

# Nuclear Reaction

The Maritime Voice Against More Nuclear Reactors

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FREE



NB Power CEO says multiple nuclear reactors could fit on the Bay of Fundy site. Photo from Facebook.

## MORE NUCLEAR REACTORS ON THE BAY OF FUNDY?

In February this year, Premier Blaine Higgs committed \$20 million in public funds to an American company, ARC Nuclear, to develop its proposal to build new nuclear reactors in New Brunswick.

This follows the \$10 million Liberal Premier Brian Gallant gave to ARC Nuclear and Moltex Energy (\$5 million each) in 2018, to set up offices in Saint John. In March, federal taxpayers tossed \$56 million more into this bottomless money pit.

Each of these two companies has their own reactor design, neither of which has been built anywhere.

Both these reactor proposals are in the very early stages of development. Both are based on experimental nuclear reactors built more than 50 years ago and never successfully commercialized.

These proposed designs are different from the existing Point Lepreau nuclear reactor in several ways. But they are the same in this fundamental way: they would split atoms to generate heat to produce steam which drives a turbine to produce electricity, a process that produces deadly radioactive wastes.

NB Power would make the Point Lepreau site on the Bay of Fundy available to these companies to build the new reactors. The CEO of NB Power said the Point Lepreau site could fit four ARC-100 nuclear reactors. He did not say how many Moltex reactors would go on the site.

What attracted the nuclear companies to New Brunswick?

The global nuclear energy industry has been in the doldrums for 30 years. Very few new reactors have been ordered since the Chernobyl nuclear catastrophe in 1987. Recently, the industry has seen an opening for a “nuclear renaissance” as a so-called “solution” to climate change.

Various private companies have been flogging nuclear designs

### No Nuclear Needed! Available, Affordable Alternatives Exist

The most reliable, available and affordable path to providing New Brunswick’s electricity needs, while meeting our climate change goals, is clear:

- Invest aggressively in energy efficiency to reduce energy use,
- Rapidly expand renewable energy infrastructure
- Upgrade the electricity grid to access existing hydro electricity from Quebec and the new Atlantic Loop.

These are the cheapest and fastest routes to putting the brakes on electricity price increases, and meeting New Brunswick’s climate change obligations.

Nuclear power, on the other hand, is a sure-fired route to ever-increasing power rates, expanding stockpiles of long-lived radioactive poisons, and a failure to achieve a clean energy future for our children.

they call “small modular reactors” or SMRs. Around the world, there are more than 50 designs for SMRs. Companies have been shopping around for governments willing to pour public money into moving their projects off their computer screens and into bricks and mortar.

The two companies, ARC Nuclear and Moltex Energy, found fertile ground in New Brunswick. Coming on the heels of NB Power’s gift of \$14 million to the ill-fated JOI Scientific hydrogen experiment, both the Liberal (2018) and Progressive Conservative (2021) governments have given ARC and Moltex hand-outs in exchange for very speculative promises of economic spin-offs.

## ARC Nuclear: More Unproven Technology

The second company to get the nod in New Brunswick is an American start-up, ARC Nuclear (also known in doubletalk as “ARC Clean Energy”). Its parent company, Advanced Reactor Concepts, is associated with GE Hitachi Nuclear Energy. Its reactor design, called “ARC-100,” has a production capacity of 100 megawatts.

The CEO of NB Power said they could fit four ARC-100 units on the Point Lepreau site on the Bay of Fundy.

ARC Nuclear has so far received \$10 million from Liberal and Progressive Conservative governments in New Brunswick, with a promise of another \$15 million from the Higgs government to be allocated in chunks of \$5 million over the next couple of years.

The ARC-100 design is for what’s called a “sodium-cooled fast reactor.” This kind of reactor has never been built in Canada. A few were built in the US more than 50 years ago. Two suffered severe accidents, including partial nuclear meltdowns at the EBR-1 and Fermi-1 reactors.

Around the world, sodium-cooled reactors have had numerous sodium leaks causing fires and other technical problems, leading the UK and Germany to abandon plans to commercialize them.

ARC Nuclear claims that its ARC-100 design is based on a nuclear reactor called EBR-2 (Experimental Breeder Reactor 2) built by the US Department of Energy at its Argonne-West National Laboratory in the desert of eastern Idaho. This remote site houses several nuclear technology experiments associated with the US nuclear weapons program.

The EBR-2 reactor provided electricity for the laboratory for almost 30 years, yet it was always an experiment and never fully validated or commercialized. The EBR-2 fuel was uranium enriched to weapons grade. Under international agreements, this fuel would not be allowed in commercial reactors because of safety and nuclear weapons concerns.

