SMR Forum

CASMR Canadian Association of Small Modular Reactors

Powering the Future: Positioning Canada as a Global Leader in New Nuclear

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Executive Summary

For the first time in a generation, Canada is increasingly facing structural pressures it can no longer defer. These challenges have been magnified by a trade conflict that has raised costs while narrowing Canada's economic room to act. One of the core constraints facing Canada is increasingly elemental: energy. Without abundant, reliable, low-cost power, Canada cannot build new mines, expand manufacturing, electrify heavy industry, or anchor the technology infrastructure now shaping global growth.

At the same moment, global nuclear markets are consolidating around a small number of standard reactor designs, supply chains, and fuel-cycle arrangements. Decisions taken in the coming months and years will determine which countries shape these standards and which countries deploy technologies that are available. Canada has been, and can continue to be, a first mover in this space, setting designs and hosting supply chains. We are at a crucial crossroads and Canada must decide if it intends to continue its historic position in the nuclear industry.

Ottawa and the provinces have begun to recognize the stakes. The federal government has committed to doubling non-U.S. exports within a decade, created a Major Projects Office to accelerate approvals, and pledged to raise defence spending to 5 percent of GDP by 2035.[1] The provinces are making parallel moves: coordinating across borders to reduce internal trade barriers, accelerating approval processes, and preparing for major industrial and resource investments that will require large volumes of reliable baseload power.

Across governments, the priorities are consistent, including oil and gas development and related infrastructure, new mines, critical-mineral processing, advanced manufacturing, hydrogen and ammonia production, and data centres supporting the explosive growth in AI. Ottawa's commitment to double non-U.S. exports is premised on Canada producing goods and technologies the world cannot easily obtain elsewhere. Provinces want investments that generate employment in multiple regions and can scale with demand. All of the foregoing requires large volumes of reliable baseload power.

The challenge is no longer whether Canada should make major investments, but which ones will materially expand the country's productive capacity. The federal budget is explicit: the projects that matter are those that strengthen internal connections, open non-U.S. markets, and generate skilled employment across sectors. They must also attract private capital rather than displace it.

The significant nuclear build-out occurring in Ontario, the long-time Canadian provincial leader in nuclear power, which began with CANDU refurbishments and is being extended with Small Modular Reactors (SMRs) and new large-scale units, meets these criteria more directly than any other option. Nuclear power is one of the few assets that simultaneously anchors industrial growth, supports export diversification, and creates long-term employment in engineering, fabrication, operations, and research.

Other provinces have also seen the benefit in new nuclear projects and are interested in participating.

It was against this backdrop that the Canadian Association of Small Modular Reactors convened industry leaders, operators, investors, and policymakers to assess what would be required for Canada to retain and extend its nuclear leadership. The group was galvanized by a common goal: to support the build out of future nuclear projects in Canada and beyond. Those projects, whether they are large or small, using new to Canada technologies or existing technologies, or are in provinces with a rich nuclear history like Ontario or those looking to build one, all have a place.

That's because nuclear power offers a direct route to a more prosperous Canada. A first-mover SMR deployment can establish the supply chains, engineering and project management capabilities, and regulatory experience that future small and large-scale nuclear builds will rely on. Conversely, delay would allow other countries to establish these supply chains and capabilities, which could undermine decades of domestic expertise and leadership.

With the right regulatory reforms, financing tools, and supply-chain strategies, Canada can convert its early advantages into a durable leadership position across the entire nuclear value chain. The sections that follow set out recommended actions to ensure Canada continues to be a global leader in the next era of nuclear development.

To secure Canada's position in the global nuclear sector, federal and provincial governments need to act swiftly and in a coordinated manner as follows:

Regulation

1. The Federal government should modernize its regulatory system by establishing binding and predictable timelines for regulatory processes, standard design approvals, and clear, efficient Impact Assessment pathways.
2. To the extent not already permitted, Provincial governments should allow industrial users to use nuclear power to generate reliable power and steam, with excess power being eligible to be sold into provincial electricity grids.

Financing

3. Federal and Provincial governments should implement changes required to facilitate private capital investment in new nuclear projects, as has been done in other jurisdictions.
4. Federal and Provincial governments should establish a National Nuclear Lifecycle Council to create a repeatable, national framework for addressing radioactive waste and decommissioning.

Building Supply Chains and Creating Jobs

5. Federal and Provincial governments should establish a whole-of-nuclear economic strategy that builds Canadian supply chains, engineering and project management capabilities, regulatory experience, and export capacity.
6. The Federal government should work to attract an enriched nuclear fuel supplier to Canada.
7. Federal and Provincial governments should continue to accelerate approvals for nuclear-adjacent industrial projects to support fleet deployment.

Energy Security and Defence

8. The Federal government should consider integrating nuclear power, mainly through SMRs or microreactors into defence and Arctic-sovereignty planning.

Together, these eight actions form a coherent national strategy to ensure Canada sets the standards, hosts the supply chains, and controls the fuel cycle of its nuclear future. It will create domestic jobs, galvanize investment, and bolster the country's economic fortunes.

Introduction
Canada's Strategic Position

Canada's history with nuclear power is rich. As early as 1945, Chalk River, Ontario was the site of the first controlled nuclear reaction outside of the United States.[2] Since then, Canada has served as a mainstay for nuclear research which eventually led to the innovation of the CANDU reactor, fueled using unenriched uranium.

With Ontario leading the way, CANDU reactors have operated in three different provinces, including New Brunswick and Québec, and at over five different generating sites.[3] At its peak, nuclear power produced over 95.7 million megawatt hours in Canada in 2017, representing almost 15% of the country's electricity supply.[4] Unit 1 at the Ontario Power Generation Inc. (OPG) Darlington Nuclear Generation Station (DNGS) holds the world record for the longest period of continuous operation between outages. Refurbishments at DNGS to extend operations by an additional 30 years are almost complete, ahead of schedule and on budget, despite COVID-19 inflationary pressures. [5,6] Similar successful refurbishment work is underway at Bruce Power LP's Bruce Nuclear Generation Station through its Major Component Replacement project. In addition, a significant refurbishment of OPG's Pickering Nuclear Generating Station B was recently announced in November 2025. Although Québec's nuclear station has since closed, New Brunswick's Point Lepreau Generating Station completed a major life extension refurbishment in 2012 and continues to provide power to the Atlantic region. Canada has proven that nuclear power is a safe, clean, non-carbon emitting source of reliable baseload power.

