nwmo

NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

GUIDED BY SCIENCE. GROUNDED IN KNOWLEDGE. COMMITTED TO PARTNERSHIP.

Annual Report 2021 »

Land acknowledgment

The Nuclear Waste Management Organization (NWMO) acknowledges that we have worked in many different Indigenous territories since the inception of the organization. We are grateful to the many Indigenous and municipal communities that have worked with us over the past 20 years.

We further acknowledge that today we are working in northwestern Ontario in the Wabigoon Lake Ojibway Nation traditional territory with Wabigoon and the Township of Ignace.

In southern Ontario, we are working in the Saugeen Ojibway Nation (SON) traditional territory with the two SON communities – Chippewas of Nawash Unceded First Nation and Chippewas of Saugeen First Nation – and the Municipality of South Bruce.

We further acknowledge that in both the northwest and the south, we have the privilege of working with other First Nations and organizations, with Métis communities and the Métis Nation of Ontario, and many municipal communities that have all expressed an interest in learning about our work.

As part of our commitment to Reconciliation, we recognize both the historic and current injustices far too many Indigenous communities endure and pledge to do our part to encourage well-being in communities with which we work.

NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

The Honourable Jonathan Wilkinson
Minister, Natural Resources Canada
Ottawa, ON K1A 0A6

March 2022

Dear Minister,

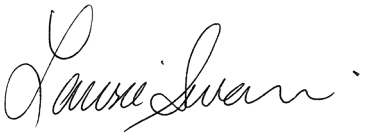
We are pleased to submit to you the annual report of the Nuclear Waste Management Organization (NWMO) for the fiscal year 2021.

We submit this report in compliance with Sections 16(1) and 23(1) of the *Nuclear Fuel Waste Act*.

In fulfilling our obligations under Section 24 of the Act, we are also making this report available to the public.

Respectfully submitted,

Wayne Robbins
Board Chair



Laurie Swami
President and CEO

Check out the digital version of this annual report at www.nwmo.ca/annualreport2021 for more interactive and multimedia content.

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Message from

Wayne Robbins, NWMO Board Chair

While protecting people and the environment has always been critical to the NWMO's work, the COVID-19 pandemic drove that message home. The significant shifts in lifestyle we all had to make brought our collective responsibilities to one another and future generations into sharp relief.

That is why the Board is so proud to oversee a project of such generational importance as Canada's plan for the safe, long-term management of used nuclear fuel. For the NWMO's Board of Directors, implementing Canada's plan means challenging the organization to keep improving in every area, from the innovations of our technical teams, to the way we engage the communities that are vital to the success of our project.

With the 2021 United Nations Climate Change Conference driving a renewed commitment to fighting climate change worldwide, we want to emphasize that we share that commitment. By building a deep geological repository, we will ensure that Canada's used nuclear fuel is safely managed, while Canada's nuclear industry continues to generate carbon-free energy. To close the nuclear fuel life cycle, the NWMO will lead the way while learning from international best practices, so that we are prepared to safely manage the used nuclear fuel of today and tomorrow.

As a Board, it is critical for us to understand our potential siting areas. Though the pandemic slowed that work, we regained ground this year, as vaccinations and reopening plans meant we had the opportunity to meet in South Bruce with municipal leaders and with Saugeen Ojibway Nation in its traditional territory. We hope to do the same in the Wabigoon-Ignace area in the coming year.

The inclusion of Indigenous Knowledge is also paramount to our work. Not only does it make our work stronger, but it is also one of the ways the NWMO demonstrates our commitment to Reconciliation. That is why the Board meets annually with the Council of Elders and Youth to exchange ideas and learn about decision-making processes that respect Indigenous peoples' traditions, knowledge and values.

This was a difficult year on many fronts, so the Board would like to acknowledge the tremendous efforts of the management team and our employees who rose to the challenge. As we look forward to 2022, the NWMO is gearing up for one of the most important milestones in our project plan – selecting a site in 2023. The Board is confident that the NWMO will approach site selection with the full culmination of all our past learning, while the organization also prepares for what is ahead.

The safe, long-term management of used nuclear fuel is in sight, and I invite you to look ahead with us.

Wayne Robbins
Board Chair

Message from

Laurie Swami, NWMO President and CEO

Canada's plan for the safe, long-term management of used nuclear fuel is designed to be adaptive. Although we faced significant challenges navigating the COVID-19 pandemic, I am proud of the way we adapted, and confident in saying we can celebrate a year marked by progress and success.

For the past decade, the NWMO's work has been building towards the key milestone of site selection in 2023. But site selection is not the end of our work – in many ways, it is the beginning.

In 2022, we must remain steadfast in our focus of selecting a site with informed and willing hosts, while also looking to the next phase of the project. Our progress to date will serve as a foundation. Great teamwork and a collaborative spirit will be the key to future success.

Even as we look beyond site selection, we must continue to work towards it. Vaccinations and reopening communities allowed us to meet face-to-face again – critically important to our engagement process, where safe, in-person meetings help us build a better understanding of each other. We also got our Mobile Learn More Centre on the road again, making nearly 50 stops to host engagement events. Re-establishing these connections was crucial to keeping us on the path to partnership.

We are also deepening our knowledge of the environment in our siting areas. In spring 2021, borehole drilling work restarted in the Wabigoon-Ignace area and began in the SON-South Bruce area. Before the end of the year, drilling was completed in the Wabigoon-Ignace area. Testing and analysis of core samples from both areas is now well underway. These are significant steps that will enhance our understanding of whether the siting areas can meet robust regulatory requirements.

Our Engineering team also took big strides forward this year, with significant work done to prepare us for full-scale emplacement trials in 2022 that will simulate conditions in the deep geological repository, including prototyping and testing of our innovative engineered-barrier system. That meant designing and fabricating key pieces of equipment that will be needed for the trials, such as our custom auger system that will be used to fill the small gaps left over in our placement rooms once our bentonite boxes have been placed.

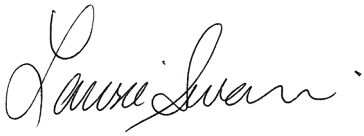
This year, we continued travelling a path together with Indigenous peoples on our journey towards Reconciliation. This journey is critical to the success of our project. It is not just the right thing to do – it is also good business.

Our work on Reconciliation in 2021 included further staff training and educational opportunities, as well as interweaving insights from Indigenous Knowledge systems throughout our work. We want to ensure our journey helps others find a path forward, so we will share the insights we have gained with others in the nuclear sector and beyond. It is our great hope that they too will allow their work to be enriched by the teachings of Indigenous peoples.

We welcomed many new faces as we expanded the NWMO with 35 new employees joining us in 2021. Many did not have the chance to meet in person until our offices reopened in the fall, and that meant finding new tools to build those meaningful connections that are so essential to our work. I was impressed by the agility of our team as we adapted to new ways of working and came back stronger than ever.

As we stay focused on the details of implementing Canada's plan, we will never lose sight of the goal that drives us – protecting people and the environment for generations to come.

I encourage you to read the following pages to see how the NWMO has adapted and progressed in 2021, as we remain guided by science, grounded in knowledge and committed to partnership.



Laurie Swami
President and CEO

Introduction to the NWMO

Canada has been using nuclear energy as a reliable, low-carbon power source for our homes and businesses for nearly 60 years. Now, as worldwide energy demand grows and the need to address climate change intensifies, nuclear power has become an increasingly important part of the conversation.

The Nuclear Waste Management Organization (NWMO) plays a vital role by closing the fuel cycle. We are entrusted with implementing Canada's plan for the safe, long-term management of used nuclear fuel inside a deep geological repository, in a manner that protects people and the environment for generations to come.

In 2002, the Government of Canada mandated the establishment of the NWMO through the *Nuclear Fuel Waste Act*. We are an independent, non-profit organization that is funded by the waste owners in Canada: Ontario Power Generation, New Brunswick Power, Hydro-Québec, and Atomic Energy of Canada Limited.

Currently, Canada's used nuclear fuel is stored at licensed, above-ground facilities. While this approach is safe, it is widely recognized as inappropriate over the long term. Canadians and Indigenous peoples have clearly told us they recognize the importance of taking action on a long-term solution today and not leaving it for future generations.

We know any long-term approach must be developed collaboratively with Canadians and Indigenous peoples. Canada's plan for used nuclear fuel, known as Adaptive Phased Management (APM), emerged through a three-year dialogue with specialists and the public. It is based on the values and objectives they identified. In 2007, the Government of Canada selected APM as the country's plan and directed the NWMO to implement it.

A significant milestone is now on the horizon for the NWMO, as we expect to select the site for the deep geological repository in 2023. Initially, 22 communities expressed interest in learning more about the project and exploring their potential to host it. Over the course of the past decade, we have narrowed down the potential siting areas to just two, both located in Ontario – the Wabigoon-Ignace area in the northwest and the SON-South Bruce area in the south.

Getting to site selection will require building on all the work we have done for nearly 20 years. With a project of such complexity and generational scope, we must always stay focused on reaching our upcoming milestones, while also keeping an eye on the long view. Our annual report is an opportunity to reflect on the progress of the past year, while looking to that future where Canada's used nuclear fuel will be safely contained and isolated for the very long term.

Adaptive Phased Management

APM includes a technical plan, as well as a phased and flexible implementation plan.

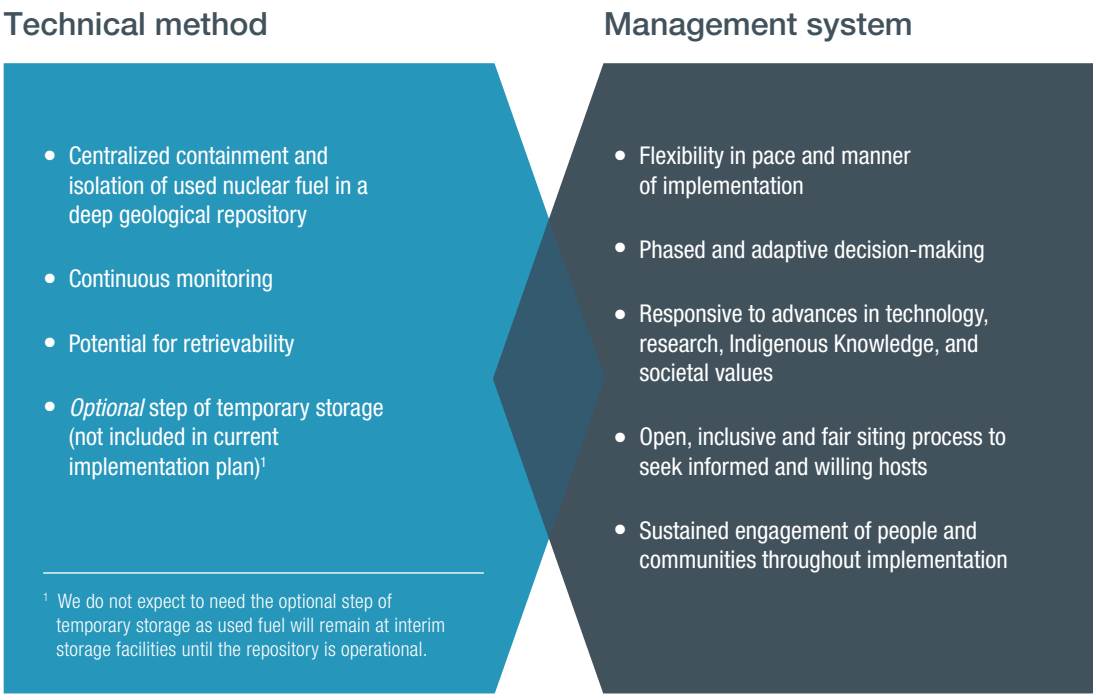
It is both a technical method (what we plan to build) and a management system (how we will work with people to get it done). The technological approach involves developing a deep geological repository in a suitable rock formation to safely contain and isolate used nuclear fuel. The management system involves phased and adaptive decision-making, supported by public engagement and continuous learning.

The project will only proceed in an area with informed and willing hosts. Together with the potential siting areas, we continue to explore the potential for partnership and look at how the project could enhance community well-being.

Canada's plan is adaptive by design. This aspect became vital this past year. As the COVID-19 pandemic continued to evolve in 2021, we found ways to further adapt our work – from how we engage with communities and provide training to our staff, to how we conduct engineering work at our proof test facility in Oakville, Ont. We are proud to have maintained momentum in delivering on our mandate.

The work we are conducting today is laying the foundation for a transition to a new series of activities once a preferred site is selected. We will then initiate regulatory processes, construct a Centre of Expertise and begin to transition our operations to the site.

The next phase of our work is fast-approaching, and we will be ready.



Informing and guiding our work

Values

Six fundamental values guide our work.

SAFETY

We place all aspects of public and employee safety – including environmental, conventional, nuclear and radiological safety – first and foremost in everything we do.

INTEGRITY

We act with openness, honesty and respect.

EXCELLENCE

We use the best knowledge, understanding and innovative thinking, and seek continuous improvement in all that we do in our pursuit of excellence.

COLLABORATION

We engage in a manner that is inclusive and responsive, and that supports trust, constructive dialogue and meaningful partnership.

ACCOUNTABILITY

We take responsibility for our actions, including wise, prudent and efficient management of resources.

TRANSPARENCY

We communicate openly and responsibly, providing information about our approach, processes and decision-making.

An Ethical and Social Framework

We are guided by an Ethical and Social Framework (www.nwmo.ca/ethicalandsocial) that was first published in 2004. It was developed with the involvement of leading Canadian ethicists and Indigenous thought leaders during the study phase of our work. We continue to build on this framework as the project moves forward.

The Ethical and Social Framework incorporates the following principles:

- Respect for life in all its forms, including minimization of harm to human beings and other sentient creatures;
- Respect for future generations of human beings, other species, and the biosphere as a whole;
- Respect for peoples and cultures;
- Justice across groups, regions and generations;
- Fairness to everyone affected, particularly minorities and marginalized groups; and
- Sensitivity to the differences in values and interpretation that different individuals and groups bring to the dialogue.

The deep geological repository

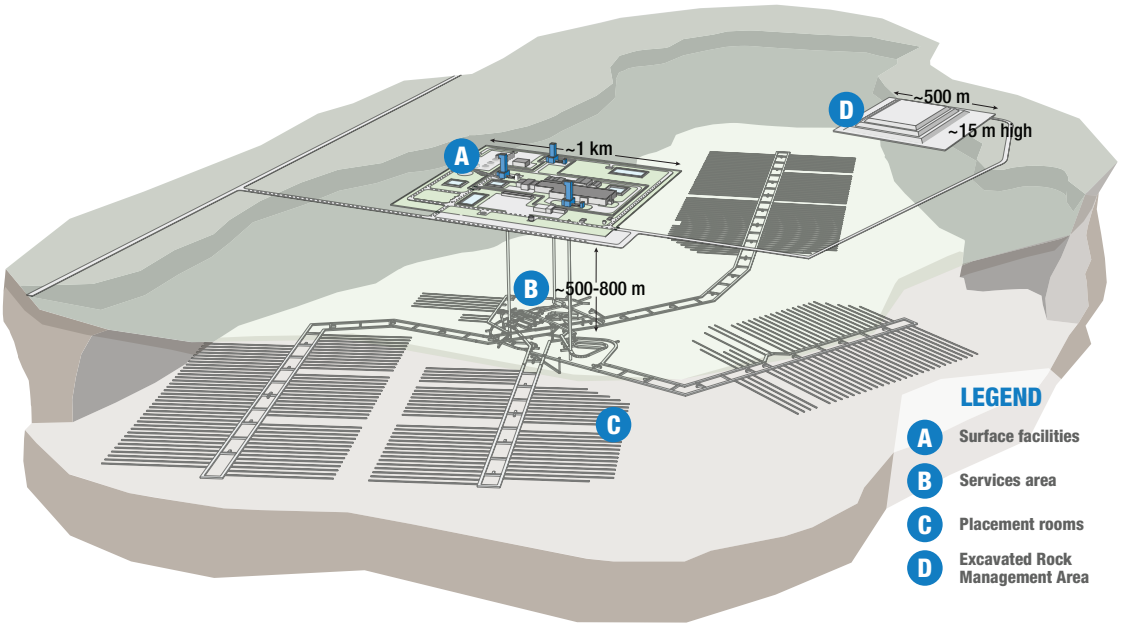
The deep geological repository uses a multiple-barrier system designed to safely contain and isolate used nuclear fuel over the very long term. Constructed more than 500 metres below ground, the repository will consist of a network of placement rooms that will store the used nuclear fuel.