## MOLTEx REACTOR “WASTE BURNER” IS A MONEY BURNER

Moltex Energy, a company based in the United Kingdom, has a conceptual design for a “Stable Salt Reactor” (SSR), also known as a molten salt reactor. Only two molten salt reactors have ever operated, both more than 50 years ago. Neither generated electricity, and neither operated for long (less than one year, and less than four years, respectively).

The Moltex proposal is for a 300 megawatt (MW) nuclear reactor, less than half the capacity of Point Lepreau (630 MW). The Moltex facility would include the SSR reactor building and a second unit, the “waste burner.”

That second unit is what makes the Moltex design unique in Canada. They propose to “burn” existing nuclear fuel waste from the Point Lepreau reactor as fuel for the SSR reactor, using a theoretical process that has never been tried anywhere in the world. Many experts believe it will not work. It amounts to a very risky experiment that would produce new liquid radioactive waste streams that would be very difficult and expensive to manage over the long term.

In March this year, the federal government handed \$50.5 million from taxpayers to Moltex for its risky project on the Bay of Fundy. The Moltex money pit is so deep that even \$50.5 million is not nearly enough. While no official estimate has been released, in 2016 the CEO of Moltex Energy said it would cost about \$2 billion to build its project, and likely more.

So far, Moltex Energy has no private sector backers, although the company did crowd-source (social media “pledges”) several million dollars. Besides the \$5 million from the Gallant government, in 2018, the UK government gave Moltex about half a million Canadian dollars. The UK has rejected the company’s further funding request.

The Moltex design is still on the drawing board. The Moltex North America CEO met with members of the Coalition for Responsible Energy Development (CRED-NB) in 2020. He suggested their plan was to build a “proof of concept” reactor in New Brunswick, which they can then market elsewhere. In other words, New Brunswick is the testing ground. He also admitted that “it might not work.” Given the timelines involved, it would be at least 2035 before we learn if our money was wasted completely.

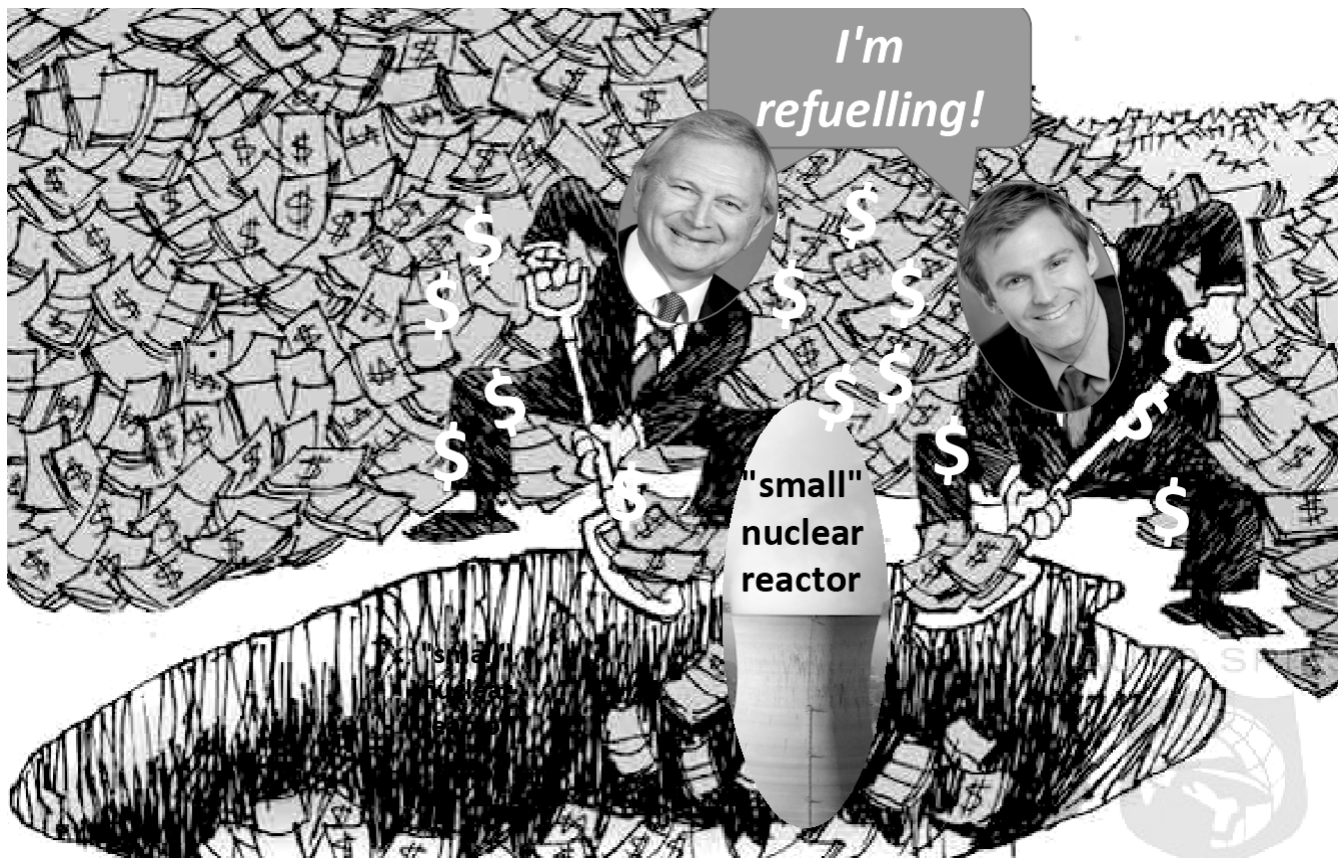
The ARC-100 design also requires fuel enriched to an usually high level. There is no supply of this in Canada (CANDU reactors like Point Lepreau use natural uranium). So the nuclear fuel for an ARC-100 reactor would have to be imported from the US.

