

Small Modular Nuclear Reactors, a case of wishful thinking at best

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From **Voices of Women** : Beze Gray (front right), Sophia Mathur (front left) and Zoe Keary-Matzner (front second from the right) are leading a lawsuit against Doug Ford's Government for weakening climate change policies <https://tinyurl.com/r37pemk>



L to R: Conservative leaders Blaine Higgs NB, Doug Ford ON & Scott Moe SK

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1- The Three Nuclear Amigos

On Friday the 13th, September 2019, the *St John Telegraph-Journal's* front page was dominated by what many readers hoped will be a good luck story for **New Brunswick** – making the province a booming and prosperous Nuclear Energy powerhouse for the entire world. After many months of behind-the-scenes meetings throughout New Brunswick with utility company executives, provincial politicians, federal government representatives, township mayors and First Nations, two nuclear entrepreneurial companies laid out a dazzling dream promising thousands of jobs – nay, tens of thousands! – in New Brunswick, achieved by mass-producing and selling components for **hitherto untested nuclear reactors called SMNRs (Small Modular Nuclear Reactors)** which, it is hoped, will be installed around the world by the hundreds or thousands!

On December 1, the **Saskatchewan and Ontario** premiers hitched their hopes to the same nuclear dream machine through a dramatic tripartite Sunday press conference in Ottawa featuring the premiers of the provinces. The three amigos announced their desire to promote and deploy some version of Small Modular Nuclear Reactors in their respective provinces. All three claimed it as a strategy to fight climate change, and they want the federal government to pledge federal tax money to pay for the R&D. Perhaps it is a way of paying lip service to the climate crisis without actually achieving anything substantial; prior to the recent election, all three men were opposed to even putting a price on carbon emissions.

Motives other than climate protection may apply. Saskatchewan's uranium is in desperate need of new markets, as some of the province's most productive mines have been mothballed and over a thousand uranium workers have been laid off, due to the global decline in nuclear power. Meanwhile, Ontario has cancelled all investments in over 800 renewable energy projects – at a financial penalty of over 200 million dollars – while investing tens of billions of dollars to rebuild many of its geriatric nuclear reactors. This, instead of purchasing surplus water-based hydropower from Quebec at less than half the cost.

In a December 2 interview on QUB radio, Gilles Provost, spokesperson for the *Ralliement contre la pollution radioactive* (Movement against radioactive pollution, a Quebec-based group) and former environmental journalist at *Le Devoir*, criticized the announcement of the three premiers as ill-considered and premature, since none of the conjectural nuclear reactor prototypes exist in reality. Quite a contrast to the three premiers' declarations, boldly claiming that "SMRs" (they leave out the "N" to minimize public opposition) will help solve climate change, knowing full well that it will take a decade or more before any benefits can possibly be realized – if ever!

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2- “Nuclear renaissance” – clambering out of the dark ages?

These new nuclear reactors are so far perfectly safe, because they exist only on paper and are cooled only by ink. But declaring them a success before they are even built is quite a leap of faith, especially in light of the three previous Canadian failures in this field of “small reactors”. Two 10-megawatt MAPLE reactors were built at Chalk River and never operated because of insuperable safety concerns, and the 10-megawatt “Mega-Slowpoke” district heating reactor never earned a licence to operate, again because of safety concerns. The Mega-Slowpoke was offered free of charge to two universities – Sherbrooke and Saskatchewan – and several communities, all of whom refused the gift. And a good thing too, as the only Mega-Slowpoke ever built (at Pinawa, in Manitoba) is now being dismantled without ever producing a single useful megawatt of heat.

This current media hype about modular reactors is very reminiscent of the drumbeat of grandiose expectations that began around 2000, announcing the advent of a **Nuclear Renaissance** that envisaged thousands of new reactors — huge ones! — being built all over the planet. That initiative turned out to be a complete flop. Only a few large reactors were launched under this banner, and they were plagued with enormous cost-over-runs and extraordinarily long delays, resulting in the **bankruptcy or near bankruptcy** of some of the largest nuclear companies in the world – such as Areva and Westinghouse – and causing other companies to retire from the nuclear field altogether – such as Siemens.

Speculation about that promised Nuclear Renaissance also led to a massive (and totally unrealistic) spike in **uranium prices**, spurring uranium exploration activities on an unprecedented scale. It ended in a near-catastrophic collapse of uranium prices when the bubble burst. *Cameco* was forced to close down several mines. They are still closed. The price of uranium has still not recovered from the plunge.

Large nuclear reactors have essentially priced themselves out of the market. Only Russia, China and India have managed to defy those market forces with their monopoly state involvements. Nevertheless, the nuclear contribution to world electricity production has plummeted from 17 percent in 1997 to **about 10 percent** in 2018. In North America and Western Europe, the prospects for new large reactor projects are virtually nil, and many of the older reactors are shutting down permanently without being replaced.