At the surface, there will be facilities where the used fuel is received, inspected and repackaged into purpose-built containers encased in a buffer box, before being transferred to the main shaft for underground placement. There will also be facilities for administration, quality, security, processing of sealing materials, and ongoing operation of the site.

The repository will include a centralized services area that will allow for underground ventilation through three shafts located within a single, secure area. The layout also includes multiple access tunnel arms that will let our technical specialists situate the placement rooms in areas with the most suitable rock. The buffer boxes will be arranged in the horizontal placement rooms, and any spaces left over will be backfilled with bentonite pellets.

To prepare for the regulatory decision-making process and construction, the NWMO has begun work on site-specific conceptual designs of the repository layout based on information from geoscience assessments and initial borehole drilling in the potential siting areas. This is an iterative process – as the NWMO develops additional site-specific information, we will continue to evolve the design of the repository. The proposed site in the Wabigoon-Ignace area would be located in crystalline rock, and in the SON-South Bruce area, it would be in sedimentary rock.

Rigorous safety standards govern the project. We have committed to meet or exceed all applicable federal and provincial regulatory requirements to protect the health, safety and security of people and the environment for generations to come.



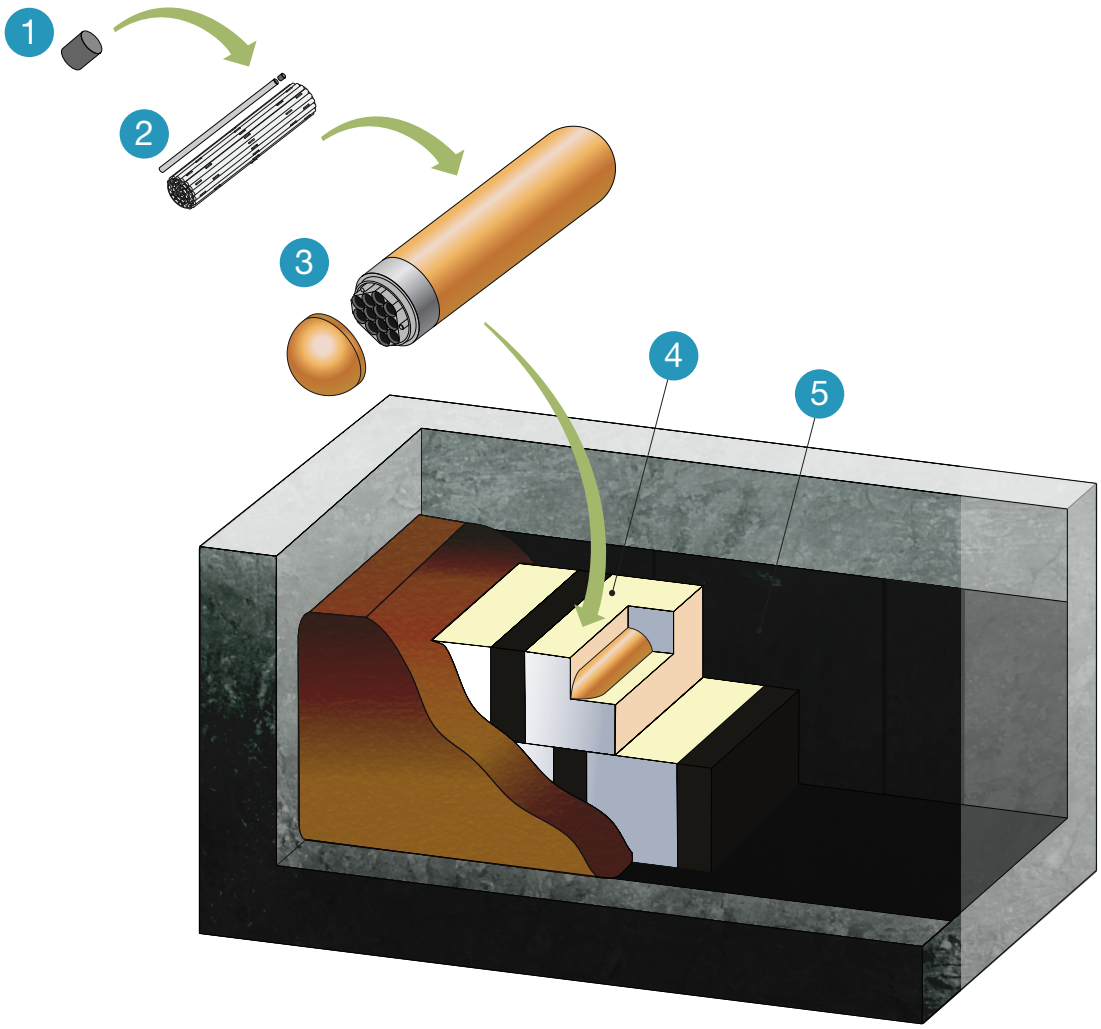
This diagram shows a conceptual layout for the surface facilities, as well as an approximate area of 1,500 acres (600 hectares) for the underground services area and placement rooms in the deep geological repository, at the proposed site with crystalline rock. This design will continue to evolve as the project progresses.

The engineered-barrier system

A series of engineered and natural barriers will work together to safely contain and isolate used nuclear fuel within the repository. Each barrier will provide a unique and stand-alone level of protection, while serving as a backstop to the last barrier. If any of these barriers were to fail, another would be there to ensure any dangerous materials remain contained or isolated.

1. The first barrier is the fuel pellet. Fuel pellets are a very stable, solid ceramic, made from highly durable baked uranium dioxide powder. They are stored end-to-end in long tubes made of a strong, corrosion-resistant metal.
2. The second barrier is the fuel bundle, made from a very corrosion-resistant material called Zircaloy, which contains a number of these tubes.
3. The third barrier is a copper-coated steel container. These containers are engineered to resist corrosion and are strong enough to keep the used nuclear fuel completely contained until its radioactivity decreases to safe levels. They are designed to survive underneath 3,000 metres of snow, ice and meltwater, 800 metres of rock and dirt, groundwater, and surrounding clay pressure.
4. The fourth barrier is a buffer box made of highly compacted bentonite clay that encases each container. Bentonite clay is a natural material proven to be a powerful barrier to water flow. It is very stable, as observed in natural formations that are hundreds of millions of years old. It also naturally prevents microbial growth, which will help maintain the integrity of the container over a long time.
5. The fifth barrier is the rock itself, which will protect the repository from disruptive natural events, water flow and human intrusion.

This diagram shows the multiple-barrier system that will contain and isolate the used nuclear fuel.



Our timelines

Like all organizations, the NWMO felt the impact of the pandemic on our work in 2021, but we remained focused and productive. Although some initiatives had to be paused temporarily, we were able to bring others forward by several months. Nevertheless, it was necessary to adjust some of the planned timelines to fully address the work associated with preparing for regulatory decision-making processes and building the Centre of Expertise.

By strategically adapting our work plans over the course of the year, we remained on track to select a preferred site in 2023. This will mark an important milestone for the project, as the decision will bring to an end the siting process we initiated in 2010. Timelines for construction and moving our operations to the selected site also remain unchanged.

We are committed to moving forward with Canada's plan. The following graphic provides a snapshot of historic and future milestones for the project.

Developing Canada's plan	2002	The NWMO is created.
	2005	The NWMO completes three-year study with interested individuals, including specialists, Indigenous peoples and the Canadian public.
	2007	Government of Canada selects Adaptive Phased Management (APM) and mandates the NWMO to begin implementation.
Developing the siting process	2008 to 2009	Work takes place with citizens to design a process for selecting a central, preferred site for the deep geological repository and Centre of Expertise.
Identifying a site using the siting process	2010	The siting process is initiated, with a program to provide information, answer questions and build awareness.
	2010 to 2015	Twenty-two communities initially express interest. In collaboration with interested communities, the NWMO conducts initial screenings, followed by preliminary assessment desktop studies and community engagement. Areas with less potential to meet project requirements are eliminated from further consideration.
	2015 to 2023	The NWMO expands assessment to include field investigations. Areas with less potential are eliminated from further consideration as the narrowing down process continues.
	2023	A single, preferred site is identified.
Towards construction	2024	Detailed site characterization begins. The project description is submitted, triggering the federal impact assessment. The Licence to Prepare Site application is submitted to the Canadian Nuclear Safety Commission (CNSC). An updated transportation planning framework is issued (updated every three years).
	2026	Impact assessment studies are submitted as part of the regulatory process.
	2027	The grand opening of the Centre of Expertise is held.
	2028	The impact assessment is approved (estimate). The Licence to Prepare Site is granted (estimate).
	2029	The Licence to Construct application is submitted to the CNSC.
	2032	The Licence to Construct is granted (estimate).
	2033	Construction begins.
Beginning operations	2040 to 2045	Operations of the deep geological repository begin. Transportation of used nuclear fuel to the repository begins.

The NWMO by the numbers

2

Areas remaining in the site selection process, both in Ontario: the Wabigoon-Ignace area in the northwest and the SON-South Bruce area in the south.

13

NWMO policies, procedures and standards have had Reconciliation assessments in 2021 to ensure that Reconciliation is reflected in all our work.

18

Blocks of highly compacted bentonite (which is part of the multiple-barrier system) were pressed in 2021.

19

The NWMO's age in 2021.

26

Communities and organizations have Learn More Agreements with the NWMO, through which they receive the resources, information and funding to learn about Canada's plan for used nuclear fuel.

28

Research projects with 15 Canadian universities were supported by the NWMO in 2021.

49

Mobile Learn More Centre (our rolling exhibit) events hosted in 2021.

182

Samples collected and tested for the surface water quality program in the potential siting areas.

207

Employees at the NWMO. About 400 more are indirectly employed, supporting communities' participation, the technical program and engagement work.

240+

Engagement activities organized by the NWMO in 2021. We estimate that more than 3,000 people participated in these events.

1,703

Rock samples from borehole drilling were sent for laboratory analysis in 2021.

2023

The year we expect to select a single, preferred site for the deep geological repository.

Interweaving Indigenous perspectives

Reconciliation and Indigenous Knowledge

At the NWMO, we recognize the importance of building good relationships with the Indigenous peoples on the lands where we work, including the traditional territories of Saugeen Ojibway Nation and Wabigoon Lake Ojibway Nation, which are also home to the Métis. As part of establishing a solid foundation for working with Indigenous peoples, we have embarked on a Reconciliation journey.

Reconciliation helps the NWMO to build meaningful relationships with all communities involved in the siting process. We seek to ground all relationships in the virtues of the seven sacred teachings – love, trust, honesty, humility, bravery, respect and wisdom.

In advancing that journey, we recognize that Reconciliation is more than an acknowledgment of injustice. Although that is an essential part of the process, Reconciliation also means taking action to co-create a better future built on rights, equity and well-being.

In 2021, we worked towards that future by continuing to implement the *Reconciliation Policy* (www.nwmo.ca/reconciliationpolicy) that we adopted in 2019. Our *Reconciliation Policy* provides a foundation to put our words into action. We have enhanced how we will evaluate our work on Reconciliation and created an annual Reconciliation report to ensure we meet the commitments outlined in our policy.

We also continue to build a culture of Reconciliation. We provide ongoing training and education opportunities to staff and have extended these opportunities to contractors and external partners.

We strive to interweave Indigenous Knowledge into all our work, which includes integrating ceremony with the guidance of Elders and other Knowledge Keepers where appropriate. In 2021, this included hosting several workshops on the application of Indigenous Knowledge, including our 4th Indigenous Knowledge and Western Science Workshop, which was hosted online with over 50 people attending.

In travelling this path together with Indigenous peoples, we believe it is important to consider different world views and how aspects of Indigenous Knowledge systems can be incorporated into the project moving forward.

A tobacco offering on the shore of Lake Huron, in the traditional territory of the Saugeen Ojibway Nation, was used as part of an Indigenous ceremony during the 2021 Environmental Review Group meeting. (*Photo credit: Jessica Perritt*)

NWMO RECONCILIATION STRATEGY

2021 and beyond

Develop an Indigenous youth strategy that includes a scholarship program and recruitment strategy

Continue to enhance Reconciliation training to include unconscious bias training

Include Indigenous Knowledge in water protection plans

Apply the Reconciliation assessment tool to regional engagement strategies

Embed Reconciliation within corporate culture

2020

Enhanced policies and procedures to address Reconciliation

Enhanced procurement program to include an Indigenous strategy

Assessed corporate Reconciliation baseline and developed a Reconciliation measurement matrix

2019

Published *Reconciliation Policy*

Developed and delivered Reconciliation training program

Developed a corporate Reconciliation baseline assessment tool

Enhanced sponsorships and donations program to include a focus on Reconciliation

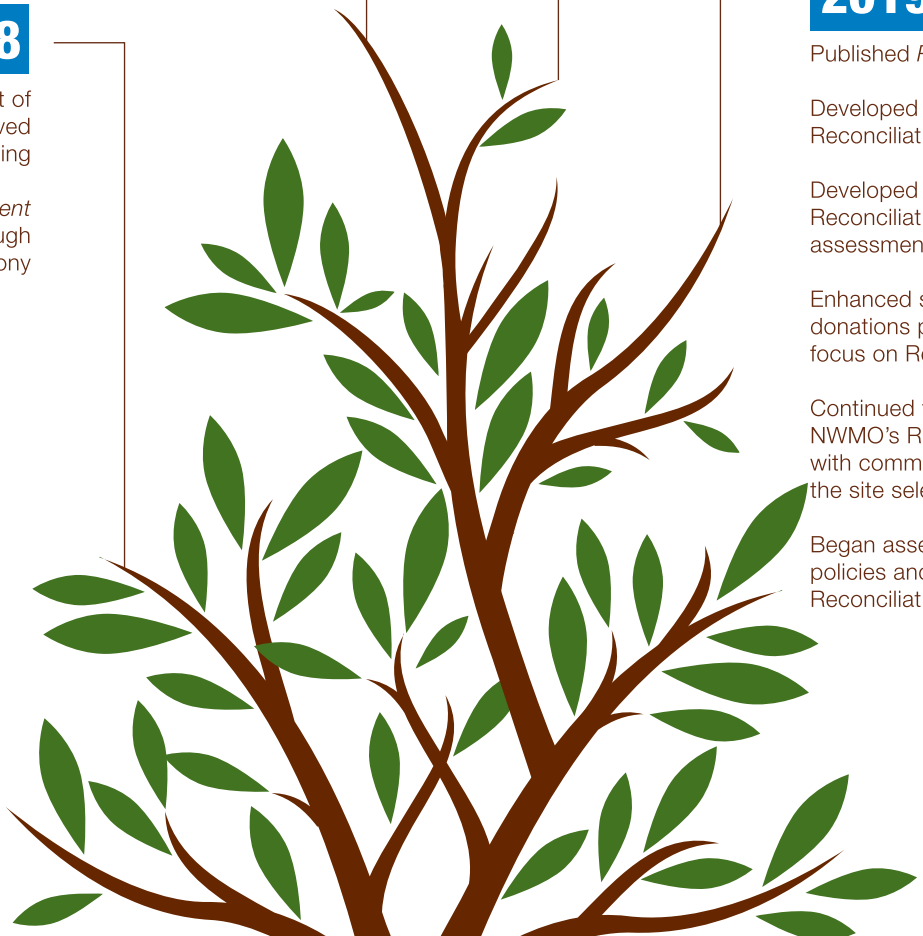
Continued to communicate the NWMO's Reconciliation program with communities involved in the site selection process

Began assessment of NWMO policies and procedures against Reconciliation assessment tool

2018

85 per cent of NWMO staff received cultural awareness training

Reconciliation Statement finalized through Indigenous ceremony



Implementing the NWMO's *Reconciliation Policy*

Through our *Reconciliation Policy* (2019) (www.nwmo.ca/reconciliationpolicy), the NWMO is committed to measuring our progress using qualitative and quantitative approaches, and publicly reporting on our progress as an organization. The NWMO has developed a Reconciliation baseline and has been using assessment tools to evaluate where we are in our contributions to Reconciliation, and how we should move forward as an organization.

This past year, the Indigenous Relations team worked with Reciprocal Consulting – an Indigenous-owned firm specializing in Indigenous evaluation and monitoring – to create our first annual Reconciliation report and an Indigenous Relations dashboard that will be evaluated against the baseline to ensure we meet the commitments outlined in the *Reconciliation Policy*.

In 2021, we applied our Reconciliation assessment tool to 10 of the NWMO's policies, procedures and standards, and two regional engagement strategies. The Reconciliation assessment tool was created in 2019 to look at our governing documents through a Reconciliation lens, to ensure we are operationalizing Reconciliation internally. This is a dialogue-driven process to identify opportunities to implement Reconciliation in meaningful and actionable ways.

We have also taken the assessment tool outside the organization to use it with some of our partner universities to apply this lens as they expand their research programs related to our work.