The Canadian Nuclear Safety Commission (CNSC) is the regulatory body that approves and licences new reactor designs in Canada. ARC Nuclear wants the CNSC to accept that their ARC-100 design is the same as the EBR-2. To have it accepted as a proven design would streamline the approval process. But the CNSC has determined that the company has not yet demonstrated the relevance of the EBR-2 to the ARC-100 design. In other words, ARC-100 is a new, unproven technology.

### History of New Brunswick Money Pits

- 1974-1975: The Bricklin
- 2004-2006: Orimulsion fiasco
- 2008-2012: Point Lepreau refurbishment
- 2010: Atcon deal
- 2018-2019: Joi Scientific
- 2018-2021? Small Modular Nuclear Reactors (SMRs)





PC Premier Blaine Higgs and former Liberal Premier Brian Gallant have heaped \$\$ millions into the bottomless nuclear money pit

## NUCLEAR PIPE DREAMS: A FOOLHARDY USE OF PUBLIC FUNDS

Premier Blaine Higgs has stated that betting on SMRs with public money will create thousands of jobs and new export opportunities. But this “economic growth strategy” of backing private companies to develop “small modular reactors” or SMRs is deeply flawed and will fail to meet these expectations, at great cost to New Brunswickers.

The idea behind SMRs is that they would be fabricated as modular components in a production facility and then exported around the world in parts, to be assembled quickly at the final destination, much like a modular home.

Similar to modular homes, SMRs are financially viable only if built in large numbers. Unlike modular homes, there is no evidence of any real markets for SMRs, export or domestic, at anywhere near the scale that would make these developments profitable. The few countries planning to set up new nuclear plants are interested in large, not small, nuclear reactors.

ARC Nuclear proposes to build a prototype of the ARC-100 reactor on the Bay of Fundy site, to test the design concept. The company would then build a production facility somewhere to fabricate modular reactor parts for export. (The Moltex design is not modular, even though it is called an SMR).

In Canada, there is talk about SMRs being sold to remote

northern communities and off-grid mining sites currently using diesel generators to make electricity. However, the cost of electricity from SMRs will be much higher -- up to ten times more -- than diesel-based electricity. Even if these remote communities could be hoodwinked into buying more expensive electricity, there is not enough demand for electricity at these remote sites to justify building a factory to manufacture SMRs.

Further, every remote site where an SMR might be built would become a radiation contamination zone for thousands of years.

Previous attempts in Canada to build nuclear reactors for small markets ended up as duds. Four small nuclear reactor models were built and then scrapped without ever becoming commercial: Gently-1, Maple 1, Maple 2, and Slowpoke 3.

Of course, markets are ultimately dependent on price, and the costs of developing SMR designs into successful commercial nuclear power plants are highly speculative. The construction of nuclear reactors everywhere, including in New Brunswick, are notorious for going way over budget and over deadline. There is no reason to assume that the SMRs would be any different.

If SMRs were a good financial bet, the private sector would be investing in them. It seems the Higgs government and NB Power learned nothing from the JOI Scientific fiasco.

## Nuclear: Dirty Energy Leaves an Everlasting Radioactive Legacy

Nuclear power is dirty and dangerous. All nuclear reactors, including SMRs, create radioactive poisons as byproducts. Such wastes are now stockpiled at the Point Lepreau nuclear plant on the edge of the Bay of Fundy. More reactors will produce more wastes.

