

What are Innovation Sandboxes?

Originating in the FinTech sector, Innovation Sandboxes have already been developed for the energy sector in many countries, primarily in Europe, with others in the process of developing more.⁷

Innovation Sandboxes combine four tools that address regulatory, policy, and procedural barriers to innovation (see figure below). Jurisdictions can choose among the tools, selecting those that meet their specific needs and will help achieve their desired outcomes.

Innovation Sandboxes

Innovation Hubs

- Places of collaboration among diverse stakeholders
- Assistance to conduct trials under existing rules
- Knowledge exchange and information sharing to ensure transparency
- Pathway to other tools

Enquiry Service

- Customized guidance to help innovators navigate the system and overcome perceived barriers
- Written assurances that the project does not raise compliance concerns

Regulatory Trials

- Time bound derogation or exemption to existing rules for specific trials
- Development of new rules or changes in existing rules
- Formal and publicly available assessment and evaluation
- Only used when necessary

Regulatory and Policy Learning

Results and outcomes will be used by regulators, policy makers, and others to inform discussion on the future of energy transition.

⁷ For more information, see report one from Pollution Probe and QUEST Canada, Enter the Sandbox: Developing Innovations Sandboxes for the Energy Sector, which looked at 10 jurisdictions that had developed or were developing innovation sandboxes:

<https://questcanada.org/wp-content/uploads/2020/07/Innovation-Sandboxes-Report-1-EN.pdf>

- **Innovation Hubs** employ collaborative tools or platforms that enable knowledge exchange and sharing of lessons learned amongst innovators, as well as general information about regulatory systems for conducting trials.

- **Enquiry Services** provide innovators with more specific information relevant to their particular idea. For instance, they allow innovators to have informal discussions with the Innovation Sandbox administrator to have their ideas assessed. This may help to clarify situations in which ideas are permissible within existing regulations; in other words, where the regulatory barrier is more perceived than actual. Alternatively, an assessment may identify real regulatory barriers and help to determine whether a Regulatory Trial is needed. It should be noted that this does not replace legal advice.

- **Regulatory Trials** may be used in cases where an innovative idea faces a real regulatory barrier. Time-bound exemptions and derogations from regulations (such as licensing or reporting requirements) may be applied to enable a trial under specific conditions. The length of exemptions and derogations can vary, often determined on a case-by-case basis, and can last from two years (as has been the case in the UK) up to 10 years (as is the case in the Netherlands), with possibilities for extension. Ensuring customer protection underlies all approvals for experiments under regulatory trials, with potentially impacted customers and risks identified, and mitigation and exit strategies put in place. Additionally, regulatory trials require criteria to be developed that determine who and how one becomes eligible to enter the experimental space. These criteria include where the experiment will be deployed, the type of energy source, and the requirements for monitoring by and regular reporting to sandbox administrators.

- **Regulatory and Policy Learning** should be taken from all other sandbox elements — Innovation Hubs, Enquiry Services, and Regulatory Trials — and used to inform the reform of existing policies as well as the development of new policies and processes. Using real-world information will allow regulators, policymakers, and other stakeholders to better prepare for the future of energy in their jurisdiction.

How we Design Innovation Sandboxes for New Brunswick

There is no one way to design and run an Innovation Sandbox. Innovation Sandboxes are diverse in the following three ways:

- 1. Who is creating and implementing them:** they can be developed by governments and regulators — in some cases, both — to pursue specific policy outcomes. Other examples of sandbox administration include a republic research body and an industry association.
- 2. The energy sources they consider:** while the focus has tended to be on the electricity system, some include (or will be expanded to) natural gas. A few have also included transportation and electrical vehicles.
- 3. The policy tools that are associated with them:** such as funding, data sharing, academic research, and even the design of regulatory trials, such as whether innovators approach them with ideas or if the administrator issues a call for potential projects on identified needs.⁸

Based on assessments conducted in a few jurisdictions, as well as results from initiatives already in place, we have identified six lessons below, to inform the development of future successful Innovation Sandboxes:

Lesson 1: Prioritize ongoing learning. A key purpose of Innovation Sandboxes is to create systems that encourage and foster innovation. To this end, it is important to ensure that lessons learned inform the development of future energy policies and regulatory initiatives.

Lesson 2: Prioritize collaboration, transparency, and knowledge sharing. Open collaboration and knowledge-sharing among all participants, including traditional and non-traditional energy players, encourages innovation.

