

Including Nuclear in Alberta's Energy Mix

Issue

Small Modular Reactors are an attractive nuclear energy solution that can be clean sources to power remote northern communities, reduce emissions in industry, and reduce Alberta's energy grid dependence on fossil fuels.

Background

As the second-largest producer and fourth-largest exporter, Canada made up 13% of global production of uranium in 2019, a key ingredient in producing nuclear energy. Nuclear energy in Canada dates back to 1942 and Canada has even developed a renowned nuclear reactor technology, *CANDU*, that is used on Canadian soil and internationally. In 2018, approximately 15% Canada's electricity grid was sourced by nuclear power.^{1,2} Nuclear is a clean energy supply that does not emit carbon and has great potential to be increased within in Canada's energy mix to work towards our ambitious net-zero targets.

Small Modular Reactors (SMRs) have gained popularity in Canada as a smaller scale nuclear energy source. Regular-sized nuclear reactors used in Canada will usually produce about 800 megawatts of electricity which is "enough to power 600,000 homes at once", while Small Modular Reactors "can generate between 200 and 300 megawatts".³ "The technology is also small enough to be transported on a truck, ship or train, and has been touted by the federal government as safer than traditional nuclear reactors".⁴ The Canada Nuclear Safety Commission (CNSC) regulates SMR projects with the purpose of protecting the "health and safety of Canadians and the environment."⁵

Both the federal and provincial government have signaled strong support for SMRs. The Government of Canada has released their SMR Roadmap in partnership with Alberta Innovates, and their SMR Action Plan endorsed by the Government of Alberta and Alberta Innovates.^{6,7}

According to Canada's SMR Roadmap, SMRs can be used for three major purposes:

- *On-grid power generation, especially in provinces phasing out coal in the near future. Utilities want to replace end-of-life coal plants with non-emitting base-load plants of similar size.*
- *On- and off-grid combined heat and power for heavy industry. Oilsands producers and remote mines would benefit from medium-term options for bulk heat and power that would be more reliable and cleaner than their current energy sources.*

¹ <https://www.nrcan.gc.ca/science-data/data-analysis/energy-data-analysis/energy-facts/uranium-and-nuclear-power-facts/20070>

² <https://www.atomicheritage.org/location/Canada>

³ <https://www.cbc.ca/news/canada/calgary/nuclear-energy-alberta-ucp-small-scale-modular-reactors-government-of-canada-1.5677983>

⁴ <https://www.cbc.ca/news/canada/calgary/nuclear-energy-alberta-ucp-small-scale-modular-reactors-government-of-canada-1.5677983>

⁵ <https://nuclearsafety.gc.ca/eng/reactors/research-reactors/other-reactor-facilities/small-modular-reactors.cfm>

⁶ <https://smrroadmap.ca/>

⁷ <https://smractionplan.ca/>

- *Off-grid power, district heating, and desalination in remote communities. These currently rely almost exclusively on diesel fuel, which has various limitations (e.g., cost, emissions). Renewables and batteries can mitigate these limitations to some extent for residential power, but may not supply building heat, nor are they likely to offer reliable bulk energy to open up economic development.*

Over 90% of Alberta's electricity grid is powered by fossil fuels.¹ By contrast, Ontario's electricity grid is currently around 60% nuclear, which demonstrates nuclear's effectiveness and potential for expansion in Canada and Alberta.²

While nuclear projects have been attempted in the past in Alberta, there have been no successful builds to date. In August of 2020, Alberta signed onto an MOU with Ontario, Saskatchewan, and New Brunswick, supporting the "advancement and deployment" of SMRs. Premier Jason Kenney noted the potential to power remote communities, the opportunity for economic diversification, and the potential for job creation and reduced GHG emissions.³

We applaud the AB Government for their efforts to decarbonize energy production in the province, the Minister of Environment and Protected Areas, Rebecca Schulz, recently announced a \$7 million investment in support of Cenovus Energy's SMR study. The study, expected to cost nearly \$27 million, will evaluate the feasibility of utilizing SMRs to provide the energy inputs needed to support oil sands production via steam-assisted gravity drainage.⁴

With both the federal and provincial government supporting SMRs it will be important that policy and regulation is harmonized and streamlined to allow for ease of research and development, and implementation. Also vital, will be a strong partnership between government, industry, and stakeholders, such as indigenous groups.

One key challenge with implementing increased nuclear energy solutions will be public acceptance. Despite a very strong historical track record of safety, nuclear technology brings a level of public concern. Chris Varcoe of the Calgary Herald discussed nuclear in Alberta stating, "Examining the case for small modular reactors makes sense, although there's a lot more work to do – and this will eventually include the need to educate Albertans about the merits and challenges about this form of energy..."⁵

New technologies are emerging in the UK to significantly reduce SMR production time, increase build quality for safety while reducing costs which should be considered for new SMR's to be built in Alberta.⁶

¹ <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-alberta.html>

² <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-ontario.html>

³ <https://www.cbc.ca/news/canada/calgary/nuclear-energy-alberta-ucp-small-scale-modular-reactors- government-of-canada-1.5677983>

⁴ New funding to study small modular reactors | alberta.ca

⁵ <https://calgaryherald.com/opinion/columnists/varcoe-alberta-studies-nuclear-power-again-this-time-its-small-modular-reactors>

⁶ [Nuclear SMR welding breakthrough: A year's work now takes a day \(newatlas.com\)](https://www.newatlas.com/nuclear-smr-welding-breakthrough-a-year-s-work-now-takes-a-day/)

The Alberta Chambers of Commerce recommends that the Government of Alberta:

1. Work with the federal government to streamline and coordinate regulatory processes to ensure that its policies, such as environmental regulations and construction red tape, do not unintentionally interfere or create disincentives for SMR technology;
2. Create a partnership with all stakeholders to support capacity-building initiatives and new technologies. This would include engagement with the public, industry leaders, and Indigenous communities, to develop a robust knowledge base; and,
3. Develop and promote an education and awareness campaign to engage with the public on the safety and benefits of nuclear technology and SMRs specifically.