Radioactive materials and used or “spent” fuel from nuclear reactors must be securely contained because it is highly dangerous to all living things. Any release of radioactivity at Point Lepreau can harm people, plants and animals nearby including in the Bay of Fundy.

Radiation damages living cells including DNA. Exposure to even low levels of ionizing radiation can eventually cause cancers, hormone disruption, birth defects, genetic damage, and other harmful health effects.

When nuclear reactors reach their end of life, contaminated steel, concrete, and other equipment will remain radioactive for tens of thousands of years. These materials cannot be safely recycled.

The radioactive waste from dismantling these reactors will be New Brunswick’s responsibility, not the companies building them. After a couple of decades of use (if they work), future generations will be paying to store and maintain this waste virtually forever.



Aging concrete silos of deadly radioactive “high-level waste” produced by the Point Lepreau nuclear reactor on the Bay of Fundy. Photo from the CNSC.

## Building New Nuclear Delays Climate Action

The nuclear industry is promoting SMRs as the answer to climate change because nuclear reactors do not burn fossil fuels. Premier Higgs has said SMRs will help New Brunswick meet our climate change emissions targets. But there is nothing in these proposals to suggest this is true.

First, given that both these designs are unproven, there is no guarantee that either of them will ever produce electricity. They could well continue the tradition of past attempts to build small nuclear reactors in Canada: Gently-1, Maple 1, Maple 2, and Slowpoke 3 were duds that never worked.

Second, we need to start the transition to real clean energy

now. In 2018, a consensus report by climate scientists stated that the world needs to reduce greenhouse gas emissions by nearly 50 per cent by 2030 in order to avert climate catastrophe. Also, under Canadian federal law, the Belledune coal-fired power plant must be phased out by 2030.

It will be virtually impossible for either of these prototype reactors to replace carbon-polluting power plants by 2030. Neither SMR design is yet approved to be built in Canada, and it is a long, complicated process. Nor are the funds in place to build them. Once those hurdles are scaled, if they are, nuclear power plants take 10 years, on average, to build. That takes us well past 2030.

NB Power has anticipated this and did not include new nuclear reactors in their future planning document, the Integrated Resource Plan. Instead, the utility is lobbying Ottawa to be allowed to continue to run the Belledune plant until 2040. For this privilege, they will incur ever increasing carbon charges on their emissions.

Meanwhile, wind power and utility-scale solar can be built now, and their costs are lower than all other sources. All the evidence points to renewable energy as the real climate change solutions. Spending many millions on speculative, expensive nuclear technologies when proven, cheap renewables can be built today is foolhardy and irresponsible.

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Send a letter to your MLA and MP.  
Tell them what you think about having more  
nuclear reactors on the Bay of Fundy.

*Nuclear Reaction was first published in 1976  
by the Maritime Energy Coalition which  
organized in 1974 to oppose nuclear power  
development in this region.*

## Expensive Nuclear Power Drives up Electricity Rates

Under the *Electricity Act*, NB Power is required to deliver electricity reliably, affordably and sustainably. The Point Lepreau nuclear generating station is the most expensive baseload must-run generating station in the NB Power fleet.

The cost to build Point Lepreau, which opened in 1984, was \$1.4 billion, more than three times the original estimate of \$460 million. After about 15 years of operation - halfway through its expected lifespan - certain reactor components were found to be aging prematurely.

NB Power faced a choice: shut it down early or rebuild the reactor core. The Energy and Utilities Board recommended against refurbishment because of potential high costs which would drive power rate increases. The Progressive Conservative Bernard Lord government went ahead anyway. The \$1 billion, 18-month project turned into a \$2.4 billion, multiple year fiasco.

In 2021, the NB Auditor General reported that \$3.6 billion

of NB Power’s \$4.9 billion debt is directly attributed to Point Lepreau. This is after the Provincial Government, in 2001, took \$450 million of Point Lepreau debt off of NB Power’s books and added it to the provincial debt. This shifted some of the nuclear cost burden from ratepayers to taxpayers.

A recent study by the Energy Futures Group found that electricity generated by SMRs is likely to be more expensive than renewable energy such as wind and utility-scale solar, including the cost of providing firm capacity through energy storage.

There is no doubt that electricity from SMRs will drive power rates in New Brunswick ever higher. And having more nuclear power plants will multiply the end-of-life costs of dismantling radioactive plant structures and managing radioactive wastes they would produce.

The alternative, investing in renewable energy and efficiency, will cap and eventually reduce power rates.