

SMALL MODULAR NUCLEAR REACTORS

*A backgrounder for SES
By Ann Coxworth, November 2018*

What are Small Modular Reactors (SMRs)?

A limited number of very small nuclear reactors designed for specialised uses have been around for many years. These include power supplies for nuclear submarines, 'Slowpoke' reactors for heating buildings and various research reactors in universities.

What is being talked about now are power reactors up to 300 MW in size that could supply electricity to communities or industrial sites. While over 150 potential designs have been suggested world-wide, none has yet been developed to the point of commercialisation. The idea is that, given a large enough market, SMRs could be mass-produced in factories rather than having to be built on-site.

What are the supposed advantages of SMRs?

SMRs are promoted as a way of providing electrical power to small and isolated communities, mine sites etc. that are currently off the grid and using diesel generators. This is described as a way of responding to the climate change crisis and the need to drastically cut fossil fuel use. The current commercial power reactors are too large (at around 1000MW) to fit into many distributed power grids.

SMRs are also seen as a way of salvaging Canada's fading nuclear power industry and developing new markets overseas.

Why haven't they been developed?

No company has been willing to invest the large sums necessary to commercialise SMRs. Many countries (e.g. Jordan, Ghana, Indonesia) claim to be interested, but not to the point of investing. There is a lost economy of scale in moving from very large to small generation systems. The hope of counteracting that loss by mass producing SMRs in factories would require production of thousands of SMRs to realise. The hope of lowering costs as knowledge about how to achieve efficiencies is gained is challenged by the experience in the existing reactor market, where costs have increased rather than decreased with construction experience.

SMRs would have most of the same environmental disadvantages of large reactors. They would generate the same kind of wastes, but in many scattered locations rather than in a few centralized sites.



What's happening in Canada?

On November 7th Natural Resources Canada released a report called 'Canadian Small Modular Reactors Roadmap'. This was the product of a 10-month consultation with the nuclear industry, power utilities (including SaskPower), government regulators and some Indigenous groups. It describes a vision of a huge economic opportunity for Canada that must be grasped quickly. It suggests:

"First-movers in this area of high-tech innovation will lock in significant benefits. For Canada, this could mean anchoring jobs, Intellectual Property, and supply chains here; positioning Canada as a policy leader and international standard-setter for strategic influence; and delivering on our climate change and clean energy commitments" ...

"Early-mover advantage will be critical to capturing global market share... For the international market, the estimated total global export potential of SMRs is approximately CDN\$150 billion per year for 2030 to 2040."

However, it is noted that the public and Indigenous groups have concerns, and there is a need for "engagement and knowledge-sharing".

The Roadmap provides a list of priority recommendations. These include:

- That governments, utilities and industry should support demonstration projects (Chalk River is suggested as a proposed site);
- That financial risks should be shared between governments, industry and utilities;
- That legislation and regulations should be modernised "to ensure an economically viable and timely pathway" (briefing notes from the Canadian Nuclear Safety Commission warn that lengthy regulatory delays could kill a promising industry and suggest that small reactors be exempted from lengthy Impact Assessments under the new Impact Assessment Act);

The federal government is currently reviewing the Roadmap recommendations and plans to develop an action plan in the near future.

Concerns about these recommendations include the proposed exemption of SMRs from Impact Assessment, and the lack of transparent, public dialogue.