Lesson 3: Establish a culture of innovation and leadership. Innovation Sandboxes can only be successfully designed and implemented when there is clear leadership from and a culture of innovation within the organizations establishing them as well as support from policymakers.

⁸ Pollution Probe and QUEST Canada, Enter the Sandbox: Developing Innovations Sandboxes for the Energy Sector, <https://questcanada.org/wp-content/uploads/2020/07/Innovation-Sandboxes-Report-1-EN.pdf>

Lesson 4: Regulators will need to be included in the energy future. Regulators need to play key roles in Innovations Sandboxes if they are to be successful in facilitating innovation. They should be willing to work with potential new players in the energy sector by developing enquiry services and engaging net stakeholders in a different way. Non-energy traditional players are not always fluent in the regulator's language and often feel overwhelmed by the regulatory "machine." Regulators need to be open to rethinking the way they engage stakeholders in order to make the system accessible to new actors.

Lesson 5: Promote real innovation that protects and benefits consumers. Without proper guidelines and safeguards in place, innovation can lead to territorial and social fragmentation and inequality, impacting consumers' privacy and the protection of personal data. When developing guidelines for Innovation Sandboxes, the protection of consumers' needs to be a primary consideration. Successful Sandboxes establish clear criteria that enables genuine innovation, and establish sound post-experiment evaluation mechanisms.

Lesson 6: Design Sandboxes based on desired outcomes. The objectives that an Innovation Sandbox is intended to achieve should dictate its design. There is no one model of an Innovation Sandbox that will work for all of the diverse jurisdictions across Canada. Every energy jurisdiction in Canada is unique, with its own mix of technologies, policies, and customer needs and desires. Developing effective Energy Innovation Sandboxes in Canada means developing specific sandbox frameworks tailored to individual jurisdictions, each of which incorporates the inputs and feedback from diverse stakeholders representing the entire energy system, including energy end-users, new entrants, utilities, regulators, and government.

New Brunswick Opportunities and Barriers

Pollution Probe and QUEST Canada held two interactive workshops with energy stakeholders from New Brunswick in the summer of 2022. These workshops were designed to identify the barriers to the deployment of low-carbon innovation in the province and inform the development of an Innovation Sandbox that could help meet the needs of New Brunswick's energy sector.

During the first workshop, participants completed two facilitated exercises to identify and prioritize barriers to low-carbon innovation in the province's energy sector, as well as potential actions that could help overcome those barriers. During the second workshop, working with the barriers identified during the first session, participants engaged in collaborative exercises to determine the value proposition of Innovation Sandbox tools for New Brunswick, as well as elements of a potential framework design.

In addition to the ambitious emissions reduction targets laid out in Section 1 of this report, there are a few initiatives in New Brunswick that can be leveraged via Innovation Sandbox to assist in making innovation more widespread (see Table 1).

Table 1: Current energy innovation policies in New Brunswick

Policy	What was done	How it promotes innovation
Smart Grid Atlantic	Smart Grid Atlantic is a four-year initiative of NS Power, NB Power and Siemens Canada, partially funded by the federal government. Projects in both provinces will test distributed energy resource technologies.	Cooperation between the provinces and Siemens allows for a wider-range of pilots. Through the Smart Grid Atlantic initiative, \$90 million will be invested to advance centralized smart grid development in the region.
Saint John Energy Smart Energy	A trial using behind the meter assets to control peak demand. Using machine learning, it will dispatch electrical storage, thermal storage devices, and various load control devices (such as heaters and standby generators).	It investigates how utility operations could be met using innovative methods.

Despite these developments, workshop participants agreed that the pace of low-carbon innovation needed to be accelerated and the energy system needed to change for the province to meet its emissions reduction targets.

Below are the key barriers that workshop participants identified as limiting low-carbon innovation:

- **An outdated regulatory system:** The current regulatory framework is outdated and there is a need for regulatory modernization, specifically the need to develop new regulatory frameworks to allow for new rate design, the integration of distributed energy resources (DERs) and electric vehicle (EV) charging, community ownership of assets, and trials of new technologies. The need for the regulator to move beyond costs and to consider externalities in their decisions was also identified as a barrier.
- **Lack of cooperation and engagement amongst stakeholders:** Multiple utilities and companies in New Brunswick are doing their own projects, with little communication and collaboration between them. Another gap includes a lack of collaboration with post-secondary institutions in relation to research and workforce development.

- **Lack of long-term vision:** The absence of a long-term vision for the future of energy in New Brunswick as well as a lack of consideration for the environmental factors of energy at the provincial level.

