

# CHARGING AHEAD: ALBERTA AND SASKATCHEWAN JOINING FORCES WITH ONTARIO AND NEW BRUNSWICK ON SMALL MODULAR REACTORS

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On April 14, 2021, the government of Alberta announced that it had officially entered into the memorandum of understanding (“**MOU**”)<sup>[1]</sup> previously signed by the provinces of Saskatchewan, New Brunswick and Ontario regarding small modular nuclear reactors (“**SMRs**”). Concurrently, SaskPower (Saskatchewan’s principal electricity utility), Ontario Power Generation (Ontario-owned electricity generator), Bruce Power (Ontario nuclear power station) and NB Power (New Brunswick’s principal electricity utility) published a feasibility report (the “**Feasibility Report**”) setting out a time frame for deploying SMRs and measuring their feasibility against other energy sources.<sup>[2]</sup>

This Bulletin offers a summary of what SMRs are, how the Feasibility Report and MOU coincide with existing federal and provincial plans for SMRs, how Alberta and Saskatchewan may try to utilize SMRs, and the Feasibility Report’s next steps for implementation.

## What are SMRs?

SMRs are nuclear fission reactors. Their name comes from their small physical size and power output, portable and scalable structure, and function as a power source.<sup>[3]</sup> SMRs are generally classified as nuclear reactors creating up to 300 megawatts (MW) of electricity.<sup>[4]</sup> By comparison, Ontario’s Bruce Power nuclear power plant has a capacity of about 6,400 MW.<sup>[5]</sup> In turn, SMRs are more affordable to produce through factory construction, relatively portable to ship and easier to install, whether for large or small electricity grids or off-grid locations.

Nuclear power has a long history in Canada: it has been used for over sixty years and accounts for approximately 15% of Canada’s electricity needs. We have established expertise and infrastructure across the country. In addition, Canada has a strong uranium industry (most nuclear power plants use uranium atoms for nuclear fission), as the second-largest producer in the world, with most of this uranium being mined in Northern Saskatchewan. Approximately 75% of the uranium exported is for nuclear purposes. Moreover, Canada has also developed unique nuclear reactor technology called CANDU and currently sells this

technology commercially to several countries.

SMR technology is not new; it was first developed in conjunction with reactor technology over fifty years ago. It has many uses, including producing energy for electricity, hybrid energy systems, district heating, water desalination, and quality steam for industrial applications. SMRs produce more energy while using a smaller footprint without emitting greenhouse gases during generation. This is especially notable compared to the emissions from diesel fuel, which is currently a popular fuel source in many remote communities and industrial sites.<sup>[6]</sup> Given Canada's recent commitment to reduce its greenhouse gas emissions by 40-45% from 2005 levels by 2030, SMRs may provide one feasible solution to meeting this ambitious goal.

### **Why are these provinces getting involved with SMRs now?**

#### *Ontario and New Brunswick*

Although nuclear power has a long history in Canada, only some provinces have been early adopters. Ontario relies heavily on nuclear power generation; nuclear energy is the province's largest source of power generation. New Brunswick has also utilized nuclear energy generation to meet the majority of the province's electricity needs. Other Canadian provinces such as British Columbia and Manitoba have traditionally relied on hydro energy, so they have not needed to consider large-scale nuclear projects to meet their energy needs.

#### *Saskatchewan*

Historically, Saskatchewan has primarily relied on coal and natural gas for its energy needs, and it did not need a large nuclear plant. However, given its abundance of uranium and expertise in the industry, SMRs are an area where there is significant potential for growth, and its government is attuned to this opportunity.

Saskatchewan's Growth Plan: The Next Decade of Growth 2020-2030,<sup>[7]</sup> which is a roadmap for growing the province and developing a strong economy and communities, identifies thirty goals, including the specific goal of "reducing carbon emissions in electricity production and advancing the development of zero-emission small modular reactor technology using Saskatchewan uranium." By all indications, Saskatchewan and its provincial utility SaskPower are committed to developing SMR technology to boost uranium production, enhance nuclear research and expertise, and develop ancillary construction and infrastructure jobs.

