



CANADA'S
SMALL
MODULAR
REACTOR

smr
action plan

CANADA'S SMR ACTION PLAN PROGRESS UPDATE

SMR ACTION PLAN LEADERSHIP TABLE

October 2022



Natural Resources
Canada

Ressources naturelles
Canada

Canada



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*Aussi disponible en français sous le titre : Plan d'action du Canada des PRM mise à jour sur les progrès
Forum du leadership du plan d'action des PRM*

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Cat. No. M4-228/2022E-PDF (Online)
ISBN 978-0-660-45720-8

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Message from Natural Resources Canada



As the Chair of the inaugural Small Modular Reactor (SMR) Leadership Table, I welcome the notable progress we have made to advance SMR development and deployment in Canada. I want to thank all SMR Leadership Table participants for a valuable first meeting, where your expertise and guidance cultivated rich dialogue and thoughtful exchanges among diverse stakeholders.

Climate change, and the pressing need to address it, is an indisputable fact. The Government of Canada has made an ambitious commitment to achieve net-zero emissions by 2050, and by 2035 in the electricity sector. Moving to a clean electricity grid and achieving net-zero emissions are some of the most important climate actions that we can undertake. By

2050, Canada will need to produce much more non-emitting power than we currently do.

Nuclear energy is a significant part of that story. Right now, it accounts for about 15 percent of Canada's electricity supply. As a reliable source of non-emitting energy that complements renewables and can support hydrogen production, nuclear energy is an important part of our effort to achieve a net-zero future. New technologies, such as SMRs, offer a promising potential to generate electricity and heat, help decarbonize heavy industry and replace diesel in remote communities. We see significant potential to expand safe nuclear technologies—in Canada and around the world.

The Government of Canada's commitment to an all-options approach to decarbonization is underlined by Budget 2022's \$120 million investment to support SMR initiatives and \$250 million in investments for electricity development initiatives, including early phase SMR development activities. These investments build on the government's \$1.2 billion revitalization of Chalk River Nuclear Laboratories. Canada's Strategic Innovation Fund has also awarded nearly \$100 million to support the development of SMR technologies.

The Government of Canada's prioritization of funding of nuclear technology projects will build domestic resiliency to disruption at a time of significant international instability. Globally, Russia's illegal invasion of Ukraine has put the spotlight on critical issues like energy security and affordability.

Recently, during the German Chancellor Olaf Scholz's visit to Canada, Prime Minister Justin Trudeau noted the success and strength of our nuclear industry. Canada is strategically positioned to support nuclear energy security in allied nations and our Tier-1 nuclear status and innovation in areas like the CANDU design and SMRs are achievements of which we can be very proud. With over 70 years of science and technology innovation, a world-class regulator and a robust domestic supply chain, our nuclear sector is poised to be a leader in an emerging global market estimated at \$150 billion annually by 2040. Our country's leadership in nuclear energy is due to dedicated and innovative people like those sitting around the SMR Leadership Table.

Canada has made significant strides in SMR deployment on an international stage and is set to be the home of one of the first operational grid-scale SMR projects among G7 nations. The global nuclear community is watching and the domestic and international stakes for this project are significant. Canada's nuclear sector is aware of this responsibility and is well positioned to undertake this role and enable the project's success by leveraging our sector's demonstrated track record, elite project management capabilities, reputation as a world-class nuclear operator, and existing nuclear project sites.

It is important to acknowledge that while our government has important responsibilities relating to nuclear energy, the decision to construct nuclear electric generation rests with provinces and territories, in concert with the relevant energy organizations and community partners. Natural Resources Canada will continue to support efforts through convening representatives from the federal government, provincial and territorial governments, Indigenous communities, utilities, industry, and non-governmental organizations to further SMR strategic priorities in Canada.

Moving forward, the SMR Action Plan will be critical because it is Canada's plan for the development, demonstration, and deployment of SMRs to reduce emissions, decarbonize heavy industry, and spur economic development. The Action Plan currently has over 119 partners who have committed to more than 500 concrete actions. I look forward to future Leadership Table meetings to provide guidance and expertise on how Canada can use SMRs in innovative ways to meet our national environmental, economic, and social objectives.

Lastly, thank you to everyone who contributed to the first SMR Action Plan Progress Update. This publication fulfills a commitment I made during the inaugural Leadership Table meeting—to capture the voice of the Leadership Table for Canadians, by highlighting discussions from the meeting and outlining future actions to support the development and deployment of SMRs in Canada.

John F. G. Hannaford
Chair, SMR Action Plan Leadership Table

Context

Government of Canada Commitments and Actions

Climate change is the challenge of our time and innovation plays a critical role in reducing greenhouse gas emissions and delivering good, quality jobs as Canada moves towards a low-carbon future. This includes innovation in the nuclear sector. SMRs are part of the next wave of that innovation, with the potential to play a role in the future of Canada's nuclear industry by providing non-emitting energy for a wide range of applications, from grid-scale electricity generation to use in heavy industry and remote communities. Nuclear energy is an important part of Canada's current energy mix, and it will continue to serve as a key element in achieving Canada's low-emissions energy future.

Canada's ambitious net-zero emission commitments—by 2050, and by 2035 in the electricity sector—are foundational to the Government of Canada's net-zero strategies, including Canada's Emissions Reduction Plan (ERP). The electricity sector, including nuclear energy, can play a leading role in helping meet these targets, which is why the ERP specifically highlighted the government's commitment to implement the SMR Action Plan. The ERP identified nuclear power as an important non-emitting source of electricity and noted that investments in emerging technologies, such as SMRs, can help provide safe, emissions-free energy to cities, industries, and remote communities.

SMRs also have the potential to offer a tangible way to advance economic reconciliation through meaningful partnerships with Indigenous communities. By emphasizing local ownership, SMRs could provide participating communities with partnership opportunities related to project development and deployment, including a potential new revenue source that would spur economic growth and put these communities at the forefront of a cleaner electricity grid.

At a time when the Government of Canada is pursuing an all-options approach to fighting climate change and getting to a net-zero world, nuclear energy, and SMRs in particular, have the potential to demonstrate Canada's leadership in the fight to lower emissions while creating jobs and economic growth. The Government of Canada will continue to work to develop a competitive and highly prosperous economy that creates wealth and high-quality jobs in every region of this country while ensuring ambitious climate and nature conservation goals are achieved. Canadian nuclear energy can and should be an important part of this low-carbon future.

Canada's Small Modular Reactor (SMR) Action Plan and Funding Initiatives

Canada's SMR Action Plan lays out our strategic framework to a comprehensive pan-Canadian approach that provides us with a critical tool to support Canada's ability to become a global leader in SMR deployment. On April 12, 2022, the Deputy Minister of Natural Resources Canada hosted the inaugural SMR Action Plan Leadership Table in Ottawa to respond to a recommendation made in Canada's 2020 SMR Action Plan. The SMR Leadership Table convened multidisciplinary representatives from the federal government, interested provincial and territorial governments, Indigenous communities, utilities, industry, and non-governmental organizations. The meeting was a notable success with diverse participants engaging in a meaningful discussion on how to advance SMR technology.

The meeting occurred during a period of important developments related to the deployment of SMRs in Canada. Taken together, these developments have generated significant momentum between the Government of Canada and its partners under the SMR Action Plan.

Federal Funding

The Government of Canada demonstrated its continued support for SMRs on our net-zero pathway through the release of the federal budget. Budget 2022 includes \$69.9 million for Natural Resources Canada to support activities to minimize waste generated from SMRs, support the creation of a fuel supply chain, strengthen international nuclear cooperation agreements, and enhance domestic safety and security policies and practices. Another \$250 million, over four years starting in 2022–23, was allotted to Natural Resources Canada to support pre-development activities of clean electricity projects of national significance, such as interprovincial electricity transmission projects and small modular reactors.

The Canadian Nuclear Safety Commission also received \$50.7 million to build its capacity to regulate SMRs, and to work internationally on regulatory harmonization. Additionally, Budget 2022 included an expanded mandate for the Canada Infrastructure Bank (CIB) to facilitate decarbonization—including hydrogen and nuclear—and carbon capture.

The Leadership Table recognized that Budget 2022 was a clear step forward for the development of SMRs in Canada and provided explicit recognition for the role this technology will play in Canada’s low-carbon energy future.

In support of Canada’s SMR Action Plan, launched in December 2020, the federal government has provided significant funding for SMR projects through Innovation, Science, and Economic Development Canada’s Strategic Innovation Fund and the Atlantic Canada Opportunities Agency, including:

- \$20 million to advance Ontario-based Terrestrial Energy’s reactor design;
- \$50 million to develop the New Brunswick-based Moltex Energy’s reactor and technology to recycle CANDU spent nuclear fuel into new fuel; and,
- \$27.2 million to support the development of Westinghouse Electric Canada’s eVinci micro-reactor.

These investments build on the ongoing \$1.2 billion revitalization of the federal Nuclear Laboratories at Chalk River.

While the federal government has important responsibilities relating to nuclear energy, the decision to invest in electric generation rests with the provinces and territories, in concert with the relevant energy organizations and community partners.

Provincial Initiatives Underway

While the federal government has important responsibilities relating to nuclear energy, the decision to invest in electric generation rests with the provinces. On March 28, 2022, Ontario, New Brunswick, Saskatchewan, and Alberta released a joint strategic plan that outlines a path forward for SMRs as a deliverable under the provincial SMR Memorandum of Understanding.

A Strategic Plan for the Deployment of Small Modular Reactors highlights how SMRs can provide safe, reliable, and zero-emission energy for the benefit of the Canadian economy and population, while creating new opportunities to export Canadian knowledge and expertise around the world. This demonstrates strong, continued, and coordinated support for SMRs in Canada. In addition to this, four power companies (Ontario Power Generation, Bruce Power, New Brunswick Power, and SaskPower) have been working collectively to develop the following three streams of SMR project proposals:

- **Stream 1** is focused on the deployment of grid-scale reactors to provide energy to consumers. Ontario Power Generation has initiated Canada’s first grid-scale SMR project (~300 megawatt) to be constructed at the Darlington site by the end of 2030, followed by the first of up to four subsequent units in Saskatchewan anticipated to be in service by 2034. Additionally, Ontario Power Generation intends to evaluate the potential for the deployment of additional SMRs at the Darlington site. This “fleet” approach would identify a common SMR technology that could be more efficiently deployed in multiple jurisdictions.
- **Stream 2** is focused on the use of nuclear technology to help decarbonize industry by creating both energy and steam through the use of 4th generation advanced SMR designs. Two of these designs will be developed in New Brunswick through the construction of a project at the Point Lepreau nuclear generating station. The ARC Clean Energy technology is anticipated to be commissioned in 2029 and generating power by 2030. The fleet approach of deploying additional units in New Brunswick and other provinces will also leverage a common platform for industrial decarbonization and hydrogen production that will improve efficiency and cost across multiple jurisdictions. Ontario Power Generation has also entered into a framework agreement to explore the deployment of this Stream 2 technology in Ontario and potentially elsewhere in Canada.
- **Stream 3** is focused on the provision of advanced reactors to off-grid or remote communities; a new class of micro-SMRs designed primarily to replace diesel use in remote communities and mines. To advance this technology, a 5 MW gas-cooled reactor project by Global First Power (GFP), a joint venture between OPG and Ultra Safe Nuclear Corporation, is underway at Atomic Energy of Canada Ltd.’s Chalk River site in Ontario and is planned to be in service by 2026.

