Atomic Energy of Canada Limited

2024-25 to 2028-29 Corporate Plan Summary

Leveraging the full potential of Canada's expertise in nuclear technology to achieve a better future for Canada and the world

AECL
EACL

With gratitude, AECL acknowledges that it operates on the territories that have, since time immemorial, been the traditional lands of Indigenous peoples in Canada.

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Executive Summary

This Corporate Plan presents an overview of Atomic Energy of Canada Limited's (AECL's) operating environment, alignment with government priorities, and key planning highlights for the 2024-25 to 2028-29 period.

Mission

Driving nuclear innovation to deliver clean energy technologies and improve the quality of life of Canadians while caring for the land.

Vision

Leveraging the full potential of Canada's expertise in nuclear technology to achieve a better future for Canada and the world.

Looking at the marketplace and overall operating environment, Canada's nuclear sector is thriving, and AECL is poised to help drive growth through contributions to innovation and technology development, but most importantly with the vital services that the Chalk River Laboratories provide to the Government of Canada to fulfill its core responsibilities related to nuclear regulations, research, and policy and programs, as well as clean-up and management of federal nuclear waste. The Chalk River Laboratories also play a key role in supporting the nuclear sector, including sustaining the safe operations of the current fleet of CANDU reactors as well as the potential role for additional large reactors as Canada moves to increase electricity generation capacity. Environmental assessments of key projects remain a major area of focus for AECL management, as key projects require regulatory approval to move forward.

For the purposes of this Corporate Plan, AECL has made reasonable planning assumptions based on expected continuity of our mission work related to nuclear science, campus maintenance and revitalization at Chalk River as well as decommissioning and waste management, and overall Indigenous engagement and reconciliation objectives. Also, the renewal of the of the Government-owned Contractor-operated contract through a procurement process.

This Corporate Plan articulates an agenda for achievement, with the following expected during the planning period:

- A new operating contract awarded, and the new contractor in place, starting in September 2025.
- The Port Hope Area Initiative is substantially complete, with only small-scale sites (residential properties) remaining to remediate beyond 2028. This will result in a significant decrease in liability for historic waste, and a successful track record of community and Indigenous engagement, collaboration, and partnership. It will mark the fulfillment of a longstanding commitment by the federal government to clean-up historic wastes in Port Hope and Clarington, Ontario.
- Major progress in the continued waste management mission at the Chalk River site with completed decommissioning of highest risk buildings, and the MAPLE reactors, as well advancing the non-radioactive decommissioning of the NRX and NRU reactors.

- The Advanced Nuclear Materials Research Centre at Chalk River completed and operational, a keystone in the revitalization of the Chalk River campus and enabling nuclear material science necessary to support core Government of Canada responsibilities (including, in particular, for small modular reactors) and for the existing and future fleet of nuclear power reactors.
- Conditional upon the satisfaction of regulatory conditions, a near surface disposal facility ready to receive waste at Chalk River.
- Exploration and acceleration of areas of clean energy (hydrogen and hydrogen safety, clean energy park, Small Modular Reactors, etc.) and health advancements such as understanding the effects of low-dose radiation, developing new medical isotopes and advances in health sciences.
- Subject to a strong business case demonstrating benefit to Canada, siting, constructing, and readying for service an advanced reactor at Chalk River for purposes of demonstration, which is coming in the next few years.
- Critical site infrastructure at Chalk River renewed to enable the long-term vision for the campus.
- Advanced Indigenous engagement, meaning positive relationships, enhanced ability for Indigenous partners to engage with AECL, more formal agreements, and more joint planning and operations with Indigenous partners, all built on a foundation of demonstrated trust and respect.
- A steady state working relationship, based on collaboration and mutual respect, between AECL, CNL, and the Algonquins of Pikwakanagan, under the Long-Term Relationship Agreement now in place for Chalk River, and strengthened relationships with Indigenous nations for activities at the Whiteshell site.
- Enabling – through research, partnerships, and the management of intellectual property – the advancement and deployment of nuclear technology, with a particular interest in CANDU, both domestically and internationally to achieve government priorities, including priorities relating to mitigation of climate change, energy security, innovation, jobs, and economic development. This will position Canada to maintain its status as a Tier 1 nuclear nation: possessing the full suite of domestic technology, nuclear fleet, supply chain, academic capability, and research infrastructure necessary to maintain a thriving industry.

Where we are today…

The research capabilities at the Chalk River Laboratories play a vital and unique role in the Canadian nuclear innovation ecosystem that span the entire technology readiness levels (TRL). Our strategic partnerships allow us to bridge lower TRL research, largely originating in academia, to higher TRL research performed by industry end-users. Between these two extremes lies a middle area that depends on the kind of long-term, well resourced, forward-thinking approach that only the Chalk River Laboratories, and AECL's unique convening power, can provide. Examples of this bridging role in action include priorities to advance the deployment of small modular and advanced reactors, growing the fusion industry with our unique tritium expertise, and developing technologies to enhance nuclear security.

Photo by Nuclear Reimagined / The Third Way.

Small Modular Reactors

Small Modular Reactors are small reactors aimed at new markets, tackling a critical and time-sensitive global need for safe, clean, economic energy. In Canada, this could mean vital, new clean energy options for replacing coal, greening resource extraction, and improving energy security for remote communities.

Canada is at the forefront of the small modular reactor industry thanks to the release of a roadmap convened by the Government and to CNL's work to site a demonstration reactor at an AECL site. This small modular reactor program is attracting significant attention worldwide as evidenced by the strong response to CNL's process to invite applications. Currently, three respondents have successfully completed the pre-qualification stage, and one has further progressed in the process, including applying for a license to prepare a site. CNL is supporting the vendors on commercial terms.

The recently announced joint venture between Canadian Nuclear Laboratories (CNL) and ITM – Actineer – is a remarkable example of successful innovation. The project first started under the Federal Nuclear Science and Technology Work Plan to develop a thorium generator for lab scale production of Actinium-225. From there, partnerships with academia and industry on Targeted Alpha Therapy expanded and demonstrated our leadership in medical isotopes. Today, this venture is designed to grow Targeted Alpha Therapy, a promising and exciting new cancer treatment that delivers alpha radiation directly to the tumor while minimizing radiation exposure to normal tissue. Under Actineer the parties will collaborate to produce Actinium-225, a rare alpha-emitting medical radioisotope, on an industrial scale, using Canadian material and knowledge, and leveraging ITM's processing capacity and global sales network.

AECL and CNL are convening academia, industry, and government to create ecosystems to advance the deployment of hydrogen and hydrogen safety by leveraging our decades of experience in hydrogen isotope handling and creating the Canadian Hydrogen Safety Centre, which is establishing a network of capabilities across Canada to consolidate expertise for finding solutions to hydrogen infrastructure challenges that will be faced by this emerging industry.

Under the oversight of AECL, CNL has made significant progress in transforming the Chalk River Laboratories, including the demolition of 117 research facilities, laboratories and other structures and has also fulfilled the commitments made by the Prime Minister in 2012 to repatriate certain weapons-grade radioactive materials to the United States. To replace required facilities, four new buildings are being constructed, three of which are complete, and all using Canadian mass timber. This revitalization of the Chalk River Laboratories is meant to transform the site into a modern and state-of-the-art nuclear science and technology campus that attracts the next generation of scientists who will drive nuclear opportunity for Canada.

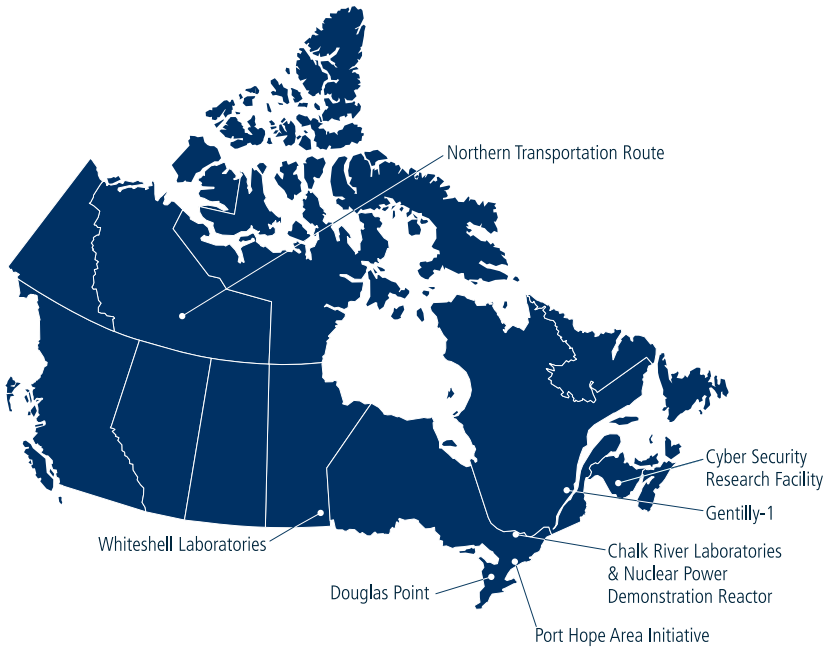
Internally, AECL has been contributing to net-zero goals through the continued drive to reduced emissions in alignment with AECL's environmental, social and governance strategy. AECL continues to reduce carbon emissions at its Chalk River Laboratories site to reach its goal of 40% relative to the 2005 baseline by 2025. In 2022 (2023 figures were not available at the time this document was written) it reached a 30% reduction relative to the baseline, primarily due to the conversion of the site powerhouse from using bunker fuel to natural gas. AECL fell short of the 40% target in 2022 primarily due to increased construction at the site. Work will continue to further improve and contribute to Canada's net-zero goals and targets.