An Innovation Sandbox for New Brunswick

While Innovation Sandboxes can help any jurisdiction deploy the innovation needed to achieve a low-carbon future, each jurisdiction will require a different Sandbox suited to its own mix of technologies, policies, and customer needs and desires.

To develop the design of an Innovation Sandbox, workshop participants answered a series of questions aimed at identifying some key features and characteristics that would tailor it to suit local needs.

What should be the objectives of the Innovation Sandbox?

- Innovation Sandboxes need to be aligned with wider provincial policies on energy and emissions reductions. Innovation is only useful if there is a goal towards which people are innovating.
- The purpose of the Innovation Sandbox is to reduce emissions and to minimize cost pressures on consumers. There is a need to ensure that successful innovation can be scaled.
- The Innovation Sandbox can also help increase participation in the sector, and as a result, participation should be broad and include all the public and private stakeholders, as well as academics, post-secondary institutions, civil society, consumer advocates, Indigenous communities, and municipalities, among others. There also needs to be a “single point of entry” for innovators or new service providers to understand how they can participate in the sector.
- Equity concerns are critical for New Brunswick, as with other jurisdictions, and thus equity should be part of the design. Ideas to maximize equity and reduce energy poverty should be developed, and equity-seeking groups should be included at all stages. This could include specific projects for low-income consumers and direct, early engagement with Indigenous communities.
- While participants identified that there is a need in New Brunswick for a clear, consistent and long-term energy policy that the sector can work towards, Innovation Sandboxes may not be the best tool to develop such policy. However, the collaboration and learnings from Innovation Sandbox can help inform any long-term energy policy and regulatory reform.

To achieve these objectives, the Innovation Sandbox should be designed to reduce the two primary barriers to low-carbon innovation in New Brunswick that were identified by workshop participants: an outdated regulatory system with a need for modernization as well as the need to increase collaboration to bring new players and stakeholders into the sector.

What Innovation Sandbox tools are needed?

Innovation Sandboxes contain four tools: (1) Regulatory Trials, (2) Innovation Hub, (3) Enquiry Services, and (4) Policy and Regulatory Learning (see text box above). Not all of these tools need to be included in every jurisdiction's Innovation Sandbox. Priority should be given to tools that will best reduce the barriers to low-carbon innovation relevant to the jurisdiction.

Based on input from workshop participants, the two Innovation Sandbox tools that could provide value to New Brunswick are Innovation Hubs and Enquiry Services. See below for more details:

- **Innovation Hubs:** A need was identified for an inclusive space for collaboration among diverse players in the energy sector. There is currently no structure to support collaboration broadly or to include new players and other important participants, including academics, post-secondary institutions, civil society, consumer advocates, Indigenous communities, and municipalities, among others. All participants need to better share information to help the sector evolve.
- **Enquiry Services:** In order to enable more renewable and alternative energy development, proponents need help with project planning and an understanding of regulatory and policy rules. This is also true for utilities that know how the business runs; however, the ways they operate are changing and guidance is needed.

Unlike other jurisdictions, Regulatory Trials were not identified as a priority. The priority barriers and action strategies identified were more focused on collaboration and knowledge sharing. Regulatory Trials were identified as an opportunity for potential contributions only after other priority barriers were addressed.

Who should administer the Sandbox and who should be included?

Most Innovation Sandboxes are administered by the energy regulator, but that is not always the case. In some jurisdictions, innovation agencies or industry groups run Sandboxes, and sometimes in partnership with the regulator.

There was broad consensus among workshop participants that an Innovation Sandbox in New Brunswick should not be administered by the regulator, because innovation is not part of its mandate. As such, there was agreement that any Innovation Sandbox should

be run by an independent third party, and not the regulator or a utility. Many participants suggested creating a new organization, a “New Brunswick Energy Council”, which would act as an independent third-party, creating a safe space to allow for information sharing.

The process itself, particularly the Innovation Hub, should be broad and include all public and private stakeholders, as well as academics, post-secondary institutions, civil society, consumer advocates, Indigenous communities, and municipalities, among others.

How will it operate?

Because Innovation Sandboxes aim to foster innovation, oversight requirements should not be burdensome. Transparency needs to be prioritized, and all decisions and advice need to be made public so that all can benefit.

To ensure that Innovation Sandbox is working to meet the needs of the jurisdiction, periodic reviews are required. Semiannual or annual “success and failures” updates should be published with a full review, every three to five years to further refine the Sandbox and iterate to meet emerging needs.