As part of our team's learning, we identified areas of improvement for the assessment tool and have revised it to become more user-friendly, provide more clarity, and ensure it is more accessible and offers deeper dialogue.

Creating a Reconciliation culture

We continue to incorporate Reconciliation throughout the NWMO's culture. Through daily practices such as land acknowledgments and ongoing training, as well as recognition and sponsorship of Indigenous events, we help advance the Reconciliation journey at both an individual and a corporate level.

This year, a significant focus of our Reconciliation work has been on training. We rolled out Reconciliation training (Part II), which includes learning about identity, privilege and the relationship of Indigenous peoples to land. By the end of 2021, we had held nine staff training sessions, with more than 85 per cent of our staff participating in the training. This training will continue in 2022.

The first module focuses on identity and how that impacts our individual and collective actions, how identity relates to privilege, and how we can spend our privilege contributing to our Reconciliation journeys. The second module focuses on land and Indigenous peoples' sacred relationship with the land. It helps make connections to how individual identity and world view can impact one's relationship to the land.

We are currently developing Reconciliation training (Part III), which will focus on treaties. The program will touch on treaties' history and modern-day context, and how treaties connect to identity, privilege and relationship to the land. The training was piloted in the fall of 2021 and will be rolled out more broadly to staff in 2022.

The NWMO continues to provide virtual cultural awareness training sessions for contractors, and presentations on the topic of Reconciliation to internal and external partners. In 2021, the Indigenous Relations and Indigenous Engagement teams supported more than 15 cultural awareness training sessions for contractors. A highlight from the sessions was the opportunity to work in partnership with Wabigoon Lake Ojibway Nation and co-deliver the training to ensure that community voice is incorporated respectfully in northwestern Ontario.

We also continued to participate virtually in events to enhance learning and promote discussion about Indigenous worldview and history. We recognized Red Dress Day, National Indigenous History Month, National Indigenous Peoples Day, the United Nations Declaration on the Rights of Indigenous Peoples, and the first National Day for Truth and Reconciliation, also known as Orange Shirt Day.

Lyndon J. Linklater is a Traditional Knowledge Keeper and Storyteller from Thunderchild First Nation (Plains Cree) in Saskatchewan. He leads cultural awareness training for NWMO staff and communities in our potential siting areas. (*Photo taken prior to the COVID-19 pandemic.*)

As part of our commitment to Reconciliation, we also enhanced our sponsorships of Indigenous programs. We continued our sponsorship agreements with the Gord Downie & Chanie Wenjack Fund to support the Legacy Schools and Legacy Spaces programs for five years. We also continued our annual support to Right To Play's Promoting Life-skills in Aboriginal Youth program in Ontario.

Interweaving Indigenous Knowledge into our work

The NWMO is committed to interweaving Indigenous Knowledge into our work. We learn from and incorporate traditional teachings such as the role of spirit and ceremony, understanding natural laws and respecting Mother Earth.

In 2021, we worked with Elder Michael Thrasher to host a four-part workshop series on the application of Indigenous Knowledge. These workshops were developed in collaboration with our Indigenous Knowledge and western science working team, and focused on applying Indigenous Knowledge into our work in meaningful and effective ways.

We again hosted two Indigenous Knowledge and western science workshops in 2021, which provided an opportunity to explore the intersections between Indigenous Knowledge and western science. Workshop discussions explored the sacred relationship and stewardship role that Indigenous Knowledge Keepers have with water and the commonalities with the perspective of western science.

Participants at these workshops included Indigenous Knowledge Keepers, Elders, scientists, industry professionals and NWMO employees. We explored why water governance is important, and the roles of sustainability, climate change and environmental stewardship within water governance initiatives, from both Indigenous worldview and non-Indigenous perspectives. We learned that water governance needs to be inclusive of water protection and restore the wrongs that have been done to water.

We also learned that water has a story to tell and that it is our responsibility to listen and learn from that story. Water has life-giving forces, which include certain duties and responsibilities to ensure that it is respected, protected and nurtured. All attendees were encouraged to start to build a personal relationship with water.

These workshops continue to be a forum where diverse voices talk about interweaving Indigenous Knowledge and western science.

Community engagement

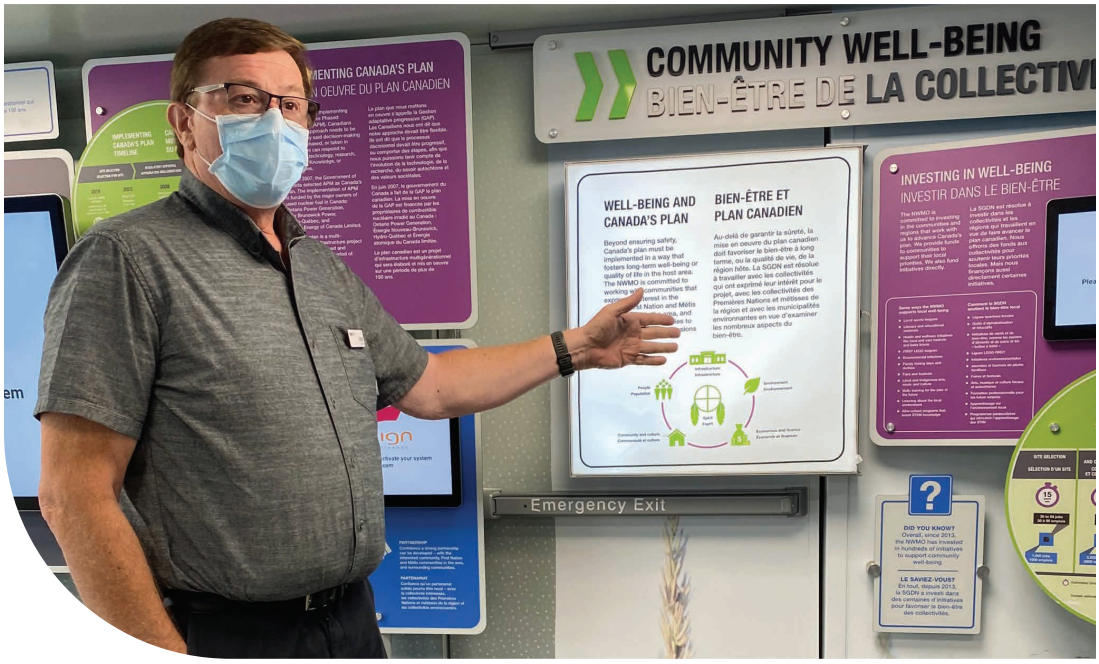
As we look towards significant milestones like site selection and beyond, the work we do with communities in and around potential siting areas has never been more important.

The sites under consideration are both located in Ontario – the Wabigoon-Ignace area in the northwest and the SON-South Bruce area in the south. Through ongoing work in these areas, we are continuing to support communities and create meaningful connections through our engagement work as they develop their understanding of Canada's plan.

The COVID-19 pandemic continues to factor into our engagement planning. In 2021, we worked with communities to reschedule delayed activities and found ways they could safely engage with us as we work towards selecting a site for Canada's plan. This included getting our Mobile Learn More Centre on tour again, our rolling exhibit designed to travel across the country to share Canada's plan. We made nearly 50 stops in communities to share information, answer questions, and hear the public's comments and concerns.

As Canada's plan is a multi-generational project, we continue to invest in youth education in science, technology, engineering and mathematics (STEM) learning. In 2021, we provided funds to community organizations in support of health and social support services, as well as broader community well-being initiatives.

Year-over-year, our work has gained greater attention from the public. In 2021, we continued to provide fact-based information to Canadians and Indigenous peoples in different ways (e.g., information sessions, media, social media, and our website) to create awareness and deepen understanding of the project.



The NWMO Mobile Learn More Centre made nearly 50 stops in 2021 in communities to share information, answer questions, and hear the public's comments and concerns.

Municipal engagement activities

In 2021, more members of our team were able to visit potential siting areas safely than had been possible in 2020 at the height of public health restrictions related to the pandemic. We found safe ways of meeting in person with residents of communities in the siting areas. We also found a variety of ways to engage with people virtually, as in-person engagement was not always possible. As we draw closer to the site selection milestone, the NWMO continues to prioritize working with community residents and leaders.

Our work to engage municipal leaders and staff from across Canada extended throughout the year. Our team virtually attended and/or sponsored more than 10 municipal association conferences throughout Ontario, Saskatchewan and New Brunswick. This was an opportunity to ensure that the NWMO and materials about our project were in front of elected leaders across the country, to provide them with the right information they needed to answer questions about the project from their constituents. For example, one of the plenary sessions of the Association of Municipalities of Ontario featured a five-minute video where our President and CEO spoke about why Canada's plan is of interest to Ontario's municipalities.

Throughout the fall of 2021, we delivered briefings on Adaptive Phased Management (APM) to regional stakeholders around the siting areas, including a visit of the Mobile Learn More Centre to Thunder Bay in October, to help the Northwestern Ontario Municipal Association become more familiar with the project.

In 2021, our President and CEO Laurie Swami visited the Township of Ignace, Wabigoon Lake Ojibway Nation and South Bruce as part of her commitment to having ongoing conversations with communities participating in the site selection process. She also met with Saugeen Ojibway Nation leadership in the fall. Additionally, business and municipal leaders from the Wabigoon-Ignace area met with the NWMO at the Ignace Learn More Centre to discuss the project and learn from each other.

In both potential siting areas, we engage through local community liaison committees. These committees provide input as we work collaboratively, create partnerships and share information. On top of our community liaison committee engagements, 2021 saw community surveys commissioned in the Township of Ignace and the Municipality of South Bruce. You can review the Ignace survey (www.nwmo.ca/ignaceclcsurvey) and the South Bruce survey (www.nwmo.ca/southbruceclcsurvey). The results of these independent community surveys show high levels of community awareness about the NWMO and our work.

Our approach to defining willingness has always been community-driven. In the Township of Ignace, willingness will be determined by a Council resolution, which will be informed by public input. In the Municipality of South Bruce, the Council has endorsed a process to determine willingness through a byelection after a draft hosting agreement has been negotiated.

NWMO President and CEO Laurie Swami joined Ignace Mayor Penny Lucas for a flight into White Otter Castle, an iconic northern Ontario landmark.

Engaging First Nation and Métis communities

In 2021, the NWMO continued building sustainable relationships with First Nation and Métis peoples in and around the potential siting areas, while maintaining ongoing engagement with national, provincial and treaty Indigenous organizations in Ontario and New Brunswick.

The NWMO also provided information on the project through engagement activities with Elders, youth and community members, as well as Chiefs, Councils, Presidents and other leaders. Technical specialists also shared insight into their fields of expertise.

Early in 2021, the NWMO's engagement staff continued to reach out to Indigenous communities through their community liaisons to discuss their situation with respect to the pandemic. Once pandemic restrictions were lifted and communities were comfortable allowing visitors to present, the NWMO resumed in-person engagement.

During the summer of 2021, the Mobile Learn More Centre visited eight individual First Nations, three communities at Lac Seul First Nation, Grand Council Treaty #3 and four Métis Nation of Ontario (MNO) communities in northwestern Ontario.

Throughout 2021, the NWMO visited communities in northwestern Ontario on a regular basis to host engagement activities, including a job fair in Seine River First Nation and an open house in Lac Seul First Nation. There were also engagement sessions with off-reserve members of Wabigoon Lake Ojibway Nation in Atikokan, Dryden, Thunder Bay and Winnipeg.

In southern Ontario, the NWMO's Indigenous engagement staff travelled to the communities each week for three days, doing engagement and drop-in sessions. Additionally, the Mobile Learn More Centre was present twice in Saugeen Ojibway Nation communities and twice at an Indigenous vendors market. In August, the unit toured the MNO Community Councils in Region 7 for four days.

The NWMO also found new ways to engage Métis communities during periods where pandemic restrictions were in place, including a range of activities online with the MNO. This included environmental workshops and transportation engagement sessions, as well as in-depth dialogue on the importance of water. All engagement sessions have seen an increase in participation from years past, with over 400 Métis citizens attending various events.

In August, MNO leadership joined the NWMO during our grand reopening of our Ignace office, and in collaboration with MNO staff, we mapped out water sampling locations for a Métis-specific monitoring program conducted by the Métis for the Métis in the SON-South Bruce area.

Throughout 2021, we also worked with local councils and governments on Reconciliation learning initiatives and will continue this work in 2022.

Engaging youth

With the knowledge that Canada's plan is a multi-generational infrastructure project that will impact today's youth and their children, the NWMO prioritizes investing in Canada's future. We are committed to helping future generations of scientists, engineers, journeypersons and nuclear industry employees grow and thrive.

The goal of creating meaningful connections with all kinds of communities drove our youth engagement in 2021. We continued to focus this year on improving young people's capacity for STEM skills, increasing awareness and understanding of APM, and building capacity to make future decisions. As with other groups, our engagement team adapted to support virtual engagement programming, as well as in-person initiatives with young people.

Education is at the heart of our youth engagement initiatives. The refresh of the Ignace Learn More Centre was completed in 2021, allowing our field engagement team to reach more members of the community in a more inclusive, interactive environment. The NWMO also supported the summer tour of the Mobile Learn More Centre that brought interactive experiences into communities, providing us with many opportunities to engage young people.

We also helped teachers and administrators bring more STEM education into the classroom. Since 2016, we have implemented a funding program called Early Investments in Education and Skills (EIES). Among other investments, the EIES program can help teachers and school administrators purchase and implement technology to teach everything from coding to robotics.

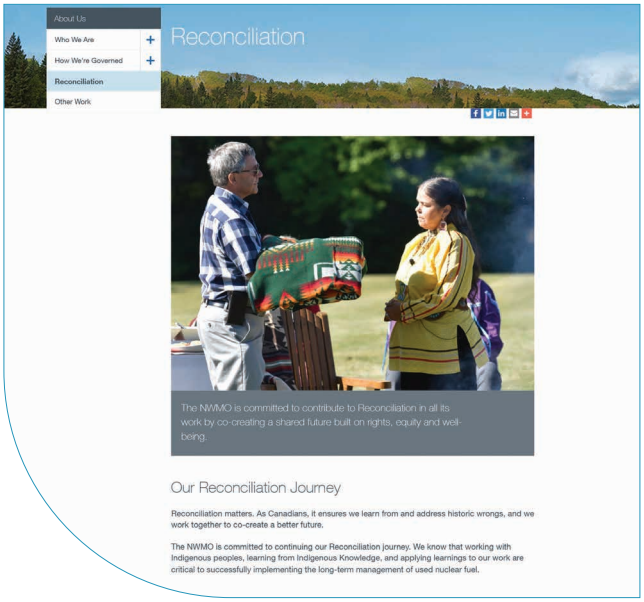
The newly renovated NWMO Ignace Learn More Centre features new displays, including a large 3D model of a deep geological repository.

Digital engagement

The NWMO's digital and social media initiatives supported the site selection process by sharing online content with local and regional audiences as part of our efforts to build trust and confidence. We also reached national audiences, raising awareness around the project by promoting online content across the country.

In 2021, we focused on engaging online audiences around the progress of our work. We widely shared content demonstrating the science behind APM, notably showcasing the borehole drilling in the Wabigoon-Ignace area (www.nwmo.ca/northwestborehole) and the SON-South Bruce area (www.nwmo.ca/southborehole). We were also able to follow our Mobile Learn More Centre tour of Ontario (www.nwmo.ca/mlmctour) through our social channels, as it travelled to dozens of stops.

To further advance our journey towards Reconciliation, a dedicated web page (www.nwmo.ca/Reconciliation) was created on the NWMO website to share key milestones, information and multimedia content on the steps and actions we are taking as part of our commitment to Reconciliation.



Visit the NWMO's Reconciliation web page (www.nwmo.ca/Reconciliation) to learn more about the steps and actions we are taking as part of our commitment to Reconciliation.

Our successful digital campaigns and positive online presence made 2021 a year of online growth for the NWMO. Audiences for our online platforms grew by an average of 30 per cent over 2020. Alongside the growth in our online communities came heightened traffic to www.nwmo.ca, with 46 per cent more page views compared to 2020. This means our information is achieving greater reach year-over-year.

Giving back through sponsorships and donations

The NWMO's sponsorships and donations program demonstrates our commitment to being a good corporate neighbour. As in years past, sponsorships in 2021 supported local and regional well-being initiatives in siting areas, and as communities continued to navigate the pandemic, the impact of our dollars was significant.

Our support for sponsorship partners also continued as they evolved and shifted their programs to better meet needs – such as virtual programming – during the pandemic. Some of our sponsorship activities are intended to support long-term community development and wellness, while others promote education, quality of life and environmental stewardship.

