

Financial Surety and Updated Lifecycle Cost Estimate for Adaptive Phased Management

In 2007, the Government of Canada selected Adaptive Phased Management (APM) as Canada's plan for the long-term management of its used nuclear fuel. Financial surety is a cornerstone of the plan. Canadians expect that the money necessary to pay for the long-term care of used nuclear fuel will be available when it is needed. The *Nuclear Fuel Waste Act (NFWA)* (2002) provides the legislative framework for the program funding, and sets statutory roles and responsibilities for the Nuclear Waste Management Organization (NWMO) and waste owners.



Overview

The NWMO, the organization mandated with implementing APM, must ensure funds are available to pay for the safe, long-term management of Canada's used nuclear fuel. The program will be developed, implemented and operated over many decades. The NWMO must estimate what costs can reasonably be expected to occur over the life of the project, along with a contingency for unexpected events, and design a system that collects and protects enough money to ensure that the entire cost can be covered under a variety of social and economic circumstances, and within a required time frame. Under the *NFWA*, one of the important obligations of the NWMO is to maintain updated cost estimates for the program so that funding will be available when needed.

The updated cost estimate is the outcome of a broadly based exercise led by the NWMO in the 2009–2011 period. Using the most up-to-date information on what it will cost to implement the APM program, this estimate provides a current and informed basis on which to inform trust fund deposits.

This backgrounder:

- » Provides background on the funding of the APM program; and
- » Reports on the 2011 update of the lifecycle estimate for APM.

Long-Term Funding for the APM Program

Who pays for the APM program?

The planning, development and implementation of the APM plan is funded by the major owners of used nuclear fuel in Canada: Ontario Power Generation, NB Power, Hydro-Québec and Atomic Energy of Canada Limited. The *NFWA* requires each of these four companies to establish independently managed trust funds and make annual deposits to ensure that the money to fund this project will be available when needed.

How much money is in the trust funds?

The funds were established in 2002, and annual contributions have been made by each waste owner since. The total value of these funds, including investment income, was approximately \$2.5 billion as of the end of 2011. This money is in addition to other segregated funds and financial guarantees the companies have set aside for nuclear waste management and decommissioning. The trust fund balances as of the end of 2011 and the 2012 deposits to trust funds required by waste owners are set out in the table below.

	Trust Fund Balances as at December 2011 (\$ million)	2012 Deposits to Trust Funds Required by Waste Owners* (\$ million)
Owner	December 2011	2012
OPG	2,296	149
HQ	80	8
NBP	95	5
AECL	38	1
Total	2,509	163

* Annual trust fund deposits are required to be made within 30 days of the submission of the Annual Report.

Are the trust funds secure?

Yes. The *NFWA* built in explicit provisions to ensure that the trust funds are maintained securely and used only for the intended purpose. The NWMO may have access to these funds only for the purpose of implementing the management approach selected by the government once a construction or operating licence has been issued by the Canadian Nuclear Safety Commission (CNSC) under the *Nuclear Safety and Control Act (NSCA)*.

How are the NWMO's operations funded in the years preceding a construction licence?

The NWMO's annual operating budget is provided by the waste owner organizations through an annual business planning process with the Board of Directors consistent with an agreed cost-sharing formula.

Who establishes the level of trust fund deposits required each year?

The *NFWA* requires the NWMO to establish annual trust fund deposits for each waste owner.

How does the NWMO ensure trust funds will be sufficient to cover the program costs?

Maintaining an up-to-date program designs and cost estimates provides a sound basis for financial planning and establishing annual trust fund deposits. Trust fund deposits required of each waste owner are established by the NWMO based on the most recent total cost estimate for the management of nuclear fuel waste and the approved funding formula.

What is the formula for setting annual trust fund deposits?

Trust fund deposits are established against a funding formula developed by the NWMO and approved by the Minister of Natural Resources Canada in April 2009.

The funding formula is based on key principles that reflect objectives the NWMO heard from many Canadians:

- » Fairness – To ensure fairness in the distribution of costs, benefits, risks and responsibilities, within this generation and across generations.
- » Economic Viability – To ensure the economic viability of the waste management system, while simultaneously contributing positively to the local economy.
- » Adaptability – To ensure a capacity to adapt to changing knowledge and conditions over time.

These objectives led to five key principles that were used to develop the funding formula:

- » Producer Pays – Each waste owner pays based on the quantity of waste produced (fuel bundles) and usage of the repository.
- » Financial Conservatism – The highest cost scenario for implementing APM is used.
- » Uncertainty Analysis – Contingencies are provided in cost estimates for unforeseen events.
- » Intergenerational Fairness – Funds will be collected over the assumed economic life of the reactors producing the used fuel bundles.
- » Fund Growth – Reasonable assumptions are used for real growth of trust funds.

The formula currently in place will ensure that all the funds necessary to construct and operate the facility for the long-term management of used fuel created by existing reactors in Canada will be deposited in the trust funds by the time the reactors have ceased operation.

Updated APM Lifecycle Cost Estimate

Under the *NFWA* (2002), the NWMO must maintain an updated lifecycle cost estimate for the APM program. The purpose of keeping updated program cost estimates is to allow the NWMO to examine the financial implications of managing Canada's used nuclear fuel over the long term. The cost estimate provides a basis for financial planning to ensure sufficient levels of trust fund deposits are made each year.