Canada is also the world's second-largest producer of uranium, supplying a significant share of global demand. In this regard, Canada is a cornerstone of global nuclear fuel security. Uranium has been discovered and mined across the country. Deposits in the Northwest Territories and in Northern and Central Ontario produced uranium for decades. In fact, Elliot Lake, Ontario owes its founding to the discovery and mining of several large uranium deposits.[7] Now, the Athabasca Basin in Northern Saskatchewan provides the country's uranium through Canadian companies like Cameco that have been providing high-quality uranium for decades. Additional projects like the Rook I uranium mine and mill project by NexGen Energy Ltd. in Saskatchewan are currently awaiting government approval to add to this effort.[8] In addition, facilities in Blind River, Port Hope, Peterborough and Toronto refine and process uranium and manufacture nuclear fuel for use in Canada's CANDU reactors.

Additionally, Canada has used nuclear power to create an economic boon for the nation. The sector contributes more than $22 billion annually to the country's GDP. As of 2024, the industry employs roughly 89,000 people in Canada. As a result of the refurbishments and new proposed developments, the sector's GDP contribution over the past five years has increased by 30% while the number of people employed in the sector has increased by 17%.[9]

Of course, Canada's nuclear supply chain powers its domestic industry, but it also drives international growth:

- The CANDU reactor remains one of the country's most successful technological exports. Though Canada has the most CANDU reactors, they are also in countries like Argentina, China, Romania, and South Korea.[10]
- 80% of Canada's mined uranium is exported for international use.[11] Companies such as Cameco anchor this position, with tier one uranium mines, coupled with refining and conversion, that make Canada a key player across the global nuclear fuel cycle.

In addition to the supply chain, Canadian companies Brookfield and Cameco own the Westinghouse Electric Company which recently secured deals with the U.S. government worth as much as $80 billion USD.[12] All in all, the demand for nuclear power is evolving and Canada is well positioned to be a major player.

A large part of this transition is the adoption of SMRs, which provide a fascinating new opportunity for Canada given their smaller, more modular, and lower capital cost characteristics. Canada has a first-mover advantage given the first SMR deployment in the G7 is now under construction in Ontario at OPG's Darlington New Nuclear Project (DNNP). Large-scale nuclear projects are also being considered in Canada, notably OPG's Wesleyville site, Bruce Power's Bruce C project and Energy Alberta's Peace River project.

This combination of new large-scale nuclear and SMRs can be used to maximize existing transmission infrastructure and can be scaled up to meet rising electricity demands from growth areas such as AI hyperscalers, data centres, and transportation electrification. Depending on the reactor technology used, they offer the potential to be deployed in more remote areas, including remote industrial applications like mining projects that have high energy requirements and currently use higher-emitting fuel sources.

Canada can lead the way if policies are adopted to lead the world-wide nuclear build up in all three domains:

1. The reactor designs that will dominate global deployment.
2. The supply chains and manufacturing centres that will anchor long-term economic value.
3. Control over enriched-fuel and fabrication capacity.

Countries that commit early will shape these systems and Canada has rightly identified SMRs as a huge growth opportunity, given Ontario's DNNP will be the first of its kind. Being the first nation in the G7 to take this technology from development to implementation will give Canada unparalleled expertise, a potential supply chain manufacturing advantage, and allow for intellectual property conversion into direct economic gain. Over the next decade, a handful of nuclear designs, supply chains, and fuel-cycle arrangements will define the global market. If Canada is able to couple this existing momentum with more efficient and predictable regulatory approvals, a better financing environment, an empowered supply chain, and the ability to enrich its uranium deposits, Canada could lead the way and become a key source for expertise, technology, and fuel.

This strategy would have unparalleled economic benefits. Ontario's proposed nuclear projects alone, which include SMR development as well as existing reactor refurbishments, are expected to contribute some $160 billion to the country's GDP during construction.[13] That pales in comparison to the $630 billion they will generate during their decades of operations. There are also 80,000 jobs during construction and 64,000 for as long as the sites operate.[14] Those figures are before including the recently announced refurbishment of the Pickering Nuclear Generating Station project which is projected to add more than $41 billion in GDP and 30,500 jobs during the refurbishment and 6,700 jobs through operations. [15]

The good news is the federal and provincial governments in Canada have taken notice. The opportunity is not lost on them. Ontario, has already committed, through OPG, to build up to four SMRs at the DNNP and is evaluating the prospects of future large-scale nuclear at Wesleyville. The DNNP has also attracted government funding: Ontario announced an up to $1 billion investment through the Building Ontario Fund, while the federal government announced an up to $2 billion investment through the Canada Growth Fund and the Canada Infrastructure Bank has provided OPG with a loan.[16, 17] In addition, the DNNP was designated as one of the first tranche of projects for consideration by the new federal Major Projects Office. Bruce Power is also considering the Bruce C project and in 2024, Natural Resources Canada announced up to $50 million in funding to support Bruce Power's pre-development work.

The rest of Canada is following Ontario's lead and becoming increasingly interested in nuclear. Saskatchewan, New Brunswick, Alberta, and Ontario all signed a joint strategic plan outlining a path forward on SMRs.[18] Saskatchewan's provincial utility, SaskPower, is exploring the option of deploying SMRs with a final investment decision expected by 2029. Since 2018, New Brunswick has actively supported the development of advanced SMR technologies and, through NB Power, is planning the construction and operation of an SMR at its Lepreau site, alongside

the existing Point Lepreau Nuclear Generating Station. Nova Scotia signed a Memorandum of Understanding with Ontario to explore the potential of SMRs for its province as well. [19]

Likewise, Nunavut and the Northwest Territories have participated in initial SMR dialogues to explore the technology's potential to replace diesel use in remote communities.[20] Prince Edward Island has declared its intention to explore SMRs in their most recent energy strategy. [21]

Alberta also sees significant potential for nuclear deployment, launching an expert panel to examine how nuclear power, including potential SMRs, could support its electricity system and industrial decarbonization. Under its new Memorandum of Understanding with the Government of Canada, both governments have committed to develop a nuclear generation strategy for the province by 2027. Alberta is also seeing early private sector momentum, with Capital Power and OPG exploring SMR opportunities in the province and Energy Alberta pursuing its Peace River large-scale nuclear project.