Global Decarbonization and Energy Security

Both large-scale nuclear generation and SMRs have the potential to be important contributors to a global net-zero future. The International Energy Agency projects a global electricity demand increase of 80% between 2020 and 2050, and has noted the unique role of hydroelectric and nuclear power as essential foundations to reach net zero by 2050. The 26th United Nations Climate Change Conference (COP26) made similar acknowledgements, advising that nuclear energy, which provides more than a quarter of the world’s clean power, is central to the transition to clean energy.

Governments, agencies, and organizations around the world are all saying that nuclear technology will be critical to meet decarbonization goals. Countries like the United States, France, United Kingdom, South Korea, and Japan have all indicated that the opportunities for nuclear technology will be essential to meet their climate goals.

Russia's invasion of Ukraine and subsequent sanctions by international governments, as well as private sector "self-sanctioning" of energy and related products, have fundamentally altered the global energy landscape. Such events have come at a time when global energy markets were already facing uncertainty and lower than needed investment in both conventional and clean energy systems.

These developments have prompted many countries in Europe and Asia to re-evaluate the security of their existing energy systems and to re-examine how best to align their energy transition goals with their energy security needs. Many are looking to energy-producing countries with market- and rules-based governance systems to replace their previous reliance on Russian energy and to re-evaluate energy system risks, such as cybersecurity threats, critical mineral supply chains, new geopolitical issues, and climate impacts.

For Canada, a major exporter of uranium and exporter of critical minerals and nuclear technology and expertise, this geopolitical shift presents an opportunity to increase its contributions to global energy security and the achievement of climate objectives.

Nuclear Energy and Supply Chain

Close allies, including the United States, the United Kingdom, the European Union, and France, view nuclear power as being critical to advancing their climate plans, and recognize the geopolitical importance of cooperation with like-minded countries to improve energy security, especially in light of Russian aggression. Canada is positioned to provide a leadership role in the global nuclear sector and to advance Western nuclear energy solutions and geo-security. Canada's long-standing leadership in nuclear energy has allowed it to maintain its influence at multilateral tables on issues affecting domestic and foreign policy, regulations, and national security.

As Canada moves towards the development and deployment of advanced reactors, there will be a need to expand our integrated nuclear supply chain, including the supply of enriched uranium. Canada can do more to work with its allies to strengthen nuclear fuel supply. Canada is engaging with like-minded countries and governments to explore opportunities to address this. In addition, prospects for nuclear new builds are now emerging.

In Canada, a particular focus has been on SMRs, which offer a promising pathway to support Canada's low carbon energy transition because the technology is potentially less complex, easier to operate, and more cost-effective than current generations of nuclear technology. Canada is also finding renewed interest in CANDU technology, which has provided an effective and reliable source of energy for several countries around the world for many years.

SMR Leadership Table Framework

Canada's 2018 [SMR Roadmap](#) recommended that the federal government work with partners to co-create an advisory council on nuclear energy. Subsequently in 2020, Canada released its SMR Action Plan where the Government of Canada committed to convene senior leadership of the Action Plan, with Natural Resources Canada (NRCan) serving as Chair. The Roadmap and Action Plan recommended that the creation of this body could serve to:

- advance SMR development and commercialization in Canada in a manner that respects shared roles, responsibilities, and jurisdictions, and that leverages benefits to Canada and supports strategic partnerships;
- provide key decision makers with a venue for discussing progress and priorities on nuclear innovation and nuclear energy matters broadly.

The mandate of the Leadership Table is to provide a forum composed of the federal government, interested provincial and territorial governments, Indigenous representatives, industry (nuclear and high-emitting sectors), electric utilities, and non-governmental organizations to review progress and discuss strategic priorities as they relate to the development and deployment of SMRs. The Leadership Table will provide advice and guidance as required to ensure progress is made towards advancing the development and deployment of SMRs in Canada. The Deputy Minister of Natural Resources Canada chaired the inaugural Leadership Table meeting on April 12, 2022, as committed to under Canada's SMR Action Plan.

SMR Leadership Table Secretariat

The Leadership Table Secretariat was formed under the leadership of NRCan and was established to support the Leadership Table in its work.

Indigenous Advisory Council

In spring 2020, the First Nations Power Authority recommended that NRCan examine the opportunity to create an Indigenous-led council, secretariat, or coordinating group focused on SMRs in Canada. The Indigenous Advisory Council for the Small Modular Reactor Action Plan was established in October 2021 to support a coordinated, national Indigenous lens to SMR policies, programs, and decisions as the SMR Action Plan develops. The Leadership Table includes four Indigenous Advisory Council representatives that provide advice to Leadership Table members pertaining to actions identified in the SMR Action Plan and an Indigenous lens to how the members can work towards the Action Plan's vision and principles.

SMR Leadership Table Meeting Summary

Participants

SMR Leadership Table membership included (listed in alphabetical order):

- Natural Resources Canada (Chair)
- Alberta Innovates
- Alberta Ministry of Energy
- Atomic Energy of Canada Ltd.
- Bruce Power
- Canadian Nuclear Association
- Canadian Nuclear Labs
- Canadian Nuclear Safety Commission
- CANDU Owners Group
- Crown Investments Corporation of Saskatchewan
- Global Affairs Canada
- Indigenous Advisory Council
- New Brunswick Ministry of Energy
- NB Power
- Nuclear Waste Management Organization
- Ontario Ministry of Energy
- Ontario Power Generation
- Organization of Canadian Nuclear Industries
- Saskatchewan Ministry of Environment
- SaskPower

SMR Leadership Table Discussion Themes

The first SMR Action Plan Leadership Table meeting built on the momentum of the SMR Action Plan to openly discuss SMR opportunities across the country and address challenges head on. The inaugural meeting focused specifically on progress updates from SMR Leadership Table participants on actions committed to under the SMR Action Plan, as well as SMR Action Plan priorities and next steps. Key highlights from the SMR Leadership Table discussion included:

Urgency: The SMR Leadership Table discussed the importance of time to market as an urgent priority for SMR technologies to have a meaningful impact on meeting the 2050 net-zero goal.

Participants also articulated the challenges and opportunities involved in positioning SMR technology to meet climate commitments and be in a competitive position in the emerging international space.

Provincial representatives recognized the need to find solutions to decarbonize their electricity grids. Provinces also noted that they are in a critical phase for SMR development and meeting their development and deployment targets would capitalize on collaboration with key partners at the SMR Leadership Table and, more broadly, with other SMR Action Plan members.

The SMR Leadership Table also identified that there are opportunities related to industrial readiness and advanced manufacturing if SMR partners can focus on developing and implementing concrete plans in the short/medium-term.

Indigenous Involvement: The SMR Leadership Table recognized the importance of having representation from the Indigenous Advisory Council to the SMR Action Plan at SMR Leadership Table meetings. The establishment of the Indigenous Advisory Council was a key commitment under the SMR Action Plan and will be a critical component in ensuring Indigenous engagement in SMR development from the outset of discussions.

Indigenous representatives at the SMR Leadership Table expressed their interest in building meaningful relationships that will foster better understanding among SMR Action Plan partners and position all participants to accomplish shared objectives.

Indigenous communities were among the first partners to indicate their interest in investing and being involved in SMR projects and the nuclear sector of the future. Indigenous SMR Leadership Table members indicated that they will work to demystify nuclear energy in their communities, but that trust in this technology will be built through consistent and equitable involvement in SMRs moving forward. Engaging these communities early and often will help foster support for SMR projects as the socio-economic benefits for all will become clear.

Key discussion items from Indigenous representatives included:

- The importance of ensuring that Indigenous perspectives and knowledge systems are integrated into SMR policies from the beginning of a project or stream of work.
- The need for capacity building to not only increase the knowledge of Indigenous communities, but to do so through education, supply chain, and equity participation.
- The importance of community and Indigenous engagement as we explore the regulatory landscape for SMRs in Canada.

Canada's Non-emitting Energy Future and Regional Considerations: SMR Leadership Table discussions highlighted the importance of having a concrete vision for nuclear energy's role in Canada's hybrid clean energy system, which will help SMR partners plan projects and investments accordingly. It was also noted that given the large regional energy differences in Canada, nuclear energy's role will need to continue being considered through a regional lens.

Jurisdictions across the country maintain their own energy systems to generate electricity, with nuclear energy already playing a strong role in certain jurisdictions, while others are seeking to develop this capability as part of their clean energy approach.

SMRs could bring non-emitting power to remote communities, help major industries reduce their carbon footprint, or add diversity to a region's overall electricity mix. For some areas of the country, SMRs will be the first major venture into nuclear energy and building this capacity will take time and close cooperation/collaboration between partners and stakeholders.

Fuel Supply and Energy Security: The SMR Leadership Table acknowledged the impact of the Russian invasion of Ukraine and the ongoing geopolitical situation in Europe. Participants linked this to the importance of securing an adequate fuel supply in the short term, as well as a possible domestic industrial opportunity for Canada in the longer term. SMR Leadership Table members noted there was significant work being done to ensure SMR projects in Canada would not be constrained by fuel supply chain issues.

As Canada and the US move towards the development and deployment of advanced reactors, such as SMRs, there will be a need to expand our integrated nuclear supply chain, including the supply of high-assay low-enriched uranium.

The Government of Canada is working with the US and like-minded European nations to look at options for establishing a more resilient nuclear energy sector to safeguard energy security. From a nuclear energy perspective, Canada is positioned to make leading contributions to the global nuclear sector and advance Western nuclear energy solutions and geo-security.

Regulatory Frameworks: Discussion at the SMR Leadership Table focused on the importance of community and Indigenous engagement as the country explores the regulatory landscape for SMRs in Canada. For example, the Canadian Nuclear Safety Commission is working domestically to improve regulatory efficiency and continues to work with international partners towards regulatory harmonization for SMRs.