Outline of the Proposed New Brunswick Sandbox

Barriers

Need for regulatory modernization

Lack of cooperation and engagement



Needs



Formal knowledge exchange system



Engage with post-secondary institutions



Regulatory clarity



Cooperation with utilities and developers



Guidance to developers and utilities

Tools



Innovation Hubs



Enquiry Services

New Brunswick Innovation Sandbox

Structure

Independent third-party as administrator of the Sandbox. Potentially the creation of a "New Brunswick Energy Council" to bring stakeholders together.

Prioritize openness, including all the public and private stakeholders, as well as academics, post-secondary institutions, civil society, consumer advocates, Indigenous communities, and municipalities, among others.

Innovation Hub to be an inclusive space for collaboration among diverse players in the energy sector, with formal knowledge-sharing tools.

Enquiry Service to enable more renewable and alternative energy development by helping with project planning and understanding regulatory and policy rules.

Transparency needs to be prioritized, and all decisions and advice need to be made public so that all can benefit.

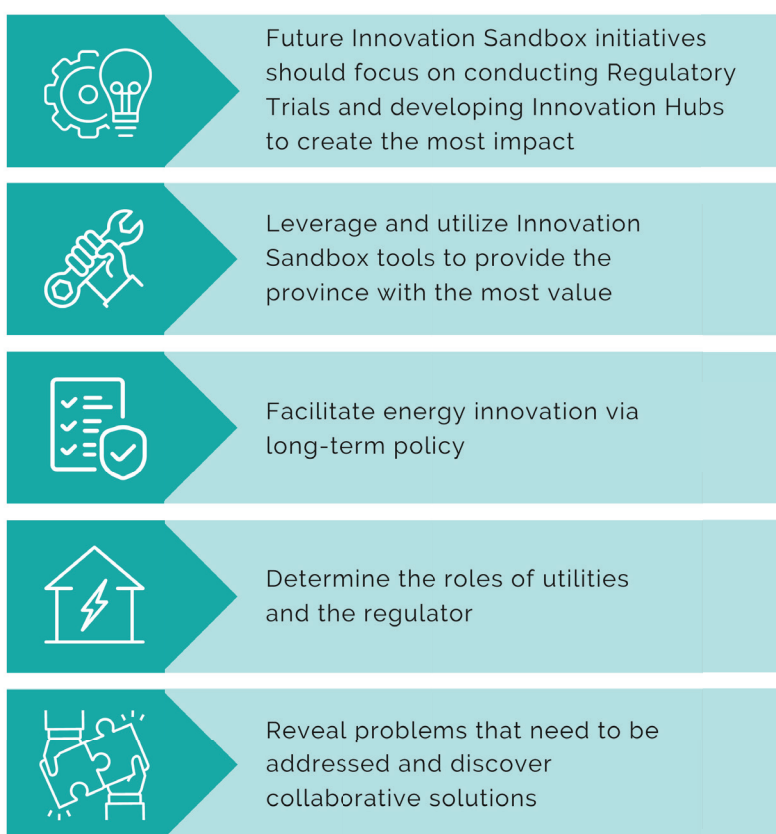
Annual reporting on success and failures, and a full review every three-five years.

Next Steps

New Brunswick works towards a low-carbon future, introducing emissions reduction targets, including the goal to be net-zero by 2050. But to meet provincial and federal targets, and to move to a net-zero energy system, more will be necessary. Additional innovative technologies and practices will be needed; it is here that Innovation Sandboxes can help.

The information contained in this report provides the framework for developing an Innovation Sandbox in New Brunswick.

Given the primary barriers that were identified to create an environment for low-carbon innovation in New Brunswick, there's a need for regulatory modernization and better collaboration and knowledge sharing. The focus of any Innovation Sandbox should be on Innovation Hubs and Enquiry Services. While the other tools of Innovation Sandboxes could also benefit the province, initial steps should be taken on the above mentioned tools that could provide the most value.



It should be noted that workshop participants identified an additional need to facilitate energy innovation in New Brunswick: long-term policy certainty and clarity. Participants noted that a long-term vision for the future of energy and a greater integration of environmental factors into decision making would improve energy innovation. While there were concerns identified that were beyond the scope of the current project, developing an Innovation Sandbox will help reveal the issues that need to be addressed, and will help facilitate the development of a platform for collaboration that can help provide answers and contribute to a future discussion on the development of the province's Net-Zero Strategy and Clean Electricity Strategy.