Nuclear science and technology activities performed at the Chalk River Laboratories continue to benefit both the Government of Canada and the broader nuclear industry. Through the Federal Nuclear Science and Technology Work Plan, research and scientific activities are undertaken to serve the needs of fifteen federal departments and agencies in the areas of energy, health, safety and security, and the environment. This program is currently oversubscribed, with a higher level of interest from federal departments than there is funding available. Furthermore, CNL has been leveraging the capabilities and expertise at the laboratories to grow and diversify commercial revenues, thereby positioning itself as a key player in the area of nuclear science and technology in Canada and internationally.

AECL is pleased to present this Corporate Plan, and to illustrate the bright future before both AECL and the nuclear sector in general.

Overview

AECL is a federal Crown corporation mandated to enable nuclear science and technology, derive optimal value for Canada from AECL's CANDU intellectual property, and to protect the environment by fulfilling the Government of Canada's radioactive waste and decommissioning responsibilities. AECL undertakes this work at several sites across Canada, with headquarters in Chalk River, Ontario. AECL's operating model allows it to leverage private sector expertise and experience to advance work and drive priorities.



Nuclear Innovation (Nuclear Laboratories)

AECL is focused on leveraging the successes of its past as well as future nuclear innovation to benefit Canada and Canadians. Working with industry, academia, and government, AECL is enabling the development of new technologies to advance SMRs, clean hydrogen and fusion all with a view to building on the success of CANDU and its already realized, and potentially enhanced, contributions to climate objectives, energy security and jobs. Advancements in nuclear medicine are being pursued in an effort to further revolutionize the diagnosis and treatment of disease. This includes supporting the research and development of new and promising nuclear health technologies, including emerging radiotherapies, diagnostics, and radiotheranostics such as Targeted Alpha Therapy. AECL and CNL, based on decades of experience, are at the forefront of the production and uses of deuterium and deuterium-based products.

Work in these areas is enabled by the vast and unique capabilities at CNL and the Chalk River Laboratories, Canada's largest science and technology complex and host to over 3,000 employees. The work undertaken at the laboratories supports Canada's federal roles, responsibilities, and priorities in the areas of health, energy and climate change, the environment, safety, and security. Services are also provided to industry and other third parties on a commercial basis.

The Chalk River site is currently undergoing an important renewal that will transform the site into a modern, world-class nuclear science and technology campus, thanks to an investment of $1.3 billion over ten years by the federal government, that began in 2016.

Through the work and capabilities of the Chalk River Laboratories, AECL and CNL can act as a conduit between the Government of Canada and private industry by identifying and facilitating opportunities for coordination between the public and private sectors to build support for initiatives that serve federal priorities, commitments, and goals.

Environmental Stewardship (Decommissioning and Waste Management)

The objective is to safely and responsibly address the environmental responsibilities and liabilities which have resulted from legacy activities at AECL sites. These legacy liabilities are the result of decades of significant contributions and advancements in nuclear science which have benefitted Canadians and the world, including the development of the CANDU technology and the production of medical isotopes which are used in the diagnosis and treatment of cancer and other diseases. AECL is now focused on the decontamination and decommissioning of redundant structures and buildings, the remediation of contaminated lands and the management and disposal of radioactive waste at AECL sites, primarily at the Chalk River Laboratories and the Whiteshell Laboratories in Manitoba. AECL is also responsible for the remediation and long-term management of sites contaminated with historic, low-level radioactive waste where the Government of Canada has accepted responsibility, most notably as part of the Port Hope Area Initiative. Responsible decommissioning and radioactive waste management is necessary to clean up AECL's sites, protect the environment, and make way for new buildings that will support the ongoing nuclear science and technology mission at the Chalk River site. AECL also continues to manage radioactive waste that is produced from its ongoing science and technology activities, in a manner that is aligned with modern standards and practices.

Reconciliation

As stewards of the environment, AECL recognizes that our nuclear science and research activities have created radioactive materials and waste, and we are committed to addressing this responsibly. We are dedicated to working in partnership with Indigenous Nations and communities to recognize and incorporate traditional knowledge, ceremony, and various cultural and stewardship practices. We have much to learn from each other as we work towards our common objective of environmental protection.

Corporate Profile

Operating Model: The Government-owned, Contractor-operated Model

Under the Government-owned, Contractor-operated model (GoCo model), AECL owns the sites, facilities, assets, intellectual property and responsibility for environmental remediation and radioactive waste management. CNL is responsible for the day-to-day operations of AECL's sites, is the employer of the CNL workforce, and is responsible for all licenses and permits. In addition, AECL has a separate model, outside of the GoCo construct, for another important element of its oversight function: management of the CANDU intellectual property. As noted in this plan, AECL is working with its licensee AtkinsRéalis under a recently announced Memorandum of Understanding to position CANDU for opportunities in the context of new investments in large nuclear reactors.

The Government-owned, Contractor-operated model allows AECL to leverage private-sector expertise and experience to accelerate the decommissioning and radioactive-waste management program, build a world-class nuclear laboratory at Chalk River to fulfill government requirements, and reduce costs and risks to Canada over the long term. As the government's agent, AECL brings value to Canada by overseeing the Government-owned, Contractor-operated arrangement and supporting the government's development of nuclear policy. Under this model, AECL can advance its priorities efficiently and effectively while ensuring that CNL meets and exceeds rigorous safety, security, and environmental requirements.

AECL oversees all CNL activities:

- We set priorities for CNL.
- We approve their long-term plan.
- We provide guidance for and approve their annual plan and budgets.
- We use internationally-recognized tools to track performance based on activities set out in the plans.
- We review their performance and perform audits.
- We can reduce incentive fee if performance is not adequate.

AECL sets priorities for CNL and assesses its performance. In other words, AECL sets out "what" needs to be achieved with CNL deciding "how" it is best executed.

AECL provides strategic guidance annually to CNL for the development of its plans which, in turn, are supported by, and align with, longer term plans which are accepted by AECL. CNL's performance is tracked based on its planned activities, including project milestones and deliverables.

To systematically monitor and assess contractor performance, AECL issues a performance plan annually. The performance plan is based on, and developed in parallel with, the annual plan. It outlines AECL's priorities for CNL and sets out areas where the contractor stands to earn fee for the management and operation of AECL's sites, as per contractual arrangements. Two specific projects, the closure of the Whiteshell Laboratories and the Nuclear Power Demonstration reactor site, are managed separately under target-cost contracts.

AECL leverages other project management and performance measurement tools to track the performance of CNL, including an Earned Value Management System (an internationally recognized tool that allows for the simultaneous tracking of work scope, schedule, and cost) and a Contractor Assurance System (a comprehensive and integrated performance assurance regime that allows for the capture of performance metrics across a wide array of work areas).

The current GoCo contract is set to expire midway through 2025-26. AECL has launched procurement activities related to the next iteration of the GoCo contract, which includes extensive industry engagement and is expected to conclude in alignment with the end date of the current GoCo contract (September 2025).

For more information on the Government-owned, Contractor-operated model visit our website www.aecl.ca.

Strategic Context

AECL's plans for the 2024-25 to 2028-29 period are informed by our understanding of our strategic context, as here described.

Market And Policy Conditions for Large And Small-Scale Nuclear

Looking at the market and policy position of the nuclear sector, the long-prophesied nuclear renaissance in Canada and around the world is here. Electrification demand coupled with the need to achieve net-zero goals are driving investment and policy decisions about what the future of energy will look like, and the role that nuclear will play in that future. These decisions are informed by key national and global climate policy: the global climate emergency demands major investment in non-emitting sources of energy, and widespread electrification of the transportation, residential, and industrial sectors. Canada is firmly committed to an electrified economy, driven by clean power, which means an enormous surge in demand for electricity in the coming decades. To achieve this will require a major investment in generating capacity, across a range of non-emitting sources. At the COP28 Climate Conference in Dubai in December 2023, 22 countries, including Canada, the U.S., and the UK, pledged to triple nuclear energy capacity by 2050.

Meeting this ambitious goal requires a suite of technological options, from large reactors on the one hand, to small and micro modular reactors on the other. The next generation of nuclear energy will need to be more flexible and adaptable than it has ever been, a key success factor that will drive adoption of nuclear power, but which also demands investment and innovation across the nuclear sector.

Looking at the opportunity for large-scale nuclear in Canada and abroad, the future is bright. Bruce Power has signaled an interest in investing in new nuclear generating capacity, creating a generational opportunity for nuclear energy in Canada of, as recently announced, at least 4.8GWe of new nuclear. Similarly, Ontario Power Generation has signaled that it would be looking at new large-scale nuclear in the coming years. This is particularly relevant for AECL and for Canada, as AECL is the owner of the CANDU intellectual property (with AtkinsRéalis holding rights, as a licensee, to commercialize this asset in accordance with its agreements with AECL and the Government of Canada). To meet growing electricity needs, it is expected that the existing CANDU technology needs to be updated by AtkinsRéalis to meet the emerging requirements of utilities operating CANDU reactors,. Canada has a proven and successful design in the CANDU reactor that is the basis of the current Canadian reactor fleet, and – with the critical asset that is the Chalk River Laboratories –the technical and research capability required to support CANDU operations on a long-term basis. Therefore, AECL has an opportunity to work with its intellectual property licensee, AtkinsRéalis, to accelerate development of an updated CANDU design. Such a design could be in the strategic interest of Canada, given potential economic benefit (including jobs and potential royalties) as well as its potential to enhance Canada's current energy security paradigm supported by a domestic and sovereign owned nuclear technology uniquely fueled by a domestic natural uranium supply unlike other foreign reactor technologies fueled by enriched uranium largely capacity supplied by countries such as Russia (close to 50% of world capacity as of 2020) and otherwise by like-minded nations such as France, the UK and the United States which have their own domestic supply requirements in an already supply constrained market for enriched uranium; continue to underpin our Tier 1 nuclear nation status rooted in nuclear. In addition, domestic investment and confidence in CANDU is expected to better position the Canadian-made reactor for competition in the global nuclear marketplace which, as in Canada, is poised for significant growth.

