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OPINION

Nuclear waste holds the key to a secure and carbon-free future

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Relentless geopolitical tensions arising from conflicts in the Middle East, Ukraine and the South China Sea have threatened global trade flows and economic stability. National security concerns and energy security – tied together at the hip – continue to dominate the policy agenda with no signs of abatement. As a consequence, the climate crisis is drifting into the background, as the extraction of fossil fuels continues to be the default answer to the question of price stability. But arguably, this time of crisis may be the best time to challenge the orthodoxy of our dependence on fossil fuels.

The role of nuclear waste as an energy source, which can be repurposed and integrated into the energy supply mix, must be revisited. Based on the world's existing inventory of uranium, thorium, and used fuel, this resource can become a non-carbon source of affordable energy for every global citizen over the coming centuries.

Canada's existing inventory of used nuclear fuel (also known as" high-level waste") remains an unacknowledged energy resource. Canada's nuclear waste exceeds the energy equivalence of Alberta's oil sands by a large margin, and the current available amount (approximately 60,000 tons, stored safely at licensed nuclear sites) can deliver a near-limitless supply of carbon-free energy. The twin threats of climate change and national security risks, compounded by geopolitical tensions, can be mitigated through the large-scale deployment of used nuclear fuel. What would otherwise be relegated to the category of "waste" can instead be recycled to create new economic value, sustaining a clean-energy future for decades to come while making coal, oil, and gas redundant.

Three interrelated reasons explain why this option has not already been developed to its full potential: the primary extraction of uranium and market-price signals have made it a relatively cheap resource, and therefore unappealing from a return-on-investment perspective; the technologies and solutions developed and established for the full recycling of nuclear waste were abandoned for political reasons; and, social perceptions of the long-term hazard of nuclear waste became the dominant narrative for opposition to nuclear power.

The safety of used fuel storage at existing nuclear facilities has been proven over the past six decades. In addition, Canada and other countries have developed technologies for the safe isolation of used fuel in permanent geological repositories. Notwithstanding the established technical capacity for the safety of this energy source, broad social acceptance still remains an open question.

The framing of nuclear waste as an "unsolved" and "unsolvable" problem rests on a questionable premise. Opponents of nuclear energy have demanded this source of fuel only be used if it carries "zero risk" for future generations. The goals of" intergenerational" equity and a desire to minimize burdens on our grandchildren have had a powerful appeal. Meeting the growing demand for clean energy without leaving an unaccountable legacy of debt to future generations has been a compelling proposition.

Reaching a zero-carbon-energy future between 2050 and 2060 will require us to combine incremental steps and make bold decisions. We will need several building blocks to interlock, including policies, investment decisions and the successful executions of projects. Policy choices and market forces combined can foster the creation of critical intellectual property and patents that would contribute to, and influence,

wider global efforts in this underutilized area, allowing Canada to prosper from these IP receipts in the future.

The dominance of fossil fuels as low-cost sources of energy emerged over the course of 150 years, enabled by subsidies and tax treatments. We can do the same in detoxifying nuclear waste. A clean-energy future is within our grasp.

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