SMALL MODULAR REACTOR BASICS

What are Small Modular Reactors (SMRs)?

Small modular reactors can provide **reliable low-carbon electricity and heat energy** while being much smaller in size and power output than traditional nuclear power reactors. These innovative reactors are designed to be scalable and built economically in factory settings, rather than onsite. This allows for clean energy that can be more **quickly deployed** to meet the urgent need for low-carbon electricity sources.

How can we use SMRs?

Next generation SMRs are more widely applicable than current power reactors, offering a unique opportunity to:

- Provide process heat for natural resource extraction, heavy GHG emitting manufacturing operations such as steel and cement, and other innovative technologies such as hydrogen production.
- Support larger grids as electricity demands grow.
- Provide heat and electricity to smaller grids, like those in remote communities.
- Better partner with renewables to provide reliable clean energy.

Do reactors need to be big?

Most traditional nuclear power reactors are built to a scale of 600 to 1000 megawatts of electricity (MWe), but they can be (and are) much smaller. SMRs generate around 50 to 300 MWe, while Very Small Modular Reactors (vSMRs) generate less than 50 MWe. Examples of small nuclear reactors have existed since the beginning of reactor technology, including marine propulsion reactors, demonstration units like Canada's Nuclear Power Demonstration reactor, and research units like Canada's National Research Universal and Slowpoke reactors at universities and research sites across Canada.

What is the SMR potential in Canada?

Canadians have the technical, project and nuclear operations expertise to be at the forefront of the SMR revolution, which could bring great economic benefits (including jobs) while supporting Canada's national commitment of net-zero GHG emissions by 2050. The deployment of SMRs in Canada would drastically reduce GHG emissions by replacing fossil-fuel power generation.

Working with Indigenous communities that express an interest, Canada has an especially promising market for vSMRs. vSMRs could promote health and economic growth by displacing unhealthy, expensive diesel generators and their high carbon emissions.

In fall 2020, Natural Resources Canada launched the SMR Action Plan, bringing together over 100 partners committed to realizing the potential of SMRs in Canada. This collective interest and effort from stakeholders is key to making Canada a world leader in SMR technology.

Is there international interest in SMRs?

With an estimated global export potential of $150 billion per year from 2030 to 2040, Canada's interest in developing and deploying SMRs is shared worldwide. SMRs are internationally recognized as an important part of the climate change toolkit, particularly in the USA, UK, Russia, France, China and Canada and by international expert bodies like the International Energy Agency. There is increasing acceptance in policy circles that nuclear has a major role to play in the world's shift toward low-carbon energy and greater clean electricity to improve standards of living.

How will SMRs be regulated?

SMRs will be regulated by Canada's world-respected nuclear regulator: The Canadian Nuclear Safety Commission (CNSC). The CNSC's regulatory framework provides the flexibility to licence new and innovative technologies while still maintaining the high safety standards and regulatory oversight Canadians expect.

What about fuel and materials/by-product management?

SMRs produce very little materials and by-products – even less than current reactors. Many SMR and vSMR designs involve different fuels and cooling systems from the current fleet of large power reactors, supporting even higher levels of efficiency, simplicity and safety. Some designs even have the potential to reduce the amounts of materials and by-products from existing reactors or themselves by partly recycling spent fuel.

Are SMRs safe and secure?

Yes. Canada has a world-class record for nuclear plant safety and security. Our existing stations have been operating safely for decades, overseen by the CNSC. Canada's nuclear operators will uphold this excellence as we move forward to the next generation of advanced reactors and SMRs. These new reactor designs have advanced passive safety features and advanced fuel designs, while the plant designs have built-in enhanced safety and security features.