A next generation CANDU design is not theoretical; work is happening now. AtkinsRéalis announced in November 2023 that it is developing the CANDU MONARK, a 1 GWe reactor, to meet the needs of today's market. The design will build on existing CANDU technology originally developed by AECL, to leverage its track record of safety, reliability and its successful project execution (i.e. on-time and budget construction and refurbishment), and take the opportunity to include state-of-the-art engineering innovations as well as the expectations of utility customers, particularly in Ontario. AECL is expected to play an important role in this project, having signed a Memorandum of Understanding intended to result in a new Collaboration Agreement and Intellectual Property Licensing Agreement (see section *Other Areas of Focus* below).

Looking globally, the government announced in 2023 the availability of $3B in export loan financing to fund the refurbishment of 2 existing CANDU-6 reactors as well as the completion of two CANDU-6 reactors at Romania's Cernavoda facility. This is a signal to the world that CANDU remains a competitive option for the future, and that it has the confidence of the Canadian and Romanian governments. In addition, CNL is expected to have commercial opportunities as a subcontractor to AtkinsRéalis on Romanian refurbishment and new build projects.

Turning to small-scale reactors, since the release of Canada's SMR Action Plan in December 2020, the nuclear industry has been focused on supporting the three major areas that were identified as beneficial for Canada:

- On-grid power generation, especially in provinces phasing out coal. Utilities want to replace end-of-life coal plants with non-emitting base-load nuclear plants of similar size.
- On- and off-grid combined heat and power for heavy industry. Oil sands producers and remote mines have expressed interest in options for bulk heat and power that would be more reliable and cleaner than current energy sources, and small modular reactors represent a potential opportunity in this regard.
- Off-grid power, district heating, and desalination in remote communities. These currently rely almost exclusively on diesel fuel, which has various limitations (e.g., cost, emissions). Renewables and batteries can mitigate these limitations to some extent for residential power, but may not supply building heat, nor are they likely to offer reliable bulk energy to support economic development. Very small modular reactors have potential to be a game changer regarding development in the North, contributing to national sovereignty, energy security and the economy.

The opportunity related to SMRs is noteworthy given Canada's extensive capabilities in nuclear technology, including academia, research, engineering, manufacturing, and existing supply chain. Economic benefits for Canada derived from SMR development and deployment include an estimated 6,000 new jobs (direct and indirect) supporting a highly skilled labor force and an estimated $10 billion in direct impacts and $9 billion in annual indirect impacts between 2030 and 2040.[1] There is also significant export potential for technology and services related to this industry should Canada be at the forefront, including an estimated total global export potential of approximately $150 billion per year between 2030 and 2040.[2]

[1] *A Call to Action: A Canadian Roadmap for Small Modular Reactors*. Small modular reactor roadmap steering committee, November 2018. Available online at smrroadmap.ca.

[2] Ibid

SMR vendors have risen to the challenge. Many have entered the Vendor Design Review process with the Canadian Nuclear Safety Commission (CNSC) and are well on their way towards having viable designs. Various levels of government have also expressly stated their intentions for SMRs, including providing funding to advance those objectives. Ontario, New Brunswick, and Saskatchewan have announced investments in SMRs, with Ontario announcing the construction of four BWRX-300 SMRs at the Darlington site. Alberta, and most recently Quebec, have stated interest in exploring options around nuclear. At the federal level, funding for SMRs has been provided through the Strategic Innovation Fund, the Atlantic Canada Opportunities Agency, the Electricity Predevelopment Program, the Future Electricity Fund, and the Canada Infrastructure Bank ($20M to Terrestrial Energy in 2020, $47.5M to Moltex Energy in 2021, $27M to Westinghouse Electric in 2022, $970M to Ontario Power Generation in 2022, $74M to SaskPower in 2023). Natural Resources Canada (NRCan) and the CNSC have also received funding to advance SMRs in Budget 2022, including $70M for NRCan to undertake research to minimize waste generated from SMRs, support the creation of a fuel supply chain, strengthen international nuclear cooperation agreements, and enhance domestic safety and security policies and practices, as well as $51M for the CNSC to build the capacity to regulate small modular reactors and work with international partners on global regulatory harmonization.

As part of its long-term vision, CNL seeks to become an accelerator for small modular reactor demonstration by the private sector and to support associated research and development, including opportunities to integrate SMRs with other clean energy sources and storage technologies to reach Canada's low-carbon future. To that end, AECL and CNL created an invitation process to host a SMR and the process remains open to all technology developers. The first potential project under this plan is one led by Global First Power, and is a partnership between Ontario Power Generation (OPG) and Ultra Safe Nuclear Corporation (USNC) and claims to be the most advanced micro-reactor project in Canada, having launched a licensing and Environmental Assessment process in 2019 and drafting its license to prepare the site to build a SMR at AECL's Chalk River Laboratories. USNC announced in mid-2023 that revisions to its MMR design and increased the reactor from a 10MWth to a 45MWth (15Mwe) design. Throughout the process, the ongoing risks of a first-of-a-kind project and a new start-up company have been at the forefront of decision-making, and AECL and CNL continue with due diligence practices and pace their involvement with the level of risk and probability of success of the proponent.

The Commissioner of the Environment and Sustainable Development's Audit on the Management of Low and Intermediate Level Radioactive Waste

In 2022, the Commissioner of the Environment and Sustainable Development (part of the Office of the Auditor General of Canada) concluded an audit on the Management of Low and Intermediate Level Radioactive Waste which looked at AECL, Natural Resources Canada and the Canadian Nuclear Safety Commission's practices.

It concluded that: "Overall, [Natural Resources Canada, the Canadian Nuclear Safety Commission and AECL] did a good job of managing the low and intermediate level radioactive waste that makes up 99.5% of Canada's radioactive waste output. The entities' management of this waste aligns with key international standards that seek to protect the environment and the safety of current and future generations."

With respect to AECL, it noted that, "Atomic Energy of Canada Limited was improving its inventory information, but public reporting could be enhanced." Specifically, it noted that "Atomic Energy of Canada Limited should ensure that its public reporting clearly aligns its plans and activities with how it is addressing historic and legacy waste. For increased transparency, these reports should include monitoring activities and timelines." AECL has developed an action plan to respond to these recommendations, most of which has already been implemented.

Procurement Process to Renew the GoCo Contract

A major strategic consideration for AECL in 2024-25 and beyond is a procurement process to renew the contract for the management of CNL under the GoCo model. The present contract ends in September 2025, and AECL will be continuing the competitive procurement process to renew it. Given the scope and size of this procurement process, AECL has put in place a dedicated team staffed with senior AECL experts across a range of functions and supplemented by external support. Further details on the project are presented in the Objectives and Plans section of this report.

Culture and People

AECL is a small organization with a complement of national and international experts who bring experience in the management of similar GoCo arrangements, both from a government and contractor perspective. As of December 2023, AECL has 52 employees. AECL forecasts a growth in its FTE complement to, amongst other things, enable proper oversight of its growing Science & Technology program (especially related to commercial opportunities), more international outreach and cooperation, greatly expanded Indigenous engagement responsibilities, and new drivers for the CANDU business line.

AECL is committed to fostering a culture that allows everyone to bring their "whole self to work" and to do their best work. Diversity Equity & Inclusion (DE&I) are fundamental principles that underpin our capacity to innovate and achieve our goals. AECL is committed to fostering an environment that embraces diversity and promotes equity and inclusion. AECL's workforce is made up of 54% women, 8% visible minorities and 4% Indigenous. Key AECL initiatives and achievements:

- Continued participation in and commitment to the Equality in Energy Transition Initiative's *Equal by 30*.
- Established an AECL employee-led, executive sponsored, DE&I working group. Developed organizational commitment statements and crafting a roadmap outlining the future state.
- Completed an organization-wide cultural competency assessment survey. Created an action plan based on key items highlighted by employees to build an inclusive organizational culture.
- Enriched internal communication of diversity and environmental, social & governance issues through regular highlights at weekly all-staff alignment meetings.
- Continued membership and involvement in the Women in Nuclear (WiN) Canada association.
- Strengthened leadership commitment and accountability for diversity and inclusion by capturing a diversity objective in each executive's performance management plan.
- Fostered diversity at the leadership level. In 2023, two executive team positions (nuclear operations oversight and human resources) were filled by women.
- Launched an anonymous reporting tool, providing an internal reporting mechanism in support of confidential workplace violence, harassment, and disclosures.
- Created AECL's first *Accessibility Plan*.
- Offers flexibility and support to employees through a hybrid workplace to build a productive, healthy, and stable workforce.
- Launched an employee engagement survey with the addition of new DE&I questions in 2024.
- Initiated an organization-wide pay equity review and job description validation process.

With operations in remote locations, attracting and retaining highly-qualified personnel is a key focus. Efforts in this area include focusing on talent management, career advancement opportunities, succession planning, and regular total reward reviews for AECL to remain competitive among similar employers nationally and internationally.

AECL continues to experience low voluntary turnover with a rate of 6.4% annually in 2022-23. However, approximately 8% of employees are eligible for retirement. AECL is accordingly focusing on strategic workforce planning and succession plans to mitigate risk. Given its small size, the impact of attrition in any particular area can be significant, particularly given the specialized knowledge and unique skillset of employees.