There is real momentum across Canada to develop nuclear technology and sectoral expertise in multiple provinces, through SMRs or large-scale nuclear.
That said, there is much work to be done. As with any major project, there are significant regulatory, financial, and operational decisions to be made. Many provinces have little or no experience with nuclear power generation. Some have electricity markets that are not currently suited to nuclear baseload generation. And others may not have the capital available, the expertise needed to work with the private sector to appropriately deploy nuclear technology, or radioactive waste management facilities.

For the nuclear sector to truly power Canada's economic growth, both figuratively and literally, it needs greater certainty. Regulatory certainty, political certainty, and financing certainty are key. These are real barriers to the growth of the nuclear industry in Canada, but they are not insurmountable. If Canada can get these pieces right and can use its world leading expertise and experience to seize the moment, it can export its lessons, technologies, and materials to the rest of the world for decades to come. Our roundtable dove into these problems and potential solutions, which we will now explore throughout the rest of this paper.

Regulation of New Nuclear

New nuclear projects face an extensive and highly technical regulatory pathway. SMRs and most large non-CANDU reactors require enriched uranium, secure material handling, and robust site protection. Similar considerations apply for CANDU reactors, though unenriched nuclear fuel is used and CANDU facilities have historical operations in Canada to draw on. All of these factors justify strong oversight, but they also make regulatory efficiency essential. If Canada wants to retain its position as a first-mover, licensing must be rigorous, efficient and predictable enough to support multi-billion-dollar investment decisions.

Today, the challenge is that these legitimate safety requirements are embedded in approval processes that remain too slow, opaque, and bespoke. Investors and utilities with exemplary track records can wait years, if not decades, for decisions. They face uncertain timelines for Impact Assessment Act reviews, and endure repeated licensing steps even for standardized reactor designs. This uncertainty raises the cost of capital and risks pushing projects and their supply chains to jurisdictions with clearer, faster, and more repeatable pathways. It is important to note, however, that any Canadian regulatory approval or licensing process must be completed in a manner that upholds the Crown's Duty to Consult Indigenous rights holders.

If Canada cannot license new designs and approve projects as quickly as peer jurisdictions, we will not set the standards. Other countries will. Slow or unpredictable approvals are the surest path to becoming dependent on foreign regulators, foreign design authorities, and foreign supply chains. Canada must recognize that it is in the midst of an international competition for investment, talent, and jobs.

The Canadian Nuclear Safety Commission (CNSC) has taken important steps to improve the licensing process. New long-duration nuclear operating licences, such as the operating licence granted to OPG for the DNGS through to 2045, are the longest nuclear operating licences the CNSC has ever granted.[22] That reflects a regulator that compares favourably with its peers internationally. Yet, the scale and diversity of next-generation builds will require a further

evaluation of how Canada regulates nuclear power. Multiple SMR fleets, refurbishments, and new large-scale units across provinces that have never hosted nuclear before will be a challenge for governments and their regulators.

If every SMR or large reactor deployment triggers a bespoke, first-of-its-kind review, Canada will lose the fundamental economic advantage of standardized, repeatable builds. This is especially problematic when a single proponent or operator with significant expertise (such as OPG) may lead deployments at multiple sites within or across multiple provinces, or where identical SMR designs are intended to be replicated across a fleet. Capital cannot sit idle while Canada repeats the entire licensing process for each site.

Two structural challenges now require federal attention

First, the Impact Assessment Act process must become more efficient, predictable, and time bound. Since 2019, only two projects have been approved under the process for designated projects set out in the Act to date, and both assessments relied on substituting British Columbia's environmental assessment process for much of the process under the Act. This is a clear signal to global investors that Canada's permitting timeline is misaligned with Canada's goals on investment attraction and a cleaner energy grid. The federal government has acknowledged this issue and begun corrective work, including through the Building Canada Act as well as its Major Projects Office, but a more fundamental reset of timelines and scope is required.

Second, the CNSC will need expanded capacity and modernized tools to keep pace with the coming volume of applications. While the CNSC is rightly respected globally, it must now evolve from a bespoke, project-by-project licensing body into a regulator capable of enabling fleet deployment.

This means:

- Adopting standard design approvals for SMR and large-scale reactor technologies so that the regulatory process does not have to start from scratch every time.
- Mandating binding service standards and decision timelines.
- Expanding staff resources and technical capabilities.
- Enabling mutual recognition of assessments from trusted allied nuclear regulators to fast-track repeat designs.

In essence, Canada should consider shifting from site-based licensing to product-based licensing. Both the United States and the United Kingdom are already pursuing these reforms and Canada needs to keep up.[23, 24] This change would dramatically shorten approval timelines, improve certainty for investors, reduce regulatory duplication, and allow Canada to participate fully in the emerging global ecosystem of deployment of fleets of standardized designs. Mutual recognition of allied regulators' work, which is already advancing under U.S.–U.K. accords, would further strengthen the CNSC's leadership role and make Canada a more competitive host for nuclear innovation.

Above all, Canada cannot hope to export its nuclear expertise, SMR technologies, or supply-chain capacity if it cannot license and build efficiently at home. Modernizing the regulatory system is not just an administrative improvement, it is a strategic requirement for Canada to be a first mover that sets the standard for the next generation of global nuclear deployment.

Industrial New Nuclear Projects

For some provinces, another piece of the regulatory puzzle is the required changes to their existing electricity market rules. Some, but not all, provinces use power purchase agreements (PPAs) with government agencies or related entities to procure electricity generation projects. For provinces without these types of PPAs, an industrial SMR will need to proceed with a private corporate PPA with one or more significant, credit-worthy end-users. As noted below under "Financing Canada's New Nuclear Development", this type of PPA may not be sufficient to permit the financing of a new nuclear project. However, in any event, the owner of the facility will want to be able to sell excess power into provincial electricity grids at competitive price points and if regulatory or market rule changes are required to enable this, applicable provinces should consider implementing the necessary changes.