Safety and security are foremost concerns for the Government of Canada, and the country has established one of the most rigorous and effective nuclear regulatory systems in the world, for which it is internationally recognized. Canadian regulations and standards are in alignment with international treaties and conventions and consider or reflect international consensus guidance provided by the International Atomic Energy Agency. Canada's nuclear energy policy and regulations have always put human health and safety first and this will continue.

SMR Leadership Table Priorities

To capitalize on the momentum being built in Canada and around the world, the SMR Action Plan Leadership Table identified four major priority areas for its members, and the broader Canadian nuclear sector, to focus on going forward.

Priority 1: Efficient SMR Deployment, Energy Security, and Market Opportunities

Ensure enabling conditions are in place across Canada to remove or mitigate barriers to SMR development and deployment so that project timelines are not delayed. The Leadership Table noted a need to ensure that technological and regulatory readiness are achieved in tandem; policy and regulatory frameworks are meeting/aligned with the Government of Canada's ambitious 2035 net-zero goals; opportunities for efficiency gains through international collaboration and harmonization activities are pursued; and SMR technologies remain competitive.

The geopolitical environment has seen a significant convergence between the issues of climate change and energy security. Canada is strategically positioned to pursue international opportunities, including the development of Western-led energy security solutions and the establishment of new nuclear supply chains. Canada is a leader in the global nuclear sector but needs to increase its momentum to maintain the advantage of its leadership position.

Priority 2: Technology, Funding, and Financial Tools

Continue work to support and down select domestic SMR technologies that demonstrate high technological readiness and/or features that are of benefit and interest to Canadian communities and markets.

Federal government support is available for SMR projects through funding mechanisms such as the Strategic Innovation Fund and the Canada Infrastructure Bank. Ensure finance structures and tools consider nuclear energy in eligibility criteria.

Priority 3: Policy and Legislative Frameworks

Work collaboratively to develop a concrete vision for nuclear energy's role in a net-zero future. This will build on existing work that has been done at the federal level to explore the role that nuclear energy can play in the hybrid renewable clean energy systems.

Identify and initiate any updates that need to be made to Canada's nuclear regulatory and environmental framework to safely and securely oversee SMR technologies.

Priority 4: Capacity, Engagement, and Indigenous Involvement

Work to diversify and expand Canada's nuclear sector through education and public awareness, with a particular focus on women, Indigenous communities, and youth.

The Annex includes SMR Leadership Table progress updates for all participants.

Background

Nuclear Power and Climate Change

Nuclear power provides non-emitting baseload electricity generation, which is an essential foundation for electricity systems. The Intergovernmental Panel on Climate Change has determined that nuclear life cycle GHG emissions rank among the lowest of all emitting technologies, on par with wind power. Nuclear generation is complementary to the deployment of intermittent renewables, such as wind and solar.

Nuclear power also has the potential to contribute to industrial decarbonization. For example, SMRs are capable of producing high-temperature heat without large-scale emissions, and can be deployed in several hard-to-abate sectors, such as mining and oil and gas. Nuclear can also support the production of low-carbon hydrogen.

The Role of Nuclear Power Today

Nuclear power is responsible for 15% of Canada's electricity generation, second only to hydropower (60%). It accounts for 60% of generation in Ontario and 40% in New Brunswick. It is a key part of Canada's 83% non-emitting electricity supply, and accounts for approximately 50 megatonnes (Mt) of avoided greenhouse gas emissions annually, relative to what would have been produced by natural gas. Ontario's \$26 billion nuclear refurbishment project will extend the lifespan of 10 reactors.

SMRs are nuclear reactors that are generally the equivalent of 300 megawatts or less in size. They are intended to be safer, less expensive, and more flexible than larger-scale nuclear power plants. The potential global market for SMRs is expected to exceed \$150 billion per year by 2040. SMRs will contribute to sustainable development because of their unique attributes in terms of efficiency, economics, and flexibility. With the possibility to pair SMRs with renewable energy sources in a hybrid energy system, SMRs are expected to play a key role in the transition to clean energy.

The ultimate role nuclear power will play in Canada's energy transition will depend on public and policy support, continuing regulation of nuclear safety and waste, nuclear technology evolution, and cost competitiveness against other low- or zero-emission electricity generation technologies.

Canada's SMR Action Plan

The Action Plan builds on the momentum of Canada's SMR Roadmap, released in 2018. The Roadmap convened Team Canada to chart a vision for this emerging area of nuclear innovation and marked the beginning of Canada's plan to become a world leader in SMR technology.

Following the release of Canada's SMR Roadmap in 2018, Canada's SMR [Action Plan](#) was launched on December 18, 2020, illustrating Canada's plan for the development, demonstration, and deployment of SMRs for multiple applications at home and abroad.

The Action Plan is the result of a pan-Canadian effort bringing together key enablers from across Canada, including the federal government, provinces and territories, municipalities, Indigenous Peoples, power utilities, industry, innovators, laboratories, academia, and civil society.

Each of these key enablers has contributed a chapter to the Action Plan that describes a concrete set of actions they are taking to seize the SMR opportunity for Canada. Collectively, these chapters demonstrate the breadth of engagement on SMRs across the country and outline the depth of progress and ongoing efforts. To date, there have been more than 500 actions listed by over 119 participating organizations.

The Action Plan responds to all 53 recommendations in Canada’s SMR Roadmap and includes voluntary actions that go beyond the SMR Roadmap recommendations.

The Action Plan website invites interested organizations to direct questions and submit chapters to the Nuclear Secretariat inbox. New chapters from interested organizations are to be received and posted on the site on an annual basis. The Action Plan website will also be updated annually to reflect progress made by all partners towards achieving the actions outlined in their chapters.

Status of Committed Actions

As of March 2021, a total of 513 actions under the SMR Action Plan are being tracked by NRCan.

Status of Actions	
Complete	19
In Progress	389
Upcoming	105
Total	513

*This list is updated annually on the Action Plan website

Next Steps

It is encouraging to see the level of work and collaboration that has been taking place in the nuclear domain in the past few years. However, we recognize that more is needed to fully capitalize on Canada’s SMR opportunity. The SMR Action Plan Leadership Table will continue to meet biannually and work with the full spectrum of Canada’s nuclear energy sector to develop an SMR supply chain and sector that will benefit Canadians economically, environmentally, and socially.

Annex: Leadership Table Updates and Next Steps

The Leadership Table represents an array of cross-jurisdictional and multidisciplinary leaders in Canada's nuclear energy sector. The following updates from participant groups provide an overview of the work undertaken in relation to Action Plan commitments and looks ahead to future opportunities to further the development and deployment of SMRs.

Leadership Table stakeholder updates are listed below in alphabetical order.

Alberta Innovates

Alberta Innovates sees the research, innovation, and development of SMRs as an opportunity to decarbonize Alberta's heavy industries and electricity grid. SMRs can also potentially provide energy equity, energy access, energy independence, and energy affordability in remote, rural, and Indigenous communities, fulfilling the intent of a just and inclusive energy transition and energy transformation. To date, Alberta Innovates has been primarily focused on collaboration and convening activities with governments, utilities, vendors, academia, and end users in Alberta, in both nuclear and non-nuclear jurisdictions. Alberta Innovates has also provided some funding in support of scoping activities and evaluation of supply chain opportunities.

Actions to date:

- **ALB01 – Connection of SMRs to Alberta Innovates Strategic Priorities:** Alberta Innovates' Clean Technology Strategic Priority continues to be aligned with SMR technology development and deployment in Canada.
- **ALB02 – Support for SMR Technology or Knowledge Development Activities:** Alberta Innovates is a partner in the Prairies Economic Development Canada (PrairiesCan) SMR Supply Chain Study completed in March 2022 and is providing grant funding to the Cenovus Energy Ltd. *SMNR Feasibility Study-SAGD Integration* project. In addition, Alberta Innovates has engaged with various technology developers and potential end users of SMR technology in the province to provide information on the Alberta Innovates granting process.
- **ALB03 – Contributions to Knowledge:** In February and March of 2021, Alberta Innovates hosted a four-part series on SMRs that provided an introduction to SMRs, information on innovation and provincial collaboration, an opportunity for SMR technology developers to talk about their technology, and a time to focus on the social impacts of SMR deployment.
- **ALB06 – Partnership Connector and Diverse Capacity Building:** Alberta Innovates participates regularly in collaborative meetings with colleagues from industry, the federal government, and provincial governments named in the Memorandum of Understanding (MOU). Meetings with a few members of the Indigenous Advisory Council on SMRs have also been held and plans are in the works for more fulsome engagement throughout 2022.

Looking Ahead

Alberta Innovates will continue to be one of the province's key conveners to evaluate the market potential and deployment opportunities for SMRs in Alberta, as well as a provider of provincial funding for technology and knowledge-generating initiatives in Alberta related to SMR opportunities.

Alberta Innovates is looking to lead an SMR consortium to initiate conversations and build collaboration between members of Alberta's heavy industry and electricity sectors, which could benefit from SMRs to assist in the decarbonization of industry in the province. Discussions with potential members of the consortium are currently taking place to confirm interest.

Alberta Innovates is committed to fostering an innovation ecosystem that values everyone's contributions. Equity, diversity, and inclusion enhance the research and innovation ecosystem and create a positive impact for Albertans. Alberta Innovates remains committed to a work environment built on equity, diversity, and inclusion for all employees, stakeholders, partners, and Albertans.

Alberta Ministry of Energy

On April 14, 2021, Premier Jason Kenney signed the MOU, adding Alberta to the provinces supporting SMR development and deployment. The participating provinces released a strategic plan for SMR development on March 28, 2022, which is a key step towards ensuring the appropriate regulatory framework is in place should private industry pursue this promising technology.

Actions to date:

- **ALB04 – Mineral Development:** The Government of Alberta released the minerals strategy and action plan, *Renewing Alberta’s Mineral Future*, in November 2021. The strategy outlines a path to unlock Alberta’s untapped mineral resource potential, helping to meet increasing demand while creating jobs and attracting investment. As a first step in implementing the strategy, Alberta passed Bill 82, the Mineral Resource Development Act, in December 2021 to enable a robust and effective regulatory environment for mineral development in the province.
 - Enhancing public geoscience is one of the key actions identified in the strategy. Budget 2021 announced \$28 million to support Geothermal Resource Development and the Mineral Strategy, with a significant portion dedicated to mineral mapping. Furthermore, Budget 2022 announced that \$41 million will be provided to the Alberta Energy Regulator (AER) over three years to support the establishment of new regulatory frameworks for geothermal and mineral resources.
 - Alberta Energy is also undertaking efforts to modernize the metallic and industrial minerals tenure system to ensure minerals are developed in the best interest of Albertans.