#### *Alberta*

Until recently, Alberta has not focussed on nuclear power generation. The last time it was discussed by the provincial government was in 2009, when the Minister of Energy commissioned a Report on Nuclear Power<sup>[8]</sup> prepared by the Nuclear Power Expert Panel, and the government undertook a public consultation on nuclear energy.<sup>[9]</sup> The Report discussed the issues associated with possible nuclear power generation in Alberta, but did not provide any recommendations regarding the feasibility of constructing a nuclear power generating

facility in the province. Instead, an assessment was made about how nuclear energy may be considered amongst other fuel sources, including coal and natural gas. Much attention was given to nuclear waste disposal, including recycling uranium and plutonium and potential storage options for spent fuel. Following the consultation, the government announced<sup>[10]</sup> that any nuclear power generation projects would be considered on a case-by-case basis and that no public funding would be provided for nuclear power proposals. However, based on the recent commitment to enter the MOU, it appears that Alberta has re-assessed the opportunities that nuclear energy may present and has recognized that it may be left behind as other provinces seek to grow the industry. Interestingly, unlike Saskatchewan, Alberta's Recovery Plan,<sup>[11]</sup> which outlines the province's plan to recover from the COVID-19 pandemic, references the goals of developing the natural gas, petrochemical, hydrogen, and carbon capture and storage industries, but no mention is made of nuclear energy. That said, when the Alberta government announced the MOU,<sup>[12]</sup> emphasis was placed on Alberta's expertise in responsible energy development, bountiful uranium supplies, and the potential to utilize SMRs in the oil sands, remote communities and industrial sites. In addition, SMRs were noted as a potential replacement for some of the province's coal-fired plants, which are anticipated to be decommissioned in the future.

### **Canada – A Future Global Leader**

In sum, SMR technology is an area where Canada is well-positioned to be a global leader. In partnership with interested provinces, territories, and power utilities, Natural Resources Canada committed in 2018 to develop a Roadmap for the future of SMRs in Canada.<sup>[13]</sup> The Roadmap aimed to gather feedback on the direction for the possible development and deployment of SMRs in Canada and create several recommendations for proceeding with the deployment. Following the Roadmap, participating organizations, including various federal and provincial government departments, Indigenous communities, municipalities, power utilities, industry organizations, civil society and institutions, academia, and heavy industry, contributed to the development of an SMR Action Plan. Alberta Innovates and SaskPower represented Alberta's and Saskatchewan's interests, respectively.

The SMR Action Plan recognizes a number of principles in developing nuclear technology, including supporting reconciliation with Indigenous and Northern communities as essential partners, developing safer and more affordable clean energy, building on and utilizing existing expertise in energy innovations and technology, and developing jobs and economic benefits for Canadians. Perhaps most notably, by acting as an early adopter of SMR technology and deployment, Canada would be in a favourable position to be a frontrunner in the field. It could develop policy, have strategic geopolitical influence, and ensure that the technology is within safe hands. Under the SMR Action Plan, the aim is to develop technology, intellectual property, and supply chains in Canada to support both domestic and international markets within the next 15

years. In addition, the Plan recognizes that each jurisdiction of Canada has areas of experience through industry, academic institutions, research laboratories, engineering and manufacturing, and therefore, there is an opportunity to collaborate and support the development of SMRs in many ways, including technology, export industry, and international standards and policies development. Further, the Plan envisions that nuclear energy will not replace Canada's other energy sources but will be integrated alongside them, thereby accelerating Canada's plans for a low-carbon future.

### **Provincial Endorsement of SMR Action Plan**

On December 18, 2020, the Government of Alberta and Alberta Innovates endorsed the SMR Action Plan Statement of Principles. They emphasized the importance of research and development for SMR technology to grow Alberta's economy and improve environmental performance.<sup>[14]</sup> Alberta also committed to several action items, including connecting SMRs to the Alberta Innovates Strategic Priorities, under the category of Clean Technology; supporting SMR technology development through the 2030 Innovation Targets project funding; assessing the techno-economic feasibility of SMRs for in situ steam-assisted gravity drainage (SAGD) operations, surface mining, and bitumen partial upgrading facilities; developing a mineral strategy as part of the Alberta's Recovery Plan to develop uranium, lithium, vanadium, and rare earth elements; and fostering holistic participation by partnering with Indigenous communities and interested parties and developing diversity initiatives to support women in the industry. The last of the action items was to join the MOU. Aside from assessing the feasibility of SMRs for mining operations, as of the date of this bulletin, the other action items are all in progress.