Highlights of our 2021 sponsorships and donations include:

- Support for programs that bring STEM education to young people, including initiatives led by Shad Canada, Scientists in School, Science North and the Nuclear Innovation Institute;
- Graduation awards and bursary programs that support skills capacity, professional development and career growth, including the Ignace School Graduation Awards and the South Bruce Student Bursary Program;
- Environmental initiatives such as establishing a water protection sponsorship with Saugeen Ojibway Nation and a partnership with the Toronto Zoo to support its work studying bat populations in Ontario; and
- Programs that enhance community well-being, including Wes for Youth Online that provides virtual counselling to Ontario youth, and the Upsala Recreation and Community Sports Centre that is establishing new programs to meet the community's needs during the pandemic.

The NWMO is proud to support local and regional well-being initiatives in siting areas. Pictured from left are Mary Smith, Property Manager at the Women's House Serving Bruce and Grey, and Morgan Murray and Jonathan Zettel from the NWMO.

Strengthening relationships with governments

In 2021, our staff engaged with representatives of federal and provincial governments to provide information about Canada's plan and our progress on implementing it. We remain connected on topics of shared interest such as fieldwork activities, siting process updates and land access. The NWMO's staff work with lead ministries within the federal and provincial governments as our primary points of contact and are working to expand relationships across all relevant government departments.

We also briefed federal and provincial elected representatives, including key ministers, parliamentary assistants, portfolio critics, and representatives of ridings involved in the siting process. In 2021, as part of our commitment to transparency, the NWMO registered as a lobbyist under Canada's *Lobbying Act*.

Site assessment

From partnership building to environmental monitoring, site assessment work is ongoing in the Wabigoon-Ignace area and the SON-South Bruce area.

In 2021, the NWMO continued working with municipal and Indigenous communities to conduct more detailed technical and social studies in the Wabigoon-Ignace area and the SON-South Bruce area. Despite the COVID-19 pandemic, we were able to continue our fieldwork activities in both areas.

We continue to build sustainable and resilient partnerships with communities in potential siting areas, acknowledging and incorporating their unique values on willingness, safety, environment, transport and benefits to the community. In 2022 and 2023, we will continue working with municipal and Indigenous communities in each siting area to explore the potential for partnership.

Accessing land

In the Wabigoon-Ignace area, the potential repository is located on Crown land, and we have worked with the appropriate government bodies to secure access for studies.

In the SON-South Bruce area, through a series of agreements signed with landowners between 2019 and 2021, we have aggregated just over 1,800 acres of land – enough to potentially host a deep geological repository in the area. The agreements include a combination of option and purchase arrangements, which allow the NWMO to conduct studies and landowners to continue using the land.

In southern Ontario, we continue to hear questions about the potential impacts of the project on property values. The NWMO has committed to developing, in consultation with the Municipality of South Bruce, a program that will provide residents located near the deep geological repository with peace of mind that the value of their property is protected should the SON-South Bruce area be selected as the site where the project will be hosted.

While the NWMO continues to engage with Saugeen Ojibway Nation, other Indigenous communities and local municipalities, the aggregation of land in South Bruce does not suggest that any of the communities mentioned have provided support for the siting of the repository in this area.

Natacha Lugo Bizarro, scientist in the Geoscience team at the NWMO, visited one of five micro-seismic monitoring stations that the NWMO and our contractor installed in the SON-South Bruce area in 2021.

Site investigations

Technical studies help us assess if a potential site will be a safe location for the repository. In 2021, this work included deep borehole drilling and testing, and installing micro-seismic monitoring stations that allow us to passively observe small-scale earthquakes. We also installed a shallow groundwater monitoring network. In addition to our field activities, data review and modelling continued, which will help us build a strong understanding of the geology at the site.

In the Wabigoon-Ignace area, we continued work to understand the water and pressure profiles in the boreholes that have monitoring instruments installed, to build up our knowledge of the underground geosphere. This work was performed alongside cultural monitors and guides from Wabigoon Lake Ojibway Nation. We also installed a micro-seismic monitoring station network made up of nine micro-seismic stations within a 50-kilometre radius of the site to monitor for seismic activity such as low-magnitude earthquakes.

As of October 2021, drilling and downhole testing of five 1,000-metre-long boreholes were completed. We finished drilling the sixth 1,000-metre-long borehole in November, and downhole testing of this borehole is ongoing. We also installed a shallow groundwater well monitoring network, and we completed geological mapping of the area.

In the SON-South Bruce area, we finished drilling the first borehole and began downhole testing. Drilling and testing of the second borehole also began. This work was performed alongside cultural monitors and guides from Saugeen Ojibway Nation. We completed installation of a micro-seismic monitoring network, with five stations installed. In addition, a 3D seismic survey across the potential site and surrounding area was completed. We also started installing the shallow groundwater monitoring network at the potential site.

Martin Sykes, Senior Geoscientist at the NWMO, examines a core sample from the Cobourg formation in the SON-South Bruce area.

The NWMO and our contractors continued to implement site safety protocols to address both conventional health and safety and the need for additional pandemic protective measures, including personal protective equipment such as masks. We conducted all 2021 fieldwork activities without reportable incidents, demonstrating our commitment to protecting people and the environment at all stages of the project.

Throughout the year, we continued to seek feedback and comments from the international Adaptive Phased Management Geoscientific Review Group.

Partnership

Together with communities, we follow a partnership road map that outlines a sequence of partnership-building topics to explore. Communities are building on the values and principles they have identified to guide discussions. Continued refinement and development of a community-specific vision, identification of key considerations and allocated funding to each community will aid project advancement and ongoing community well-being efforts. This will ensure that each of our potential siting areas is in a positive position for participation.

Throughout 2021, the NWMO continued engaging municipalities, First Nation and Métis communities in the siting areas, and surrounding communities to build awareness of the project while developing and sustaining relationships. All the NWMO's partnership work considers traditional laws, practices and land use.

Starting from the bottom and moving upwards, the road map guides our discussions about partnership with communities.

ALIGNED PARTNERSHIPS
Through a schedule developed and agreed upon with partners

INVESTMENTS
Identify and deliver investments that drive capability and economic prosperity for partners

IDENTIFY REQUIRED PARTNERSHIPS
Identify required partnerships with whom, at what level, in what combination, and when

DEVELOP VISION FOR THE PROJECT
Develop the project vision that will meet the NWMO's and community's interests, and potential partners as well

VALUES AND PRINCIPLES TO GUIDE PARTNERSHIP DISCUSSIONS
Agree on common values and principles to guide partnership discussions

Engineering, safety and technical research

Dr. Jeff Binns, Corrosion Scientist at the NWMO, inspects the borehole worksite following the successful installation of Engineered Barrier Science test modules. The installation was completed with the help of the NWMO Site Investigations team and contractors Solexperts and Weatherford.

In 2021, despite ongoing restrictions due to the COVID-19 pandemic that impacted many of our key vendors, partners, universities and institutions, the NWMO's Technical team remained focused on advancing the design and development of the deep geological repository, and further developing the project's safety case.

Engineering

Over the past year, the Engineering team continued physical prototyping and testing the engineered-barrier system, to prepare for full-scale emplacement trials in 2022 at our proof test facility in Oakville, Ont. Those trials will test and demonstrate the NWMO's ability to make and deploy the engineered-barrier system at the quality and performance similar to that needed for the future repository.

The team completed the design, fabrication, installation and commissioning of the key equipment and components needed for the trials. The team also fabricated several Used Fuel Container prototypes using our finalized manufacturing techniques and updated equipment.

The results of the emplacement trials, along with the conceptual designs of the repository facility, will form the basis for site-specific repository layouts.

Work progressed in 2021 on improving the design for the deep geological repository and its systems across their full life cycle – including site preparation, construction, operations, decommissioning and closure. The team continued developing the conceptual repository facility designs and documented them in the 2021 Conceptual Design Report. This information will support the initial regulatory decision-making phase.

Additionally, the associated cost estimates for the designs were updated in support of the 2021 Lifecycle Cost Estimate, which the NWMO prepares every five years.

A bentonite buffer box is moved by an emplacement machine (modified forklift) at the NWMO's proof test facility in Oakville, Ont. (*Photo taken prior to the COVID-19 pandemic.*)

Safety and technical research

Repository safety remains of paramount importance, both during the deep geological repository's operating period and after being filled, sealed off and closed. Case studies previously developed for generic sites demonstrate that regulatory requirements for safety can be met in a suitable site.

For the two specific sites of interest to the NWMO, the Safety and Technical Research team continued developing the safety case, including advancing site-specific and regional studies. Preparations were made for site-specific safety analyses that will be conducted in 2022 in support of the selection of a preferred site in 2023.

Materials test modules were installed in a deep borehole at the potential repository site in the Wabigoon-Ignace area. These tests will expose materials used in our engineered-barrier system to actual underground conditions, particularly water chemistry, to test their real-world performance. The team also conducted preliminary flood hazard and external hazard assessments.

We will continue to conduct research in 2022 to maintain and develop an understanding of critical processes relevant to safety, methods to characterize those processes, and expertise to support the regulatory decision-making phase.

In 2021, the NWMO supported 28 research projects with 15 Canadian universities and assisted several university research groups in obtaining multi-year Natural Sciences and Engineering Research Council of Canada Alliance grants. We also collaborated on 17 research projects with international partners. The work was published as 21 journal papers on a variety of topics, including glaciation erosion, Canadian Shield hydraulic conductivity and the long-term effects of radiation on copper.

In 2021, the Safety and Technical Research team continued to improve its understanding of Indigenous Knowledge, including conducting an Indigenous Knowledge and western science workshop. As work progresses, the team will seek Indigenous input into its safety assessments, including considering local lifestyles representative of the communities in the potential siting areas.

The NWMO meets with researchers at Western University and online during the annual Ontario Research Fund – Research Excellence Award Program meeting to discuss their latest results investigating the long-term stability of engineered barriers.

International collaboration

In 2021, the NWMO continued to collaborate with our international counterparts to share information, conduct joint research and learn from shared experiences related to the safe management of used nuclear fuel.

We maintained general co-operation agreements with international counterparts in Belgium, France, Japan, Sweden, South Korea, Switzerland and the United Kingdom. These agreements allow us to work together on joint projects to help ensure we are considering international best practices and sharing resources.

Due to the COVID-19 pandemic, project meetings continued to be held virtually. A side benefit of virtual meetings was that more of the NWMO's technical staff could attend information-sharing sessions.

North American Young Generation in Nuclear hosts a panel during the Canadian Regional Conference, featuring Dr. Mehran Behazin (second from left), Corrosion/ Microbiology Scientist at the NWMO, and Dr. Lindsay Brathwaite (on left), recent graduate from a NWMO-sponsored PhD program, to discuss emerging opportunities and innovations in nuclear waste management.

Exchanging technical knowledge with other countries

Throughout 2021, underground research laboratory experiments continued at the Mont Terri Project and Grimsel Test Site in Switzerland, and the Äspö Hard Rock Laboratory in Sweden. Projects included corrosion studies, microbiology, sealing system performance and groundwater behaviour in natural underground conditions, as well as laboratory testing of rock strength.

Specialists at the NWMO contributed to international projects, including the Effective Rock Mass and POST Projects (with SKB of Sweden), the Nuclear Energy Agency (NEA) Clay Club, the Crystalline Club, the NEA Integration Group for the Safety Case, and the DECOVALEX coupled-process modelling project. We are also working with Nagra in Switzerland, NUMO in Japan and others to develop and performance test the copper coating technology we use in our engineered-barrier system.

The NWMO also continued our participation in Posiva's Full-Scale In-Situ System Test project and joined their Engineered Barrier System Behaviour Test – the next phase of this program at Posiva's ONKALO repository facility in Finland.

Some other joint projects we worked on this year included:

- Joint modelling project on permafrost and cold climate hydrology;
- Pre-planning for the project to study natural coppers from Lake Superior;
- Behaviour of fractured rock mass;
- Thermodynamic database development; and
- Pre-planning for a project to study natural bentonites from Japan.

In 2021, the NWMO invested more than $1 million to participate in more than 30 international collaborative projects.

In 2012, the NWMO established the Adaptive Phased Management Geoscientific Review Group, which is made up of five internationally recognized experts from Canada, Sweden, Switzerland and Australia. They possess extensive multidisciplinary experience relevant to the siting of a deep geological repository. (*Photo taken prior to the COVID-19 pandemic.*)

Transportation planning

In 2021, our work on transportation planning continued to focus on responding to people's priorities, questions and concerns about how used nuclear fuel will be transported from the interim storage facilities where they are managed today, to the deep geological repository once it is operational in the 2040s. As this used fuel must be transported through communities and traditional territories to reach the repository, it is essential that the NWMO's planning ensures safe and secure transportation, and reflects public priorities and concerns. To that end, we have continued to actively seek feedback from the Council of Elders and Youth, as well as thousands of Canadians and Indigenous peoples through surveys and engagement sessions, both virtual and in-person.

In 2021, we published a *What we heard* report summarizing the input we received from people and communities about our draft transportation framework. Using that feedback, we revised the draft framework and have committed to updating it every three years.

People also told us they want more detailed information about transportation planning that is easy to understand, so we developed and released a plain-language *Preliminary transportation plan*. As the transportation framework will be a dynamic document, our engagement activities will continue over the next 25 years to ensure it reflects the evolving perspectives and addresses the concerns of Canadians and Indigenous peoples.

In 2021, we also developed a community-based transportation working group that held two virtual meetings to advise the NWMO on implementing the transportation framework. We also organized and attended more than 30 virtual presentations, panel discussions and workshops during the year, took part in a virtual workshop with the Ontario Good Roads Association, and participated in an international panel discussion where experiences about the transportation of used nuclear fuel were shared.

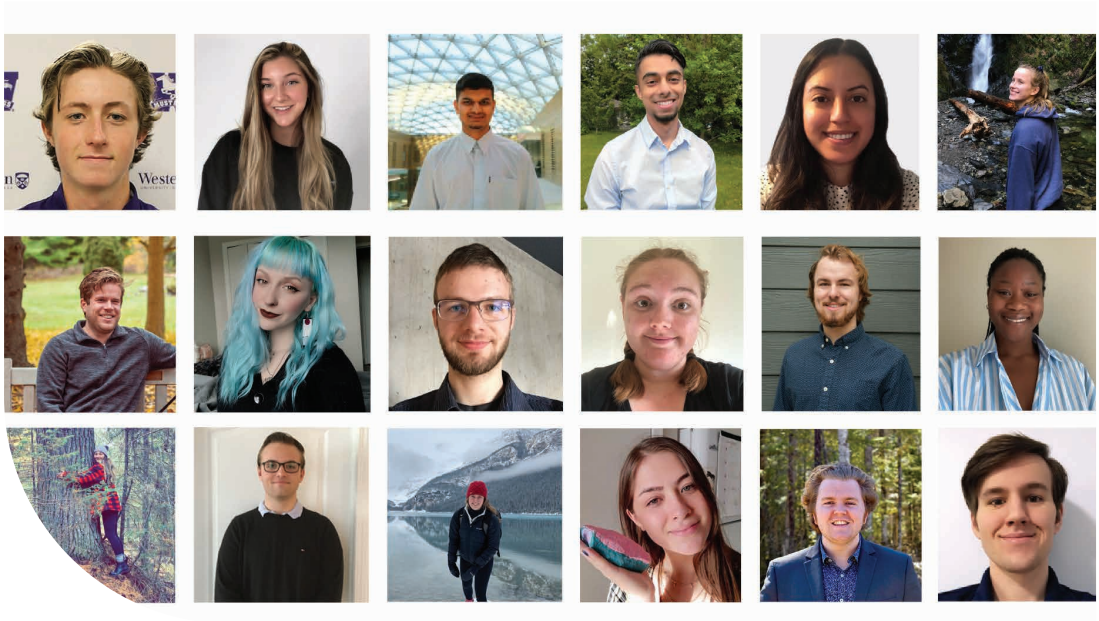
We also continued to engage with Indigenous communities, including with the Métis Nation of Ontario. Indigenous voices will play an important role as we move forward with transportation planning. We are committed to listening to the priorities Indigenous communities identify. Our planning is guided by those priorities, along with Indigenous Knowledge and science.

The NWMO's technical work in this area focused on exploring design concepts and key components of the used fuel transportation system. While this includes both road and rail as potential modes of transportation, along with various transportation packages, the cost estimates associated with the transportation of used fuel that form part of the NWMO's lifecycle cost estimate considered an all-road scenario.

The NWMO is working with Canadians and Indigenous peoples to develop a socially acceptable framework for transporting used nuclear fuel.