Cost estimates for the APM program were developed in 2003. A full update of those estimates was commenced by the NWMO in 2009 and completed in 2011. This new estimate will provide the basis for financial planning and trust fund deposits for future years.

What does the cost estimate cover?

The updated cost estimate covers some 150 years of APM lifecycle activity for the deep geological repository and related transportation of used fuel.

In producing an estimate for the long-term planning around the APM program, a number of system design and costing assumptions were adopted to guide the projections. Among these were:

- » Engineering and conceptual design assumptions for the deep geological repository and transportation.
- » Assumed repository capacity of 3.6 million fuel bundles.
- » An in-service date of 2035 for the deep geological repository.
- » Closure of repository in 2160.

Each component of APM costs was systematically addressed to develop a full lifecycle cost estimate. Allowances and contingencies are also included in the APM cost estimate to account for cost risks. Further information on this cost estimating exercise is available from the NWMO.

What is the updated cost?

The updated cost estimate for the APM program for managing 3.6 million used fuel bundles is \$17.9 billion (2010 \$), or present value of \$7 billion (2010 \$).

This updated \$7 billion present value (2010 \$) estimate includes:

- » \$2 billion for the initial period to develop the repository to the point of obtaining a construction licence; and
- » \$5 billion for the later period to complete construction, transport the used fuel to the deep geological repository, and operate, close and monitor the repository. The *NFWA* requires that these costs must be funded through contributions to the *NFWA* trust funds established by Ontario Power Generation, Hydro-Québec, NB Power and AECL.

This updated cost estimate will form the baseline from which cost estimates for a used fuel inventory greater than 3.6 million bundles can be derived.

How does this compare to the previous estimate?

The previous (2003) APM cost estimate for managing 3.6 million used CANDU fuel bundles was \$16.9 billion (2010 \$), with a present value of \$6.9 billion. This represents a 1.4% increase in the present value estimate.

What is the reason for the change in the estimate?

The increase in total lifecycle cost is due primarily to changes in mine design assumptions and placement method for used fuel containers.

Will trust fund deposits be adjusted in light of the new APM cost estimate?

Yes. Trust fund contributions that the NWMO requires of waste owners will be adjusted to reflect the latest cost estimates starting in 2012, as well as the final 2011 year-end trust fund balances.

The impact on trust fund contributions is expected to be minor. For 2012, the total trust fund contribution for 2012 is expected to be \$163 million, rather than \$165 million under the previous estimate. The NWMO will be presenting this updated APM cost estimate in its 2011 Annual Report, issued in March 2012. In that report, the NWMO will set out the new trust fund deposit levels required of each individual waste owner for 2012 taking into account the final 2011 year-end trust fund balances.

How many fuel bundles have been created?

As of 2011, just under 2.3 million used fuel bundles have been produced after more than 40 years of nuclear power generation. Based on announced refurbishment plans as of 2011, the current fleet of reactors is expected to create approximately 4.6 million used fuel bundles by the end of their planned current lives.

How often are the cost estimates updated?

In addition to a regular baseline cost estimate update on a five-year cycle, the NWMO is committed to providing annual assessments of all factors that impact the estimates. Any material change in the estimated cost will be dealt with and disclosed in the NWMO's Annual Report.

It is important to continue updating APM cost estimates over time. Estimates are produced for financial planning purposes, based on a number of design and costing assumptions that will need to be reviewed and modified as the APM program evolves. Actual implementation of APM may differ substantially in terms of scope of work and timing of activities. The NWMO is committed to a step-wise decision-making process and will only proceed to the next step after careful consideration and with societal support. The NWMO must allow the time required for communities to engage in an informed and willing way during different phases of site investigations. Many decisions, such as the nature and duration of extended monitoring during operations, closure of the facility and postclosure monitoring, will be taken in collaboration with future societies.

How can I follow the long-term funding provisions for the APM program?

You can follow the growth in trust funds over time. As required by the *NFWA*, the NWMO makes public the audited financial statements of the trust funds when they are provided by the financial institutions annually. They are posted at www.nwmo.ca/trustfunds.

In each Annual Report, the NWMO is required under the *NFWA* to provide a range of financial information.



HIGHLIGHTS

Strong legislative framework in place for financial surety:

- » The *NFWA* (2002) addresses the funding of the APM program, and assigns roles and responsibilities.
- » The Minister of Natural Resources Canada approved the APM funding formula in 2009.
- » Waste owners must fund the APM program through annual deposits to trust funds at levels set by the NWMO.
- » Waste owners are also required under the *NSCA* to provide financial guarantees to the CNSC dedicated to nuclear waste management and decommissioning.

Trust funds are in place with regular contributions being made to meet program implementation:

- » Total APM lifecycle cost is \$17.9 billion (2010 \$): \$7 billion present value (2010 \$)
- » Portion required post construction licence
(financed through trust funds): \$5 billion present value (2010 \$)
- » Trust fund balances as at end of 2011: \$2.5 billion

Annual contributions to waste owner trust funds will continue such that the funds necessary for the complete construction costs of the facility will be available by the time construction commences.

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