Indigenous Engagement and Reconciliation

Indigenous Engagement and Reconciliation remains an important priority cutting across all of AECL and CNL business. Both our innovation and environmental stewardship missions depend on strong relationships with Indigenous Nations and communities. Most importantly, substantive Indigenous involvement in how AECL and CNL design and execute their activities makes that work better. Progress can already be observed under the Long-Term Relationship Agreement with the Algonquins of Pikwakanagan, and the working groups established thereunder, for Chalk River Laboratories. More broadly, strong Indigenous engagement – built on relationships, not just project-driven transactional interactions – is critical for ensuring that current work and future projects meet and exceed the regulatory bar for Indigenous engagement. Building and maintaining strong relationships with the large number of Indigenous communities and organizations affected by and interested in our sites and activities remains a key priority for AECL.

Environmental Assessments

Three projects are currently undergoing or have recently undergone Environmental Assessments through the Canadian Nuclear Safety Commission:

- Construction of a near surface disposal facility at the Chalk River Laboratories.
- *In-situ* decommissioning of the WR-1 research reactor at the Whiteshell site.
- *In-situ* decommissioning of the Nuclear Power Demonstration facility in Rolphton, Ontario.

All three projects have faced significant delays, which are due to enhanced public and Indigenous engagement requirements, requests from the CNSC to provide additional technical studies, and the COVID-19 pandemic which slowed work at its peak. As a result, additional time has been needed to prepare the safety case for each project, which includes: making adjustments based on feedback and comments received from the regulator, other government organizations, the public, and Indigenous Nations and communities; continuing engagement with key stakeholder and Indigenous Nations and communities; and, focusing communications activities with a view to increasing understanding of the rationale behind the projects – protection of the environment – as well as AECL's role specifically. Overall, while these delays have impacted CNL's ability to commence large-scale cleanup and remediation activities at AECL sites, they have allowed for more public and Indigenous engagement, and the development of additional studies in support of the projects' safety cases (which are also facilitating public and Indigenous engagement).

Progress has been made on the Near Surface Disposal Facility project as the Canadian Nuclear Safety Commission (CNSC) issued its decision, in January 2024, to amend the CNL operating license at Chalk River Laboratories to permit the construction of the proposed near surface disposal facility. This decision comes after a lengthy regulatory process, including a July 2022 CNSC decision to extend the Indigenous consultation period requiring the CNSC staff, CNL and AECL to submit additional evidence and information on the subject of engagement and consultation. A public hearing to deliver final arguments was held in August 2023. CNL is now working to understand and fulfill CNSC conditions associated with the project, as well as collaborating with Indigenous Nations and communities on pre-construction preparation. It is possible that the project will be further delayed as applications for judicial review have been initiated.

The *in-situ* decommissioning of the WR-1 research reactor and the Nuclear Power Demonstration reactor projects are progressing with collaboration and engagement between CNL and Indigenous Nations and communities, with both projects adjusting their approach and documentation to reflect the lessons learned from the regulatory process of the Near Surface Disposal Facility.

Funding Requirements

AECL's current funding expires in September 2025. Thus, AECL is seeking renewal of authorities and operational funding between 2025 and 2035 to advance its core missions. That proposal focuses on:

Continued funding for AECL to accelerate the reduction of Canada's liabilities and hazards related to legacy nuclear waste, which will result in important risk and hazard reduction at AECL sites, including the closure of three legacy sites. This will significantly reduce AECL's footprint and existing liabilities, which are currently captured in the Public Accounts of Canada. More broadly, this will demonstrate responsible and timely management of radioactive waste, which can enable larger public acceptance of new nuclear projects to address Canada's net-zero goals.

Total Funding Projections Based on Approved Federal Funding

				Plan					
(millions of Canadian dollars)	**Notes**	**Actual 2022-23**	**Budget 2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**5 Year Total**
Funding Requirements									
Environmental Stewardship		806	1,030	1,197	471	80	10	–	1,758
Nuclear Laboratories - Operating		129	236	238	221	17	17	17	510
Nuclear Laboratories - Capital		147	171	159	81	–	–	–	240
Planned Budget 2023 spending reductions		–	–	(2)	(4)	(8)	(8)	(8)	(30)
Federal Funding Requirements AECL	1	**1,083**	**1,436**	**1,592**	**769**	**89**	**19**	**9**	**2,479**

[1] The current GoCo contract ends September 2025 and most approved funding only extends up until this point. This table has been provided for illustrative purposes, and only represents the actual amounts approved and not the funding required of AECL as a going concern.

Total Five-Year Projection of Federal Funding Requirements Including Unapproved Funding

				Plan					
(millions of Canadian dollars)	**Notes**	**Actual 2022-23**	**Budget 2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**5 Year Total**
Funding Requirements									
Environmental Stewardship		806	1,030	1,197	1,234	1,104	958	898	5,391
Nuclear Laboratories - Operating		129	236	238	284	194	211	225	1,153
Nuclear Laboratories - Capital		147	171	159	345	290	264	254	1,312
Planned Budget 2023 spending reductions		–	–	(2)	(4)	(8)	(8)	(8)	(30)
Federal Funding Requirements AECL	1	**1,083**	**1,436**	**1,592**	**1,859**	**1,581**	**1,426**	**1,369**	**7,826**

[1] The table above includes, in addition to approved funding, preliminary AECL projections of anticipated funding requirements that have not yet been subject to the federal cycle for approval of expenditures by the government and Parliament. These estimates are subject to further planning, and neither their preliminary status nor the numbers should be interpreted as an indication of the future funding level for AECL.

Refocusing Government Spending

Budget 2023 announced the goal of refocusing $15.4 billion over five years (2023-24 to 2027-28) and $4.5 billion annually thereafter, to priorities that matter to Canadians the most. It also announced that the government would work with federal Crown corporations to ensure they achieve comparable spending reductions, which would account for an estimated $1.3 billion over four years starting in 2024-25, and $450 million ongoing.

Accordingly, AECL has been working with the Government to identify spending reductions. The target for the funding reduction was applied to AECL's operations assuming that the level of appropriations for 2023-24 would continue at similar levels in future years. For 2024-25 and 2025-26, AECL will manage the funding reduction ($2,137,000 and $4,469,00 respectively) within existing budgets.

For 2026-27 and future years (where savings reach $7,660,000 per year on an ongoing basis), the precise implementation of the spending reduction can only be determined with certainty after a government funding decision on the full AECL budget. This will be discussed in more detail in future Corporate Plans.

In 2024-25, AECL will undertake a review of spending on travel and professional services in particular, with a view to establishing spending reduction goals in these areas, in line with government expectations.

Risks Overview

AECL has identified two important pressures and risks: a stable, long-term funding model for the Chalk River Laboratories, and upward pressure on decommissioning and waste liability.

With respect to AECL's decommissioning and contaminated sites liability costs, as projects addressing environmental liabilities progress, there remains an ever-present risk of both increasing scope and realization of risks that ultimately place an upward pressure on AECL's environmental liabilities (which are reported in the Public Accounts of Canada). This is a common challenge related to the decommissioning and remediation of legacy and historic nuclear sites internationally.

Cost increases can be attributed to several factors, including delays in Environmental Assessments (discussed above), or scope changes. In some cases, the remediation of decades-old radioactive waste material is proving more challenging than originally planned, either because of changed/unanticipated conditions, or higher hazards (e.g., higher levels of contamination, more complicated contamination, or other industrial hazards) being discovered. While some of these cost increases have been included in AECL's liabilities and subject to additional funding in 2022, risks remain for further liability increases as work continues in remediating AECL's complex sites and facilities. Engagements with the public and Indigenous communities can also translate into judicial reviews, potentially causing significant delays.

Consistent with its mandate and international best practices, AECL is focusing on accelerating decommissioning, remediation, and waste disposal projects as it is the most safe and effective way of reducing risks and costs over the long term. Addressing risks and hazards now protects facilities from further degradation, which can otherwise lead to further complications, contamination, and overall cost increases.

From a liability management perspective, throughout the year AECL oversees CNL's work in addressing the liabilities and has CNL formally report any changing conditions or impacts to projects from a scope, schedule, and cost perspective as well as any changes in strategy due to new information (current performance or industry knowledge/benchmarking). These reviews are underpinned by a set of AECL and CNL procedures, including governance provisions aligned with AECL's change control procedure and approval authority thresholds, that govern how changes are reviewed and managed. These changes and financial impacts are also subject to audit by the Office of the Auditor General on an annual basis.

The 2018 shutdown of the National Research Universal (NRU) reactor, and associated decrease in funding has created cost pressures at the Chalk River Laboratories. In particular, overhead costs for the entire site (which do not change with the shutdown of the reactor) that were previously partially funded by the NRU are now attributed in greater measure to remaining missions, including nuclear science and technology. As overhead attributions increase, the amount of science that can be undertaken with the same fixed budget decreases. This erodes both the viability of the Federal Nuclear Science and Technology Work Plan, as well as CNL's commercial S&T opportunities (by effectively pricing them out of the market).

AECL maintains close oversight on CNL's management of this long-term financial sustainability challenge, incentivizing where required to drive an optimal outcome without compromising safety, security, and the protection of the environment.

Objectives and Plans – Reconciliation

AECL operates on land and territories that have, since time immemorial, been the traditional lands of Indigenous peoples in Canada. AECL, with its contractor, CNL, is committed to advancing reconciliation with First Nation, Métis, and Inuit peoples through a renewed relationship based on recognition of rights, mutual understanding and respect, and meaningful engagement and collaboration.