Organizational readiness

The selection and announcement of the preferred site for the deep geological repository in 2023 will trigger a new phase of operations for the NWMO. This will require the NWMO to ensure we are properly resourced to carry out our responsibilities in advance of site selection and to fulfil the many new tasks that will follow that decision such as detailed site characterization, making regulatory submissions, and constructing and operating the deep geological repository. Preparations for that future are well underway.



The NWMO welcomed 18 students in 2021 as we continue our student program and our support for youth education, in particular, experiences in the fields of science, technology, engineering and mathematics.

Human resources

One of the most important resources we have at the NWMO is the talented people who drive our work forward. The scope and complexity of the project means it is essential that our staff are supported, trained and ready for each upcoming phase of work, through site selection and beyond.

In 2021, the Human Resources (HR) team launched an extensive recruitment process to ensure alignment and competence relative to our organizational objectives that included promotions, restructuring, new hires and student placements. The HR team supported the business resources plan through job design, evaluation and recruitment of 35 new employees, including 18 students. These internships are an important way we engage youth and develop the skills capacity that will be necessary to support our multi-generational project.

These changes and new roles are part of a talent attraction and retention strategy that will ensure we have the right people in key roles to reach site selection. The HR team also advanced the workforce planning and mobilization strategy for the post–site-selection phase when we will begin moving our operations to the site.

To ensure our staff are continuing to develop their skills capacity, we also implemented the NWMO-U training management system and conducted several staff and leadership training sessions as part of our multi-year organizational learning plan. Since our project will span generations, it is important that we develop a learning culture adept at knowledge transfer.

The NWMO also took additional steps to drive an organization-wide culture shift that supports our strategic plan and corporate values. We did this by identifying and developing cultural competencies supported by organizational behaviours and standards, as well as corporate tools, which will be key to executing future phases of the project.

We value diversity in all disciplines and at all levels of the organization. In 2021, the HR team bolstered its ongoing work to build an equitable, diverse and inclusive workforce by partnering with key organizations that support and drive actions and best practices such as Electricity Human Resources Canada and the Canadian Centre for Diversity and Inclusion. The NWMO also signed on to the Thunder Bay Anti-Racism and Inclusion Accord.

Training was provided to the entire organization on fundamental equity, diversity and inclusion concepts to support our commitment to maintain a workforce free of direct, indirect and systemic discrimination, and to increase representation from under-represented and designated groups.

To further support these efforts, in 2021, two governing documents – our *Recruitment Procedure* and the *Whistleblower Policy/Procedure* – underwent a Reconciliation review to ensure HR governance considers and incorporates Indigenous Knowledge into its practices. The HR team also completed a review of governance and amended practices to align them with recent changes to the *Canada Labour Code*.

Despite ongoing restrictions resulting from the COVID-19 pandemic, the NWMO was able to maintain operations in 2021 by continuing to ensure our employees could work safely and productively, first through working remotely in accordance with public health standards, and then in a hybrid work environment once restrictions were eased. We implemented a vaccine disclosure policy and achieved 99 per cent vaccination status as we transitioned staff from only working remotely to working in the office again in a hybrid work model, beginning in early October.

Mobilization

The NWMO continued developing a mobilization plan that can adapt to whichever of the two possible sites for the repository is selected and to partnership agreements developed with host communities. This plan considers our collective agreements and human resources policies and procedures so that we can work optimally in a new host community environment.

Once a preferred site with informed and willing hosts is selected, the NWMO will begin transitioning our operations to the area. We seek to maximize job opportunities in the local municipality and surrounding region, including First Nation and Métis communities, and to build capacity in communities through investments in training and education.

Even now, in the early stages of implementation, the work associated with Canada's plan employs approximately 600 people – 200 of these are directly employed by the NWMO, and about 400 are working to support the communities' participation, the technical program and engagement work.

Preparing for licensing applications

After a preferred site is selected, the required regulatory process will begin, which will require conducting detailed analyses of the project's environmental impact, completing a formal impact assessment, applying for a Licence to Prepare Site, and developing the materials to apply for a Licence to Construct.

We are working in close collaboration with Indigenous and non-Indigenous community members to establish environmental monitoring programs in the two potential siting areas. The process for designing a monitoring program for the SON-South Bruce area was completed in 2021. This process was concluded for the Wabigoon-Ignace area in 2020. These programs will be updated annually.

This year, the NWMO proceeded with data collection for the environmental baseline studies in both the Wabigoon-Ignace area and the SON-South Bruce area. The NWMO will be collecting information on a number of environmental conditions – water, air, soil and habitat, for example.

With the involvement of Wabigoon Lake Ojibway Nation, data collection started in early 2021. Aspects of the data collection also began in the SON-South Bruce area with the involvement of the Saugeen Valley Conservation Authority. These studies will help establish an understanding of the environment in both areas before project development begins, so that changes due to the project can be assessed and appropriate mitigation measures can be incorporated into the design of the deep geological repository.

Included in the environmental data collection program in the Wabigoon-Ignace area was the application of the emergent technology of environmental DNA, or e-DNA, in partnership with the Hammond Laboratory at the University of Guelph. DNA collected through water samples in the area are analyzed to identify the species that are present.

We also began data collection for socio-economic baseline studies in the Wabigoon-Ignace area and the SON-South Bruce area. Similar to the environmental baseline, this data will give us insights into the social, cultural, economic and health conditions in the Wabigoon-Ignace area and the SON-South Bruce area. This enables the NWMO to determine the extent of the changes that the project will bring to those communities, including the benefits that will arise from new employment and business opportunities.

In 2021, the NWMO also continued our relationship with the Toronto Zoo's Native Bat Conservation Program to learn more about Ontario's native bats and identify steps that should be taken to protect them. This research will help inform our biodiversity studies and contribute to the protection of the environment. Following the installation of monitoring equipment in the SON-South Bruce area during the project's first year, we installed similar equipment in the Wabigoon-Ignace area this past year.

We developed our regulatory plan to ensure compliance with the *Impact Assessment Act* passed in 2019. We also continued our ongoing dialogue with the Canadian Nuclear Safety Commission to seek additional guidance about the information the NWMO must provide when preparing for licence applications and eventually seeking those licences.

The NWMO and University of Guelph research teams conducted eDNA sampling in 2021 in the Wabigoon-Ignace area.

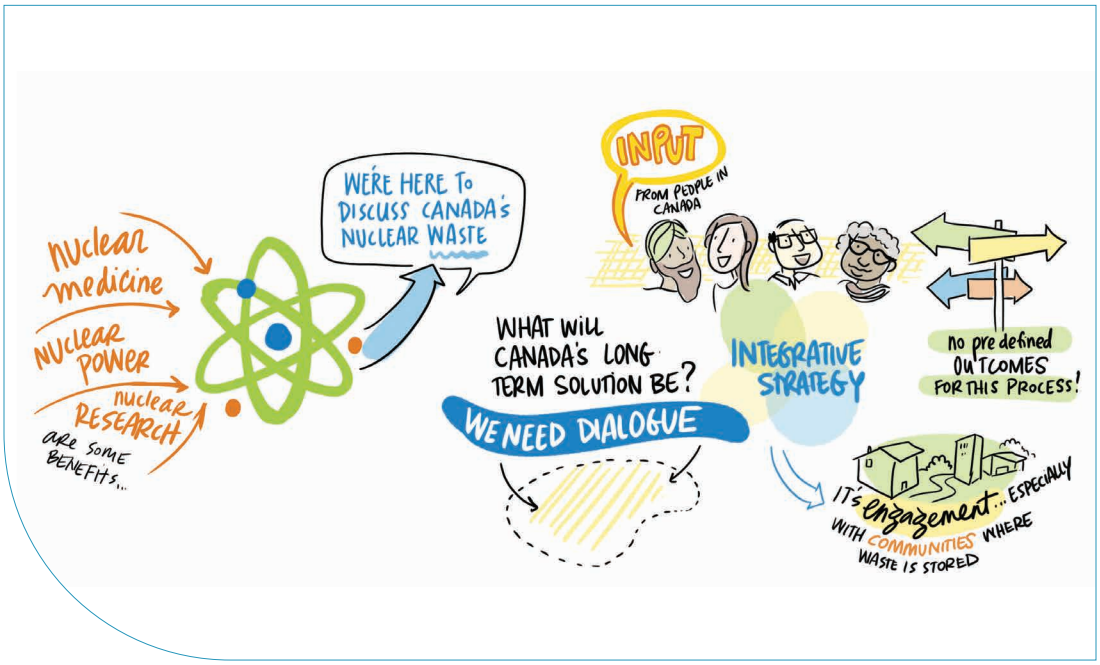
Developing a Canadian Integrated Strategy for Radioactive Waste

All Canada's low- and intermediate-level radioactive waste is safely managed today in interim storage. An integrated strategy will ensure these materials continue to be safely managed following international best practices over the very long term.

In November 2020, the Minister of Natural Resources Canada formally launched an inclusive engagement process to ensure Canada has a strong, modern radioactive waste policy that continues to meet international standards based on the best available science and that reflects the values and principles of Canadians.

The NWMO has been asked by the Minister of Natural Resources to develop an Integrated Strategy for Radioactive Waste (www.radwastereview.ca) to ensure that all Canada's radioactive waste has disposal solutions. We have been asked to lead development of the strategy, in part to leverage our nearly 20 years of recognized expertise in the engagement of Canadians and Indigenous peoples on plans for the safe, long-term management of used nuclear fuel.

Building on our previous work, this strategy represents a next step to identify and address any gaps in radioactive waste management planning, while also looking further into the future. The focus of this work is on low- and intermediate-level waste for which there are no long-term plans in place.



People from across Canada are contributing to the development of an Integrated Strategy for Radioactive Waste. This is an artist illustration of one of our conversations.

The NWMO is following an open and transparent engagement process that will yield a strategy reflective of the values and interests of the public. We have come a long way in 2021. We heard from communities across Canada, Indigenous peoples, academics, a wide range of interest groups and technical experts. Their input will inform practical recommendations to the Canadian government on a more comprehensive radioactive waste management strategy.

In 2021, we hosted our first Canadian Radioactive Waste Summit, which saw more than 500 participants engage during the event, participating in polls, question-and-answer periods and breakout sessions. We hosted a series of 12 community engagement events across towns, cities and provinces to hear what people have to say on Canada's Radioactive Waste Strategy. We also followed up with a series of technical workshops and roundtable sessions to gather opinions and insights from industry, youth, academics and other key stakeholder groups. We further engaged with Indigenous peoples through dedicated activities. The outcomes from these sessions and events will be compiled into a series of "what we heard" reports published early in 2022 and will help develop informed and practical recommendations for the Government of Canada.

As part of our commitment to transparency, the NWMO has published a report on technical options and created several tools to ensure these resources are accessible to anyone who is interested. We have also produced a layperson summary report of the technical options.

The NWMO additionally created a series of fact sheets that include information on a range of disposal options, including a shallow rock cavern, deep borehole, deep geological repository, containment mound, and rolling stewardship, all of which are available on our website (www.nwmo.ca).

We continue to engage with Canadians and Indigenous peoples on a strategy for Canada's low- and intermediate-level radioactive waste, developing new ways to engage with interested individuals and organizations, while respecting public health directives related to the COVID-19 pandemic.

Governance and accountability

Canadians and Indigenous peoples can rest assured that the organization responsible for managing Canada's used nuclear fuel has a strong governance structure in place.

The NWMO is federally mandated under the *Nuclear Fuel Waste Act* (*NFWA*). Our members are provincially owned Crown corporations that produce used nuclear fuel. As a not-for-profit corporation, the NWMO falls under the *Canada Not-for-profit Corporations Act*.

We are governed by a nine-member Board of Directors. The member organizations elect the Board, which has a fiduciary duty to the NWMO and includes capabilities in Indigenous culture and financial management, and represents a range of perspectives from within and outside the nuclear industry. The Board takes a leadership role in developing the corporation's strategic direction, and the NWMO provides an annual report to Canada's Minister of Natural Resources each year, as required by the *NFWA*.

The Advisory Council, an independent advisory body established under the *NFWA*, provides ongoing advice to us. Other independent expert bodies offer additional guidance and review on technical, social and Indigenous matters, ensuring the organization is continually pursuing excellence.

The NWMO's integrated management system ensures we are well equipped to implement our vision while protecting people and the environment for generations to come.

Annual reporting to Minister

Every year, in accordance with the *NFWA*, the NWMO produces an annual report, which is made public on our website and tabled in Parliament. The Minister issues a statement on it each year that can be read at www.nwmo.ca/ministerstatement.

Every third year, the *NFWA* requires an expanded version of the annual report, which reports on the previous three years and includes comprehensive comments from the Advisory Council about its progress and findings of the NWMO. The next triennial report will be published in March 2023.

Reporting to member organizations

Ontario Power Generation, New Brunswick Power Corporation and Hydro-Québec are the founding members of the NWMO. The Membership Agreement and bylaws set out member roles and responsibilities in supporting the objectives of the *NFWA* and the NWMO's implementation mandate. The NWMO regularly briefs our member organizations. In accordance with our bylaws, the NWMO's Annual General Meeting of Members was held in June 2021.

Board of Directors

Chair of the Board: Wayne Robbins

Vice-Chair of the Board: Glenn Jager

President, CEO and Director: Laurie Swami

Directors: Lesley Gallinger, Sean Granville, Michael G. Hare (until May 7, 2021), Ronald L. Jamieson, Jason Nouwens (since May 8, 2021), Josée Pilon, Beth Summers

The Board of Directors convened seven formal meetings in 2021. The minutes can be viewed online (www.nwmo.ca/board).

The Board held its annual strategy session in October 2021 to focus on issues of strategic importance. The Board continued to focus on recovery from the impacts of the COVID-19 pandemic on the NWMO's work. The Board also received regular reports and held its annual meeting virtually with the Advisory Council to discuss relevant topics of importance.

To include Indigenous perspectives, the Board meets annually with the Council of Elders and Youth to exchange ideas and understand decision-making that reflects upon and respects Indigenous peoples' traditions, customs and values. In 2021, they held a virtual meeting.

Board of Directors: Wayne Robbins, Glenn Jager, Laurie Swami, Lesley Gallinger, Sean Granville, Ronald L. Jamieson, Jason Nouwens, Josée Pilon, Beth Summers.

Committees of the Board

Audit, Finance and Risk (AFR) committee

The AFR committee is responsible for monitoring the integrity of the NWMO's internal control and management information systems, approving annual financial plans, ensuring the integrity of the NWMO's reported financial performance, and providing oversight of the NWMO's pension fund. The AFR committee met five times in 2021, plus one joint AFR-Human Resources, Compensation and Governance (HRCG) committee meeting.

As of Dec. 31, 2021, the committee had five directors: Beth Summers (Chair), Lesley Gallinger, Ronald L. Jamieson, Josée Pilon and Wayne Robbins.

Human Resources, Compensation and Governance (HRCG) committee

The HRCG committee is responsible for overseeing the NWMO's human resources functions, including compensation practices, human resources policy, organization design, labour relations, the pension plan and governance. The HRCG committee met five times in 2021, plus one joint AFR-HRCG committee meeting.

As of Dec. 31, 2021, the committee had five directors: Lesley Gallinger (Chair), Sean Granville, Josée Pilon, Beth Summers and Wayne Robbins.

Project Oversight committee

The Project Oversight committee provides oversight of the NWMO's project planning and execution, including safety, recommending new projects for Board approval, project planning and controls, contracting strategies and contractor performance, technical matters and project risk as it relates to the implementation of Adaptive Phased Management. The Project Oversight committee met four times in 2021.

As of Dec. 31, 2021, the committee had four directors: Glenn Jager (Chair), Lesley Gallinger, Jason Nouwens and Laurie Swami.

Siting committee

Through the Siting committee, the Board maintains oversight of the site selection process and manages any identified risks associated with its execution. The committee met four times in 2021.

As of Dec. 31, 2021, the committee had five directors: Ronald L. Jamieson (Chair), Glenn Jager, Sean Granville, Jason Nouwens and Wayne Robbins.

Officers

Chair of the Board:	Wayne Robbins
President and CEO:	Laurie Swami
Vice-President of Site Selection:	Mahrez Ben Belfadhel (*until April 30, 2021*)
	Lise Morton (*since March 15, 2021*)
Vice-President and Chief Engineer:	Chris Boyle (*since Jan. 1, 2022*)
Vice-President of Communications:	Lisa Frizzell
Chief Financial and Risk Officer:	Georgina Kossivas
Vice-President of People and Technology, and Chief Ethics Officer:	Jennifer Spragge (*until Dec. 31, 2021*)
Vice-President of Human Resources, and Chief Ethics Officer:	Jennifer Spragge (*since Jan. 1, 2022*)
Vice-President and General Counsel:	Doug Taylor
Vice-President of Indigenous Relations and Strategic Programs:	Bob Watts
Vice-President of Construction and Projects:	Derek Wilson (*until Dec. 31, 2021*)
Chief Operating Officer:	Derek Wilson (*since Jan. 1, 2022*)
Board Secretary:	Gillian Morris

Executive Committee: Laurie Swami, Chris Boyle, Lisa Frizzell, Georgina Kossivas, Lise Morton, Jennifer Spragge, Doug Taylor, Bob Watts, Derek Wilson.