- **ALB06 – Partnership Connector and Diverse Capacity Building:** Alberta Energy continues to participate in various meetings on a regular basis with nuclear industry stakeholders. See Alberta Innovates ALB06 above for additional information.

Looking Ahead

Alberta Energy, the Alberta Utilities Commission (AUC), and the Alberta Energy Regulator (AER) are planning work to identify and address potential areas of overlap, uncertainty, and duplication between federal and provincial regulatory regimes. The AUC and AER have been contacted to begin discussions with federal regulators, such as the Canadian Nuclear Safety Commission (CNSC), to better understand the process for potential SMR development in Alberta.

Alberta Energy, along with Alberta Innovates and the participating MOU provinces, is in the final stages of entering into a Research and Innovation MOU with Atomic Energy of Canada Ltd (AECL).

Alberta Energy will also continue to participate in various meetings with nuclear industry stakeholders to provide government insights on potential SMR development opportunities.

Atomic Energy of Canada Limited (AECL)

As a federal Crown corporation, AECL's mandate is to enable nuclear science and technology, and to protect the environment by fulfilling the government of Canada's radioactive waste and decommissioning responsibilities. Under our science and technology umbrella, we are uniquely suited to enable SMR deployment within Canada in multiple ways, with our invitation process to site an SMR on an AECL site, our ability to support technology readiness via partnerships that will exploit the laboratory infrastructure and decades of nuclear experience available at CNL, as well as our convening power bringing together strategic partnerships across government, industry, and academia. Our significant experience and knowledge of nuclear waste allow us to be an active and key participant for modernizing the radioactive waste policies that will need to be updated to include SMRs.

Actions to date:

- **AEC02 – Federal Nuclear Science and Technology (FNST) Work Plan:** Since 2015, AECL's FNST Work Plan has invested approximately \$118.8 million in R&D to build the knowledge, expertise, and capabilities to advance the deployment of SMRs, and advanced reactors in Canada and internationally. The impact of the FNST Work Plan investment has:
 - positioned Canada as a global player in SMR and advanced reactors;
 - developed highly qualified personnel for the next generation of nuclear workers and scientists;
 - developed technical knowledge and science-based evidence to support policy and regulation decisions;
 - supported Canada's active participation internationally through bilateral agreements with the United States and the United Kingdom and multilateral agreements such as the Generation IV International Forum; and
 - developed new capabilities that can be leveraged to support industry through programs at Canadian Nuclear Laboratories, such as the Canadian Nuclear Research Initiative to support collaborative research projects with third-party proponents in Canada.
- **AEC03 – Invitation for SMR demonstrations:** CNL continues its Invitation for Demonstration process to enable, support, and accelerate SMR demonstration projects proposed by industry. The impact of this process will keep Canada at the forefront of the SMR industry, as CNL aims to site a demonstration reactor at one of AECL's sites by the end of the decade. The Global First Power project is the most advanced in Canada, having launched a licensing and environmental assessment process in 2019 to build an SMR at AECL's Chalk River Laboratories.
- **AEC04 – International lab-to-lab collaboration:** AECL and CNL continue to advance international collaboration on SMR research and development with the United States through the Canada-US Action Plan and with the United Kingdom under the Canada-UK Action Plan. Areas of research under these Action Plans include SMR fuels and fuel cycles, modelling, and simulations.
- **AEC05 – Radioactive Waste Leadership Forum (RWLF):** AECL and CNL have continued to support collaboration with the RWLF and its subcommittees, including participating in the collaborations led by NRCAN to modernize the radioactive waste policy and by NWMO to provide recommendations on an integrated radioactive waste strategy for Canada. AECL and CNL are also participating fully in the Nuclear Waste Council and the SMR Task Force, which continue to advocate for SMR waste issues identified in that forum.

Looking Ahead

The FNST Work Plan will continue to support R&D of SMRs and advanced reactors and maximize the investment through strategic partnerships and collaboration with academia and industry. The capabilities developed under the Work Plan will continue to support industries to advance technology readiness and government to ensure regulatory readiness. More focus and priorities on research will be given on domestic SMR technologies that are down selected by 14 departments and agencies that participate in the governance of the FNST Work Plan.

Through its invitation process, CNL will continue to invite promising SMR technologies and vendors to site a demonstration reactor at AECL's sites. In addition, we will advance the deployment of a Clean Energy Demonstration, Innovation, and Research (CEDIR) park. The CEDIR park will be a demonstration platform of clean energy technologies, including a nuclear-renewable hybrid energy system, and will advance the technological readiness of low-carbon hybrid energy systems enabled by SMRs.

International collaboration on SMR research and development with countries such as France, Romania, Argentina, and Japan are being explored.

Issues identified for discussion at the RWLF will now be brought forward to the Nuclear Waste Council. The SMR Task Force has sponsored a Radioactive Waste Task Team that has been collaborating to identify radioactive waste management issues that require resolution to enable demonstration projects. It is anticipated that the identified issues will be brought to the Nuclear Waste Council for consideration and resolution.

Bruce Power

Bruce Power provides nuclear power to one in three homes, hospitals, schools, and businesses in Ontario. It also provides medical isotopes across the globe to keep medical equipment sterilized and help fight disease.

Canadian-made CANDU reactors have served the site, community, and Ontario for many decades. CANDU reactors provided 89 percent of the electricity needed to phase out coal in Ontario, one of the largest and most successful greenhouse gas and pollution reduction initiatives in the world. Bruce Power continues to stand by CANDU technology as a strategic asset for Canada that enables further nuclear innovation while supporting other clean energy sources.

Actions to date:

- **CANDU Reactor Refurbishments:** Bruce Power's short- to mid-term plan to maximize assets will be achieved by successfully refurbishing six of eight CANDU reactors, ensuring a long-term, reliable, low-cost supply of electricity for homes, businesses, schools, and hospitals. This work and ongoing operations will secure 22,000 direct and indirect jobs annually, while generating \$10 billion in economic activity each year.
- **Life-Extension Program:** As part of the Life-Extension Program to optimize CANDU reactors and extend the life of the site, Bruce Power is carrying out its intensive Major Component Replacement (MCR) Project, which focuses on the replacement of key reactor components in Units 3–8, including steam generators, pressure tubes, calandria tubes, and feeder tubes.
- **Asset Optimization:** Bruce Power is also optimizing assets to increase peak generation and site peak output to 6,550 MW from 6,400 MW in 2021, with a goal of achieving a peak generation output of 7,000 MW by 2030. The generation increase is equivalent to adding a ninth unit, or two SMRs, to the Bruce Power site without the need to build new infrastructure.
- **Emissions Reduction:** Bruce Power has committed to achieving net-zero carbon emissions on site by 2027. In addition, Bruce Power announced the issuance of \$500 million in Green Bonds, a world first for nuclear power and recognition of the critical role the technology plays in fighting climate change and enabling a net-zero future.
- **Medical Isotopes:** Bruce Power has partnered with Isogen to develop and install a made-in-Ontario Isotope Production System to produce urgently needed medical isotopes starting with Lutetium-177, a breakthrough therapeutic isotope used in the treatment of prostate cancer and neuroendocrine tumours.
- **Indigenous Involvement:** Bruce Power has formed an historic partnership with the Saugeen Ojibway Nation (SON) to jointly market new isotopes in support of the global fight against cancer, while also working together to create new economic opportunities within the SON territory. Relationships continue to be built with the SON and other Indigenous hosts to work towards meaningful reconciliation.

Bruce Power is also forming strategic relationships to provide support and share expertise with companies pursuing advanced nuclear opportunities. As a Pan-Canadian team member, Bruce Power is supporting two demonstration projects in New Brunswick with ARC Clean Energy and Moltex Energy's waste recycling facility and reactor. Bruce Power is also supporting companies, including Kairos Power and Holtec, in an advisory capacity on projects, including demonstration reactors.

Finally, as large nuclear is also an option, Bruce Power continues to work closely with partners at SNC-Lavalin and AECL to understand the readiness of CANDU technology and future deployment. To support this, key activities and studies have been conducted.

To date, Bruce Power has undertaken and completed several studies including a joint feasibility study with Westinghouse as a potential site for its micro reactor; an options analysis of the Bruce Power site; an electricity market analysis to support future development opportunities at our site; a licence ability study for available technologies; and a transmission study to confirm capacity limit.

Looking Ahead

Bruce Power's priority in the next year will focus on the successful execution of the Life-Extension Program, as well as plans to further develop the site.

Canadian Nuclear Association (CNA)

The Canadian Nuclear Association (CNA) is a non-profit organization that represents the nuclear industry in Canada and promotes the development and growth of nuclear technologies to meet Canadians' energy, environmental, economic, and social needs. The CNA's mission is to create and foster a political environment and reasonable regulatory framework for advancing the industry; encourage cooperation among all stakeholders; provide a forum for the discussion and resolution of issues; and encourage cooperation with other associations that have similar objectives and purposes.

Actions to date:

- **CNA01** – CNA has supported NRCan in the creation and kick-off of the SMR Leadership Table. The first meeting of the SMR Leadership Table was held in conjunction with the CNA conference in April 2022. CNA has routinely worked with NRCan to ensure that the SMR Leadership Table covers the most important topics impacting SMR deployment in Canada.
- **CNA02** – CNA was instrumental in the creation of the Electricity Alliance of Canada, which brings together all clean energy types and works to promote electrification and the need for all clean energy sources.
- **CNA03** – CNA continues to promote and lead the Team Canada approach to SMRs. Since the release of the action plan, CNA has promoted SMRs both domestically and internationally, has signed MOUs with international nuclear associations, and is present in new nuclear jurisdictions and conferences (Western provinces, COP 26/27, Globe Forum, Global Energy Show, and the Oil Sands Conference to name a few).
- **CNA04** – CNA has convened a task team to review and guide the industry on the new *Impact Assessment Act* (IAA). This will ensure that the IAA achieves its goals while not impeding the deployment of SMRs and new nuclear in Canada.
- **CNA05** – CNA has formed relationships with many clean energy associations, vendors, and groups. Through these partnerships, nuclear is being recognized in some jurisdictions as clean energy and receiving the same incentives as renewables. CNA will continue to push for further inclusion of nuclear in Canadian policies and programs such as Green Bonds, clean energy tax credits, and the Canada Infrastructure Bank.
- **CNA06** – CNA played a supportive role in the Provincial SMR MOU between ON, NB, SK, and AB. This demonstrates the shared interest in SMRs across the country, and a feasibility report and strategic deployment plan were produced through this MOU.
- **CNA07** – CNA continues to support a variety of groups and initiatives (Women in Nuclear, North American Young Generation in Nuclear, and Equal by 30) and has continued to promote diversity and inclusion through its annual conference and various workshops.
- **CNA08** – CNA has helped advocate for SMRs in heavy industries through various working groups, workshops, and events. CNA has led discussions at conferences such as the Global Energy Show, the Oil Sands Conference, and the Saskatchewan Mining Association, co-chairs the Nuclear Hydrogen working group, and has met regularly with the Oil Sands Pathways to Net Zero Alliance.