Financing Canada's New Nuclear Deployment

Though nuclear has the power to galvanize Canada's economy, it is capital intensive. Large-scale nuclear can cost tens of billions of dollars and though SMRs are less capital intensive given their smaller size, SMRs can still cost billions. Then there is the cost of connecting the generating facilities to transmission infrastructure to deliver the power from the reactors to businesses and homes. The cost of these facilities should decrease though as additional units are constructed and come online. With each unit constructed, lessons are learned, efficiencies are realized, and best practices implemented. For example, Ontario has already suggested that the cost of SMR builds will decrease as more units are completed.[25] Overall costs can therefore be reduced by building at scale across Canada.

Prior buildouts of nuclear plants in Canada in the 1970s to 1990s were financed with government funds. Given the significant costs projected for the nuclear projects being contemplated, and the other demands on governments with respect to other infrastructure, housing, healthcare and other key areas, private capital (e.g., Canadian pension plans and privately managed infrastructure funds) will be needed in addition to government funding. The good news is the nuclear sector is already well suited to attract private financing for its operating fleet with decades of operating history, either through debt or equity. Ontario's Bruce Power facility, which has eight operating reactors in the Kincardine area, has been leased and operated by private investors since 2001 – currently, Bruce Power LP is owned by TC Energy, OMERS and certain unions.[26] In addition, both Bruce Power and OPG have been able to attract significant debt financing. However, the same cannot be said for new nuclear projects. In order to attract private capital investment for a new nuclear build project, the following criteria will need to be met.

Certainty of Revenue Model

The key to any private capital investment will be a reliable and creditworthy revenue source, without it no nuclear project will proceed in Canada. Canada already has examples of such a revenue source for the existing operating nuclear fleet in Ontario. For Bruce Power, this is a contract with the Ontario Independent Electricity System Operator (IESO) and for OPG, this is rate regulation pursuant to the Ontario Energy Board Act, 1998. Both mechanisms, government contract or rate regulation, are options that could be used throughout Canada to provide the certainty of revenue that private capital would need to invest in a nuclear project.

What is critical is that certain criteria are contained in the revenue models for new nuclear projects, including:

- **Return on Equity:** The return on equity will need to be sufficiently sized to reflect the risks associated with a new nuclear project.
- **Concurrent Cost Recovery:** There will be no return on investment in nuclear projects during the construction period - which will take years to complete - if revenue is paid only in relation to the generation of electricity. Payment of concurrent cost recovery at the Weighted Average Cost of Capital (WACC) during the construction period allows investors to start receiving a return and lenders to be paid interest which has the added benefit of reducing overall costs as interest-during-construction is reduced or eliminated.
- **Term:** The revenue model will need to last for the entire operating life of the facility.
- **Stoppage:** Even with a robust revenue model in place, private capital investors will require protections in the event the nuclear project is stopped due to government policy changes, permitting or approval issues, cost overruns, or otherwise. These protections would result in the return of capital to the investors.
- **Early Development Costs:** Another unique aspect of nuclear projects relates to the significant early development costs that must be incurred upfront before a project is approved to proceed and financing can be obtained, including development costs in respect of site selection, design and engineering, regulatory approvals and permits, and revenue contracts/regulation, and other project contracts. A private investor will require a cost recovery contract or regulation to cover all or a significant portion of these costs to address the risk that the project does not ultimately proceed to construction.

For some provinces, adopting a government contract or rate regulation model will require changes to their existing electricity markets. If that is a bridge too far, it may be possible for an industrial SMR to proceed if it has a properly constructed PPA/steam purchase agreement with one or more significant, credit-worthy end-users. Private PPAs only, however, will be insufficient for nuclear facilities constructed for the purpose of producing electricity to be injected into a province's transmission grid though a PPA with a hyperscaler, for example, could play a role in providing some financing for such a nuclear project. Therefore, provinces will need to decide if they are pursuing nuclear energy for their own electricity requirements or solely for industrial users or both, as that may drive the scope of changes needed.

Sharing of Cost Overrun Risk

It is no secret that nuclear power plant builds can be daunting prospects for investors. Poor project management and planning can provide a cost over-run sticker shock that is difficult to overcome. For example, the Vogtle project in Georgia came online seven years late and $17 billion over budget.[27] That type of experience can scare away investors.

There have been significant increases in Canada's project management capabilities as can be seen with the successful execution of the refurbishment of the CANDU nuclear fleet in Canada. Additionally, nuclear operators share expertise and best practice amongst each other. That said, private capital will want a mechanism in place whereby risks around cost overruns are shared with governments or ratepayers so that their ultimate exposure is capped.

Government Funding

Private capital investors are not likely to be able to finance an entire nuclear project without government funding, whether debt financing like concessionary loans at low interest rates or loan guarantees or equity financing. Governments can also assist with funding through tax credits like the current Federal Clean Electricity and Clean Technology Investment Tax Credits. Government funding would give investors' confidence, not only by providing financing, but also by ensuring that governments are mutually invested in the project reaching completion. Government funding can also lower the WACC for a project which will ultimately result in lower project costs.