3- Fighting climate change cannot wait

Many people concerned about climate change want to know more about the moral and ethical choices regarding **low-carbon technologies**: “Don’t we have a responsibility to use nuclear?” The short reply is: nuclear is too slow and too expensive. The ranking of options

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should be based on what is cheapest and fastest — beginning with **energy efficiency**, then on to off-the-shelf renewables like **wind and solar energy**.

As a case in point, Germany installed over 30,000 megawatts of **wind energy capacity** in only 8 years, after deciding to close down all of its nuclear reactors by 2022. That is an impressive achievement – more than twice the total installed nuclear capacity of Canada. It would be impossible to build 30,000 megawatts of nuclear in only 8 years.

By building wind generators, Germany obtained some carbon relief in the very first year of construction, then got more benefit in the second year, even more benefit in the third, and so on, building up to a cumulative capacity of 30,000 MWe after 8 years. With nuclear, even if you could manage to build 30,000 megawatts in 8 years, you would get absolutely no benefit during that entire 8-year construction period. In fact you would be making the problem worse by mining uranium, fabricating fuel, pouring concrete and building the reactor core and components, all adding to greenhouse gas emissions – earning no benefit until (and IF) everything is finally ready to function. In the meantime (10 to 20 years), you will have starved the efficiency and renewable alternatives of the funds and political will needed to implement technologies that can really make an immediate and substantial difference.

In Saskatchewan, professor Jim Harding, who was director for *Prairie Justice Research* at University of Regina where he headed up the *Uranium Inquiries Project*, has offered his own reflection. Here is the conclusion of his December 2, 2019 comment:

“In short, small reactors are another distraction from Saskatchewan having the highest levels of GHGs on the planet – nearly 70 metric tonnes per capita. While the rest of Canada has been lowering emissions, those here, along with Alberta with its high-carbon tar sands, have continued to rise. Saskatchewan and Alberta’s emissions are now almost equal to all the rest of Canada. Shame on us!”

In the USA, engineers and even CEO’s of some of the leading nuclear companies are admitting that **the age of nuclear energy is virtually over in North America**. This negative judgment is not coming from people who are opposed to nuclear power, quite the opposite — from people lamenting the decline. See, for example, one major report from the Engineering faculty at Carnegie-Mellon University (linked below):

<https://www.power-technology.com/news/nuclear-power-predicted-virtually-disappear-us/>

4- Small Modular Nuclear Reactors – costly and hazardous

That Carnegie-Mellon report includes Small Modular Nuclear Reactors in its analysis, without being any more hopeful for a nuclear revival on that account. The reason? It is mainly because a new generation of smaller reactors, such as those promised for New Brunswick, will necessarily be **more expensive** per unit of energy produced, if manufactured

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individually. The sharply increased price can be partially offset by mass production of prefabricated components; hence the need for selling hundreds or even thousands of these smaller units in order to break even and make a profit. However, the order book is filled with blank pages — there are **no customers**. This being the case, finding investors is not easy. So entrepreneurs are courting governments to pony up with **taxpayers' money**, in the hopes that this second attempt at a Nuclear Renaissance will not be the total debacle that the first one turned out to be.

Chances are very slim however. There are over 150 different designs of “Small Modular Reactors”. **None of them** have been built, tested, licensed or deployed. At Chalk River, Ontario, a consortium of private multinational corporations, comprised of **SNC-Lavalin** and two corporate partners, operating under the name “Canadian Nuclear Laboratories” (CNL), is prepared to host six or seven different designs of Small Modular Nuclear Reactors — none of them being identical to the two proposed for New Brunswick – and all of these designs will be in competition with each other. The Project Description of the first Chalk River prototype Small Modular Reactor has already received over 40 responses that are posted on the CNSC web site, and virtually all of them are negative comments.

The chances that any one design will corner enough of the market to become financially viable in the long run is unlikely. So the second Nuclear Renaissance may carry the seeds of its own destruction right from the outset. Unfortunately, governments are not well equipped to do a **serious independent investigation of the validity** of the intoxicating claims made by the promoters, who of course conveniently overlook the persistent problem of **long-lived nuclear waste and of decommissioning the radioactive structures**. These wastes pose a huge ecological and human health problem for countless generations to come.

Finally, in the list of projects being investigated, one finds a scaled-down “**breeder reactor**” fuelled with plutonium and cooled by liquid sodium metal, a material that reacts violently or explodes on contact with air or water. The breeder reactor is an old project abandoned by Jimmy Carter and discredited by the failure of the ill-fated French *SuperPhénix* because of its extremely dangerous nature. In the event of a nuclear accident, the Tennessee *Clinch River Breeder Reactor* was judged capable of poisoning twelve American states and the *SuperPhénix* half of France.

One suspects that our three premiers are only willing to revisit these bygone reactor designs in order to obtain funding from the federal government while avoiding responsibility for their inaction on more sensible strategies for combatting climate changes – cheaper, faster and safer alternatives, based on investments in energy efficiency and renewable sources.

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