Looking Ahead:

CNAs key priorities for the next year include:

- continuing to support the Pan-Canadian SMR team on collaborative topics such as the *Impact Assessment Act*, secure fuel supply, federal funding programs, and radioactive waste;
- expanding the advocacy and public outreach on SMRs and new nuclear in a variety of spaces including new nuclear provinces, events, and conferences, and through educational platforms and groups (such as the University Network of Excellence in Nuclear Engineering);
- continuing to convene resourcing workshops that focus on the steps needed to establish the workforce that will support SMR and new nuclear deployment, both domestically and internationally;
- supporting international opportunities that look to leverage Canadian expertise and IP in New Nuclear and SMR technologies and services;
- supporting Indigenous engagement initiatives;
- supporting other nuclear industry groups in their efforts to develop and deploy new nuclear and SMRs in Canada (OCNI, COG, CNS, UNENE, etc.); and
- continuing to seek opportunities to promote nuclear in clean energy discussions at both the federal and provincial Levels.

Canadian Nuclear Labs (CNL)

Canadian Nuclear Labs (CNL) is an integral part of the Canadian SMR industry. CNL is Canada's largest science and technology complex and is actively working to develop the expertise and facilities to provide technical support for SMR demonstration and deployment opportunities that are being pursued by Canadian utilities (Ontario Power Generation, Bruce Power, New Brunswick Power, and SaskPower) in partnership with SMR Vendors.

Actions to date:

- **CNL01 – Site Preparation for SMR Demonstration:** Several potential sites suitable for SMR demonstration have been identified at both the Chalk River Laboratories and Whiteshell sites. Baseline environmental studies and reports have been completed on a subset of potential sites at Chalk River Laboratories, where infrastructure needs are being identified to support SMR utility supply and energy offtake options.
- **CNL02 – Federal Nuclear Science and Technology Work Plan:** CNL continues to execute on the broad array of work under AECL's Federal Nuclear Science and Technology (FNST) Work Plan to advance SMR development and deployment in Canada. Ongoing research spanning all aspects of SMR technologies active in Canada continues, including techno-economic studies, feasibility studies, nuclear co-generation, fuel studies, reactor materials and structural materials integrity, cyber security, sensor network development, and life cycle assessments.
- **CNL03 – Invitation for SMR Demonstrations:** CNL launched its four-step Invitation for SMR Demonstrations in 2018, with two annual intakes for submissions of demonstration project ideas. Six proponents have submitted responses to the Invitation to date. Three proponents have successfully completed Stage 1. One proponent has progressed to Stage 3 and is in a formal review process with the CNSC. Stage 3 negotiations for land arrangements and other contracts with the proponent are underway.
- **CNL04 – International Lab-to-Lab-Collaboration:** CNL continues to work extensively with international labs to advance SMR research and development.
- **CNL05 – Fuel Supply Security:** CNL fully supports the federal government actions on addressing SMR fuel supply security. CNL is working collaboratively with partners in the UK to explore this question further under the auspices of the bilateral Canada-UK Action Plan's SMR fuel supply chain work stream.
- **CNL06 – Initiatives to Reduce SMR Capital Costs:** CNL's applied research program includes studies on fuel qualification/testing, additive manufacturing, and the economics of SMRs, deployment, and co-generation. CNL is participating in an IAEA Coordinated Research Project entitled "Economic Appraisal of Small Modular Reactors (SMR) Projects: Methodologies and Applications," with specific planned focus on economic assessment of factory fabrication requirements and benefits.

- **CNL07 – Promoting Diversity in the Future SMR Workforce:** CNL is a signatory to Equal by 30 and will continue discussions on opportunities to engage Indigenous communities in the supply chain, workforce, and broader CNL activities.
- **CNL08 – Indigenous Engagement:** CNL is working towards establishing long-term relationship agreements with some communities. CNL meets regularly with Indigenous communities for briefings and sharing of knowledge on a variety of subjects, including our SMR program, as well as the broader portfolio of work underway within our organization. Likewise, CNL receives and incorporates, where possible, Indigenous knowledge related to our ongoing operations. CNL hired a Director of Indigenous Relations who is responsible for the oversight and growth of CNL’s ongoing activities related to Indigenous engagement.
- **CNL09 – Training Programs and Education Curriculum:** CNL maintains a comprehensive network of domestic and international university collaborations and supports UNENE. CNL is part of the advisory committee for the Natural Sciences and Engineering Research Council Small Modular Advanced Reactor Training (SMART) program. CNL also maintains collaborative relationships through the Canada-US (US Department of Energy Laboratories) and Canada-UK Action Plans (UK National Nuclear Laboratory).

Looking Ahead

CNL will continue to be actively engaged in an enabling role with all stakeholders to advance the development and deployment of SMRs. Through the FNST program, CNL will develop the S&T knowledge and expertise to support all SMR technologies that are active in Canada, with a focus on those that are moving towards deployment.

The CNL open invitation for siting demonstration units will also remain available to any SMR proponent. CNL’s Canadian Nuclear Research Initiative, a co-funded applied research program, will continue to offer opportunities for SMR vendors and third parties to access expertise and advance their technologies.

Lastly, CNL will continue to incorporate Indigenous involvement as well as diversity, equity, and inclusion principles in all aspects of operations.

Canadian Nuclear Safety Commission (CNSC)

The CNSC's activities are guided, in part, by the SMR Action Plan's priorities. The CNSC is directly involved in the review of and preparation for SMR designs and emerging technologies. It is also cognizant of the regulator's central role in modernizing the regulatory framework to enable efficient SMR deployment in Canada; the CNSC's SMR Readiness Project was developed with this in mind. The CNSC is also mandated to disseminate scientific information to the public and consult with Indigenous Nations and communities, both of which are central to the SMR Readiness Project.

Actions to date:

- **Nuclear Security Regulations:** Progress has been made towards updating the Nuclear Security Regulations. The package is tentatively scheduled for a fall 2022 Treasury Board meeting to seek approval for pre-publication in the Canada Gazette Part I.
- **Regulatory Revisions:** Revision of regulatory documents has occurred to reflect a risk-informed and graded approach.
- **SMR Readiness Project:** Development of the SMR Readiness Project to identify and address objectives aimed at optimizing CNSC's regulatory framework.
- **Directorate of Advanced Reactor Technologies:** Formation of the Directorate of Advanced Reactor Technologies is to be the central hub for all CNSC-wide SMR readiness activities.
- **Innovation and Research Hub:** The formation of the CNSC's Innovation and Research Hub with the goal to stay as far ahead of emerging technologies as practicable.
- **Vendor Design Reviews:** Completion, initiation, and progress of several Vendor Design Reviews.
- **Engagement:** CNSC has hosted and participated in several SMR-related engagement activities with the public, and Indigenous Nations and communities. The engagement comprised webinars on SMR technologies, and SMR workshops with interested Indigenous Nations.
- **International Collaboration:** Ramping up of international collaboration activities on SMR regulation and harmonization, including partnerships with the:
 - United States Nuclear Regulatory Commission, which involves the development of a strategic plan, publishing several joint reviews, and the creation of a working group to conduct joint assessments for the GE Hitachi BWRX-300 reactor design selected by Ontario Power Generation.
 - United Kingdom Office for Nuclear Regulation for SMR licensing and technical knowledge exchanges.
 - International Atomic Energy Agency (IAEA), including participating in the Nuclear Harmonization and Standardization Initiative (NHSI).

Looking Ahead

The CNSC will continue to review SMR designs through the established Vendor Design Review process to provide early feedback to SMR vendors and to ensure exposure to new SMR designs. The CNSC will also continue to conduct SMR licensing reviews (i.e., Darlington New Nuclear Project Licence to Construct, Global First Power Licence to Prepare Site) to progress the path of safe SMR deployment in Canada.

The CNSC will execute the SMR Readiness Project to enhance regulatory predictability, capacity and capabilities, and complete strategic reviews of the regulatory framework to further identify any required updates and increase regulatory efficiency while maintaining safety and security of SMR technologies.

The CNSC will continue to collaborate with domestic regulators to streamline and increase the effectiveness of the regulatory review process across jurisdictions. The CNSC will also continue to collaborate with international nuclear regulators on harmonization to enhance regulatory efficiency and to increase the robustness of regulatory reviews.

The CNSC also plans on gaining access to independent regulatory research on SMRs through activities led by the Innovation and Research Hub and through Natural Sciences and Engineering Research Council of Canada grants, and to develop an SMR-specific training program at the CNSC to build the internal capability and capacity to review SMRs.

Lastly, continued and improved outreach and engagement activities with the public and Indigenous Nations and communities to build awareness and trust in the CNSC's regulatory and oversight processes.

CANDU Owners Group (COG)

COG is a private, not-for-profit organization founded in 1984 with the objective of achieving operational excellence through the collaboration of CANDU utilities in its four business lines: (i) Information Exchange, (ii) Research and Development (R&D), (iii) Joint Projects and Services, and (iv) Nuclear Safety and Environmental Affairs. In support of Canadian and international net-zero goals, COG's vision is excellence through collaboration for CANDU and advanced nuclear technologies. We help our members provide safe, clean, cost-effective, and reliable electricity to communities worldwide by working with our members, suppliers, and research and partner organizations to continuously innovate nuclear plant equipment and processes, ensuring the highest standard of safety, efficiency, and environmental performance.