As noted above, both Ontario and Canada have provided equity and debt financing in respect of the DNNP. In addition, there are many international examples of government funding being provided for new nuclear projects including:

Sweden:

- In May 2025, the government passed an act establishing a state-aid framework for new nuclear power investments, covering up to 5,000 MW (about four large reactors) in total capacity.[28]
- Under that framework, aid is provided as government loans for construction, testing, and preparatory work, plus two-way Contracts for Difference for power sold once the reactor is operational.[29]
- If market electricity prices fall below a 'strike price', the state pays the difference. If prices rise above it, the reactor operator pays back the excess.[30]

France:

- As part of its nuclear fleet renewal, the government has agreed to provide a special subsidized loan to the state-owned operator EDF to cover at least half of the construction costs for six new reactors as well as a contract for difference on electricity price.[31,32]

United States:

- The federal U.S. Department of Energy via its Loan Programs Office used federal loan guarantees to finance new-build nuclear reactors at Plant Vogtle (Units 3 & 4) in Georgia, the first new reactors in the U.S. in decades.[33]
- These guarantees dramatically reduce financing risk for private investors because the government assumes the risk if borrowers' default, thereby improving access to capital at lower rates.[34]
- The Loan Programs Office has begun issuing loans as high as $1 billion to private investors and the latest loan to the Constellation Group to restart the Three Mile Island nuclear facility reached conditional commitment and financial close on the same day.[35]

Nuclear Insurance

The global markets for nuclear property damage insurance are not sufficient to provide protection for all capital costs invested by private capital in a nuclear project. A lack of privately available insurance could result in some private capital being unwilling to invest. This is an area where governments could step in and fill the insurance gap until such time as the insurance market is robust enough to provide complete insurance.

Decommissioning and Used Nuclear Fuel and Other Nuclear Waste Disposal

When attempting to secure investment for a nuclear project, there are additional considerations that can add uncertainty into any proposal. Every nuclear project will produce used nuclear fuel and other radioactive nuclear waste, and ultimately, the facility itself will need to be decommissioned following operations as its core components will also be radioactive. As many of the costs in connection with these activities will be incurred decades after the project is constructed, the funds to pay for these costs need to be set aside during operations to ensure they are available when needed. Although these issues are not new for Canada as the industry has been managing nuclear waste for decades in respect of the existing CANDU fleet and has begun decommissioning activities in respect of units that have been permanently shut down, as nuclear projects gain momentum across Canada the need for a harmonized and national approach to decommissioning and nuclear waste will increase.

Currently in Canada, the Nuclear Waste Management Organization (NWMO) is a not-for-profit organization mandated under the Nuclear Fuel Waste Act to design and implement Canada's plan for the safe, long- term management of used nuclear fuel. It is implementing Adaptive Phased Management, which will contain and isolate used fuel in a deep geological repository (DGR). After a years-long site selection process, the NWMO selected the Wabigoon Lake Ojibway Nation–Ignace site for the DGR. In 2023, the federal government expanded the NWMO's mandate to plan for a second deep geological repository for intermediate level and non-fuel high level radioactive waste, with potential capacity for used fuel from new nuclear projects.

In order to facilitate new nuclear projects across Canada, the federal government should build on the existing leadership of the CNSC and the NWMO and establish a National Nuclear Lifecycle Council with provinces, Indigenous partners, industry and civil society. The purpose of this body would be to improve coordination across jurisdictions and waste classes and to support a repeatable, consent based national framework for decommissioning and nuclear waste management. Pursuing a bespoke solution for each and every proposed site adds upfront costs and inserts the potential for regulatory delay and uncertainty into the process. A repeatable national framework could be deployed each time, cutting down the cost, timelines for approvals, and uncertainty that this necessary area of regulation brings. This is an important issue that requires dedicated thought and attention, but it should not be the barrier that holds the country back from pursuing energy security, significant economic growth, and the creation of thousands of jobs.

Indigenous Participation

Indigenous participation should sit at the heart of all new nuclear projects in Canada. Each nuclear project will likely be located in or near traditional Indigenous territories and will be subject to the Crown's Duty to Consult and, if appropriate, accommodate. Indigenous peoples, as rights holders, will be consulted in relation to any new nuclear project and may need to be accommodated depending on the circumstances. Nuclear projects also offer an incredible opportunity for long-lasting, generational economic reconciliation through Indigenous participation in projects.

Governments should provide the appropriate loans and loan guarantees to enable Indigenous participation. Many programs already exist through entities such as the Canada Indigenous Loan Guarantee Program, the Indigenous Opportunities Financing Program, the Saskatchewan Indigenous Investment Finance Corporation, and the Canada Infrastructure Bank. Other groups like the Alberta Indigenous Opportunities Corporation could have their mandate expanded to cover nuclear projects. However, as nuclear projects gain momentum across the country and given the significant investment dollars that will be required, additional government resources will be required.

The national Indigenous Advisory Council on SMRs, supported by Natural Resources Canada and led by the First Nations Power Authority, marks an important step in putting Indigenous leadership at the centre of Canada's SMR plans. [36] Federal and provincial governments could now strengthen this council with stable funding and a clear mandate so that Indigenous perspectives actively shape SMR policy and project decisions while ensuring benefit sharing from the outset.

International Example

There is international precedent to attract private capital investment in a new nuclear project – the Sizewell C new nuclear project in the UK. Britain adopted a Regulated Asset Base (RAB) model which facilitated private capital equity investments including Québec's La Caisse $3.2 billion (CAD) investment for a 20% interest. [37,38] The UK Government and EDF also remain equity investors. In addition, £5 billion of debt was raised through a Bpifrance AE export credit facility as well as a £500 million Working Capital Facility, both sitting alongside a term loan from the UK's National Wealth Fund. Thirteen banks have supported the £5 billion debt raise and a subset of these are providing the Working Capital Facility, demonstrating the depth of support for Sizewell C's pioneering financing model.[39]

Building Supply Chains and Creating Jobs

Manufacturing

The primary purpose of new nuclear investment domestically is to secure, reliable, clean baseload power. However, an ancillary benefit of new nuclear investment is the potential to create high-paying, good value jobs for Canadians across the country.

Supply chains follow early, large, and standardized commitments. If Canada wants to export rather than import, Canada should leverage its 'early-mover advantage' to supply high-value components, engineering, construction and project management expertise, and intellectual property internationally. Long-term industrial benefits will accrue to countries that move fast. A good example of these supply chain benefits is BWXT. Following OPG's selection of GE-Hitachi's BWRX-300 SMR technology for the DNNP, GE-Hitachi, Synthos Green Energy and BWXT announced their intention to cooperate in deploying BWRX-300 SMRs in Poland.[40] This could result in BWXT manufacturing a wide range of products for the Polish SMRs from its facilities located in Ontario.