The Government of Saskatchewan also endorsed the SMR Action Plan on December 18, 2020. Like Alberta, it emphasized Saskatchewan's strategy of advancing technology and innovation to attain environmental and economic goals. Emphasis was also placed on Saskatchewan's *Prairie Resilience*, which is the province's climate change strategy. Together with the Government of Saskatchewan's Growth Plan 2020-2030, and through collaboration with SaskPower, the province is committing to reducing carbon emissions from electrical generation by advancing SMRs and achieving up to 50% of power from renewable sources by 2030. Saskatchewan's plans also include an emphasis on collaboration with Ontario, New Brunswick and Alberta through the MOU and Government of Canada contributions through funding and financial tools. Saskatchewan has also committed to several action items, including deploying SMRs in the province through an initial fleet-based approach by 2032; developing climate change and clean energy policies to allow for SMR deployment in collaboration with the Sylvia Fedoruk Canadian Centre for Nuclear Innovation at the University of Saskatchewan and other interested parties; developing an SMR Unit within the Ministry of Environment to coordinate SMR policies and programs; developing policies and framework to advance SMR deployment, including the ability to incorporate SMRs within the electrical grid, and opportunities to leverage financing, and

labour; and promoting uranium mining and developing a strong value chain with Canadian and international partners.<sup>[15]</sup>

### **What Does the Feasibility Report Propose?**

The Feasibility Report builds on the Roadmap and SMR Action Plan. It is broken down into three streams of SMR project proposals.

Stream 1 concerns a grid-scale SMR of roughly 300 MW at the already-licensed Darlington, Ontario site, with the goal of generating power by 2028, plus four units in Saskatchewan, targeting an in-service date of 2032. The utility companies behind the Feasibility Report aim to choose the developer and technology by the end of this year. The overarching theme of Stream 1 is helping to “create flexibility and growth opportunities for communities connected to the grid”<sup>[16]</sup> through SMRs.

Stream 2 comprises two 4th generation SMR designs being developed in New Brunswick, with demonstration units located at the Point Lepreau facility. New Brunswick aims to have the ARC Clean Energy demonstration unit operational by 2030 and Moltex Energy’s waste recycling facility and reactor operational by the early 2030s.<sup>[17]</sup> 4th generation refers to the stage of development of SMRs, as the cutting edge design in this field, developed through the Generation IV International Forum,<sup>[18]</sup> which includes Canada. The theme here is “support[ing] advancement in nuclear technology and innovative methods to reduce nuclear by-products.”<sup>[19]</sup>

Stream 3 involves a set of micro SMRs that could help replace diesel usage in remote locations and mines. Ultra Safe Nuclear Corporation is designing a 5 MW gas-cooled reactor demonstration unit at Chalk River, Ontario, which aims to be operational by 2026. The hope is that this unit offers a road map for future 10 MW plants that can be deployed at mining sites or remote locations.<sup>[20]</sup> This Stream’s theme is “bring[ing] affordable, clean energy to remote communities and mines.”<sup>[21]</sup>

The Feasibility Report anticipates that these advanced technologies can begin to be deployed in Alberta or Saskatchewan by 2030.

### **What is the Future of SMRs?**

SMRs have a promising future both in domestic and international markets. Firstly, the signatory provinces to the MOU see SMRs as a potential fuel source for Canada’s natural resource projects, such as in Alberta’s oilsands, plus an alternative fuel source for remote or small-grid communities such as those in Northern Canada. In addition, there may be significant export opportunities for SMRs given the large global market for SMRs and Canada’s strategic position as an energy and geopolitical leader. Canada is already along this path as it is exporting SMRs to several other countries.

By being open to new opportunities and working together, the provinces will be able to collaborate on shared aspirations, including job development, economic diversification, ambitious research and development, and establishing leadership in an emerging niche within the energy industry.

As Saskatchewan's Premier Scott Moe explained:

[t]oday's announcement confirms the commitment of our provinces to advancing SMRs as a clean energy option, leveraging the strength and knowledge of each of our jurisdictions. This study confirms the feasibility of small modular reactors in Canada and outlines a path forward to deploy this new clean, safe, reliable and competitively priced power. This new technology will help attract investment, create high-skilled jobs and contribute to our growing economy.

### **What happens next?**

The next deliverable from the MOU to watch for is a joint strategic plan developed by the provinces, with a target completion date of spring 2021.<sup>[22]</sup> This plan promises to “identify steps required within each stream to achieve project commitments in a timely manner, while identifying key risks, mitigation measures, as well as the policy and regulatory analysis required to enable and govern expanded deployment of nuclear technology in Canada.”<sup>[23]</sup> It is anticipated that the joint strategic plan will build on the commitments made in the SMR Action Plan, as it seems unlikely that the provinces will commit to further or new action items. Instead, the joint strategic plan will ideally set out further deliverables and timelines to continue implementing the SMR Action Plan towards deploying SMR technology by the end of the decade.