Actions to date:

- **COG01 – SMR Technology Forum (SMR TF) and SMR Vendor Participant Program (SMR VPP).** COG continues to organize quarterly meetings with both the SMR TF and the SMR VPP. Both groups have been addressing challenges in funding, international cooperation, licensing requirements, net-zero goals and nuclear energy, fuel supply, fuel reprocessing, human resources, nuclear waste, and decommissioning.
- **COG02 – Radioactive Waste Leadership Forum (RWLF):** RWLF suspended its activities in Q3 2021, while both NRCAN and NWMO completed their consultations and presented their draft results in mid-2022. In April 2022, RWLF was replaced with the COG-CNA Nuclear Waste Council, with an initial mandate of coordination and collaboration of the nuclear industry's public affairs and communications approach to waste.
- **COG03 – COG Nuclear Liability Task Team:** The SMR liability task team prepared the COG report COG-20-9021, "Risk Approach to Liability Limits for Small Modular Reactors," which was shared with NRCAN on May 31, 2021. Feedback from NRCAN is expected later this year.
- **COG04 – COG SMR Security Task Team:** The SMR Security Task Team prepared the COG report COG-19-9025 "Recommendations for Revisions to the Canadian Nuclear Security Regulations Using Objective-Based Performance Criteria" about the cost impact of proposed changes to the Nuclear Security Regulations for High-Security sites, SMRs, and non-high-security sites. The report was discussed with the CNSC in 2021. The team is now awaiting the publication of the draft updates to the Nuclear Security Regulations in the Canada Gazette for public comment later in 2022.
- **COG05 – International Collaboration by Industry:** Monthly, quarterly, and semi-annual meetings are organized with relevant international organizations (NEI, EPRI, IAEA, WNA, NEA) to ensure alignment. Both MOUs and MOCs have been signed to facilitate the exchange of information and ideas. Areas of shared interest include harmonization of codes and standards, harmonization of the licensing processes, waste management and decommissioning, innovation, and fuel supply.
- **COG06 – The Canadian Nuclear Industry SMR Secretariat:** Together with CNA, COG supports the Canadian Nuclear Industry SMR Secretariat. The Secretariat engages Team Canada (the enabling partners from the federal government, provinces and territories, Indigenous Peoples and communities, power utilities, industry, innovators, laboratories, academia, and civil society), and tracks and documents the progress of actions.
- **COG07 – Engagement with NWMO on fuel waste management specifications and costs:** NWMO is actively engaging the public through various forums, including a recent summit, to gather input on the Canadian Integrated Waste Management Strategy. Both the CANDU Industry and the SMR TF have provided input on their needs. NWMO recently unveiled its draft Integrated Strategy for Radioactive Waste for Public Comment report.

Looking Ahead

COG will continue to support the Canadian nuclear industry in resolving technical issues related to the safe operation of CANDU reactors, as well as the advancement and deployment of SMR technologies. COG's infrastructure is ideal for additional partnerships with utilities and SMR vendors interested in completing their designs with additional R&D or joint projects, and in achieving a common resolution of licensing issues.

Crown Investments Corporation of Saskatchewan

Saskatchewan has a rich history in nuclear technology, from leading-edge uranium mining to medical isotope production. Small modular reactor development builds on this experience and is a key action in Saskatchewan's 10-year Growth Plan, providing the opportunity for clean, stable, and secure power generation, and creation of a nuclear power industry in the province. Saskatchewan continues to work collaboratively with Ontario, New Brunswick, and Alberta, and in March 2022 the provinces together issued "A Strategic Plan for the Deployment of Small Modular Reactors."

Actions to date:

- **SK01 – Demonstration and Deployment:** In June 2022, SaskPower selected the GE Hitachi SMR design for their grid-scale SMR project. In May 2022, the Saskatchewan Research Council (SRC) partnered with Westinghouse to deploy an eVinci™ reactor in Saskatchewan; earlier in March 2022, Westinghouse received \$27.2M from the Government of Canada to support deployment in Canada. The Government of Saskatchewan continues to work with provincial governments, utilities, the federal government, and the CNSC in areas of regulation, public engagement, and investment to support these deployments.
- **SK04 – Policy, Legislation, and Regulation:** The Government of Saskatchewan continues to explore the current landscape of nuclear regulations across Canada, building relations with the MOU provinces, provincial and federal regulators, as well as focusing on and contributing to key areas of SMR interest to ensure an effective and efficient nuclear regulatory framework for SMRs. Examples in this area include:
 - On behalf of the MOU provinces, Saskatchewan submitted a letter to NRCan reviewing their draft policy for radioactive waste; the provincial letter was focused through the lens of SMR development and deployment.
 - Saskatchewan commissioned a study on the regulatory oversight of uranium mines and mills in Saskatchewan, specifically the interaction between federal and provincial regulators and the impact the current regulatory practices have on Indigenous Peoples.
- **SK05 – Capacity, Engagement, and Public Confidence, and SK06 – International Partnerships and Markets:** There are numerous ongoing activities in these areas:
 - The governments of Saskatchewan and Alberta worked with Prairies Economic Development Canada (PrairiesCan) to complete a supply chain study in April 2022, which highlights the potential for 68% of the capital for new build SMRs to be within the region.
 - Saskatchewan provided technical support to the Yukon Government for their Request for Proposals for an SMR feasibility study, which is currently underway.
 - In 2020–2022, Saskatchewan opened seven new global offices: Mexico, United Kingdom, United Arab Emirates, India, Singapore, Vietnam, and Japan. These international offices serve to advance Saskatchewan's Growth Plan targets, including a 2030 goal of increasing the annual value of uranium sales to \$2 billion and using SMRs to reduce emissions from electricity production.

Looking Ahead

Saskatchewan is focusing on the business case for SMRs, supply chain growth, targeted engagement, provincial regulatory framework, research and development, and education and training. SaskPower activities for the future are described in the SaskPower entry of this document and not repeated here.

The business case for SMRs examines the costs, benefits, feasibility, and emissions reductions opportunities of SMRs beyond grid-scale electricity production. To enable SMR opportunities identified from a business case economic analysis, Saskatchewan will continue to lead in several areas:

- In May 2022, an MOU was signed with Abu Dhabi's Department of Energy of the United Arab Emirates to collaborate on sustainable energy initiatives, including SMRs.
- Working with Saskatchewan Industrial and the Mining Suppliers Association, the Organization of Canadian Nuclear Industries, and PrairiesCan to explore a Ready4SMR program in Saskatchewan. A strong Saskatchewan nuclear and non-nuclear supply chain would support SMRs in Canada and internationally and bring economic benefits to Saskatchewan.
- Seeking federal support for international discussions on uranium enrichment, federal policy support for expanded exports, and to promote trade missions and federal investments in SMRs.

For the provincial regulatory framework, Saskatchewan will build on existing collaboration with the MOU provinces and federal regulatory authorities, including the CNSC, which is responsible for uranium mines and mills in the province. In the long term, Saskatchewan aims to implement a regulatory framework for project proponents to develop and deploy SMRs of all sizes and types in Saskatchewan.

In collaboration with SaskPower, the Saskatchewan Research Council, the Fedoruk Centre, Innovation Saskatchewan, academic institutions, and SMR vendors, the government will investigate research and development (R&D) and education and training opportunities associated with SMRs. Building a strong and relevant R&D foundation that complements national and global SMR activities will enable Saskatchewan to educate, retain, and attract highly qualified people and companies that can support growth in Saskatchewan's nuclear innovation ecosystem.

In all the activities above, the Government of Saskatchewan will conduct engagement activities with targeted stakeholders and Indigenous Peoples to explore opportunities for participation in research and development, education and training, policy development, and supply chain development.

Global Affairs Canada (GAC)

GC17 – International Partnerships and Markets: Taking Canadian SMR technology abroad

The Government of Canada continues to advocate for Canada’s nuclear industry around the world via GAC’s Trade Commissioner Service (TCS), which continues to support the innovation and exporting goals of Canadian SMR companies, promoting global exports of Canadian SMR technologies, and positioning Canada as a leader in nuclear and emissions-free energy generation.

Since 2020, the TCS has promoted Canadian nuclear expertise to relevant stakeholders around the world and provided support to over 70 Canadian clients in the nuclear industry. The TCS has also been deepening its understanding of SMR export opportunities, for example, engaging on multiple levels with the different players involved in the Darlington New Nuclear Project. The TCS also supported the Canadian delegation to the World Nuclear Exhibition in Paris, France (Nov 30 – Dec 2, 2021).

In addition, GAC participates in the Nuclear International Markets Working Group (IMWG) led by NRCan’s Nuclear Energy Division.

To date, the activities undertaken by the TCS have led to networking opportunities for the Canadian nuclear industry, helping firms build relationships with relevant foreign entities and laying the groundwork for when SMRs are commercially available for export. They have also led to nuclear-related contract and partnership discussions between Canadian firms and potential foreign buyers, partnerships being formed, contracts being signed, and job-creating investments taking place in Canada, resulting in a total of 32 nuclear-related successes since 2020.

Looking Ahead

The TCS plans on organizing and/or supporting several nuclear and SMR-related business delegations including:

- a Canadian delegation to the International Atomic Energy Association General Conference in Vienna, Austria, September 2022;
- a Canadian nuclear delegation to Poland, September 2022;
- a Romanian nuclear buyers’ mission to Canada, fall 2022;
- A virtual showcase of Canadian nuclear capabilities to a European audience, 2022; and
- a Brazilian SMR business delegation to Canada, March 2023.

GC19 – International Partnerships and Markets: International enabling frameworks for SMR

GAC has also undertaken several consultations with SMR vendors to ensure awareness of Canada’s nuclear non-proliferation policy and export control framework, and to better understand the SMR technologies and potential implications from a non-proliferation and export control perspective. This includes presenting on Nuclear Cooperation Agreements (NCAs) at an IMWG meeting.

In February 2022, the Government of Canada solicited input from industry on potential international markets of interest to identify NCAs that may be needed and to prioritize the work in this regard.

The Government of Canada has held bilateral discussions with counterparts in two potential SMR markets to explain our non-proliferation policy, NCAs, nuclear governance in Canada, and to promote Canadian SMR vendors.

The Government of Canada engages with participating governments of the Nuclear Suppliers Group (NSG) on an ongoing basis. This ensures that the international export control framework is prepared for the deployment of various types of SMRs. This includes working with the NSG Technical Experts Group to draft a report on new reactor technologies on the horizon, and to identify and address potential gaps in the existing NSG Guidelines and in the international export control framework.

Looking Ahead

A key GAC priority in the coming year is continued engagement with industry on SMR technologies and markets of interest to ensure the appropriate legal and policy frameworks are in place to enable SMR deployment in Canada and abroad. It will also allow us to make new policy recommendations, as appropriate.

GAC will achieve this through continued engagement with SMR vendors, export control regimes, and like-minded countries. GAC will also encourage increased engagement from the NSG Chair and Consultative Group with SMR vendors as part of the group's ongoing efforts to increase engagement with, and outreach to, industry.

