NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

March 2020

Funding Canada's plan for the safe, long-term management of used nuclear fuel

Canada has a plan for its used nuclear fuel. It is called Adaptive Phased Management (APM), and it is up to the Nuclear Waste Management Organization (NWMO) to lead its implementation.

In 2007, the Government of Canada selected APM as Canada's plan for the safe, long-term management of its used nuclear fuel. The plan emerged from a three-year dialogue with Canadians, and reflects their preferences and priorities. Citizens have made it clear that it is important to develop a long-term approach for used nuclear fuel and not leave it for future generations.

Both the plan and the NWMO are funded by Canada's nuclear fuel waste owners.

Waste owners pay for Canada's plan

The development and implementation of Canada's long-term plan for used nuclear fuel is funded by the waste owners in Canada: Ontario Power Generation, New Brunswick Power, Hydro-Québec, and Atomic Energy of Canada Limited.

The *Nuclear Fuel Waste Act* (*NFWA*) requires each of these four companies to establish independently managed trust funds and make annual deposits to ensure the money to fund this project will be available when needed. Effectively, this means the consumers who benefit from the electricity will, over time, fund the long-term management of the waste that is generated.

Paying for the long-term management of used nuclear fuel is a relatively small portion of the cost of electricity. The cost of the APM Project is only about 0.1 cent per kilowatt hour of electricity produced.

Each waste owner pays a fair share of the costs

The Minister of Natural Resources approved the funding formula in April 2009, and the NWMO is responsible for maintaining it.

Each waste owner's deposit is calculated based on the number of fuel bundles it has produced and continues to create. The amounts cover estimated fixed costs for the NWMO to construct, operate, monitor, and decommission a deep geological repository, as well as variable costs associated with managing each fuel bundle.

Waste owners make annual contributions to trust funds

In 2020, the four waste owners are required to make a total trust fund deposit of $69.1 million.

This deposit represents the 2020 contribution towards the cost of the long-term management of the 2.9 million fuel bundles produced up to June 2019, as specified in the APM funding formula.

In addition to these trust fund contributions, waste owners are also responsible for funding the NWMO's annual operating budget.

Waste owners are also required under the *Nuclear Safety and Control Act* (*NSCA*) to provide to the Canadian Nuclear Safety Commission financial guarantees that are dedicated to nuclear waste management and decommissioning.

The NWMO anticipates new market entrants and emerging technologies

The *NFWA* considers the potential for new market entrants such as small modular reactors, and the government-approved formula used to determine funding for APM anticipated this eventuality.

For emerging technologies, the NWMO would provide a fee for service at fair and reasonable costs, and determine the long-term management requirements and associated costs for the resulting fuel wastes.

Funding is in place for the entire lifecycle of Canada's plan

Many factors will affect the long-term cost of Canada's plan, including the volume of used nuclear fuel to be managed, the location and design of the deep geological repository, surrounding infrastructure, rock type and characteristics, and length of time the site will be monitored following fuel placement.

The existing inventory of used nuclear fuel in Canada is approximately 2.9 million bundles, and more bundles are produced each year as nuclear reactors generate electricity.

The NWMO completed a full update of the cost estimates for APM in 2016, with the next update planned for 2021. These estimates provide the basis for financial planning and trust fund deposits for future years.

For planning purposes, our cost estimate is based on an expected volume of about 5.2 million fuel bundles. With this expected volume, the total lifecycle cost of APM – from the beginning of site selection in 2010 to the completion of the project about 150 years from now – is approximately $23 billion (in 2015 dollars).

This figure covers many decades of lifecycle activity – stretching well into next century. That does not mean, however, that we need $23 billion today. Instead, we must calculate how much money needs to be in trust today so that it can continue to generate enough income over time to cover the costs of Canada's plan.

We know these funds will grow over time as waste owners pay into trusts and investment income provides returns. So how much do we need in trust today to cover the project's costs tomorrow and decades from now?

Based on best estimates, in 2020 present value, the funding required to be in place in order to implement the project from 2020 onwards is $9.6 billion – a sum that will grow and compound as the project advances so it is always available to cover the costs of Canada's plan.



An artist's rendering portrays one example of how the Centre of Expertise could look. The final design will be developed collaboratively with those living in the area. Funding for Canada's plan will cover the centre's construction costs.

Funding covers pre- and post-construction and operations costs

Funding for Canada's plan must look decades ahead and base future costs on today's dollar value. The NWMO's detailed cost estimates ensure waste owners will fund the entire cost of planning and building the repository, as well as the costs of getting the used fuel to the facility and operating it for decades to come.

Included in the $9.6 billion funding requirement is $2.8 billion for work to select a site for the repository, complete a detailed design, develop the Centre of Expertise, acquire the site, evaluate environmental impacts, and obtain a site preparation and construction licence under the *NSCA*.

These pre-construction costs are paid for by the waste owners based on the annual budget as approved by the NWMO's Board of Directors.

The additional $6.8 billion included in the estimate will allow the NWMO to complete construction, transport the used fuel to the repository, as well as operate, close, and monitor the facility. The *NFWA* requires that these post-construction costs be funded by waste owner contributions to the *NFWA* Trust Funds.

Waste owners make regular contributions to trust funds to meet the project implementation costs and ensure funds necessary for constructing the facility will be available by the time construction begins.

Trust fund balances at the end of 2019 were $4.8 billion. This is enough money to cover post-licensing costs of APM for the country's existing inventory of used nuclear fuel.



The NWMO is responsible for determining the cost of the project and designing a system that collects the funds needed.

Canada's plan looks a century into the future, and beyond

The NWMO expects to identify a preferred site by about 2023. After that, detailed site characterization and licensing activities could take about nine years. Construction is expected to take about 10 years. In this scenario, we assume that operations could begin by about 2043.

Operations are expected to last for about 45 years, depending on the volume of used fuel to be managed. After that, the repository will be monitored for an extended period of time – we have assumed 70 years for planning purposes.

The NWMO provides regular updates on the progress of Canada's plan

The NWMO produces annual reports on our progress, which are made public. We also maintain a robust social media presence on Facebook, Instagram, Twitter, and LinkedIn that provides up-to-date information. Our website (www.nwmo.ca) includes news stories about ongoing activities, technical and social engagement reports, and an archive for those interested in learning more about Canada's plan for used nuclear fuel.

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