Advisory Council

The Advisory Council is an independent and arm's-length body that reviews and comments on the NWMO's work, as a requirement of the *NFWA*.

There are 11 Advisory Council members who represent a broad range of expertise, including engineering, community engagement, public affairs, environment, sustainable development, Indigenous relations, Indigenous Knowledge and community-based research.

Council members

David R. Cameron (Chair), Donald Obonsawin (Vice-Chair), Joseph Cavalancia, Monica Gattinger, Sue Hartwig (until Dec. 31, 2021), Dean Jacobs, Diane M. Kelly, Derek Lister, Dougal McCreath, Stella Swanson, Linda Thompson.

The full Advisory Council membership is profiled online at www.nwmo.ca/advisorycouncil.

In 2021, the Advisory Council focused on providing the NWMO with advice in these key areas:

- Site assessment, engineering and technical transportation activities;
- Plans for establishing the final siting decision process and community willingness;
- Partnership development and community well-being funding to support building partnership agreements;
- Assessments of risks related to the NWMO's work;
- Development of the NWMO's transportation planning framework;
- Business planning activities;
- Development of the NWMO's regulatory plans;
- Topics related to used fuel transportation;
- Reconciliation and Traditional Knowledge activities; and
- Technical and social matters related to long-term safety.

Advisory Council: David R. Cameron, Donald Obonsawin, Joseph Cavalancia, Monica Gattinger, Dean Jacobs, Diane M. Kelly, Derek Lister, Dougal McCreath, Stella Swanson, Linda Thompson.

Council of Elders and Youth

The Council of Elders and Youth is an independent advisory body with members from First Nations and Métis communities. It provides counsel to the NWMO on how to apply Indigenous Knowledge in implementing Adaptive Phased Management and enhancing the development and maintenance of good relations with First Nations and Métis communities and organizations. More information about the Council of Elders and Youth is available online (www.nwmo.ca/eldersandyouth).

Municipal Forum

Established by the NWMO in 2009, in collaboration with the Federation of Canadian Municipalities, the Municipal Forum is made up of municipal leaders with experience and expertise on municipal issues and challenges. It provides advice to the NWMO on municipal perspectives and processes to help guide our engagement and outreach. More information about the Municipal Forum is available online (www.nwmo.ca/municipalforum).

Environmental Review Group (ERG)

The ERG was established in 2018 by the NWMO to provide independent expert advice and guidance on environmental programs and impact assessment planning, including engagement and the interweaving of Indigenous Knowledge and western science, as well as international best practices. Made up of professionals from various academic and cultural backgrounds, the group meets quarterly to discuss strategic issues related to assessing potential impacts of the project on the natural environment. More information about the ERG is available online (www.nwmo.ca/erg).

Adaptive Phased Management Geoscientific Review Group (APM-GRG)

The APM-GRG was established by the NWMO to ensure that site evaluations are conducted in a consistent and traceable manner that consistently meets or exceeds best international practices. It reviews and provides guidance on the NWMO's geoscience site assessment approach, methods and findings. The APM-GRG is comprised of five internationally recognized experts from Canada, Australia, Sweden and Switzerland, who combine extensive multidisciplinary experience in areas relevant to the siting of deep geological repositories in both crystalline and sedimentary rock formations. More information about the APM-GRG is available online (www.nwmo.ca/apmgrg).

Site Selection Review Group

The Site Selection Review Group is made up of three internationally respected members from varied professional backgrounds, who provide independent advice and guidance on the NWMO's final approach, methods and criteria in advance of the site selection in 2023, to ensure the decision-making process is reasonable, comprehensive, credible and rigorous. More information about the Site Selection Review Group is available online (www.nwmo.ca/peerreview).

Community-Based Transportation Working Group

The NWMO established the Community-Based Transportation Working Group to seek feedback from a broad range of individuals across Ontario, Québec and New Brunswick about how to implement the organization's transportation planning framework. The working group is made up of individuals acting as independent advisors, bringing forward their own thoughts and perspectives about transportation. Feedback and advice are sought more specifically on envisioning collaborative transportation planning, and on opportunities and challenges related to engagement and dialogue for the transportation program. More information about the Community-Based Transportation Working Group is available online (www.nwmo.ca/transportationworkinggroup).

Peer reviews

The NWMO works with leading scientists and experts from universities, in the industry or as part of international research groups, in order to ensure our work is based on the best science. We continue to seek independent external experts to review and comment on our technical work through peer reviews (www.nwmo.ca/peerreview) when publishing research results in scientific journals and at conferences. We also seek out peer reviews or request state-of-science reviews on specific topics be prepared by leading experts.

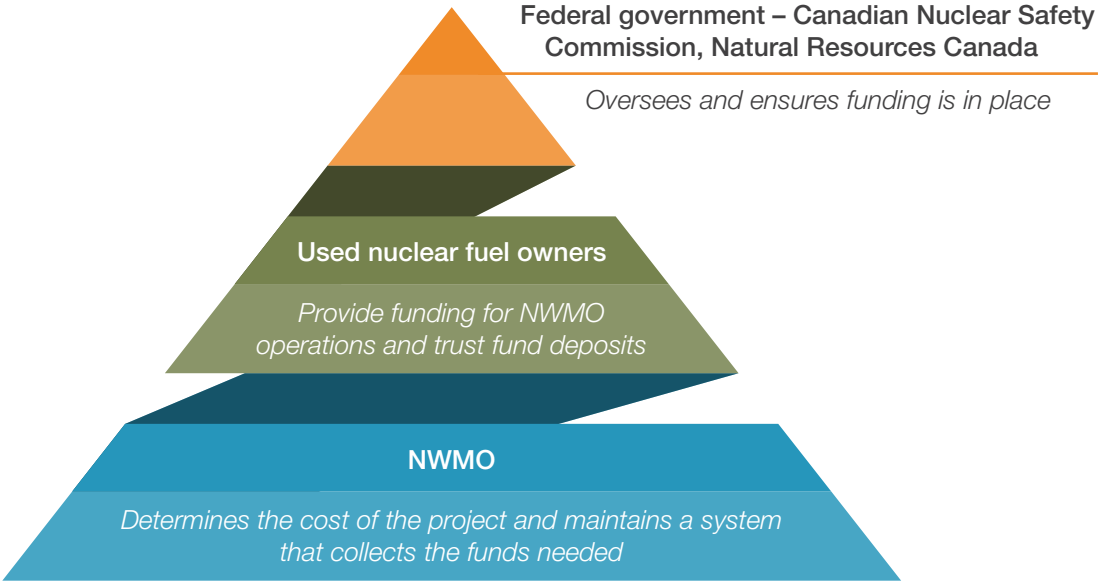
Integrated management system

The NWMO continues to focus on ensuring our integrated management system supports the ever-evolving work on our project, while meeting the requirements of the Canadian Nuclear Safety Commission. This is of particular importance as we approach the site selection decision in 2023 and the subsequent initiation of the licensing phase of the project.

In 2021, we conducted an end-to-end assessment of our management system to identify opportunities to further improve our governance, to support effective operations and to ensure regulatory compliance. We launched a formal process and tool for assessing risk and determining the appropriate quality assurance requirements. We also evolved the performance assessment program that will be launched in 2022 to more effectively assess compliance with the CSA N286-12 Management System Requirements for Nuclear Facilities, which includes facilities for managing used nuclear fuel.

Ensuring funding is in place

A key aspect of our commitment to accountability is ensuring that the funding necessary to pay for the long-term management of Canada's used nuclear fuel will be available when needed. The roles and responsibilities of financial surety are summarized in the diagram below.



Total cost estimate

One of the NWMO's important responsibilities is determining the lifecycle cost of the project so we can ensure the funds will be available when needed. Updated every five years based on the latest information, the lifecycle cost estimate explains what we anticipate the project will cost from beginning to end and why. It helps ensure accountability and transparency as we implement Canada's plan for the safe, long-term management of used nuclear fuel.

The NWMO completed a full update of the cost estimate for the Adaptive Phased Management project in 2021 (available at www.nwmo.ca/projectcosts).

The estimate includes costs to develop, construct, operate, monitor, and decommission a long-term facility, including the deep geological repository and Centre of Expertise, and to transport the used nuclear fuel to the repository. As this is a 175-year estimate, many assumptions have been taken for planning purposes to ensure sufficient funds are available, and where possible, have been and will continue to be revised and made more specific as the plan advances.

Many factors impact the eventual cost of the project. They include the volume of used nuclear fuel to be managed, the facility's location, the surrounding infrastructure, rock type and characteristics, the design of the repository, and the length of time allocated to monitoring the site following fuel placement.

Since the last update in 2016, the NWMO has advanced elements of the conceptual design and associated cost estimate for the deep geological repository and used fuel transportation system. The most significant changes are the continued development and demonstration of the engineered-barrier system design and components, and the narrowing of potential siting areas down to two, both located in Ontario – the Wabigoon-Ignace area in the northwest and the SON-South Bruce area in the south.

The total amount of used nuclear fuel in Canada, which is currently about 3.1 million fuel bundles, could be impacted by the longevity and productivity of nuclear reactors, decisions on refurbishments or new nuclear reactors, and other factors. Every year, we update fuel bundle volume estimates and trust fund balances that impact the project's cost estimates and funding requirements, based on fuel bundle estimates provided by the nuclear energy producers. We then determine the trust fund contribution requirements for the following year to ensure sufficient resources for future use.

For planning purposes, our 2021 cost estimate is based on an expected volume of about 5.5 million fuel bundles, the anticipated volume at the end of the planned operation of Canada's existing nuclear reactors.

Based on this expected volume, the total lifecycle cost of the project – from the beginning of site selection in 2010 to the completion of the project – is approximately $26 billion (in 2020 dollars). This figure covers many decades of lifecycle activity.

This latest estimate is within the range of previous estimates, with the main change attributed to an increase in the projected quantity of fuel bundles due to approved nuclear plant refurbishments and life extensions. There is no change in the total cost of the project to that of the 2016 estimate when scaled to 5.5 million fuel bundles and escalated to 2020 dollars.

It is important to determine the amount that is required, in today's dollars, in order to have the necessary funds in place when needed in the future. The funds in place today will grow to cover the full cost of the project over the long term, based on continued additional payments from the funders of the project and through expected investment income that will also grow over time.

The funding required (using Jan. 1, 2022, present value) to manage approximately 5.5 million fuel bundles from 2022 onwards is $10.3 billion.

Pre- and post-construction costs

The $10.3 billion funding requirement includes $3.1 billion to select a site for the repository, complete a detailed design, develop the Centre of Expertise, acquire the site, evaluate environmental impacts, and obtain the site preparation licence and the construction licence under the *Nuclear Safety and Control Act* (*NSCA*). These pre-construction nuclear facility costs are paid for by the waste owners based on the annual NWMO budget, as approved by the Board of Directors.

The remaining $7.2 billion funding requirement is to construct the facility, transport existing and future fuel bundles to the repository, and operate, close and monitor the repository. The *Nuclear Fuel Waste Act* (*NFWA*) requires that costs after the Licence to Construct is granted must be funded through contributions to the *NFWA* trust funds established by Ontario Power Generation (OPG), Hydro-Québec (HQ), New Brunswick Power (NBP) and Atomic Energy of Canada Limited (AECL). As of December 2021, the total value of the *NFWA* trust funds was approximately $5.5 billion, and this amount is sufficient to cover costs for the existing inventory of used fuel bundles in Canada.

Waste owners will continue to contribute annually to ensure that the full $10.3 billion funding requirement is fulfilled. The costs of interim storage at the reactor sites and retrieval of the used fuel from storage are not funded through the NWMO because they are the responsibility of the waste owners.

Financial reporting requirements

The *NFWA* specifically addresses the future financial obligations expected for managing used nuclear fuel over the long term, as described in the box below. All the requirements defined in Subsection 16(2) of the *NFWA* are addressed in this chapter (*Ensuring funding is in place*).

Requirements of the *NFWA* (2002)

The NWMO is required to provide a range of financial information in each of our annual reports following the government's decision, as defined in Subsection 16(2) of the *NFWA*.

16(2) Each annual report after the date of the decision of the Governor in Council under section 15 must include:

(a) the form and amount of any financial guarantees that have been provided during that fiscal year by the nuclear energy corporations and Atomic Energy of Canada Limited under the *Nuclear Safety and Control Act* and relate to implementing the approach that the Governor in Council selects under section 15 or approves under subsection 20(5);
(b) the updated estimated total cost of the management of nuclear fuel waste;
(c) the budget forecast for the next fiscal year;
(d) the proposed formula for the next fiscal year to calculate the amount required to finance the management of nuclear fuel waste and an explanation of the assumptions behind each term of the formula; and
(e) the amount of the deposit required to be paid during the next fiscal year by each of the nuclear energy corporations and Atomic Energy of Canada Limited, and the rationale by which those respective amounts were arrived at.

Based on the *NFWA*'s requirements, trust funds were established in 2002, and each waste owner has made annual contributions since. The total value of these funds, including investment income, was approximately $5.5 billion as of the end of 2021. Additionally, the companies have set aside other segregated funds and financial guarantees for nuclear waste management and decommissioning.

The *NFWA* built in explicit provisions to ensure the trust funds are maintained securely and used only for their 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 under the *NSCA*.

Owner	Trust fund balance ($ million) December 2021
OPG	5,025
NBP	205
HQ	182
AECL	59*
Total	5,471

All figures in the chart above are approximate.

* NOTE: AECL is not a member of the NWMO and is required to contribute to a trust fund for used nuclear fuel under the *NFWA*. See next page for more detail.

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 online (www.nwmo.ca/trustfunds).

Canadian Nuclear Safety Commission (CNSC) financial guarantees reporting

As mandated under the *NSCA*, the CNSC requires waste producers to provide financial guarantees to cover the cost (in present value terms) associated with decommissioning, interim storage and the long-term management of radioactive waste (including used nuclear fuel) produced to date.

The guarantees available for 2022 total $21 billion. They are reviewed independently by the CNSC as part of the waste owner licence requirements and are satisfied by segregated funds (totalling approximately $25 billion as of year-end 2021) and in the form of Provincial Guarantees.

The status of these guarantees is presented as follows:

Ontario Power Generation (OPG)

In accordance with the *NSCA*, the CNSC requires OPG to have sufficient funds available to discharge its existing nuclear waste management and nuclear-decommissioning obligations. The CNSC process requires the CNSC Financial Guarantee requirement to be updated once every five years, and OPG to provide an annual report to the CNSC on the assumptions, asset values, and resulting financial guarantee requirements. The CNSC Financial Guarantee requirement calculation takes into account nuclear waste expected to be generated to the end of each year.

The CNSC Financial Guarantee requirement continued to be satisfied, in part, by the forecast fair market value of the federally mandated Ontario *NFWA* Trust, and the remainder by the two segregated funds governed by the *Ontario Nuclear Funds Agreement* (*ONFA*) between OPG and the Province of Ontario (collectively, the "Nuclear Funds") without the requirement of a Provincial Guarantee for 2022. As per the terms of the *ONFA*, the province is committed to providing a Provincial Guarantee to the CNSC as required, on behalf of OPG, should there be a shortfall between the CNSC Financial Guarantee requirement and the fair market value of the Nuclear Funds during 2022.

The CNSC Financial Guarantee requirement for 2022 is $19,001 million (Jan. 1, 2022, present value). This will be satisfied by the 2021 year-end fair market value of the Nuclear Funds of $24,203 million without the requirement of a Provincial Guarantee. The Nuclear Funds of $24,203 million include $5,025 million in the Ontario *NFWA* Trust.

NB Power (NBP)

NBP has provided the CNSC with a Decommissioning Financial Guarantee that covers the costs associated with the long-term management of used fuel projected to be produced from the Point Lepreau Generating Station and the cost of station decommissioning, including the long-term management of low- and intermediate-level radioactive waste.

- The Financial Guarantee requirement is based on the present value of future costs to manage used fuel produced to the end of 2021 and the present value of future estimated costs for station decommissioning.
- The Financial Guarantee requirement is satisfied by three separate funds: a Used Fuel Fund, a Station Decommissioning Fund, and the *NFWA* Trust Fund.
- The total market value of the funds at Dec. 31, 2021, was approximately $914 million and was comprised of the following:
  - Used Fuel Fund – $247 million;
  - Station Decommissioning Fund – $462 million; and
  - *NFWA* Trust Fund – $205 million.