Indigenous Advisory Council (IAC)

Canada requires the active cooperation of First Nations, utilities, provinces, and the federal government to ensure the successful development of nuclear technologies to support carbon emissions reduction. In recognition of the joint desire to see nuclear play a role in reducing carbon emissions, interested First Nations were invited to participate not only in an Indigenous section of the SMR Action Plan, but in a meaningful way at all levels. The Indigenous Advisory Council on the SMR Action Plan (IACSMRAP) was formed in 2021 to achieve this goal. Given the shared desire to work together to find climate solutions, and the fact that the Canadian legal framework requires First Nations participation, the primary function of the IACSMRAP will be to provide insight, support, and knowledge, and to recommend pathways for Indigenous participation in the nuclear industry, which will necessarily develop from the deployment of SMRs in Canada.

IACSMRAP actions to date include:

- 1) An inaugural meeting was held at the end of 2021 which began with an examination of the state of nuclear development and attitudes across the country by region and led to a better understanding of existing and developing technologies.
- 2) A second meeting was held in early 2022 which included adopting terms of reference and developing a strategic approach to ensure that the goals of advising, participating, and developing of an engagement plan will be met.
- 3) Two subcommittees were recommended and formed by the IAC—one to look at economic participation models and the other to look at the education and capacity needs of Indigenous communities. These subcommittees ensure that, when opportunities arise, Indigenous groups have the necessary knowledge to make informed decisions about participation and the resources needed to act.
- 4) The economic participation subcommittee has held its first meeting, while the education subcommittee has been scheduled and an agenda has been drafted.

Looking Ahead

The IACSMRAP has designated four participants to the SMR Leadership Table to ensure that regional Indigenous perspectives are captured in every conversation. The IACSMRAP will meet in person at least twice a year to ensure that IACSMRAP objectives are regularly updated and can be achieved. In addition, the IACSMRAP has fully supported and advocated for the Leadership Table to appoint a co-chair from the IACSMRAP and is pleased that NRCan has selected the IACSMRAP as the first co-chair of the Leadership Table.

The IACSMRAP has lobbied NRCan for additional funding to facilitate more in-person meetings, as well as a new and more expansive work plan. The IACSMRAP requires technical support to enable its members to provide advice and prepare the work necessary to advance meaningful Indigenous participation in the SMR Action Plan, as well as funding for capacity development of organizations that advocate and advance the SMR agenda.

The IACSMRAP will focus its initial efforts on the education and engagement of Indigenous people(s) impacted by SMRs. Capacity building, preparing Indigenous youth for employment opportunities in SMRs, and developing Indigenous contractors will be important activities in this area.

The IACSMRAP will also focus on economic reconciliation as it relates to SMRs. It will review and develop opportunities for Indigenous entities to take equity positions in SMRs so that Indigenous communities gain ongoing economic benefits from SMRs.

New Brunswick Department of Natural Resources and Energy Development/NB Power

As part of the SMR Action Plan, and as one of the four Memorandum of Understanding (MOU) provinces, the Government of New Brunswick and NB Power have been leading the development of the Stream 2 Generation 4 Reactor after selecting ARC Clean Energy and Moltex Energy as the two technologies to pursue.

The primary focus has been developing the preliminary design and completing the Canadian Nuclear Safety Commission's Vendor Design Review (VDR). ARC is on track to complete Phase II in 2023, and Moltex completed Phase I this year and will move to Phase II.

In addition, all major engineering partnership agreements were concluded for ARC, including a significant teaming agreement with Hatch. Moltex has also entered into a strategic agreement with SNC-Lavalin. Site and environmental studies have begun, market studies have been completed, interaction with NRCAN is ongoing, and information sharing/cooperation agreements have been signed with other utilities.

The result of all the work underway is that Canadians are seeing homegrown Generation 4 SMR technology move forward quickly with the first-of-a-kind ARC-100 SMR ready to be commissioned in 2029 at the Point Lepreau site and generating power in 2030. This will be the first Generation 4 Reactor online in Canada and opens up opportunities to learn and expand this technology for industrial applications and hydrogen production across Canada and abroad.

Furthermore, New Brunswick's First Nations partners, such as the North Shore Mi'kmaq District Council, have expressed an interest in direct investment in SMRs and held a one-day symposium named First Nations Participation in SMRs. MOUs between First Nations and both ARC and Moltex have been concluded and NB Power has done extensive work on community engagement and outreach. First Nations also led a breakout session at the major SMR Supply Chain Event held in June 2022.

Looking Ahead

New Brunswick will be conducting a full supply chain gap analysis to determine the province's SMR readiness and to assess any advanced manufacturing that must be addressed before manufacturing or construction begins. This work also includes skills and training, which will be led by Opportunities New Brunswick, in collaboration with the utility and vendors, as well as organizations such as the Organization of Canadian Nuclear Industries, which will be opening an office in the province this year.

ARC is expected to complete work on VDR Phase II in 2023, with preliminary design and site assessment completed, environmental assessment initiated, and fuel contracts established. Meanwhile, Moltex will continue its transition from VDR Phase I to VDR Phase II. A rigorous project team and oversight process is in place.

Work will continue with other provinces, utilities, and potential customers in Canada to expose them to the technology and seek applications in their industrial operations. First Nations engagement activity will also continue, with some form of investment expected in 2023.

Nuclear Waste Management Organization (NWMO)

The Nuclear Waste Management Organization (NWMO) is responsible for designing and implementing Canada's plan for the safe, long-term management of used nuclear fuel. The work undertaken by the NWMO to assess SMR-used fuel from a long-term disposal perspective will demonstrate technological readiness in addressing the full life cycle of SMRs. Credible disposal solutions for SMR-used fuel will also ensure enabling conditions are in place across Canada, mitigating barriers for SMR development and deployment. This work is supported through the Nuclear Fuel Waste Act and aligns with the draft revised Policy for Radioactive Waste Management and Decommissioning that was published by NRCan in early 2022.

At this time, the NWMO has been working closely with Ontario Power Generation (OPG) and GE Hitachi to provide support for the next phases of OPG's new nuclear project at the Darlington site, and a formal agreement between NWMO and OPG is being established for this work. The NWMO has also been working to establish a formal agreement with X-Energy to support an assessment of its used fuel from a long-term disposal perspective.

The NWMO has also continued its public, community, and Indigenous engagement program as it relates to Canada's plan for the safe, long-term management of used nuclear fuel—including used fuel from SMRs. With the advancement of work on SMRs in Canada, the NWMO has prepared and distributed communications materials through print, social media, presentations in potential siting areas, and conferences to elaborate on and respond to questions about our anticipated role with respect to any resulting used fuel.

Additional work undertaken by the NWMO includes:

- Maintaining an annual watching brief on advanced fuel cycles and alternative waste management technology, which includes SMR discussion.
- Providing community outreach support to utilities in Ontario, New Brunswick, Alberta, and Saskatchewan that are considering SMRs.
- Leading the development of an Integrated Strategy for Radioactive Waste (ISRW) to address all current and future radioactive waste in Canada—including waste from SMRs. To date, the NWMO has completed over 70 engagement activities and received input from over 4000 Canadians and Indigenous peoples.
- Continuing to lead engagement with the public and Indigenous peoples for both Adaptive Phased Management (APM) and ISRW, which supports nuclear education and public awareness, with a particular focus on diversity, Indigenous communities, and youth. The NWMO also provides funding to enhance the participation capacity of Indigenous communities on both APM and ISRW.

Looking Ahead

The NWMO will continue to advance the selection of a preferred location for the APM used fuel deep geological repository. Ensuring a safe and socially acceptable solution for the used fuel, whether from the existing fleet or new technologies, is extremely important to the Canadian public, Indigenous peoples, and the nuclear industry. This will require the ongoing support of the government at all levels and alignment within industry.

The NWMO will also undertake preliminary assessments of GEH and X-Energy used fuel from a long-term disposal perspective to support the deployment of SMRs and to demonstrate high technological readiness and/or features that are of benefit and interest to Canadian communities and markets.

The NWMO is aiming to complete the engagement on the ISRW and the public comment period on the draft ISRW report and associated recommendations as the next step in addressing gaps in long-term waste management of radioactive waste, in line with the priority of policy and legislative frameworks for waste owners to have a strategy in place to address all waste.

Ontario Ministry of Energy/Ontario Power Generation (OPG)

In December 2019, Ontario signed a Memorandum of Understanding (MOU) with Saskatchewan and New Brunswick to collaborate on the development and deployment of SMRs. In April 2021, Alberta joined the MOU. The MOU included two key deliverables (i.e., a Feasibility Study and a Strategic Plan for the development and deployment of SMRs), both of which are now complete.

Specifically, for Ontario, the province is supporting the work being undertaken at the Darlington new nuclear site, which is planned to be the location of Canada's first 300 MW on-grid SMR as early as 2028. The Darlington site has already completed a federal Environmental Assessment (EA) and obtained a "Licence to Prepare Site" for a new-build project from the Canadian Nuclear Safety Commission (CNSC). In November 2021, Ontario rate-regulated the Darlington SMR project under the oversight of the Ontario Energy Board. This allows for recovery of prudently incurred project development, construction, and operation costs from electricity consumers. In December 2021, Ontario Power Generation (OPG) announced the selection of GE Hitachi's BWRX-300 SMR technology for the Darlington SMR project, and the Government of Ontario supported OPG's selection.

Ontario is already engaging suppliers and leveraging skilled workforces for work on SMR deployment at Darlington:

- OPG expects that 70–80%, or more, of the necessary components and materials for the Darlington SMR will be sourced from Ontario's nuclear supply chain companies;
- In December 2021, Ontario announced that GE Hitachi, BWXT Canada, and Synthos Green Energy of Poland have reached an agreement worth about \$1 billion to build key components in Ontario for a potential fleet of Polish SMRs; and
- In June 2022, SaskPower followed OPG's lead and selected the GE Hitachi SMR design for deployment in Saskatchewan (i.e., as part of a "fleet" approach). Saskatchewan-produced uranium linked with Ontario nuclear knowledge and expertise will create new economic opportunities on SMRs for both provinces at home and abroad.

