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Frequently Asked Questions

What is a SMR?

Small Modular Reactors, or SMRs, are a powerful next generation advanced nuclear technology designed for enhanced safety, reliability and carbon-free power generation.

SMRs operate using the same basic principles as traditional nuclear reactors but are built using modular components for easier construction and scalability. Their small size makes them suitable for a range of applications, from grid scale power generation, to powering remote communities, to supporting industrial facilities.

How does a SMR work?

SMRs harness the power of nuclear fission, the controlled splitting of uranium atoms, to produce an energy-dense source of carbon-free electricity. The energy from the nuclear fission is used to heat water within an isolated closed-loop system within the reactor and turned into steam. The steam spins a turbine that generates electricity, which is distributed and transmitted to homes and businesses. The steam is cooled down and returned to the reactor and the cycle repeats. There is no intermixing of reactor produced steam and cooling water.

What are the benefits of SMRs?

SMRs provide safe, reliable and carbon-free baseload power 24 hours per day - 7 days per week - 365 days a year. They are designed to be modular, have a smaller overall footprint than traditional nuclear plants, and are cost competitive with other forms of generation. SMRs can be part of a balanced energy mix for added energy security and reliability as well as a backstop for intermittent renewable energy like solar and wind.

Why is Alberta a good place for SMRs?

Alberta is a unique jurisdiction with a large industrial load, a skilled workforce and a growing population that currently does not have nuclear in its electricity generation mix. SMRs have the potential to be a viable solution to serve growing demand for secure, reliable and carbon-free power. The development of a nuclear energy sector in Alberta offers new opportunities for people and economies, is highly supported by both the federal and provincial governments, and is a priority for the government of Alberta.

Are nuclear power and SMRs safe?

Yes. Canada's nuclear safety and security regulations and best practices are among the most stringent in the world, ensuring SMRs meet rigorous safety control standards required under Canada's *Nuclear Safety and Control Act* (NSCA). The Canadian nuclear industry has been safely operating nuclear power generation for over 50 years, without incident, building upon established science and engineering, innovation and regulatory oversight.

Modern SMR designs include enhanced safety features, such as passive cooling systems and automated shutdowns. SMRs are subject to rigorous design reviews and ongoing inspections by

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licensing authorities and international oversight bodies to ensure they are engineered, constructed and operated to safeguard people and the environment.

Are there any SMRs operating in the world today?

There are currently two operating SMRs in the world today. One is in Russia and the other is operating in China. Different forms of SMRs and nuclear reactor technologies have long been used across the world and in Canada on aircraft carriers, in submarines, and for scientific research and production of life saving medical isotopes.

How will a SMR affect electricity prices in Alberta?

We are undertaking market modelling and assessment as part of the feasibility study to understand how a grid-scale (commercial) SMR facility could operate in Alberta's competitive market design.

What is considered in selecting a site?

Site screening and selection is a data intensive, community focused and progressive process. Site screening considerations includes proximity to load, ecological resources, water, cultural heritage and traditional land and resource use, geology, transmission and transportation infrastructure. Site selection also considers and listens to the perspectives and level of support of local communities and rightsholders to be a willing host.

Do SMRs require a large amount of water?

Water used to dissipate excess heat depends on the respective reactor and cooling system technologies. A 300 MW nuclear facility equipped with a once-through cooling system generally diverts about 10 - 13 m³/s from an approved water source. Evaporative consumption is minimal. After the initial water fill, water diverted to cool and condense steam would be similar to any thermal power plant, including for example a combined cycle natural gas-powered plant. A SMR facility that uses a cooling tower to cool and condense steam requires significantly less water - about 0.3 m³/s.

To put this diversion rate into context, the average mean discharge (flow rate) of Alberta's Athabasca River over the past 20 years was 416 m³/s. Water diversion for one SMR unit would be between <1 - 3% of the annual average flow of the Athabasca River. The lowest flow on record was recorded in December 2000 at a monthly average of 47.8 m³/s (compared to the mean monthly discharge for December of 114 m³/s).

How will nuclear waste be managed at an SMR facility?

Canada's nuclear generators track and store nuclear waste in licensed facilities near the nuclear power stations where it is generated. The nuclear industry is one of the only industries that can account for all waste produced from generation operations. Only a small portion of waste from a nuclear power facility, used fuel, is a highly radioactive byproduct of nuclear fission and it is

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safely and securely managed. The management and disposal of nuclear waste products would be considered as part of project planning and engineering design.

[Canada's Nuclear Waste Management Organization](#) (NWMO) oversees the planning and implementation of safe disposal of nuclear waste from electricity generation that involves the development of a deep geological repository. The NWMO has also developed an [Integrated Strategy for Radioactive Waste](#) aimed to address gaps in waste disposal planning to ensure that nuclear waste remains safely contained for thousands of years.