

Will expanding Canada's plutonium interests support the peaceful use of nuclear energy?

Small modular reactors are not going to solve these problems. On the contrary, adding plutonium separation to the Canadian nuclear industry's repertoire will create a new global security risk and raise legitimate questions about Canada's stated goal to be a leader in the peaceful use of nuclear energy.

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Opinion



The federal government is on a roll, ardently declaring how much it supports expanding nuclear energy. A recent example is the Oct. 26 address by Natural Resources Minister Jonathan Wilkinson to an international conference in Washington, D.C., on nuclear power. Wilkinson proclaimed that Canada desires to play a leadership role in nuclear energy and promote its peaceful use around the world. Unfortunately, the leadership role the federal government has chosen involves separating plutonium, which enormously increases the risk of furthering nuclear proliferation.

Earlier in the year, Atomic Energy of Canada Limited (AECL), a federal Crown corporation, broke ground on a large nuclear research facility. The Advanced Nuclear Materials Research Centre, described as "the cornerstone" of the government's \$1.2-billion expansion of AECL's Chalk River, Ont., site, is to feature 12 "new shielded hot cells" and "glovebox facilities" for research on fuel associated with proposed small modular nuclear reactors

(SMRs). The shielding and the glovebox are needed to develop some SMR designs that require plutonium as fuel to operate.

One of those SMR designs is being developed by Moltex, a company that received \$50.5-million from Innovation, Science and Economic Development Canada. In his Washington address, Wilkinson took credit for investing in Moltex to develop its plutonium-extraction technology that can "recycle CANDU spent nuclear fuel into new fuel." He said he would like Canada to export such "technology, goods and services" globally.

Plutonium is intimately connected with nuclear power since it is created in all reactors when uranium absorbs neutrons. Using a chemical process called "reprocessing," this plutonium can be separated from the remaining, highly radioactive, byproducts contained in irradiated nuclear fuel. Once removed, the plutonium could be used as fuel in some nuclear power plants.

But countries and individuals could make nuclear weapons with plutonium. Indeed, most people learned about this material first from news of the Fat Man bomb that flattened Nagasaki. The two uses of plutonium lie at the heart of India's nuclear program. Set up ostensibly for peaceful purposes, India justified acquiring a reprocessing plant in the 1960s by announcing plans to develop reactors fuelled with plutonium. The source of the plutonium was CIRUS, a research reactor gifted by Canada. However, India's first use of such plutonium was in the atomic bomb exploded in 1974, yet again demonstrating how plutonium separation and nuclear weapons are connected.

In 1977, U.S. president Jimmy Carter banned civil reprocessing and plutonium use in his country. Unfortunately, other countries didn't follow suit—specifically, the United Kingdom, France, and Russia. The result: a stockpile of approximately 545 tonnes of plutonium. The Fat Man bomb used roughly six kilograms of plutonium. It is easy to do the math and calculate how many tens of thousands of nuclear weapons can be fabricated from this stockpile of separated plutonium.

Producing more plutonium will only exacerbate nuclear proliferation. This is why a recent report published by the International Panel on Fissile Materials called for a global ban on separating plutonium. The Canadian government

is pushing in the opposite direction, increasing its research capacity to separate plutonium, and funding a company that seeks to export SMRs fuelled by this material.

In 2021, a group of U.S. non-proliferation experts and former government officials and advisers with related responsibilities penned an open letter to Prime Minister Justin Trudeau expressing concerns about the Moltex project. Moltex responded with the argument that the plutonium that would be produced in their proposed process is "impure" and cannot be used in nuclear weapons. But this argument has long been refuted, for example, in a 2009 report by safeguards experts from six U.S. national laboratories. The reason is simple: any process that allows plutonium from spent fuel to be cleaned up adequately for use as nuclear fuel will make the material almost good enough for use in nuclear weapons; only relatively cheap and easy processing in a "hot cell" is necessary after that. This is why the International Atomic Energy Agency considers all plutonium (with one exception that does not apply to the process proposed by Moltex) as being "of equal sensitivity" when it comes to safeguards.

The open letter also suggested that the government carry out high-level reviews of the non-proliferation and environmental implications of the project. Instead of commissioning such reviews, the Canadian government has funded building an expensive laboratory to work on plutonium, also at Chalk River, the site where reprocessing was carried out until 1954. After India's nuclear weapons test, separating plutonium became a political liability, and the nuclear establishment has only considered burying irradiated fuel in a deep geological repository. That changed under Trudeau's leadership in March 2021, when Moltex received \$50.5-million.

The nuclear industry's hope that reactors that can burn plutonium-based fuel will be less expensive has been illusory. Vast stores of separated plutonium sit in storage because nobody has built a reactor that can burn plutonium fuel successfully and economically. Molten salt reactors like the Moltex SMR have a problematic history and investing in them is wasteful.

Further, a 2016 report from the Canadian Nuclear Laboratories found that

there was no business case for reprocessing CANDU fuel, in part "due to its low fissile content," and the associated costs and risks. The report also noted "significant upfront investment and numerous investments over a long timeframe," and that reprocessing in other countries has not been commercially successful. Crucially, the report emphasized that reprocessing "would increase proliferation risk." In 2021, Moltex completed the first phase of a pre-licensing design review with the Canadian Nuclear Safety Commission.

Meanwhile, all Canada's current and proposed plutonium activities have reduced regulatory oversight. In 2019, Parliament approved Bill C-69, which allows some small modular reactors and associated nuclear projects below various thresholds, to move forward without being subject to a federal impact assessment. This is why the Coalition for Responsible Energy Development in New Brunswick has petitioned Environment and Climate Change Minister Steven Guilbeault to require an impact assessment for a project proposed by the provincial utility NB Power, which wants to build the ARC-100, an SMR that will "breed" plutonium. NB Power is planning to apply for a licence to develop the Point Lepreau site for the ARC SMR in June 2023. Unless Guilbeault requires it, there will be no federal impact assessment of this new plutonium project.

Over six decades of global experience with building nuclear power plants has clearly demonstrated that they are expensive and take years and years to start operating. Electricity from nuclear plants costs far more than from renewable energy sources. Nuclear power, then, cannot be a viable solution to climate change.

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