Other nuclear projects to note:

- OPG has partnered with Ultra Safe Nuclear Corporation on a joint venture called Global First Power (GFP) to deploy off-grid SMRs for remote applications, starting with a proposed demonstration project at the Canadian Nuclear Laboratories site in Chalk River, Ontario, in the mid-2020s. In 2019, the demonstration project commenced a federal EA and submitted a "Licence to Prepare Site" application to the CNSC.
- In 2020, Bruce Power and Westinghouse entered into an agreement to explore applications of the company's eVinci 5 MW micro-reactor in Canada. In November 2021, Bruce Power and Westinghouse released a feasibility study that concluded that the eVinci would be cost-effective for replacing diesel fuel to supply electricity, heat, and other energy needs for remote communities and mines in Canada's north.
- In April 2022, OPG and the Tennessee Valley Authority (TVA) announced a partnership to develop advanced nuclear technology as an integral part of a clean energy future and creating a North American energy hub. The agreement allows the companies to coordinate their explorations into the design, licensing, construction, and operation of SMRs. No exchange of funding is involved, but the collaboration agreement will help OPG and TVA reduce the financial risk that comes from development of innovative technology, as well as future deployment costs.
- In July 2022, OPG announced a framework agreement with X-Energy to evaluate and consider deployment of their Xe-100 technology in Ontario with OPG as the operator. The focus of this Stream 2 technology will be to assist industrial companies to decarbonize through the provision of both high-temperature thermal and electrical energy. This framework agreement also contemplates support of this technology if deployed elsewhere in Canada.

Looking Ahead

The Government of Ontario will continue to advance the Darlington SMR project, Canada's first grid-scale SMR, as well as monitor developments related to off-grid SMR projects, including GFP's proposed off-grid micro-SMR demonstration project at Chalk River, Ontario, which is currently progressing through regulatory approvals at the CNSC.

Ontario will also work with the province's experienced nuclear operators and world-class nuclear supply chain to seek opportunities to advance Ontario's and Canada's leadership in the global SMR market by leveraging Ontario's early mover status for on-grid and off-grid SMRs. It will also continue engaging with provincial and federal government partners as well as utilities and other stakeholders in several areas related to SMR deployment, including:

- an effective and efficient nuclear regulatory framework for SMRs;
- federal financial and policy support for SMRs as a clean energy technology that is key to achieving Canada's greenhouse gas emission reduction targets;
- SMR nuclear waste management; and
- Indigenous and public engagement on SMRs.

The SMR Strategic Plan also identifies a strong domestic supply chain as a critical success factor for the deployment of SMRs in Canada. Ontario will continue to work with partner provinces, utilities, and SMR technology developers to engage suppliers and leverage skilled workforces to ensure readiness to support SMR projects. The partner provinces will also work together and collectively engage with the federal government to ensure readiness of the nuclear supply chain to support SMR deployment, with a focus on:

- availability of skilled labour and supply chain capacity;
- enhanced innovation capabilities including leveraging laboratories, research centres and educational institutions; and
- development of innovative advanced manufacturing techniques to reduce SMR costs.

Organization of Canadian Nuclear Industries (OCNI)

The Organization of Canadian Nuclear Industries (OCNI) is the leading voice in Canada's nuclear supply chain, and actively promotes the production of safe, clean, and reliable nuclear baseload electricity as a central part of Canada's balanced electricity generation portfolio.

OCNI received three actions under the SMR Action Plan:

OCN01 – Develop a Pan-Canadian SMR Supply Chain;

OCN02 – Promote Use of Advanced Manufacturing Methods to Reduce SMR Costs;

OCN03 – Promote SMR Workforce Diversity and Indigenous Engagement.

In February 2022, OCNI submitted a funding request to the Atlantic Canadian Opportunities Agency (ACOA) for a new program titled Ready4SMR in New Brunswick. The program focuses on capacity building, engagement, and increasing Indigenous involvement through regional partners, such as the North Shore Mi'kmaq District Council. The funding for the program was approved in June 2022, allowing OCNI's Brian Fehrenbach to initiate the two-year program in July 2022. The program will start with New Brunswick-based companies who complete a self-assessment with Opportunities New Brunswick. OCNI expects to have hired a Regional Project Coordinator by September 2022 to begin activities with companies that are identified in September by ONB, starting with a specific quality transition plan for each company.

In support of the Advanced Manufacturing goal, OCNI launched the Canadian Advanced Manufacturing in Nuclear Alliance, a forum for nuclear-focused companies to discuss the use and adoption of advanced manufacturing methods, in collaboration with academic institutions that are also active in this area. This forum is open to OCNI members as well as companies who are participating in the Ready4SMR program.

Finally, OCNI has increased its capacity to support the development of opportunities for Indigenous Communities to work towards the goal of an inclusive pan-Canadian supply chain. These activities are led by Terri-Lynn Woods and are focused on ensuring inclusivity in developing the New Brunswick nuclear supply chain. OCNI has also bolstered our Indigenous Relations program by achieving Bronze certification in August from the Progressive Aboriginal Relations Program of the Canadian Council for Aboriginal Business. **Looking Ahead**

Following the implementation of the Ready4SMR program in New Brunswick, OCNI plans to pursue a similar program through PrairiesCan in Saskatchewan in the fall of 2022. In preparation, MOUs were signed with the Saskatchewan Industrial and Mining Association and the First Nations Power Authority, and OCNI will also seek to share office space in Regina. OCNI is increasing its presence in Saskatchewan by participating in energy industry events, including being a keynote speaker at the Saskatchewan Mining Association's annual conference and presenting at the Saskatchewan Energy Forum in September.

We have participated in initial planning meetings with the Province of Saskatchewan and look forward to submitting a funding application later this year.

SaskPower

SaskPower is Saskatchewan’s leading energy provider. We are defined by our commitment to support economic growth and enhance quality of life in our province. Our corporate mission: ensuring reliable, sustainable, and cost-effective power for our customers and the communities we serve. SaskPower has achieved the Sustainable Electricity Company designation from the Canadian Electricity Association, which recognizes SaskPower’s commitment and work surrounding social responsibility and sustainable development.

SaskPower’s team of 3,000 permanent full-time employees manages over \$12 billion in generation, transmission, distribution, and other assets. SaskPower operates 4,000 megawatts (MW) of electricity generation facilities from coal, natural gas, hydro, wind, and solar. SaskPower also purchases electricity from independent power producers and neighbouring jurisdictions, which brings our total available generation capacity to more than 5,200 MW.

SaskPower is on track to reduce greenhouse gas (GHG) emissions by at least 50% from 2005 levels by 2030 and achieve net-zero emissions by 2050. To achieve these aggressive and challenging emissions targets, SaskPower will phase out all its conventional coal generation by 2030 while adding up to 3,000 MW of renewable generation from wind, hydro, and solar by 2035, and as much as 1,200 MW of nuclear power from Small Modular Reactors (SMRs) by 2043. The expansion of SaskPower’s intermittent wind and solar generation will be supported by the deployment of additional natural gas, battery energy storage, and a major expansion in regional transmission infrastructure to neighbouring jurisdictions.

In 2021, SaskPower advanced planning work to support the deployment of SMRs. In June 2022, SaskPower announced the selection of the GE-Hitachi BWRX-300 SMR for deployment in Saskatchewan and expects to finalize the selection of a site for the first 600 MW of nuclear power from SMRs by the end of 2024.

Update on SMR Action Plan Commitments

SKP01 – Recommendation to proceed with SMR planning and project development—completed: In 2021, SaskPower was authorized to advance with SMR project development leading to a decision on whether to proceed with construction in 2029.

SKP02 – Industry partnerships to advance SMR development in Canada—ongoing: SaskPower continues to actively engage with industry partners to advance nuclear power development in Canada. As a member of the CEO SMR Forum, SaskPower continues to work closely with OPG, Bruce Power, and New Brunswick Power to engage with the Government of Canada in the following priority areas:

- Development of a secure nuclear fuel supply for Canada’s emerging SMR fleet;
- Regulatory predictability and efficiency in the licensing and impact assessment processes;
- Federal Investment to support early mover SMR deployment in Canada; and
- Advancing long-term plans for Canada’s radioactive waste streams.

SKP03 – Fleet Deployment Pathways—ongoing: SaskPower has collaborated with OPG since 2019 to assess SMR technologies for fleet-based deployment in Canada. In 2021, OPG selected the GE-Hitachi BWRX-300 for deployment in Ontario. In 2022, SaskPower selected the same technology for deployment in Saskatchewan. SaskPower is also engaging with industry partners to assess the potential for fleet-based deployment of advanced reactors in Canada to support industrial decarbonization.

SKP04 – Indigenous Engagement—ongoing: SaskPower initiated early engagement with indigenous partners in 2019 to discuss the potential for SMR deployment in Saskatchewan as part of SaskPower’s long-term electricity supply strategy, two years before a decision to advance with SMR project planning was made and a full decade before a decision on whether to proceed with construction will be considered. SaskPower will build on its engagement with First Nations and Metis communities in 2022, and throughout the full life of SMR development, operation, and decommissioning.

Looking Ahead

Following the selection of a site, SaskPower will submit an Initial Project Description to the Impact Assessment Agency of Canada in early 2025, and apply for a Licence to Prepare a Site to the Canadian Nuclear Safety Commission (CNSC) in 2027 and a Licence to Construct in 2028. SaskPower will decide on whether to proceed with construction of its first GE-Hitachi BWRX-300 in 2029 following approval by the CNSC of a Licence to Construct and an approved Impact Assessment by the Impact Assessment Agency of Canada. With these approvals, SaskPower expects construction to take approximately three years, leading to a commercial operating date for the first 300 MW of nuclear power in Saskatchewan in 2034, with the potential to add another 300 MW at the same site by 2037.

Potential Development of Generation IV Advanced SMRs in Saskatchewan

SaskPower selected the Generation 3+ GE-Hitachi BWRX-300 for deployment in Saskatchewan because this innovative technology is well suited to generate reliable baseload electricity for the province as part of a broader plan to support the economically and environmentally sustainable transition to net zero by 2050.

However, electricity generation is responsible for just 20% of Saskatchewan’s GHG emissions. Achieving net zero for the province will also require the decarbonization of heavy industry and transportation. Generation IV Advanced SMRs such as the X-Energy Xe-100, the Terrestrial Energy SMR being developed in Ontario, and the Advanced Reactor Concepts ARC-100 being developed in New Brunswick have strong potential to support industrial decarbonization in Western Canada.

SaskPower will continue its SMR technology evaluation in the fall of 2022, as well as an assessment of the potential for deployment of advanced SMRs in Saskatchewan by the mid-to late 2030s to meet the growing demand of Saskatchewan’s heavy industries for emissions-free electricity and thermal energy (heat).

Conclusion

It is energizing to see the level of work and collaboration that has been taking place in the nuclear arena over the past few years. However, we recognize that there is still work to be done to maintain the momentum required to fully capitalize on the opportunity that the SMR represents for Canada. The SMR Action Plan Leadership Table will continue to meet biannually and work with the full spectrum of Canada's nuclear energy sector to develop an SMR sector and supply chain that will benefit Canadians economically, environmentally, and socially.