The new investments in SMRs in Ontario alone will create 18,000 jobs during construction then create and sustain 3,700 jobs during operations of the four SMR sites.[41] The Ontario government estimates that 80% of the total project spend will go to companies in Ontario.[42] That number is likely even higher if the rest of the country is included. Of course, these employment benefits are before accounting for the job creation allowed by access to an additional 1,200 megawatts of reliable and affordable baseload power.

When indirect and induced employment is included, the Conference Board of Canada estimated that four SMRs at the DNNP could generate 113,161 jobs-years in Ontario and over 128,000 nation-wide. The work would also generate nearly $5 billion in tax revenue for governments across the country which can be used to help stimulate even more economic growth.[43]

For provinces that are considering nuclear power for the first time, these supply chain benefits are important considerations that can increase the value of an investment in the sector. Places like Alberta, Saskatchewan, and the Atlantic provinces can also benefit with the right policies, supports, and investment conditions to attract businesses and investments in the nuclear supply chain.

Whether the investments are in new large-scale nuclear builds or in SMRs, the potential for job creation and GDP growth is material. A concerted effort by all governments to foster the required investment and create a supply chain that leads the way from start to finish can power domestic builds and also create goods, technologies, and expertise that can be exported to countries around the world for decades to come. A large-scale buildout across Canada would provide the largest economic development effects. The larger the investment in nuclear, the greater the business case to onshore manufacturing in Canada. Given the strong provincial momentum across the country, the time is now to transform these plans from ideas to realities and foster a world class supply chain and expertise in nuclear power.

Preparing the Nuclear Workforce

To build supply chains and create lasting jobs, Canada must build and sustain the workforce that new nuclear projects will require. These builds will create tens of thousands of new jobs, with the largest share in skilled trades on construction sites and substantial growth in engineering, science, and plant operations roles.

In practical terms, this will require higher enrolment in nuclear related engineering programs, more apprenticeship seats in key trades, and mid-career pathways for workers interested in upskilling into these good paying careers. Considering that degrees and apprenticeships can take years to complete, action will be required soon. Similarly, thoughtful programs in other government-controlled areas could be undertaken, like expedited immigration of nuclear engineers or funded scholarships to help create the domestic talent the nuclear sector needs.

In short, Canada will need to act now so that the people who will build, operate, and regulate these projects are in place when the next wave of nuclear construction begins in the 2030s.

Critical Minerals

Often lost in these economic statistics is the sourcing of materials and products needed to build large-scale nuclear reactors and SMRs. Nuclear facilities require large amounts of nickel, lead, graphite, chromium, niobium, and indium-cadmium alloys, as well as uranium for fuel. Each of these critical minerals are either already produced in Canada or can be produced in Canada. Notably, extraction of these minerals happens across the country, even in provinces that have not invested in nuclear power itself. Canada is rich with critical mineral deposits in British Columbia, Québec, Ontario, Saskatchewan and elsewhere, making this a prime opportunity for cross-country economic growth.

More investments in nuclear power and its corresponding supply chain for domestic and international use will increase the need for locally sourced critical minerals. The business case for critical mineral extraction and processing increases in step with the amount of money invested into SMRs, CANDU refurbishments, and large-scale new nuclear power since each of these projects will require a high volume of critical minerals.[44] In addition, mines consume considerable electricity in their operations. It is a mutually beneficial cycle that could see both sectors complement each other and grow simultaneously, while creating a national advantage that can be exported around the world.

Whether it is critical mineral extraction and processing or the major projects that would use large amounts of electricity, the most important role governments can play is ensuring expedited approval of these projects. Doing so must go hand in hand with the timely, well-resourced fulfillment of the Crown's Duty to Consult and, where appropriate, accommodate Indigenous rights holders, so that approvals are both faster and more grounded in meaningful Indigenous participation. The creation of the Major Projects Office is an important step in this direction and the work that office will conduct, be it in nuclear direct approvals or for other projects of national significance, has the potential to be truly powerful for the nation's economic prospects.

Enriched Fuel

If Canada can get the mix of regulatory certainty, financing support, and domestic job creation right, the potential for economic growth via new nuclear production is sizeable. However, there is another important factor to consider that could super charge that growth: fuel supply.

As mentioned earlier, Canada's current CANDU nuclear reactors use unenriched uranium fuel, all of which is produced in Canada. However, SMRs and many new large light-water reactors use enriched uranium. Though the uranium could be mined and refined in Canada, Canada does not currently possess the facilities needed to perform the enrichment process domestically. No matter what technologies Canada selects for its future nuclear builds and whether they require enriched nuclear fuel to operate, the reality is world demand for enriched fuel will likely continue to grow and Canada can play an important role in meeting this demand.

Uranium enrichment occurs in France, the U.S., the Netherlands, Germany, China, and Russia.[45] In fact, Russia is home to two of the largest uranium enrichment facilities in the world. Together, by 2030, these two facilities alone are projected to generate over 60% of the world's enriched uranium supply.[46] Given Russia's hostile acts around the world and the fact that enriched uranium is a key component of nuclear weaponry, this reliance on Russia is particularly problematic as they could use Canada's fuel supply as a negotiating chip or subject Canada to high enriched uranium prices at a moment's notice.

As recently as mid-November, the Canadian government increased sanctions on Russia and simultaneously expressed concerns about growing nuclear programs in hostile nations.[47] Issuing these sanctions and warnings while relying on these same countries for enriched uranium and domestic energy supplies is not a recipe for success. In this regard, Canada and other like-minded partners signaled their intent to advance collective enrichment and conversion capacity free from Russian influence through the Sapporo 5 Declaration.[48] As nuclear power grows on the global stage, the case for treating the fuel cycle as a strategic industrial asset, and for developing a coherent mine to fuel strategy in Canada rather than relying entirely on allied capacity, grows with it.

The good news is Canadian companies are already involved in the enrichment of uranium. Global Laser Enrichment is a business venture of two companies, one of which is the Canadian company Cameco. Cameco currently has a 49% stake in the company that is exploring a new laser uranium enrichment process but does have an option to attain a majority interest of up to 75% ownership.[49] This demonstrates that Canadian firms already have enrichment expertise, even if their current activities are based outside the country. As Canada considers options for domestic enrichment, policymakers should look for ways to build on and expand this participation so that more of the fuel cycle is anchored at home.

If the federal and provincial governments worked together to develop and implement a strategy to secure a domestic uranium enrichment facility it could accelerate the economic benefits of new nuclear, assuage concerns about international reliance, and create more jobs right here at home. Part of this strategy could be better utilizing Canada's reliable and inexpensive access to the premium stockpiles of uranium already known to be located throughout the country. Purchase orders for enriched uranium from new Canadian nuclear reactors could be an easy first customer for any new domestic facility. American exports are also possible since enriched uranium is used in all the nearly 100 nuclear reactors currently in the U.S. That business could be available to a domestic enriched uranium supplier today and likely grow as new nuclear and SMRs are developed south of the border and around the world. However, for an enrichment facility to be built in Canada, it will need a committed 'book of business' to justify the investment.

Exportable Expertise

Canada can also use its first mover advantage and domestic procurement of new nuclear projects across the country to establish an expertise that is recognized around the world. The emerging market domestically should be used to entice companies to establish their supply chains right here in Canada. Domestic procurement rules could also be leveraged to ensure that companies who are contributing to the build out of SMRs and large-scale reactors in Canada are providing domestic benefits and employment.

Then, as countries around the world turn to Canada for advice, expertise, and lessons learned, Canadian companies can monetize that. Additionally, local supply chain companies can provide physical parts and equipment for export around the world, also deriving value for the country and diversifying export markets in line with federal government goals to diversify trade.

The federal government has identified this opportunity with Budget 2025 proposing to provide $4.2 million over three years to Natural Resources Canada to maintain capacity for promoting nuclear energy exports and strategic engagement in key international markets.[50] Canada needs to tell its story at international events, exhibitions, and on trade missions with federal and provincial governments, but it can only do so convincingly with a strong domestic sector.

With this kind of harmonized effort, Canada can use its first mover advantage to become the leader in the space and export that around the world.

Medical Isotopes

Canada is already one of the world's leading sources of medical isotopes and the existing nuclear fleet in Canada is playing a key role in the production of medical isotopes. These isotopes are critical pieces used in diagnosing and treating diseases such as cancer and heart disease and are also used in sterilizing medical equipment.[51]

Nuclear medicine is estimated to be a $14-$33 billion (USD) market by 2031.[52] As the nuclear fleet is built out in Canada, consideration should be given to concurrently increasing Canada's production of medical isotopes. Through increased isotope production, Canada can help improve health outcomes here at home, increase medical technology exports, further grow the nuclear related supply chain, and become world leaders in an emerging new export market needed around the world.

Energy Security and Defence

New nuclear projects can strengthen Canada's energy security and defence posture, particularly in the Arctic, as the federal government moves to meet its commitment to spend 5% of GDP on defence by 2035. The future of Arctic security – be it over-the-horizon radar or simply an increased presence in the region – will increase the energy demand in the area. Given the remote nature of Arctic military installations, there is often little choice except for diesel fuel sources which are high-emitting, volume heavy, and need to be continually resupplied.

Nuclear plants, specifically SMRs and microreactors, can provide reliable energy for military bases and nearby communities and help the country establish a strategic presence in locations that are far removed from current electricity infrastructure. This would help to secure our sovereignty in the North and provide the power infrastructure to support the training and deployment of defence forces in the future.

These projects could be co-developed with Inuit and other Indigenous partners, with opportunities for equity and long-term partnerships, so that defence driven investments in energy infrastructure also advance community priorities and Indigenous-led visions of northern development. Finally, if there are mining or other infrastructure projects nearby, the nuclear plants could also be sized to provide power to those projects as well.

The Department of National Defence is well placed to act as the anchor customer and procure these reactors directly, creating a testbed for wider deployment across the North. This would be similar in intent to the U.S. Army which is procuring its own SMRs to provide an uninterruptible source of power to major military bases and installations through Project Janus.[53] Because the NATO Defence Investment Pledge allows a portion of increased defence spending to be directed to critical infrastructure, Canadian Arctic nuclear projects structured in this way would support the 5% of GDP spending commitment while also delivering lasting, cleaner power to the North.[54]

Detailed Recommendations

These recommendations are designed to position Canada as a **first mover** in global nuclear deployment. Delaying decisions until others have set the designs, the supply chains, and the fuel-cycle rules is not an option. That approach would permanently relegate Canada to the role of adopter in a system defined by others while losing out on critical opportunities for economic growth. These recommendations ensure Canada is leading the way on nuclear for decades to come. Each of these recommendations are designed to be implemented in the next 1-3 years to ensure Canada is in the best position to turn first-movement into a lasting win.

Regulation of New Nuclear

Recommendation 1 — Modernize the Regulatory System

Canada cannot be a first mover if every SMR or large-scale reactor requires a bespoke, unpredictable, lengthy regulatory process. Investors, utilities, and provincial governments need timeline certainty and standardized rules for repeat builds across multiple jurisdictions. Without a shift to standardized design approvals, binding service standards, and a predictable Impact Assessment process, Canada will fall behind countries whose regulators can license fleets rather than one-offs.

The Federal government via its applicable Ministries, the CNSC, and the Impact Assessment Agency of Canada should:

- Adopt standard design approvals for SMR and large-scale reactor technologies so that the regulatory process does not have to start from scratch every time.
- Establish prequalified/tiered regulatory pathways for proponents/operators already holding CNSC licences.
- Implement binding CNSC service standards (e.g., 12–36 months) and timeline guarantees.
- Allow mutual recognition fast-tracks for technologies approved by U.S., U.K., or other trusted regulators.
- Amend the Impact Assessment Act to include binding timelines for the full process and clearer scoping rules.
- Ensure streamlined processes still uphold the Crown's Duty to Consult and, where appropriate, accommodate Indigenous rights holders, with clear timelines for meaningful participation.

Recommendation 2 — Enable Industrial PPAs

To the extent not already permitted, provincial governments should allow industrial users to use nuclear power to generate reliable power and steam, with excess power being eligible to be sold into provincial electricity grids.

Financing Canada's New Nuclear Deployment

Recommendation 3 — Implement Changes Required to Facilitate Private Capital Investment

Given the significant costs projected for the nuclear build out in Canada, and the other demands on governments with respect to other infrastructure, housing, healthcare and other key areas, private capital will be needed. By way of example, the UK implemented a Regulated Asset Base (RAB) financing model for Sizewell C and thereby obtained third party private capital investment, including from Québec's La Caisse. To facilitate private capital investment for a new nuclear project:

Provincial governments via their relevant Ministries and electricity regulators and agencies should:

- Provide a reliable and creditworthy revenue source for nuclear projects through contracts with provincial entities or rate regulation that will provide for the following:
  - A return on equity that reflects the risk associated with a new nuclear project.
  - Concurrent cost recovery at Weighted Average Cost of Capital during the period prior to operations.
  - A term that will last for the entire operating life of the facility.
  - Protection in the event that nuclear project is stopped prior to operations.
  - Recovery of pre-construction development costs.

The Federal government should:

- Fill any nuclear property insurance gap until such time as the insurance market is robust enough to provide complete insurance.

Federal and Provincial governments via their relevant Ministries and electricity regulators and agencies should:

- Share in the risk of cost overruns and provide an ultimate cap for private capital investors' exposure to these risks.
- Provide funding through equity investments, loans, and loan guarantees.
- Increase their Indigenous funding and loan programs to facilitate Indigenous participation in nuclear projects.

Recommendation 4 — Establish a National Nuclear Lifecycle Council

Every nuclear project will produce used nuclear fuel and other radioactive nuclear waste, and ultimately, the facility itself will need to be decommissioned following operations as its core components will also be radioactive. As many of the costs in connection with these activities will be incurred decades after the project is constructed, the funds to pay for these costs need to be set aside during operations to ensure they are available when needed. Although these issues are not new for Canada as the industry has been managing nuclear waste for decades in respect of the existing CANDU fleet and has begun decommissioning activities in respect of units that have been permanently shut down, as nuclear projects gain momentum across Canada, the need for a harmonized and national approach to decommissioning and nuclear waste will increase. A repeatable, nationally coordinated framework for radioactive waste and decommissioning would accelerate approvals and implementation of projects, while ensuring public confidence.

The Federal government should:

- Build on the existing leadership of the Canadian Nuclear Safety Commission and the Nuclear Waste Management Organization and establish a National Nuclear Lifecycle Council with provinces, Indigenous partners, industry and civil society.

Building Supply Chains and Creating Jobs

Recommendation 5 — Build a Whole-of-Nuclear Economic Strategy

Nuclear is not only about megawatts. It is an industrial strategy that spans critical minerals, component manufacturing, engineering and project management services, intellectual property development, and export markets. Over the next decade, a small number of standard global designs and supply chains will determine where long-term value resides. Canada must deliberately position itself on the supply side and not the import side. Canada can do this by ensuring that its nuclear build-out anchors domestic manufacturing and services.

The Federal government via its relevant Ministries, relationships with provinces, and work with the sector should:

- Create an Industry Nuclear Economic Strategy Working Group.
- Map and incentivize the supply chain from critical minerals through to fuel, components, engineering, construction, and Intellectual Property.
- Align procurement, immigration, and tax policy to favour nuclear investment in Canada.
- Require Canadian-based supply-chain and Intellectual Property commitments for nuclear firms benefiting from Canadian projects.
- Consider additional policies that promote and attract international talent and build a domestic workforce capable of powering Canada's nuclear future.

Recommendation 6 — Establish Domestic Enriched-Uranium Capability

Canada adopting SMRs means enriched uranium becomes a core strategic input. In addition to domestic supply, a domestic Canadian enrichment facility would be able to sell its services to other nuclear facilities outside of Canada that require enriched nuclear fuel.

The Federal government via its relevant Ministries should:

- Create a policy and regulatory framework enabling siting of enrichment facilities in Canada.
- Provide federal loan guarantees and tax incentives to attract an enrichment supplier to Canada.
- Integrate Canada into allied fuel-cycle initiatives.

Recommendation 7 — Expedite New Project Approvals Across All Sectors

Nuclear expansion depends on parallel growth in critical minerals, manufacturing, data centres, transmission upgrades, and associated infrastructure. Accelerating approvals across the economy, as we are seeing through the Major Projects Office, is therefore a necessary complement to nuclear build-out, not a separate policy stream.

Provincial and Federal governments should:

- Implement fast-track approval streams for projects linked to nuclear demand or supply chains.
- Reduce regulatory duplication across provincial and federal processes.
- Use Major Project Office–style coordination in every province for nuclear-adjacent projects while still meeting the Crown's Duty to Consult Indigenous rights holders.

Energy Security and Defence

Recommendation 8 — Integrate Nuclear Energy into Defence and National-Security Strategy, including in the Arctic

SMRs and microreactors can provide secure, continuous power to remote bases, Arctic radar chains, sovereignty infrastructure, and critical defence installations. Leveraging defence budgets and mandates to support SMR or microreactor deployment reduces project costs and anchors early demand. Treating nuclear as a strategic asset instead of just an energy asset will help Canada meet NATO spending commitments, strengthen Arctic sovereignty, and accelerate domestic nuclear capability.

The Federal government via the Department of National Defence, NORAD, and its relevant Ministries should:

- Pilot SMR and/or microreactor deployments for Arctic and remote military installations.
- Integrate civil nuclear energy explicitly into continental defence and Arctic sovereignty planning.
- Evaluate the U.S. Government's Project Janus for lessons about the potential use of SMRs and/or microreactors to provide secure, uninterruptible power to domestic military bases and installations.
- Explore co-developing Arctic and remote SMR and microreactor projects with Inuit and other Indigenous governments, including equity opportunities, so investments advance community priorities and Indigenous led visions of northern development.

Conclusion

The next decade will determine which countries will benefit from the significant increase in nuclear power projects. Canada can lead as a first mover. This approach will capture domestic investment, create jobs, and help Canada bolster its economy during tough economic times. It will ensure that investors do not pass Canada by for more attractive jurisdictions, taking the jobs with them. The choice is clear and, with the eight recommendations detailed in this paper, the path forward is clear too.

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