Hydro-Québec (HQ)

The fair value of the *NFWA* Trust Fund as of Dec. 31, 2021, was estimated at $182 million.

HQ has also provided the CNSC with a Decommissioning Financial Guarantee of $685 million that includes a guarantee associated with used fuel arising from the operation of Gentilly-2 and the cost of station decommissioning, including the long-term management of low- and intermediate-level radioactive waste. The guarantee is in the form of an expressed commitment of the Province of Quebec to HQ that provides a guarantee of payment.

The *NFWA* Trust Fund and the Financial Guarantee provided by the Province of Quebec covered the future financial obligations as follows:

- $474 million for decommissioning and long-term management of low- and intermediate-level radioactive waste; and
- $270 million for used fuel.

Atomic Energy of Canada Limited (AECL)

AECL is not a member of the NWMO and is required to contribute to a trust fund for used nuclear fuel under the *NFWA*. The AECL *NFWA* Trust Fund contained approximately $59 million as of Dec. 31, 2021.

AECL has also provided the CNSC with a financial guarantee in the form of an expressed commitment by the Government of Canada to cover the costs associated to safely terminate licensed activities.

Budget forecast for 2022

For 2022, the NWMO Board of Directors approved a budget envelope of $158 million to continue implementing Adaptive Phased Management. Annual costs beyond 2022 are subject to further review. Sharing of these costs will be in accordance with the percentages defined in the Membership Agreement, as amended from time to time. The 2022 cost-sharing percentages among the waste owners are OPG: 93.68 %, NBP: 3.66 %, HQ: 2.07 %, and AECL: 0.59 %.

Funding formula

The NWMO funding formula has been in place since its approval by the Minister of Natural Resources in April 2009. The formula allocates liabilities and trust fund contribution requirements to each waste owner. Costs common to all waste owners are shared based on a cost-sharing percentage agreed to by the members. The nuclear fuel waste owner is responsible for expenses that are owner-specific.

Possible future reactors

With the recent developments in small modular reactor (SMR) projects, the NWMO has begun initial reviews of the funding requirements related to these potential new fuel waste streams. However, as potential SMR projects are still in the early stages of development, there is insufficient information available to include in our forecasting. We expect this will be addressed as projects progress to the later stages of development.

Trust fund deposits for 2022

The 2022 *NFWA* trust fund deposit requirements have been developed based on the NWMO's project cost estimate completed in 2021. Under the approved funding formula, the funding for post-construction licence costs is divided into two parts:

1. Funding for historical used fuel bundles (committed liability); and
2. Funding for used fuel to be produced each year (future liability).

Committed liability represents all costs that will be incurred regardless of whether any further used fuel bundles are generated in the future. This liability includes all fixed costs for the facility and variable costs attributed to the historical used fuel bundles. Considering the deep geological repository would be available between 2040 and 2045, contributions for the committed liability are to be amortized to the midpoint year 2043 in equal present value payments. This funding method has the advantage of distributing the funding obligations evenly to each year, while considering the time value of money.

Future liability represents the incremental cost of transferring used fuel bundles to the repository, facility expansion, and additional operating and monitoring costs associated with used fuel bundles to be produced each year. Each future used fuel bundle would incur the same cost in present value terms, taking into account the time value of money.

The 2022 trust fund deposit requirements are shown in the table below.

Total trust fund deposits: Year 2022

Owner	Trust fund balance ($ million) December 2021	Deposit to trust funds (committed and future bundles) ($ million)* 2022
OPG	5,025	52
NBP	205	4
HQ	182	0
AECL	59	1
Total	5,471	57

* Annual trust fund deposits are required to be made within 30 days of the submission of the annual report. A deposit date of April 30 is assumed for illustrative purposes.

Auditor's report and financial statements

Management's responsibility for financial reporting

The accompanying consolidated financial statements of the Nuclear Waste Management Organization (NWMO) and all the information in this annual report are the responsibility of management and have been approved by the Board of Directors.

The consolidated financial statements have been prepared by management in accordance with Canadian accounting standards for not-for-profit organizations set out in Part III of the Chartered Professional Accountants Canada Handbook. When alternative accounting methods exist, management has chosen those it deems most appropriate in the circumstances. Financial statements are not precise since they include certain amounts based on estimates and judgments, particularly when transactions affecting the current accounting period cannot be finalized until future periods.

Management has determined such amounts on a reasonable basis in order to ensure that the consolidated financial statements are presented fairly, in all material respects, and in light of information available up to February 14, 2022.

Management has a system of internal controls designed to provide reasonable assurance that the consolidated financial statements are accurate and complete in all material respects. The internal control system includes an established business conduct policy that applies to all employees. Management believes that the systems provide reasonable assurance that transactions are properly authorized and recorded, financial information is relevant, reliable and accurate, and the Organization's assets are appropriately accounted for and adequately safeguarded.

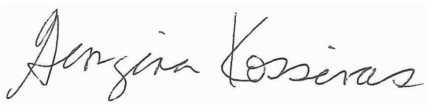
The Board of Directors is responsible for ensuring management fulfils our responsibilities for financial reporting, and is ultimately responsible for reviewing and approving the consolidated financial statements. The Board carries out this responsibility through its Audit, Finance and Risk Committee (the Committee).

The Committee is appointed by the Board and meets periodically with management, as well as the external auditor, to discuss internal controls over the financial reporting process, auditing matters and financial reporting issues; to satisfy itself that each party is properly discharging its responsibilities; and to review the consolidated financial statements and the external auditor's report. The Committee reports its findings to the Board for consideration when approving the consolidated financial statements for issuance to the members. The Committee also considers, for review by the Board and approval by the members, the engagement or reappointment of the external auditor.

The consolidated financial statements have been audited by Deloitte LLP, the independent external auditor, in accordance with Canadian generally accepted auditing standards on behalf of the members.

February 14, 2022

Laurie Swami
President and CEO



Georgina Kossivas
Chief Financial and Risk Officer

Independent Auditor's Report

To the Members of
Nuclear Waste Management Organization

Opinion

We have audited the consolidated financial statements of Nuclear Waste Management Organization (the "Organization"), which comprise the consolidated statement of financial position as at December 31, 2021, and the consolidated statements of operations, changes in net assets and cash flows for the year then ended, and notes to the consolidated financial statements, including a summary of significant accounting policies (collectively referred to as the "financial statements").

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Organization as at December 31, 2021, and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Basis for Opinion

We conducted our audit in accordance with Canadian generally accepted auditing standards ("Canadian GAAS"). Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of our report. We are independent of the Organization in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Organization's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Organization or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Organization's financial reporting process.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian GAAS will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Canadian GAAS, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Organization's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Organization's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Organization to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Organization to express an opinion on the financial statements. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinion.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

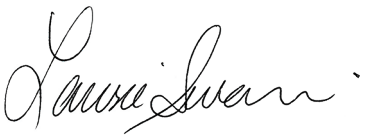
Deloitte LLP

Chartered Professional Accountants
Licensed Public Accountants
February 14, 2022
Vaughan, Ont.

Consolidated statement of financial position
As at December 31, 2021

	Notes	2021 $	2020 $
Assets			
Current assets			
Cash		7,461,090	3,203,888
Member contributions receivable	5a	13,316,377	10,597,104
Other receivable from members and AECL		1,317,420	2,121,380
Accounts receivable	12	143,600	219
Prepaid expenses and deposits		2,130,029	1,619,687
		24,368,516	17,542,278
Capital assets	3	37,835,394	33,494,135
Accrued pension asset	7	70,044,678	59,780,395
		132,248,588	110,816,808
Liabilities			
Current liabilities			
Accounts payable and accrued liabilities	7 and 12	23,139,624	16,621,345
Deferred lease inducements	8	460,171	543,839
Deferred/payable contributions from members and AECL	5b	1,368,721	877,094
		24,968,516	18,042,278
Deferred capital contributions	6	37,835,394	33,494,135
Deferred contributions from members and AECL	5c	12,513,656	12,781,788
Other post-employment and pension benefits liability	7	29,156,068	36,998,653
		79,505,118	83,274,576
Net assets		27,774,954	9,499,954
		132,248,588	110,816,808

Approved by the Board of Directors on February 14, 2022



Laurie Swami

President and CEO
Toronto, Ont.

Beth Summers

Chair – Audit, Finance and Risk Committee
Toronto, Ont.

The accompanying notes are an integral part of the consolidated financial statements.

Consolidated statement of operations
Year ended December 31, 2021

	Notes	2021 $	2020 $
Revenue			
Contributions from members	4	147,149,000	110,505,693
Contributions from AECL		1,554,595	846,074
		148,703,595	111,351,767
Change in deferred capital contributions	6	(4,341,259)	(27,881,231)
Change in long-term deferred contributions from members and AECL	5c	268,132	(765,431)
Change in member contributions receivable	5a	2,719,273	10,576,465
Change in deferred/payable contributions from members and AECL	5b	(491,627)	(619,173)
Total contribution revenue	11	146,858,114	92,662,397
Interest and other revenue	11	46,305	90,730
Total revenue		146,904,419	92,753,127
Expenses			
Adaptive Phased Management			
Staffing and administration		46,262,829	40,931,986
Site assessment		40,735,475	9,143,890
Engagement		24,338,440	19,716,093
Engineering		10,673,210	8,060,635
Regulatory decision-making		8,788,414	3,822,359
Safety		4,346,321	4,225,173
Communications		3,753,314	3,195,877
Transportation		671,295	282,067
		139,569,298	89,378,080
Services for OPG's Deep Geologic Repository			
Geoscience		2,932,266	359,352
Safety assessment/waste characterization		-	648,262
Environmental assessment		-	361,521
		2,932,266	1,369,135
Integrated Strategy for Radioactive Waste			
Communications and engagement		1,959,027	496,909
Technical and project management		859,504	64,799
		2,818,531	561,708
Amortization of capital assets		1,584,324	1,444,204
Total expenses	11	146,904,419	92,753,127
Excess of revenue over expenses for the year		-	-

The accompanying notes are an integral part of the consolidated financial statements.

Consolidated statement of changes in net assets
Year ended December 31, 2021

	2021	2020
	$	$
Net assets, beginning of year	9,499,954	6,894,954
Excess of revenue over expenses for the year	-	-
Remeasurements during the year:		
Accrued pension asset	8,628,000	8,196,000
Other post-employment and pension benefits liability	9,647,000	(5,591,000)
Net assets, end of year	27,774,954	9,499,954

Consolidated statement of cash flows
Year ended December 31, 2021

	Notes	2021	2020
		$	$
Operating activities			
Cash received from contributions		142,767,671	81,951,268
Interest and other revenue received		46,305	90,730
		142,813,976	82,041,998
Cash paid for salaries and benefits, materials and services		(138,556,774)	(97,909,929)
		4,257,202	(15,867,931)
Investing activity			
Purchase of capital assets	3	(5,935,924)	(29,400,499)
Financing activity			
Cash received from contributions used for purchase of capital assets		5,935,924	29,400,499
Net increase (decrease) in cash		4,257,202	(15,867,931)
Cash, beginning of year		3,203,888	19,071,819
Cash, end of year		7,461,090	3,203,888

The accompanying notes are an integral part of the consolidated financial statements.

Notes to the consolidated financial statements
December 31, 2021

1. Description of organization

The Nuclear Waste Management Organization ("NWMO") is a not-for-profit corporation without share capital, established under the *Canada Corporations Act*, as required by the *Nuclear Fuel Waste Act* ("*NFWA*"), which came into force on November 15, 2002. The NWMO transitioned to the *Canada Not-for-profit Corporations Act* and obtained a Certificate of Continuance on December 20, 2012.

The *NFWA* requires electricity-generating companies which produce used nuclear fuel to establish a waste management organization. In accordance with the *NFWA*, the NWMO established an Advisory Council, conducted a study and provided recommendations on the long-term management of used nuclear fuel to the Government of Canada. The results of the study and the recommendations were submitted in November 2005. As part of the long-term mandate, the NWMO is now responsible for implementing Adaptive Phased Management ("APM"), an approach selected by the Government of Canada to address the management of used nuclear fuel.

The NWMO formally began operations on October 1, 2002. Its founding members are Hydro-Québec, New Brunswick Power Corporation, and Ontario Power Generation Inc. ("OPG") ("members"). The *NFWA* requires that the NWMO offer nuclear fuel waste management services at a fee to all owners of nuclear fuel waste produced in Canada, including non-members and Atomic Energy of Canada Limited ("AECL").

Pursuant to a Membership Agreement, cost sharing of APM costs in 2021 is based on the principles of the projected total number of fuel bundles and the assumed timing of access to the long-term used fuel management facility. This cost-sharing formula has been in effect since January 1, 2018.

The NWMO has an agreement with OPG to provide services supporting its Low- and Intermediate-Level Waste Deep Geologic Repository ("DGR"). The NWMO's activities related to this program were reduced since 2018, as the project management activities were transitioned back to OPG. The NWMO continued to offer limited support to OPG under the existing DGR Services Agreement that ended on December 31, 2021.

On November 13, 2020, the Minister of Natural Resources Canada ("NRCan") tasked the NWMO with leading the development of Canada's Integrated Strategy for Radioactive Waste ("ISRW"). This strategy will address all Canada's radioactive waste, with the work that the NWMO is leading focusing on existing gaps, specifically in the long-term management for low- and intermediate-level waste. The resulting integrated strategy is not intended to replace other projects currently in progress, but rather incorporate them as part of the recommendations, and work will continue into 2022, pending completion of NRCan's review of Canada's existing Radioactive Waste Policy Framework.

2. Significant accounting policies

Basis of presentation

The NWMO has elected to present consolidated financial statements that included its accounts and those of its wholly owned subsidiaries (collectively, the "NWMO").

The consolidated financial statements of the NWMO are the representations of management prepared in accordance with Canadian accounting standards for not-for-profit organizations set out in Part III of the Chartered Professional Accountants Canada ("CPA Canada") Handbook using the deferral method of reporting restricted contributions. The significant accounting policies adopted by the NWMO are as follows:

Principles of consolidation

The NWMO's wholly owned subsidiaries are those entities over which the NWMO has control and has the right and ability to obtain future economic benefits, and is exposed to the related risks. Control is the continuing power to determine the strategic operating, investing and financing policies of the other entity without the co-operation of others.

Consolidated wholly owned subsidiaries include:

- NWMO Property Management 1 Inc.;
- NWMO Property Management 2 Inc.; and
- NWMO Property Management 3 Inc.

On January 2, 2020, the NWMO incorporated its three wholly owned subsidiaries under the *Canada Business Corporations Act* to support site assessment activities.

Capital assets

Capital assets are recorded at cost. Amortization is provided for on the straight-line basis over their estimated useful lives as follows:

Office building	15 years
Furniture and office equipment	7 years
Transport and work equipment	7 years
Vehicles	5 years
Computer equipment and software	3 years
Leasehold improvements	Initial lease term plus one renewal period

2. Significant accounting policies (continued)

Income tax

The NWMO and its wholly owned subsidiaries are not-for-profit organizations, and pursuant to section 149(1)(1) of the *Income Tax Act* ("*ITA*"), are not subject to income tax.

Revenue recognition

Contributions received from members and AECL are treated as restricted contributions, and as such, they are recognized as revenue when qualifying expenses are incurred. Any excess or shortfall of member contributions is recorded as deferred/payable contributions or member contributions receivable, respectively.

Contributions used for the purchase of capital assets owned by the NWMO are initially recognized as deferred capital contributions and amortized into revenue at the rate corresponding with the amortization rate of the related capital assets.

Pension and other post-employment benefits

The NWMO's post-employment benefit programs include a contributory defined benefit registered pension plan, a defined benefit supplementary pension plan, and other post-employment benefits, including group life insurance and health-care benefits. The NWMO has adopted the following policies with respect to accounting for these post-employment benefits:

(i) The NWMO accrues its obligations under pension, supplementary pension plan, and other post-employment benefit ("OPEB") plans. The defined benefit obligation for pension is determined using the projected benefit method pro-rated on service and is measured based on the actuarial valuation prepared for funding purposes (but not one prepared using a solvency, wind up, or similar valuation basis). Under this method, the benefit costs are amortized over the average remaining service period of active employees as indicated in Note 7. For other unfunded plans such as supplementary pension plan and OPEB, a similar accrual method is used and the benefit obligations are measured based on the actuarial valuation for accounting purposes. Remeasurements for the period are recorded through the consolidated statement of changes in net assets.

