

MYTHS VS FACTS: THE TRUTH ABOUT SMALL MODULAR REACTORS

Misunderstanding advanced Small Modular Reactor (SMR) technology can lead to the emergence of misconceptions. Here are the most common myths about SMR. The following responses, each supported by research, offer the facts on SMR technology.

Myth: Advanced SMR are unsafe.

Truth:

Nuclear energy and materials are highly regulated in Canada by the Canadian Nuclear Safety Commission (CNSC). The CNSC is a world-class nuclear regulator and ensures that every nuclear power plant in Canada meets the highest levels of safety.

Conventional nuclear power plants, like the one at Point Lepreau, are equipped with systems and equipment designed to minimize the likelihood of failures and mitigate the potential consequences of an accident. Their design incorporates the concepts of redundancy and diversity and includes multiple levels of defense (controls, barriers, and safeguards) so that the potential failure of one layer of defense is backed up by another.

Advanced SMR will achieve an equal or greater level of safety. These advanced designs have inherent safety characteristics and utilize the concept of passive safety. This means that they have fewer complex systems and equipment and require very little operator involvement.

Myth: Advanced SMR are unclean.

Truth:

Advanced SMR will provide a clean energy source.

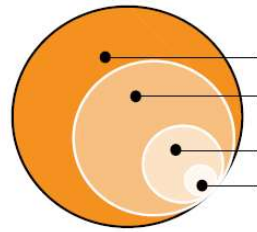
Over its entire lifecycle, including construction and decommissioning, a nuclear power plant's carbon emissions are very low and comparable to renewable energy sources such as hydro, solar, and wind.

When the Point Lepreau Nuclear Generating Station is operating at full capacity, it avoids approximately 4.2 million tons of CO₂ every year. This is equivalent to removing 822,304 passenger vehicles from our highways.

With respect to radioactive emissions, the total radiation dose due to emissions from the Point Lepreau Nuclear Generating Station since 1983 is very low at 29.35 microsieverts (μSv). To put this into perspective, a single chest X-ray results in a radiation dose of approximately 70 μSv .

Advanced SMR are one more piece, along with existing CANDU-6 nuclear technology, hydro, wind, and solar that will help us achieve the province's Climate Change Action Plan.

Comparison



Natural background radiation: 2,000-5,000 μSv per year

Legal limit for dose from emissions: 1,000 μSv per year (CNSC)

Single chest X-ray: approximately 70 μSv

Total radiation dose due to emissions from Point Lepreau Generating Station since 1983: 29.35 μSv

Myth: We must choose between Advanced SMR or renewables to achieve our emissions reduction goals

Truth:

Advanced SMR and renewables can work together to enable a 100% clean energy grid. One of the challenges of managing an electricity system, otherwise known as a grid, is keeping electricity generation coming onto the grid smoothly and reliably to meet the peaks and valleys of demand. This is further complicated by generation methods that are susceptible to the unpredictability of the weather conditions. Currently, load-following electricity sources like natural gas are used to fill in the gaps.

Nuclear is a firm and predictable energy source that is often relied on for providing baseload electricity. It is available when required and can provide a constant amount of electricity to the grid. Advanced SMR being developed in New Brunswick will offer more flexibility.

ARC Clean Energy's ARC-100 reactor will be able to ramp up and down its power in the order of minutes, allowing the reactor to successfully meet the grids energy needs and to support intermittent wind and solar generation.

Moltex Energy's SSR can produce 300 MW(e) of energy every hour of every day. The plant design can incorporate an energy storage system that can be used to integrate with renewables and could be used for peaking power.

Myth: Advanced SMR are an unreliable source of energy

Truth:

Advanced SMR will offer a reliable energy source.

Intermittent sources, such as solar and wind, can only provide energy when the sun is shining and the wind is blowing. As a result, power systems need to include firm and dependable sources to deliver energy in a predictable way so that supply can be efficiently matched with demand.

Nuclear is a firm and predictable energy source that is available when required to provide a constant amount of electricity to the grid. On average, a nuclear power plant produces electricity 90% of the time.

Advanced SMR will help ensure we can continue to provide reliable electricity to meet demand, while offering additional flexibility to complement renewable energy sources.

Myth: Advanced SMR are unaffordable

Truth:

Due to their simplistic modular design and potential factory manufacturing, Advanced SMR are an affordable option.

The life cycle cost of a conventional nuclear reactor is comparable to renewable energy sources such as wind and solar, even without taking into account that a replacement power source is required when the wind doesn't blow and the sun doesn't shine. While the upfront capital cost for constructing a new nuclear power plant is high, it has relatively low fuel costs and high capacity factors.

The costs of Advanced SMR are being studied and estimated as the designs evolve. Preliminary estimates suggest that their capital and life cycle costs will be even more affordable than conventional nuclear reactors, while providing additional environmental and economic benefits.

Myth: Advanced SMR will produce a lot of additional nuclear waste

Truth:

The amount of waste that will be produced by advanced SMR will be relatively small and it will be very well-managed.

Because very little nuclear fuel is required to produce large amounts of electricity, a relatively small amount of waste is produced as a result. According to the World Nuclear Association, the waste from a reactor supplying a person's electricity needs for a year would be equivalent to the size of a brick. Of this waste, only 5 grams – around the same weight as a sheet of paper – is high-level radioactive waste or used fuel.

Used nuclear fuel contains radioactive elements that take a long time to decay and therefore require long-term isolation from the environment. This used fuel is safely and securely stored and managed in accordance with Canada's long-standing waste management plan. As per regulation in Canada, the radioactive waste owners have to demonstrate that they have adequate funds to cover the costs of storage.

However, we know waste from electricity generation, whether it is through air emissions from fossil fuels, waste from spent solar panels and wind turbines or nuclear used fuel, is a concern for Canadians.

Advanced SMR are a sustainable choice for the environment because they will reduce the amount of nuclear waste generated from their operation and the amount of time it needs to be isolated from the environment. In some cases, there is potential for SMR to recycle used fuel to generate electricity, creating an additional use before the remaining radioactive material needs to be managed.

Myth: An Advanced SMR industry will have little impact on the economy

Truth:

Nuclear power is and will continue to be a valuable contributor to the New Brunswick economy.

Over the next 15 years, the development of Advanced SMR in New Brunswick is project to create:

- Approximately 730 jobs (direct and indirect) per year
- \$1 billion in Gross Domestic Product (GDP)
- \$120 million in provincial government revenue

A state-of-the art SMR production program brings countless benefits to New Brunswick as part of the pan-Canadian program to grow the low carbon economy of the future. The economic benefits will go beyond New Brunswick and significant positive impact will be felt Canada wide as the technology grows.