Moreover, the regulation of SMRs in Canada by the Canadian Nuclear Safety Commission (“**CNSC**”) is still a work in progress.<sup>[24]</sup> For example, it is currently unclear whether the CNSC will allow type certification, whereby the SMR manufacturing process is regulated as a whole, without certifying every individual SMR produced.

### **Conclusion**

While the provincial and federal governments are in the process of developing SMR policies and frameworks, this is a favourable time for project proponents to take advantage of a growing industry and involve themselves from the early stages as leaders in the next phase of SMR development. This means taking advantage of funding and grant programs, partnering with existing Canadian companies to develop Canadian-made supply chains, and building on existing energy expertise to create scientific and innovation hubs and research centres. By leveraging existing strengths and resources, Canada, and more particularly Alberta and Saskatchewan, are well-positioned to deploy SMRs for a safe, reliable and affordable energy future, all while contributing to a strong economy and working towards reducing greenhouse gas emissions.<sup>[25]</sup>

As part of McMillan's expanded [environmental, social and governance \(ESG\) initiative](#), we are eager to help you

and your business identify areas of opportunity, both in SMR opportunities and ESG as a whole. We will continue to provide updates regarding the MOU's joint strategic plan, the SMR Action Plan, and how businesses can expect SMRs to impact the existing resource and energy sectors in Alberta, Saskatchewan and the rest of Canada.

- [1] [Collaboration Memorandum of Understanding](#) dated December 1, 2019, between the Provinces of New Brunswick, Ontario and Saskatchewan.
- [2] SaskPower, Ontario Power Generation Bruce Power and NB Power, "[Feasibility of Small Modular Reactor Development and Deployment in Canada Report](#)" (March 2021).
- [3] [Canada's Small Modular Reactor SMR Action Plan](#).
- [4] Press Release, Government of Alberta, "[Alberta signs small modular nuclear reactor MOU](#)" (April 14, 2021); See also Canadian Nuclear Safety Commission, "Small modular reactors" (last modified November 19, 2020).
- [5] Bruce Power, "[The Ontario Energy Report](#)" (2019).
- [6] Feasibility Report, *supra note 2*. The Pembina Institute, "[Diesel Reduction Progress in Remote Communities](#)", presented at the Renewables in Remote Communities Conference 2021, April 13–16, 2021.
- [7] [Saskatchewan's Growth Plan: The Next Decade of Growth 2020-2030](#).
- [8] [Nuclear Power Expert Panel](#): Report on Nuclear Power and Alberta.
- [9] [Alberta Nuclear Consultation](#).
- [10] [Province Releases Results of Nuclear Consultation](#).
- [11] [Alberta Recovery Plan](#).
- [12] [Premier Kenney announces an agreement in small-scale nuclear technology](#) (August 8, 2020).
- [13] [Canada's Small Modular Reactor SMR Action Plan](#).
- [14] [SMR Action Plan: Alberta Chapter](#).
- [15] [SMR Action Plan: Alberta Chapter](#).
- [16] Feasibility Report, *supra note 2* at 20.
- [17] Feasibility Report, *supra note 2* at 4.
- [18] Generation IV International Forum, "[Gen IV Reactor Design](#)" (last updated September 16, 2013).
- [19] Feasibility Report, *supra note 2* at 20.
- [20] Feasibility Report, *supra note 2* at 5.
- [21] Feasibility Report, *supra note 2* at 20.
- [22] Feasibility Report, *supra note 2* at 6.
- [23] Feasibility Report, *supra note 2* at 6.
- [24] Andrew Dusevic, [Risk-Informed Decision Making and the Regulation of Small Modular Reactors](#) (LLM Thesis, University of Saskatchewan, 2019).
- [25] For more information on Canada's emissions goals, please see our bulletins here: [Canada Legally Commits](#)

[to Net-Zero Emissions by 2050, Fueling the Future: Canada's Plan to Reduce Greenhouse Gas Emissions under the Clean Fuel Regulations.](#)

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### **A Cautionary Note**

The foregoing provides only an overview and does not constitute legal advice. Readers are cautioned against making any decisions based on this material alone. Rather, specific legal advice should be obtained.

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