(ii) The obligations are affected by salary levels, inflation, and cost escalation of specific items (e.g., dental and health claims). Pension and OPEB costs and obligations are determined annually by independent actuaries using management's best estimate assumptions. The discount rate used by the NWMO in determining projected benefit obligations and the costs for the NWMO's pension plan is based on the funding valuation on a going concern basis, while other employee benefit plans' discount rates are based on representative AA corporate bond yields in effect at the end of the year.

(iii) Pension fund assets are valued using market-related values for the purposes of determining actuarial gains or losses and the actual return on plan assets. The plan's assets consist of pooled funds, fixed income securities and limited partnership units in a real estate fund. Market and credit risk on these securities are managed by the plan by placing plan assets in trust and through the plan's investment policy.

Research and development

Research and development costs are charged to operations as expenses in the year incurred.

Foreign currency translation

Monetary assets and liabilities denominated in foreign currencies are translated into Canadian currency at the year-end exchange rate. Any resulting gain or loss is reflected in staffing and administration expenses. Transactions in foreign currencies throughout the year have been converted at the exchange rate prevailing at the date of the transaction.

Financial instruments

Financial instruments include cash, member contributions receivable, other receivable from members and AECL, accounts receivable, and accounts payable and accrued liabilities.

Financial assets and financial liabilities are initially recognized at fair value when the NWMO becomes a party to the contractual provisions of the financial instrument. Subsequently, all financial instruments are measured at amortized cost. Financial assets measured at amortized cost are assessed at each reporting date for indications of impairment. If such impairment exists, the asset is written down and the resulting impairment loss is recognized in the consolidated statement of operations.

2. Significant accounting policies (continued)

Related party transactions

Related party transactions are recorded at the exchange amount.

Use of estimates

The preparation of consolidated financial statements in conformity with Canadian generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosures of contingent assets and liabilities at the date of the consolidated financial statements, and the reported amounts of revenues and expenses during the reporting period. Due to the inherent uncertainty in making estimates, actual results could differ from those estimates. Accounts requiring significant estimates include accrued pension asset, other post-employment and pension benefits liability, certain accrued liabilities and amortization which is based on the estimated useful life of the capital assets.

3. Capital assets

			2021	2020
	Cost	Accumulated amortization	Net book value	Net book value
	$	$	$	$
Land	31,838,644	-	31,838,644	27,058,750
Computer equipment and software	4,722,159	3,690,763	1,031,396	1,392,402
Transport and work equipment	5,984,727	2,323,388	3,661,339	3,626,220
Furniture and office equipment	1,852,624	1,342,401	510,223	550,665
Leasehold improvements	1,979,660	1,948,670	30,990	37,188
Office building	1,182,612	432,543	750,069	828,910
Vehicles	388,379	375,646	12,733	-
	47,948,805	10,113,411	37,835,394	33,494,135

During 2020, capital assets with a cost of $3,187,605 and accumulated amortization of $3,142,363 were written off. The resulting loss of $45,242 was included in amortization expense. No capital assets were written off during the current year.

Capital asset additions totalling $104,738 ($115,079 in 2020) have been excluded from the consolidated statement of cash flows as they remain unpaid at year-end. During 2021, capital asset additions totalling $115,079 ($190,143 in 2020) have been included in the consolidated statement of cash flows as they were accrued at December 31, 2020, and paid in 2021 (2020 – accrued at December 31, 2019, and paid in 2020).

4. Related party transactions and balances

Transactions and balances not otherwise disclosed separately in these consolidated financial statements are as follows:

				2021	2020
	APM	DGR	ISRW	Total	Total
	$	$	$	$	$
Transactions during the year					
Member contributions					
Ontario Power Generation Inc.	132,393,000	3,038,000	2,615,000	138,046,000	103,031,310
New Brunswick Power Corporation	5,797,000	-	111,000	5,908,000	4,065,383
Hydro-Québec	3,120,000	-	75,000	3,195,000	3,409,000
	141,310,000	3,038,000	2,801,000	147,149,000	110,505,693

5. Member and AECL contributions

The NWMO is solely funded through contributions it receives from its members and AECL. The contributions are restricted in nature, and thus revenue is recognized when qualifying expenses are incurred. Amounts received in advance of qualifying expenses are recorded as deferred contributions. Commitments for contributions that have not been received by the NWMO are recorded as member contributions receivable when the amount is determinable and the ultimate collection is likely.

(a) Contributions receivable from members

Contributions receivable from members are comprised of the following:

	2021	2020
	$	$
Ontario Power Generation Inc.	13,244,997	10,257,398
New Brunswick Power Corporation	71,380	339,706
	13,316,377	10,597,104

(b) Deferred/payable contributions from members and AECL – current

Deferred/payable contributions from members and AECL are comprised of the following:

	2021	2020
	$	$
Hydro-Québec	688,534	749,809
Atomic Energy of Canada Limited	680,187	127,285
	1,368,721	877,094

(c) Long-term deferred contributions from members and AECL

Long-term deferred contributions from members and AECL represent amounts received or receivable to fund various employee future benefits as follows:

	2021	2020
	$	$
Accrued pension asset	70,044,678	59,780,395
Other post-employment and pension benefits liability	(29,156,068)	(36,998,653)
Other post-employment and pension benefit liabilities – short term (Note 7)	(600,000)	(500,000)
Remeasurements in net assets	(27,774,954)	(9,499,954)
	12,513,656	12,781,788

(d) Continuity of deferred contributions from members and AECL

The continuity of deferred contributions from members and AECL is as follows:

	2021	2020
	$	$
Balance, beginning of year		
Deferred/payable contributions from members and AECL – current	877,094	257,921
Deferred contributions from members and AECL – long term	12,781,788	12,016,357
	13,658,882	12,274,278
Contributions received	148,703,595	111,351,767
Contributions receivable	13,316,377	10,597,104
Contribution revenue recognized	(146,858,114)	(92,662,397)
Amounts received previously recognized	(10,597,104)	(20,639)
Change related to deferred capital contributions	(4,341,259)	(27,881,231)
	13,882,377	13,658,882
Balance, end of year		
Deferred/payable contributions from members and AECL – current	(1,368,721)	(877,094)
Deferred contributions from members and AECL – long term	12,513,656	12,781,788

6. Deferred capital contributions

	2021	2020
	$	$
Balance, beginning of year	33,494,135	5,612,904
Contributions for the purchase of capital assets	5,925,583	29,325,435
Less amortization into revenue	(1,584,324)	(1,444,204)
Balance, end of year	37,835,394	33,494,135

7. Pension and other post-employment benefit plans

Effective January 1, 2009, the NWMO offers benefits to certain employees and retirees. A brief overview of these benefit plans is set out below:

(a) Registered pension plan
The federally registered pension plan is a contributory defined benefit plan covering eligible employees and retirees. The registered pension plan is funded, and plan assets are managed by third parties and include pooled funds, fixed income securities, and limited partnership units in a real estate fund. The benefit costs and assets related to this plan are recorded in the NWMO's consolidated financial statements.

(b) Supplementary pension plan
The supplementary pension plan is a defined benefit plan covering certain employees and retirees. This plan is unfunded.

(c) Other post-employment benefit plans
The other post-employment benefit plans provide medical, dental and group life insurance coverage for certain groups of full-time employees who have retired from the NWMO. These plans are unfunded.

A funding valuation, which was completed for the registered pension plan as of January 1, 2021, reported an actuarial surplus of $59.3 million and a funding ratio of 174% on a going concern basis; and an actuarial surplus of $9.2 million and a solvency ratio of 107% on a solvency basis.

In the case of a federally registered pension plan surplus, the *ITA* prohibits the making of contributions while the plan assets exceed 125% of the current value of the plan's liabilities on a going concern basis if the pension plan is also fully funded on a solvency basis (solvency ratio in excess of 105%).

As a result, the *ITA* prohibits the plan sponsor from contributing to the pension plan after the actuarial valuation report is filed with regulators. Consequently, the NWMO has made total contributions of $1.3 million for 2021 up until the actuarial valuation report filing was made in June 2021 ($2.5 million in 2020).

The most recent actuarial valuations were performed for the registered pension plan as at January 1, 2021, for the supplementary pension plan as at December 31, 2019, and for the other post-employment benefit plans as at December 31, 2020. The liability as at December 31, 2021, is based on an extrapolation of the previous valuations.

Information for the NWMO's pension plans and other post-employment benefit plans is as follows:

	Registered pension plan		Supplementary pension plan		Other post-employment benefit plans	
	2021	2020	2021	2020	2021	2020
	$	$	$	$	$	$
Changes in accrued benefit obligation						
Accrued benefit obligation, January 1	(82,841,000)	(74,133,000)	(10,142,834)	(7,661,237)	(27,355,819)	(22,083,297)
Current service cost	(2,733,000)	(2,143,000)	(352,000)	(288,000)	(1,918,000)	(1,335,000)
Interest cost	(4,456,000)	(4,158,000)	(280,000)	(262,000)	(757,000)	(744,000)
Past service cost	(45,000)	(5,000)	-	-	-	-
Employee contributions	(667,000)	(1,342,000)	-	-	-	-
Benefits paid	5,622,000	2,247,000	1,113,937	276,403	288,648	189,478
Net actuarial (loss) gain	(1,192,000)	(3,307,000)	797,000	(2,208,000)	8,850,000	(3,383,000)
Accrued benefit obligation, December 31	(86,312,000)	(82,841,000)	(8,863,897)	(10,142,834)	(20,892,171)	(27,355,819)
Changes in plan assets						
Fair value of plan assets, January 1	142,621,395	122,788,845	-	-	-	-
Expected return on plan assets	7,523,000	6,775,000	-	-	-	-
Benefits paid	(5,622,000)	(2,247,000)	-	-	(288,648)	(189,478)
Net actuarial gain	9,820,000	11,503,000	-	-	-	-
Employer contributions	1,302,283	2,454,550	-	-	288,648	189,478
Past service cost	45,000	5,000	-	-	-	-
Employee contributions	667,000	1,342,000	-	-	-	-
Fair value of plan assets, December 31	156,356,678	142,621,395	-	-	-	-
Funded status						
Fair value of plan assets	156,356,678	142,621,395	-	-	-	-
Accrued benefit obligation	(86,312,000)	(82,841,000)	(8,863,897)	(10,142,834)	(20,892,171)	(27,355,819)
Accrued benefit asset (liability)	70,044,678	59,780,395	(8,863,897)	(10,142,834)	(20,892,171)	(27,355,819)
Short-term portion	-	-	(300,000)	(250,000)	(300,000)	(250,000)
Long-term portion	70,044,678	59,780,395	(8,563,897)	(9,892,834)	(20,592,171)	(27,105,819)
	70,044,678	59,780,395	(8,863,897)	(10,142,834)	(20,892,171)	(27,355,819)
Components of cost recognized						
Current service cost	2,733,000	2,143,000	352,000	288,000	1,918,000	1,335,000
Interest cost on accrued benefit obligation	4,456,000	4,158,000	280,000	262,000	757,000	744,000
Expected return on plan assets	(7,523,000)	(6,775,000)	-	-	-	-
Cost (recovery) recognized	(334,000)	(474,000)	632,000	550,000	2,675,000	2,079,000

7. Pension and other post-employment benefit plans (continued)

The short-term portion of the accrued benefits liability of $600,000 ($500,000 in 2020) that is included in accounts payable and accrued liabilities is part of the total $29,756,068 ($37,498,653 in 2020) accrued benefits liability at the end of the year for the supplementary pension and other post-employment benefit plans.

The pension and other post-employment benefit costs recognized are included in the respective expense categories in the consolidated statement of operations.

The significant actuarial assumptions for benefit obligations and costs adopted in estimating the NWMO's accrued benefit obligations are as follows:

	Registered pension plan		Supplementary pension plan		Other post-employment benefit plans	
	2021	2020	2021	2020	2021	2020
	%	%	%	%	%	%
Discount rate at the beginning of the period	5.25	5.50	2.60	3.20	2.60	3.20
Salary schedule escalation rate	3.00	3.00	3.00	3.00	-	-
Rate of cost of living increase	2.00	2.00	2.00	2.00	-	-
Rate of increase in health-care cost trend	-	-	-	-	5.20	5.34
Discount rate at the end of the period	5.25	5.25	3.10	2.60	3.10	2.60
Average remaining service life for employees	15 years	14 years	15 years	14 years	15 years	15 years

Sensitivity information related to the other post-employment benefit plans is as follows:

	2021	2020
	$	$
Effect of 1% increase in health-care cost trends on		
Accrued benefit obligation	4,741,000	6,767,000
Current service cost and interest cost	573,000	908,000
Effect of 1% decrease in health-care cost trends on		
Accrued benefit obligation	(3,477,000)	(4,860,000)
Current service cost and interest cost	(398,000)	(610,000)

The supplementary pension plan is unfunded and is secured by a Standby Letter of Credit of $9,725,800 ($11,997,800 in 2020) obtained on the NWMO's behalf by OPG, as approved by the members.

8. Deferred lease inducements

	2021	2020
	$	$
Tenant inducements	835,676	835,676
Less accumulated amortization	(375,505)	(291,837)
	460,171	543,839

9. Guarantees

In the normal course of business, the NWMO enters into agreements that meet the definition of a guarantee.

(a) The NWMO has provided indemnities for various agreements. Under the terms of these agreements, the NWMO agrees to indemnify the counterparty for various items, including, but not limited to, all liabilities, loss, suits, and damages arising during, on or after the term of the agreement.

(b) The NWMO indemnifies all directors, officers and employees acting on behalf of the NWMO for various items, including, but not limited to, all costs to settle suits or actions due to services provided to the NWMO, subject to certain restrictions.

The nature of these indemnification agreements prevents the NWMO from making a reasonable estimate of the maximum exposure due to the difficulties in assessing the amount of liability which stems from the unpredictability of future events and the unlimited coverage offered to counterparties. Historically, the NWMO has not made any payments under such or similar indemnification agreements, and therefore, no amount has been accrued with respect to these agreements.

The NWMO also arranged a Standby Letter of Credit issued by OPG to secure its supplementary pension plan (Note 7).

10. Operating leases

The NWMO has entered into a number of operating leases for office premises and a vehicle which expire at various dates up to June 30, 2027.

The estimated annual minimum payments over the initial term of these leases up to their expiration are as follows:

	$
2022	1,305,958
2023	1,042,021
2024	1,043,925
2025	1,043,363
2026	1,047,096
2027	523,548
	6,005,911

11. Segment reporting

The NWMO has three reportable segments as follows:

- Federal mandated program (APM);
- Direct services outside its mandated program include a service contract with OPG for DGR, which became effective February 1, 2011, and ended December 31, 2021; and
- ISRW, effective November 13, 2020.

Segment information is as follows:

	APM		DGR		ISRW		Total	
	2021	2020	2021	2020	2021	2020	2021	2020
	$	$	$	$	$	$	$	$
Contribution revenue	141,108,888	90,730,898	2,931,510	1,369,980	2,817,716	561,519	146,858,114	92,662,397
Interest and other income	44,488	89,440	1,002	1,101	815	189	46,305	90,730
Total revenue	141,153,376	90,820,338	2,932,512	1,371,081	2,818,531	561,708	146,904,419	92,753,127
Amortization of capital assets	1,584,078	1,442,258	246	1,946	-	-	1,584,324	1,444,204
Operating expenses	139,569,298	89,378,080	2,932,266	1,369,135	2,818,531	561,708	145,320,095	91,308,923
Total expenses	141,153,376	90,820,338	2,932,512	1,371,081	2,818,531	561,708	146,904,419	92,753,127
Capital asset additions	5,925,583	29,325,435	-	-	-	-	5,925,583	29,325,435

The allocation of the common service expenses to each reportable segment above is based on direct staff hours in each segment.

12. Government remittances

Government remittances is comprised of the following:

	2021	2020
	$	$
Goods and Services Tax/Harmonized Sales Tax ("GST/HST") payable	(1,484,663)	(2,153,130)
GST/HST receivable	1,620,767	525,892
GST/HST receivable (payable), net	136,104	(1,627,238)

The net government remittances receivable balance of $136,104 is included in accounts receivable (2020 – payable balance of $1,627,238 is included in accounts payable and accrued liabilities).

13. Significant event – COVID-19

On March 11, 2020, the World Health Organization characterized the outbreak of a strain of the novel coronavirus ("COVID-19") as a pandemic, which has resulted in a series of public health and emergency measures that have been put in place to combat the spread of the virus. The duration and impact of COVID-19 is unknown at this time, and it is not possible to reliably estimate the impact that the length and severity of these developments will have on the financial results and condition of the NWMO in future periods.

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SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES