cna

Nuclear Financing in Canada

Abridged Version

Lead Author

Megan Goodland, Nuclear Specialist, Hatch Ltd.

Contributing Authors

Monika Eby, P.Eng, Mariam Faizal, Nicole Wirawan

HATCH

Contents

Introduction

Canada is well-positioned to benefit from its competitive position within the nuclear industry globally – from the fuel supply chain through to power generation, research facilities, and nuclear expertise. The need for a strong nuclear sector is growing as scalable, emissions-free nuclear power gains recognition as a vital technology to combat climate change, as countries around the world seek ways to ensure energy security, and as the electrification of the economy progresses. The support of government, industry, and the financial sector will determine the viability and ultimate success of Canada's existing nuclear infrastructure and implementation of new nuclear technologies, refurbishment projects, SMR development, projects in the fuel supply chain, as well as expanding research and development capabilities.

This report is an abridged version of an original report produced [1] to expand on the background and motivations for supporting the Canadian nuclear industry as highlighted at the October 2022 CNA Nuclear Financing Summit in Ottawa. Approaches used to address financial risk and sources of funding and financing are presented and assessed in the context of encouraging project success and investment from the private sector.

Background

Under the 2015 Paris Agreement, 196 countries entered a legally binding international treaty on climate change with the goal of limiting global warming to below 2°C compared to pre-industrial levels [2]. To achieve the goals set by the Paris Agreement, 120 countries have committed to net-zero carbon emissions by 2050. As a low-carbon energy source, there is a strong case for nuclear power as the preferred technology in the net-zero transition. Nuclear energy in Canada is estimated to displace 50 million tonnes of greenhouse gas emissions annually, and electricity from Canadian uranium is estimated to offset 300 million tonnes of emission worldwide [3].

Nuclear power plants have most often been financed and built in regulated utility markets with significant government backing [4]. They are primarily funded through utility system rate payers, or in some cases, taxpayers. More recently, there has been international movement away from state-owned, regulated electricity markets, with the intention to increase the number of power providers and allow for competition, ideally leading to lower prices. Therefore, it is anticipated that future nuclear power projects will be implemented in increasingly liberalized markets. With electricity markets becoming unregulated, electricity prices are less predictable, as the spot price, or system marginal price, is usually determined by the most expensive unit of power generation required to meet the demand. Less predictability in electricity prices increases the risk associated with funding nuclear projects.

Canada is a Tier 1 nuclear nation with over 70 years of technological leadership, a world-class regulator, and a strong domestic supply chain. The country has the third-largest uranium reserves globally and is the second-largest uranium exporter. With technology assets, natural resources, and technical expertise, Canada is well-positioned to continue its legacy in the nuclear industry.

In Canada, nuclear activities are under federal jurisdiction; however, it is the decision of provinces and territories to pursue nuclear power projects. The current Canadian reactor fleet was initially funded through provincial crown corporations. To date, Canadian nuclear plants are supported through markets that are regulated based on providing power on a cost-of-service basis.

Nuclear Investment Risks

Nuclear industries worldwide have faced challenges that have impeded their ability to scale up and compete with other energy sources, despite the benefits of nuclear power in lowering emissions and ensuring energy security while facilitating economic growth. From an investment perspective, a typical nuclear power plant is arguably no different to that of any other large infrastructure project: it demands a large upfront capital cost, involves a long construction period, and suffers from a long, and potentially unfavourable, payback period. Investment risks associated with nuclear projects are presented in the table below.

Nuclear Investment Risk	Definition	Methods of Mitigation
Political	Potential for policy change prior to or during the payback period by a current or new government.	- Federal and provincial bodies themselves, improvement of accessibility of information on nuclear power.
Demand	Potential that the power will not be preferred power source once a plant construction or refurbishment is complete.	- Long-term revenue guarantees.
Construction	Nuclear power plant projects have a poor reputation for schedule and budget exceedances.	- Demonstrating on-time and on-budget nuclear projects. - Phased financing arrangements. - Stable, predictable, adequate funding throughout regulatory environment and technology standardization.
Regulatory	Potential for a change in nuclear safety regulations during design, construction, or operations project phases.	- Cooperation of international regulators. - Standards harmonization. - Streamlined regulatory process.

Summary of Nuclear Investment Risks and How to Mitigate Them

Approaches to Address Financial Risk

Government support and new project funding structures from developers can reduce and better distribute project risk in both regulated and deregulated markets. Models such as Power Purchasing Agreements (PPAs), regulated asset programs, sovereign loan guarantees, and phased financing can aid in addressing financial risks associated with nuclear projects. The table below lists considerations associated with each approach to mitigate financial risk. These approaches are intended to assign risk and liability to parties most suitable and increase the likelihood of projects being delivered on time and on budget.

	Types of Approaches	Considerations
Power Purchasing Agreements (PPAs)	Contracts for Difference (CfDs)	- Difficult to determine a strike price.
	Feed-In Tariffs (FITs)	- Canadian FIT program for renewables was repealed in 2019 and faced controversy; unlikely that they will be used for nuclear projects in Canada.
	Mankala Model	- Requires a sufficient number of willing and able participants/ - Risk that the cost price power from nuclear plant becomes higher than market price.
	Exeltium	- Recent history demonstrates risk of fixed price rising above market prices. - Necessary contingencies need to be in original agreement to protect stakeholders.
Regulated Assets	Advanced Cost Recovery (ACR) Programs	- Use of ACRs for nuclear projects has been subject to controversy in the US [1]. - If used in Canada, regular reporting and reviews should be used for accountability and disincentives for project cancelation.
	UK Regulated Asset Base (RAB) Model	- Consumers take on a construction risk before obtaining power.
Phased Financing		- Construction of the first unit carries the highest risk while subsequent units may be able to benefit from a different financing model once the project has demonstrated success to investors.

Considerations Associated with Approaches for Addressing Financial Risk

PPAs are typically struck between an energy producer and an energy consumer in order to lock in the future purchase price of electricity once the generating plant is operational. These agreements are crucial for nuclear projects in liberalized markets. Alternative PPA structures include Feed-in Tariffs and Contracts for Difference (CfD), along with the Mankala Model and Exeltium which are two unique international arrangements used to fund nuclear power. Bruce Power, the largest public private partnership in Canada, has a successful example of the use of a CfD as it secured long-term cashflow to allow Bruce Power to proceed with its reactor refurbishment program.

Regulated assets allow utilities to receive a revenue stream prior to the operating phase of a nuclear project. Programs used to support nuclear projects include the Advanced Cost Recovery programs (ACR) at the state level in the US and the UK's Regulated Asset Base (RAB) model.

Phased financing refers to a projects' phases (planning, construction, operation, etc.) or through the phased financing of subsequent reactor units in a project. This method may be used in combination with any funding and investment method or source.

Funding and Investment Sources

Different sources of funding and investment for nuclear power include government support, the use of Environmental, Social, and Governance (ESG) investing and Green Bonds, as well as even crowdsourcing.

Government support for nuclear projects furthers interest and project favourability to financiers. The government can provide direct support through the use of grants, subsidies, and taxation/accounting policies. However, while Canada has a history of providing grants and subsidies for the nuclear industry, a majority of the recent considerations have been allocated toward the development of Small Modular Reactors (SMRs) and not large nuclear projects. Similarly, the 2022 Fall Economic Statement proposes a refundable tax credit of up to 30% of the capital costs of investments in a range of green power technologies, including SMRs [5]. While this is a strong signal to the investment community that Canada supports nuclear power as a reliable, clean energy source, by restricting the tax credit to SMRs, the potential benefits of this strategy are limited. Lastly, in 2018, the Canadian Accelerated Investment Incentive introduced an Accelerated Capital Cost Allowance (ACCA) to increase the rate at which capital investments depreciate annually. This serves to lower immediate tax obligations, improve cash position, and lower capital costs. An ACCA can substantially reduce the investment risks posed by alternative energy technologies. In fact, according to a US Department of the Treasury report, a 100% ACCA could lower the average cost of capital for investments by nearly 75% [6]. Presently, Canadian ACCA provisions do not include nuclear projects as they are exempt from the tax code.

While investors are increasingly applying ESG factors into their investment decisions, ESG metrics are not harmonized across countries or industries, which can lead to the exclusion of nuclear projects in investment portfolios.

Green bonds are a type of fixed income instrument designed to provide debt financing projects that provide an environmental benefit. However, nuclear energy is currently excluded from Canada's green bond framework. Bruce Power and Ontario Power Generation (OPG) have issued green bonds for nuclear projects despite a lack of federal support for nuclear green bonds, and have been met with success.

Crowdfunding allows individuals to contribute monetarily to a business venture. For instance, UK's Moltex Energy managed to raise £6 million for their Advanced Modular Reactor Program through an online investment platform [7]. Though numerous start-up companies have turned to crowdfunding, this tends to be rare for larger projects. It is likely that utility and government support is still required to implement a nuclear technology due to the high associated costs.

Current Canadian government support is focused the advancement of SMRs. As government support furthers interest and project favourability to financiers, support for large nuclear projects is still needed to support the industry.

Conclusion

There are many different approaches to funding nuclear projects that may allow for appropriate sharing of risks and opportunities amongst stakeholders. While the Canadian nuclear industry has traditionally been supported by government funding, recent large nuclear projects in Canada have successfully transitioned from relying solely on government financial support to attracting private and institutional investors. Successful project execution will continue to encourage private investment by allowing the investment community to better anticipate and evaluate the investment risk associated with nuclear projects. However, until Canada reaches a point where nuclear project risk can be readily accepted by traditional investment valuation models, the government must take a larger role in facilitating a way for private investors to manage and mitigate risk. With many levers at the government's disposal, such as favourable policies, taxation incentives, and loan guarantees, the government can influence the trend toward private investment to a greater extent. Ultimately, stable policy and government support is what can attract private investment in the nuclear industry and help Canada achieve its goals of emissions-free power, energy security, and economic growth for decades to come.

References

[1] Hatch, “Nuclear Financing in Canada,” Canadian Nuclear Association, 2023.

[2] Intergovernmental Panel on Climate Change (IPCC), “Special Report: Global Warming of 1.5 deg. C,” 2018. [Online]. Available: https://www.ipcc.ch/sr15/. [Accessed 2022].

[3] Natural Resources Canada, “Nuclear in Canada Infographic,” [Online]. Available: https://natural-resources.canada.ca/sites/nrcan/files/energy/pdf/uranium-nuclear/20-02262-Canada-Nuclear-Fuel-Cycle-Infographic-EN.pdf. [Accessed 2022].

[4] International Atomic Energy Agency, “Financing of Nuclear Power Plants,” International Atomic Energy Agency, Vienna, 2008.

[5] Department of Finance Canada, “Fall Economic Statement 2022,” 2022. [Online]. Available: https://www.budget.gc.ca/fes-eea/2022/report-rapport/FES-EEA-2022-en.pdf.

[6] US Department of Treasury, “The Case for Temporary 100 Percent Expensing: Encouraging Business to Expand Now by Lowering the Cost of Investment,” 2010.

[7] S. Birch, “Moltex raises US$7.5m in crowdfunding ‘first’,” Reuters Events, 25 September 2019. [Online]. Available: https://www.reutersevents.com/nuclear/moltex-raises-us75m-crowdfunding-first. [Accessed 12 December 2022].

cna canadian nuclear association

HATCH