AECL has made four commitments consistent with the government's reconciliation priorities:

- Listening, understanding, improving, and taking meaningful actions to advance reconciliation with Indigenous Nations and communities on whose lands we operate.
- Continuously learning about Indigenous history, culture, traditions, and world views.
- Integrating Indigenous knowledge and values into AECL's policies, procedures, practices, and projects so that they become embedded in all that we do.
- Finding ways to empower Indigenous Nations and communities to enable collaboration, capacity-building and economic improvement.

Nuclear Innovation

Fueling the Next Generation of CANDU

AECL owns the intellectual property for the CANDU reactor from its former CANDU Reactor Division, a major nuclear success story, and one of Canada's most significant technological exports. Looking ahead at the five-year planning period, AECL sees a vital opportunity for CANDU technology: answering the call for new reactors to meet Canada's forecasted need for far greater clean electricity supply, supporting ongoing energy security and sovereignty through the use of a domestic technology and existing supply chain as well as creating jobs and economic growth for Canadians. This opportunity will involve competition among leading foreign companies and designs, and AECL sees CANDU as a prime contender for business in Ontario and beyond because of the articulated benefits it provides Canada. However, CANDU's competitive position for such opportunities will benefit from further investment in the CANDU design to meet the needs of the modern utility customer, including their interest in a 1GWe CANDU reactor. To achieve this, AECL is working with its current licensee, AtkinsRéalis, under the recently announced Memorandum of Understanding, to further efforts for an optimized CANDU model to position CANDU for the next generation of large nuclear reactors in Canada and abroad.

Successful CANDU deployment means both royalty revenue to Canada, and significant economic benefit resulting from business going to Canadian companies and well-paying jobs for Canadian workers. More importantly, the model and investments are needed to best position CANDU and Canada to successfully achieve decarbonization, energy security and economic objectives as well as sustaining Canada's Tier 1 nuclear nation status among a select group of nations worldwide. Careful management of the CANDU intellectual property is vital at this juncture to protect one of the government's strategic assets and gain the benefits that can be derived from it by Canada.

AECL's Nuclear Innovation mission has four main components:

1. **The Federal Nuclear Science and Technology (FNST) Work Plan (Government funded):** performs nuclear-related S&T to support core federal roles, responsibilities and priorities, while maintaining necessary national capabilities and expertise at the Chalk River Laboratories. The program is responsible for research and scientific activities that advance federal priorities related to the responsibilities of fifteen departments and agencies in the areas of health, safety and security, energy and the environment. It has provided the funding to maintain core and unique capabilities at the Chalk River Laboratories that can be leveraged by government, academia, and industry.

2. **Commercial Services (Third Party Revenues):** CNL provides science and technology services and other products to third-party customers on a commercial basis. Activities in this area are self-funded through commercial revenues (i.e., no government funding is necessary), but are aligned to AECL and CNL long-term plans via an annual business development plan. Canada's nuclear operators are the most significant source of this commercial revenue.

3. **New Technologies Initiatives Fund:** This program provides seed funding and investment for projects and capabilities considered to be essential to the future of the nuclear industry, as well as growth areas for the Chalk River Laboratories (which can lead to increased commercial revenue). These investments allow CNL to explore opportunities to respond to industry needs and have resulted in partnerships which have led to demonstrable products.

4. **Revitalization of the Chalk River Laboratories:** Capital investment in the Chalk River Laboratories that is distinct from the Chalk River decommissioning mission. This area includes both new science infrastructure and site infrastructure, the supporting water, sewage, electrical, and other systems required to operate the Chalk River campus.

The budget related to the Nuclear Laboratories for the planning period will be tracked according to three project areas, as presented in the following table:

Nuclear Laboratories Five-Year Projection for Use of Approved Federal Funding

(millions of Canadian dollars)	Notes	Actual 2022-23	Budget 2023-24	Plan 2024-25	Plan 2025-26	Plan 2026-27	Plan 2027-28	Plan 2028-29	5 Year Total
Nuclear Laboratories									
Nuclear Laboratories – Operating		194	306	318	306	103	106	112	945
Revenue		65	71	80	85	86	89	95	436
Capital (Revitalization of the Chalk River Laboratories)		147	171	159	81	–	–	–	240
Planned Budget 2023 spending reductions		–	–	(2)	(4)	(8)	(8)	(8)	(30)
Federal Funding Requirement	1	**277**	**407**	**395**	**298**	**9**	**9**	**9**	**721**

[1] AECL currently only has approved funding for the majority of its activities until mid-2025. Please refer to the next table for details on beyond this date.

Nuclear Laboratories Five-Year Projection of Federal Funding Requirements Including Unapproved Funding

(millions of Canadian dollars)	Notes	Plan 2024-25	Plan 2025-26	Plan 2026-27	Plan 2027-28	Plan 2028-29	5 Year Total
Nuclear Laboratories							
Total Nuclear Laboratories		395	625	476	468	471	2,435
Difference Between Approved Government of Canada Funding and Federal Funding Requirements Including Unapproved Funding	1	**–**	**(328)**	**(467)**	**(458)**	**(462)**	**(1,715)**

[1] The table above includes, in addition to approved funding, preliminary AECL projections of anticipated funding requirements that have not yet been subject to the federal cycle for approval of expenditures by the government and Parliament. These estimates are subject to further planning, and neither their preliminary status nor the numbers should be interpreted as an indication of the future funding level for AECL.

Federal Nuclear Science and Technology Work Plan

AECL's Federal Nuclear Science and Technology Work Plan includes the participation of:

1. Canada Border Services Agency
2. Canada Coast Guard
3. Canadian Nuclear Safety Commission
4. Canadian Space Agency
5. Communications Security Establishment
6. Defense Research and Development Canada
7. Department of National Defence
8. Environment and Climate Change Canada
9. Global Affairs Canada
10. Health Canada
11. Innovation, Science and Economic Development
12. Natural Resources Canada
13. National Research Council of Canada
14. Public Safety Canada
15. Royal Canadian Mounted Police

Overview: AECL oversees the delivery of the Federal Nuclear Science and Technology Work Plan for nuclear research and development to support the Government's priorities and core responsibilities in the areas of health, nuclear safety and security, energy, and the environment. The Federal Nuclear Science and Technology Work Plan serves to build, maintain and maximize those capabilities that are unique to CNL. AECL engages with fourteen federal departments and agencies to develop a program of work that meets broad federal needs and priorities and fosters innovation through the development of technologies and applications, while supporting Canada's international partnerships, commitments, and obligations. AECL's Federal Nuclear Science and Technology Work Plan focuses on four research themes:

1) Supporting the development of biological applications and understanding the implications of radiation on human health.

This includes:

- Supporting the health and wellness of Canadians by developing better methods for diagnosis and treatment using biological applications of nuclear research.
- Improving the understanding of radiological health risks caused by exposure to radiation at levels found in occupational and public environments.
- Contributing to the body of evidence that informs the international radiation protection framework (e.g., United Nations Scientific Committee on the Effects of Atomic Radiation, International Commission on Radiological Protection, International Atomic Energy Agency).
- Collecting or generating evidence to inform the application of international recommendations in Canada and incorporation into Canadian regulations and national guidance.
- Increasing knowledge of the uncertainties in low-dose risk assessment to address challenges in regulatory policy, health assessment and public communication.
- Integrating sex and gender-based analyses, as well as diversity analysis, to ensure research accounts for diversity factors.
- Supporting Canada's response to future pandemics.

2) Supporting environmental stewardship and radioactive waste management.

This includes:

- Maintaining Canada's national and international leadership related to demonstrating strong, science based, and risk-informed regulation with respect to historical, current, and future applications of nuclear technologies, supporting Canada's environmental stewardship by ensuring that nuclear energy technologies are developed within a robust framework that addresses environmental and waste management concerns.
- Supporting the implementation of Canada's Pan-Canadian Framework on Clean Growth and Climate Change and related initiatives such as the SMR Roadmap and the Canadian Critical Minerals Strategy, through research to support transparent, science- and risk-based decision making related to the environmental behaviour of naturally occurring and anthropogenic radionuclides associated with these initiatives; and,
- Developing and demonstrating innovative technologies to optimize environmental protection and waste management, increase competitiveness, and promote responsible use of clean technologies.

3) Enhancing national and global security, nuclear preparedness, and emergency response.

This includes:

- Developing and advancing science and technology to detect, monitor, track and characterize chemical, biological, and radioactive and nuclear materials, including special nuclear materials, and other threats (explosives
- Improving Canadian global leadership in Science & Technology development to support nuclear non-proliferation, safeguards, and trade to export control objectives, which is part of Canada's broader aim to advance its security interests around the world.
- Supporting Canada's international commitments on the peaceful use of nuclear energy and its interests in the Comprehensive Nuclear-Test-Ban Treaty, Fissile Material Cut-off Treaty, and the International Partnership for Nuclear Disarmament Verification.
- Improving cyber security and protecting our nuclear critical infrastructure from cyber-threats.
- Ensuring that Canada is ready to respond in an event of a radiological or nuclear emergency, in Canada or abroad through science and technology to inform decision-making and solutions in emergency situations.
- Building and improving domestic pandemic resilience and long-term preparedness.

4) Supporting safe, secure, and responsible use and development of nuclear technologies

This includes:

- Implementing the Pan-Canadian Framework for Clean Growth and Climate Change and helping achieve Canada's international greenhouse gas targets by reducing the environmental impacts of energy production, bringing clean energy onto the grid, reducing industrial emissions, and reducing diesel use in remote areas.
- Increasing competitiveness and promoting the use of clean technology through research, development, and demonstration of innovative nuclear energy technologies.
- Supporting the Government of Canada's nuclear technology initiatives including recommendations linked to the SMR roadmap, SMR Action Plan, and the Nuclear Energy Leadership Table.
- Delivering on Canada's commitment under Mission Innovation to advance clean energy research, development, and demonstration while encouraging private sector investment and increasing domestic and international partnerships.
- Giving effect to Canada's bilateral partnerships on nuclear science and technology with countries such as United States, and United Kingdom, as well as multilateral partnerships including the Nuclear Energy Agency, Clean Energy Ministerial, and the Government's extension of the Generation IV International Forum (GIF) Framework Agreement and participation in GIF System Arrangements.
- Informing potential programs, regulations, and policies of nuclear energy technologies; and
- Providing risk-informed, science-based evidence for regulatory decision making.

Status: In 2023-24, the federal interdepartmental committees, representing fifteen departments and agencies, continue to work with CNL on developing a program of work that addresses the medium and long-term Government priorities in the areas of climate change and a clean environment, innovation for economic growth and prosperity, and the health, safety, and security of Canadians.

The program of work includes actions to:

- demonstrate the production of hydrogen without greenhouse gas emissions using a copper-chlorine (Cu-Cl) thermochemical cycle. This work contributes to the Generation IV Forum and CNL's work on hydrogen to decarbonize the transportation sector; it is also aligned with Canada's 2020 Hydrogen Strategy, aligning with the key principle in the Strategy that hydrogen should be produced using methods with the lowest environmental impact. As CNL's method uses nuclear reactor heat for production, it represents a zero-emission source of hydrogen.
- advance small modular reactor technologies and deployment for Canada in order to inform regulatory guidance, assessments and policies such as experimental validation of predictive models in support of safety analysis and licensing and the development of sensor monitoring of remote and underground structures.
- examine the safety and efficacy of Actinium-225 in support of new medical applications and developing proof-of-concept production of high-quality radioisotopes for cancer treatments.
- support regulatory and licensing decisions for projects to understand the behavior of materials in advanced reactors, small modular reactors and the current fleet in extreme environments.
- examine the effects of aging, corrosion and degradation of in-core materials for new and current reactor types as well as develop state of the art online monitoring networks.
- examine the potential for small modular reactors to meet the needs of a near-zero carbon remote mining operation.
- contribute to Canada's emergency response capability by developing improved bio dosimetry techniques for rapid triage in emergency response; improvement of techniques for rapid measurement of radionuclides, development of decorporation and decontamination techniques and work on emergency planning such as dispersion modelling.
- improve the understanding of the basis of biological effectiveness of different radiations at low doses and dose rate.
- advance technologies for the detection of special nuclear materials at the border.
- study nuclear security and emergency response considerations for deployment of SMRs in remote sites.
- reduce uncertainties in low-dose risk assessment to address challenges in regulatory policy, health assessment and public communication through in vivo mice studies.
- improve the understanding of environmental impacts and waste of SMR operations in support of the SMR Action Plan.
- host exercises to test cyber security resilience for nuclear power plants in a full-scale cyber physical simulation of the control and safety systems.
- support Canada's interests, commitments, and arrangements in non-proliferation, counter- terrorism, and disarmament priorities such as the International Partnership for Nuclear Disarmament Verification and the Comprehensive Nuclear-Test-Ban Treaty Organization though international engagements and technology demonstrations at the Chalk River site.

Planned Results

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Deliver quality research projects on time, as set out in the Federal Nuclear Science and Technology Work Plan and detailed in CNL's annual plan.	Meet identified project objectives and disseminate the results with uptake from stakeholders.	Support Canada's position as a global player in areas of security, health, energy, and nuclear regulation. Develop highly qualified personnel for the next generation of nuclear workers and scientists. Advance unique technical knowledge and understanding to support nuclear policy and regulation. Maintain Canada's ability to actively participate in international obligations with respect to energy technology, safety, security, and nonproliferation.

Work over the planning period is consistent with and responsive to AECL's priorities and those of the Government of Canada, including supporting the Government of Canada to reach its climate change targets in 2030 and 2050. On the international front, priorities continue to include strengthening Canada's bilateral partnerships on nuclear science and technology with countries such as the United States and the United Kingdom, as well as multilateral partnerships and agreements including the Nuclear Energy Agency, the International Atomic Energy Agency, the Generation IV International Forum, the Fissile Material Cut-off Treaty (in negotiation), the Comprehensive Nuclear Test Ban Treaty, and the International Partnership for Nuclear Disarmament Verification. Support provided by the Federal Nuclear Science and Technology Work Plan allows for Canada's participation in these important international fora.

As in previous years, the measures of success are related to meeting federal priorities through delivering on milestones and targets set out in CNL's Annual Program of Work and Budget.

Risk Overview: Risks to the Federal Nuclear Science and Technology Work Plan include the availability of facilities and technical staff, which can be mitigated through careful planning and appropriate facility maintenance and upgrades.

Commercial Services

Science and technology for commercial purposes - Overall

Overview: CNL will continue to provide commercial services to third parties and is expected to grow commercial margins in order to enable increased recovery of corporate and site support costs, and to continue to build a strong, vibrant, and sustainable nuclear science and technology mission. The objective is to leverage the assets and capabilities of CNL to undertake third-party commercial work, in doing so enabling CNL to further grow its science and technology capabilities, with intended benefits for Government and Canadians. As CNL grows its revenues and associated margin, CNL will further grow its science and technology capabilities, with intended benefits for Government and Canadians.

Most of CNL's commercial services have followed a traditional customer-supplier relationship. In particular, AECL has incentivized CNL to grow its commercial revenues, taking into account internal and external factors, market trends, as well as the broader long-term vision for CNL and ultimate benefit to Canada. Following the shutdown of the National Research Universal reactor in March 2018, revenues from the sale of reactor-based isotopes have gone to zero as the last of the cobalt-60 produced in the reactor was sold in 2019-20. Moreover, COVID-19 impacted growth plans, delaying some of the planned marketing efforts and enabling activities, which has negatively impacted revenue growth in the medium-term. Ongoing efforts to grow commercial margin for other products and services therefore seek to mitigate the loss of revenue and the increase in allocated overhead costs to other parts of the S&T mission.

Status: Building on previous years' efforts, CNL continued to engage with and respond to existing customers' requests while exploring new markets. CNL is also initiating a more collaborative approach to commercial opportunities, actively seeking out partnerships where unique skills can be leveraged to provide a broader offering, or to build ecosystems that can provide services to a community of users looking to overcome specific challenges.

Commercial opportunities in science and technology for industry customers continue to be pursued in the areas of fleet support, hydrogen and tritium, medical isotopes and medical application of radiation, radiobiology, and environment, safety and security, and advanced reactors – with CANDU reactor fleet support being the single largest area of current work. Whilst this remains one of the largest growth areas, the evolving nuclear market presents considerable opportunity and continues to driver substantial diversification of CNL's commercial activities. Work for industry customers included energy-related services to the CANDU Owners Group, major utility companies, marine propulsion companies, and new work in the light-water reactor market.

The market for deuterium oxide or deuterium gas related technology and health products (e.g., non-nuclear uses like in Organic Light Emitting Diodes or applications in medicinal chemistry) has grown exponentially in the last few years. This is an important new opportunity for CNL where it has a significant niche experience and could work in partnership with industry to accelerate advancements.

Work for the year 2023-24 included:

- Materials, chemistry, and corrosion testing on irradiated and unirradiated materials for CANDU facilities.
- Progressing Canadian and international nuclear utilities' reactor life management (and fuel channels specifically), with the goal of extending the years of reactor operation to provide carbon-free electricity.
- Critical work on quantification of parameters needed for stations to meet regulatory requirements, such as measuring deuterium ingress into pressure tubes.
- Supporting the proposed life extension of the Pickering nuclear power plant and a potential follow-up decision to refurbish those Pickering reactors.
- Innovation efforts to extend the life of future nuclear components, including fuel channels (e.g. designing thicker channels), end fittings (optimizing chromium content) and feeders (reducing corrosion impacts and monitoring requirements).
- Work with utilities on the development of tools to help reduce maintenance time and dose rates – a corrosion monitoring tool developed at the Chalk River Laboratories in collaboration with Canadian universities has recently helped reduce corrosion inspection time by 30% at Ontario Power Generation's Darlington nuclear power plant.
- Post irradiation examination of light-water reactor fuel for a US utility, including innovative destructive examination (burst testing) of fuel cladding that will provide valuable insight into corrosion rates and material integrity. Once the study is complete, it is anticipated that other US utilities will be interested in similar examinations for their units.
- Commercial work relating to small modular reactors. CNL achieved further growth in multiple services categories including fuel prototyping and qualification, novel test facility design and operation, feasibility studies for end users, materials testing, and safety analysis. In particular, services to the OPG Darlington New Nuclear Project will be a crucial component of CNL's growth in this market sector in the future.
- The provision of techno-economic feasibility assessments for hydrogen production and hydrogen-derived clean fuels (e.g., syngas, synthetic diesel, methanol, etc.).
- Tritium process engineering support for fusion energy developers Pre-clinical and Contract Research Organization services for radiopharmaceutical organizations.
- Partnership with ITM to produce greater quantities of Actinium-225 to serve the clinical trial market (as detailed earlier in this report).

Commercial Services to Federal and other Government Clients

Overview: In addition to work for federal departments and agencies under the Federal Nuclear Science and Technology Work Plan, CNL provides services and access to its unique expertise and facilities on a commercial basis. These capabilities are also made available to international agencies such as the International Atomic Energy Agency and the Nuclear Energy Agency.

Status: Under the Canadian Safety and Security Program, CNL will continue to examine the epigenetic basis of radiation and its health effects, develop a deployable technique that will support more secure and efficient screening of packages and travelers and start new projects to explore active interrogation techniques for nuclear disarmament verification and the development of low burden shielding material with melanocytes as a possible means of shielding and protection against radiation.

National Research Universal (NRU) Reactor

After 60 years of operation, the NRU was shut down in 2018. Designed in the early 1950's, the low-temperature, low pressure, research reactor enabled great advances across a wide variety of globally important industrial sectors. The NRU reactor was used to prove out many concepts which later appeared in the CANDU reactor. It spawned a global medical radioisotope industry and provided the neutron source to conduct research across a wide spectrum of sciences, both applied and basic.

The reactor shutdown has left a significant gap in research capabilities at the Chalk River Laboratories. AECL and CNL are currently exploring options around a future research reactor. A decision to deploy domestic nuclear technology (i.e. CANDU) to support Canada's energy transition will have a significant impact on the business case for a research reactor.

In 2024-25, CNL will continue to expand work with federal departments including new work with the Department of National Defense to further explore the feasibility of energy offtakes of a SMR on the Chalk River site as well as new work with the Canadian Coast Guard to examine low-carbon fuels for their vessels.

New Technology Initiatives Fund

Overview: The New Technology Initiatives Fund allows CNL to undertake science and technology activities to build expertise and capability at the Chalk River Laboratories, with a long-term view to attracting and retaining world-class expertise and building skills and knowledge that are anticipated to be needed for future or emerging opportunities. Consistent with similar programs at national laboratories around the world, providing funding to support work and projects that may be at very early stages, peripheral to current research priorities, high risk, or exploratory, the New Technology Initiatives Fund is expected to promote innovative thinking, reward initiative, balance near-term priorities with long-term vision, and improve employee engagement.

Status: Planned work includes:

- Continuing with the seventh iteration of the Strategic, Enabling, Engaging, Development (SEED) Crowd Sourcing Initiative that was launched in 2018-19. This program draws inspiration from the startup model and crowd sources employee ideas for new projects, investing in those selected for the research pipeline.
- Continuing work in new or emerging areas, such as:
  - Developing and maintaining expertise and capabilities in iron and activity transport modelling
  - Integrating H2 Production with Nuclear and Renewable Energy Systems Prototype neutron detector based on nanoparticle aerogels
  - Oxygen analyzer for characterizing MSR fuel and coolant salts purity
  - Targeted alpha therapy using intracellular nanobodies
  - 3-D Printing of Tissue Equivalent Proportional Counters (TEPCs) and Embedding TEPCs in Biological Specimens
  - Developing novel nanotube materials that could be used to protect astronauts against radiation in space.

Planned Results

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Maintain and enhance expertise and capabilities.	Maintain and develop expertise and capabilities.	Develop world-class expertise, new capabilities, and build skills and knowledge for future or emerging opportunities.

Heavy Water

AECL currently owns heavy water assets which can be used either in a CANDU reactor or for non-nuclear purposes. Through the GoCo model, CNL acts as an agent for AECL for the marketing, sale, and distribution of AECL's existing heavy water inventory. CNL also manages AECL's inventory of legacy heavy water at AECL's facility in Laprade, Quebec. CNL is currently working on a project to remove contaminants (tritium) from a large amount of heavy water currently considered a liability. In addition to reducing a liability, this project will increase the stock of assets which can be sold to industry, and allows CNL to continue to build its prominence, experts, and capabilities in purifying and upgrading heavy water, which is a cornerstone of CANDU reactor needs. Construction of the decontamination facility is expected to be completed by 2026.

AECL will be looking to CNL to continue its work to optimize the management and sales of legacy heavy water (the current stock of detritiated heavy water will continue be sold over the coming years) as well as leverage its decade of expertise to realize new opportunities.

Pursuing the Opportunity of a Research Reactor

With the closure of the National Research Universal reactor in 2018, Canada does not currently have a research reactor with sufficient capabilities to enable advanced fuel research and testing nor to advance the very rapidly growing demand for unique and ever-expanding portfolio of medical isotopes used for health diagnosis and treatment. In addition, many international research reactors are expected to be decommissioned in the coming decades which is expected to create a shortage of neutron sources.

A new research reactor would bolster our commercial opportunities in promising areas such as medical isotopes, advanced fuels, and new reactor technologies (e.g., advanced CANDU reactors, Generation IV reactor systems, and SMRs). This would propel Canada to the forefront of the global industry and using the GoCo commercial mechanisms, drive economic benefit to Canada. It could be used to drive national interests to fill gaps in our medical isotope ecosystem, support the existing and any new nuclear fleet (large nuclear, SMRs and advanced reactors), and potentially benefit other industries depending on the capabilities of the reactor (e.g. materials research which is possible with a neutron source is critical in a range of industries including aerospace, automobile, space exploration, etc.). Conversely, not having a research reactor to support our fleet of new reactors means that Canada will need to wait in line to use research reactors in other countries to address operational issues or to pursue innovation opportunities to support and enhance the operation of new nuclear facilities throughout their operating lifetimes.

To this end, AECL will work, subject to available funding, to explore options around a research reactor, including defining a case for such a facility, and engaging Canadian nuclear stakeholders.

Revitalization of the Chalk River Laboratories (Capital Plan)

As part of AECL's role in overseeing CNL's activities for the management and operations of our sites, a clear focus is placed on the ongoing, safe operations of the nuclear laboratories and decommissioning sites. Above and beyond the role of the CNSC which, as a regulator, ensures that all nuclear activities in Canada are delivered safely, AECL expects high levels of performance from CNL in health, safety, security, and environmental protection.

CNL's long-term plans for targeted and strategic capital investments will allow the laboratories to grow the unique complement of science and technology capabilities, while remaining flexible to quickly adapt to the evolutionary opportunities of nuclear and energy-related, leading-edge innovation. These investments will contribute to an efficient and cost-effective campus, replacing aged facilities and infrastructure that are costly to operate and maintain.

AECL has also asked CNL to transform its operations to increase value for money and reduce costs and risks to Canada. The overall objective is to have in place a cost-effective, modern campus-like site with new and refurbished facilities to support the future growth of CNL. Any capital investments at AECL sites will take into consideration best practices with respect to sustainability and green building standards for AECL to meet its GHG emission reduction targets. Details on capital plans are provided in Annex 2.

Planned Results

TARGETS		
Short-term 1-2 years	**Medium-term 3-4 years**	**Long-term 5+ years**
Science Collaboration Center Energy performance audit complete. Continue construction of the Advanced Nuclear Materials Research Centre.	Continue construction of the new Advanced Nuclear Materials Research Centre. New Customer Transformer Station in-service.	Complete construction and commissioning of the Advanced Nuclear Materials Research Centre. Build a new S&T Multi-Purpose Lab. Replace infrastructure to support greenhouse gas reduction targets and improve facility performance
Ensure stability in health, safety, security, and environmental industry standard metrics against industry standard benchmarks.	Continue improving health, safety, security, and environmental metrics.	
Implement actions to achieve CNL's objectives to manage operating costs while maintaining safety and the protection of the environment, with a view to ensuring a sustainable and science-focused organization in the long term.	Continue achieving industry best practices for the management of all AECL's sites.	

Environmental Stewardship

AECL has been conducting nuclear science and technology activities for decades. While these activities have had important benefits for Canada and Canadians – for example the production of medical isotopes used in the detection and treatment of cancer – they also produced radioactive waste. AECL has various types of radioactive waste at its sites, including high-level waste (used fuel), intermediate-level waste and low-level waste. Several sites and/or buildings have also been contaminated as a result of nuclear science and technology activities and past waste management practices; these now need to be decontaminated and demolished, sites cleaned up and remediated, and the radioactive waste managed properly and safely.

AECL is also responsible for fulfilling Canada's responsibilities with respect to historic low-level waste at sites where the original owner no longer exists, or another party cannot be held liable and for which the Government has accepted responsibility. This includes the cleanup and safe long-term management of historic, low-level radioactive waste in the municipalities of Port Hope and Clarington, in Ontario pursuant to an agreement between Canada and the municipalities. This project is one of the largest and most complex environmental projects in Canada.

AECL's objective is to protect the environment by advancing key decommissioning, remediation, and waste management projects in order to address risks and hazards. With the implementation of the GoCo model, AECL was given a mandate to accelerate these activities to reduce risks and costs for Canada in a safe manner, consistent with international leading practices. Specifically, AECL has asked CNL to propose long-term radioactive waste disposal solutions and to advance other decommissioning activities to reduce its environmental liabilities.

This work is well underway, with significant progress having been made at the Chalk River Laboratories where 117 old and outdated buildings and facilities have been demolished. This not only reduces AECL's environmental liabilities and overall site maintenance costs, but it also paves the way for new facilities to be constructed as part of the site's revitalization.

AECL's planned results under Environmental Stewardship include working safely to reduce environmental risks and hazards in the short-term, working towards environmental remediation and closure of four nuclear sites (Nuclear Power Demonstration reactor, Whiteshell Laboratories, Port Granby, and Port Hope), and ultimately protecting Canadians and the environment through decommissioning and waste management activities.

Environmental Stewardship Five-Year Projection for Use of Approved Federal Funding

				Plan					
(millions of Canadian dollars)	**Notes**	**Actual 2022-23**	**Budget 2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**5 Year Total**
Environmental Stewardship									
Total Environmental Stewardship		808	1,031	1,199	473	82	12	2	1,766
Revenue	1	2	2	2	2	2	2	2	8
Federal Funding Requirement		**806**	**1,030**	**1,197**	**471**	**80**	**10**	**–**	**1,758**

[1] AECL currently only has approved funding for the majority of its activities until mid-2025. Please refer to the next table for details beyond this date.

Environmental Stewardship Five-Year Projection of Federal Funding Requirements

(millions of Canadian dollars)	Notes	Plan 2024-25	2025-26	2026-27	2027-28	2028-29	5 Year Total
Environmental Stewardship							
Total Environmental Stewardship		1,197	1,234	1,104	958	898	5,391
Difference Between Approved Government of Canada Funding and Federal Funding Requirements Including Unapproved Funding	1	**–**	**(763)**	**(1,024)**	**(948)**	**(898)**	**(3,633)**

[1] The table above includes, in addition to approved funding, preliminary AECL projections of anticipated funding requirements that have not yet been subject to the federal cycle for approval of expenditures by the government and Parliament. These estimates are subject to further planning, and neither their preliminary status nor the numbers should be interpreted as an indication of the future funding level for AECL.

The forecasts presented above represent preliminary budgets which may be adjusted as plans evolve.

Scope details on the various areas for Decommissioning and Waste Management are found below:

General Decommissioning and Waste Management

Activities in General Decommissioning and Waste Management include all waste and decommissioning activities to address AECL's environmental. Activities for the planning period will mainly focus on the Chalk River Laboratories, where the majority of the waste and contaminated lands and buildings are located.

A key project in this area is the proposed Near Surface Disposal Facility, which is necessary to enable large-scale environmental remediation and risk reduction. The project received regulatory approval in January 2024, and is currently undergoing pre-construction preparation as detailed below.

Waste management and disposal at the Chalk River site

Overview: Existing radioactive waste is safely stored at the Chalk River site. However, final disposal solutions must be developed for various types of wastes to allow for the remediation of contaminated buildings, lands, and soils and to move away from continuous temporary storage. As such, CNL has proposed to build a near surface disposal facility for the permanent disposal of AECL's low-level radioactive waste, as well as small amounts of waste from other Canadian producers such as hospitals and universities. This project was approved by the CNSC in January 2024, and CNL is now mobilizing pre-construction planning and preparation, with a view to beginning clearing of the site in Fall 2024. Applications for judicial review of the licensing decision are before the federal court, and may present a risk of delay, but the outcomes of those processes are unknown. Near surface disposal is an internationally proven method of disposing of such wastes. The facility will allow for the permanent disposal of the vast majority of AECL wastes currently in interim storage, as well as waste which will be generated as a result of contaminated land remediation activities, decommissioning activities, and continued operations of the nuclear laboratories. As noted above, this project is critical to advance decommissioning and remediation activities at AECL sites, and further delays could have significant cost implications for AECL, including to its decommissioning liability.

With respect to AECL's intermediate-level waste, the Minister of Energy and Natural Resources has recently endorsed the Integrated Strategy for Radioactive Waste which was developed by the Nuclear Waste Management Organization. Based on the Integrated Strategy for Radioactive Waste, the Nuclear Waste Management Organization will be tasked with implementing a deep geological repository for the disposal of intermediate-level waste and non-fuel high level waste in Canada. AECL and CNL stand ready to work with the Nuclear Waste Management Organization to ensure that AECL's inventory of intermediate-level waste can be appropriately accommodated. In the meantime, AECL's intermediate-level waste continues to be consolidated at the Chalk River Laboratories for storage until disposal capacity is operational.

AECL's high-level waste (used fuel) is destined to be disposed of in the proposed repository that is currently being advanced by the Nuclear Waste Management Organization. Projects to manage used fuel are discussed in more detail in the section on *Management of used fuel and repatriation of highly-enriched uranium* below.

CNL also manages AECL's inventory of highly radioactive stored liquid waste which is a byproduct of nuclear science and technology and medical isotope production. A project is in place to safely remove and process the legacy radioactive liquid wastes (240 cubic meters) from existing tanks at the Chalk River site and to decommission the tanks and associated structures.

Until disposal solutions are approved and available, CNL will continue to manage existing radioactive waste inventories at dedicated waste management facilities at the Chalk River site in a manner that is safe and minimizes the impacts on the environment.

Planned Results

TARGETS		
Short-term 1-2 years	**Medium-term 3-4 years**	**Long-term 5+ years**
Prepare for and commence construction of the Near Surface Disposal Facility.	Construct the Near Surface Disposal Facility.	Commission and safely operate the Near Surface Disposal Facility and routinely emplace low-level waste from decommissioning, remediation and ongoing nuclear science and technology activities. Retrieve low-level waste from legacy storage, characterize and process for disposal, and emplace in the Near Surface Disposal Facility.
Radioactive waste from other AECL sites is received at the Chalk River Laboratories (low-level radioactive waste received for storage and disposal when NSDF is operational, and intermediate-level waste for storage).	Radioactive waste from other AECL sites is received at the Chalk River Laboratories (low-level radioactive waste received for storage and disposal when NSDF is operational, and intermediate-level waste for storage).	Complete consolidation of low and intermediate level radioactive waste from other AECL sites at the Chalk River Laboratories (low-level radioactive waste for disposal in NSDF and intermediate-level waste for storage).
Complete the construction of a facility for the interim storage of intermediate-level radioactive waste at the Chalk River Laboratories.	Work with the Nuclear Waste Management Organization to ensure that AECL's inventory of intermediate-level waste can be appropriately accommodated in the facility to be implemented for the disposal of intermediate-level waste and non-fuel high level waste in Canada.	Work with the Nuclear Waste Management Organization to ensure that AECL's inventory of intermediate-level waste can be appropriately accommodated in the facility to be implemented for the disposal of intermediate-level waste and non-fuel high level waste in Canada.

Status: Since 2016, CNL has been working with the regulator, the Canadian Nuclear Safety Commission, and meeting with stakeholders and Indigenous communities to discuss the proposed Near Surface Disposal Facility. Engagement has included several open houses (including most recently virtual open houses), webinars, presentations to municipal councils and interested groups. CNL has engaged with the public both at a general and technical level based on the interest and level of knowledge/understanding. CNL has also specifically engaged with Indigenous Nations and communities and has provided capacity funding to enable meaningful engagement.

This has included funding for traditional knowledge studies, risk communication and environmental monitoring. Meetings have been held with a variety of Indigenous Nations and communities, including site tours and community meetings. This engagement is also meant to pave the way for the development of long-term relationships that go beyond the Environmental Assessment process; for example, CNL and AECL recently signed a long-term relationship agreement with the Algonquins of Pikwakanagan.

As noted above, greater-than-anticipated public and Indigenous engagement, as well as requests from the Canadian Nuclear Safety Commission to provide additional technical studies have led to delays in the project of almost three years. While these have impacted CNL's ability to commence large-scale cleanup and remediation activities at AECL sites, they have allowed for more public and Indigenous engagement, and the development of additional studies in support of the project's safety case (which are also facilitating public and Indigenous engagement).

Following extensive reviews, CNL submitted its final Environmental Impact Statement to the CNSC in December 2020. A two-part public hearing to consider CNL's application was held during the first half of 2022. The Commission withheld a decision until 2023 and directed staff from the Canadian Nuclear Safety Commission, AECL and CNL to continue to engage and consult with two Quebec Indigenous communities, with further evidence submitted in early 2023. A public hearing to deliver final arguments was held in August 2023. In January 2024, the CNSC issued its decision, allowing for a license amendment to permit the construction of the proposed near surface disposal facility. Construction of the facility, currently planned to begin in spring 2024, is contingent on meeting additional permitting and regulatory requirements. Engagement with stakeholders and Indigenous Nations and communities continues on an ongoing basis.

In the meantime, interim waste storage has continued to expand to accommodate waste which is produced as a result of continued building decontamination and decommissioning at the Chalk River site.

New arrangements for the sorting and segregation of legacy low-level radioactive waste in storage have been developed and implemented to enable more efficient retrieval and sorting of waste in preparation for the proposed Near Surface Disposal Facility with a successful pilot project undertaken in 2021-22. During the pilot phase, more than 300 cubic meters were processed and valuable operational experience gained. The lessons from this pilot project helped inform the construction of a new sorting and segregation facility, which will enable larger-scale retrieval and processing of legacy low-level radioactive waste in preparation for the Near Surface Disposal Facility, with waste having been optimally packaged such that volumes of waste for ultimate disposal have been reduced. The new facility became operational in April 2022.

AECL also has an inventory of liquid wastes that requires management and processing to reduce liabilities. Following a comprehensive review of the project which started in 2021, remediation activities are being undertaken earlier than planned in order to reduce risks and include upgrades to the waste treatment centre to allow for the processing of liquid waste, which began in the Spring of 2023.

Environmental restoration at the Chalk River site

Overview: For more than 60 years, nuclear science and technology activities at the Chalk River site have led to the production of a variety of radioactive and other hazardous wastes. These wastes are carefully managed in dedicated areas, otherwise known as waste management areas. While the majority of the Chalk River site remains undisturbed, certain areas, including the waste management areas have contaminated soil and waste requiring retrieval and processing to allow for final disposal. As there remains a significant amount of buried waste, soil contamination and associated plumes, remedial actions are required to further protect the environment. Until such a time, legacy waste is being safely managed and closely monitored.

Planned Results

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Complete characterization and remediation plans for various waste management areas at the Chalk River site.	Continue with the completion of characterization and remediation plans for various waste management areas at the Chalk River site.	Remediate the waste management areas once the Near Surface Disposal Facility is available.

Status: The remediation of the Waste Management Areas cannot progress until the Near Surface Disposal Facility is available. The intent is to align the completion of the characterization and remediation planning of the waste management areas with the availability of the disposal facility. CNL is focusing resources on early completion of the characterization of all the Waste Management Areas to better inform discussions with stakeholders and first nations communities on the next land uses for all affected areas. CNL is developing the site infrastructure requirements and appropriate permissions required to safely and efficiently remediate the affected lands and emplace the low-level waste in the NSDF once it is available. Ongoing ground water monitoring and plume assessments continue to ensure the legacy wastes are contained within the boundary of the Chalk River site.

Decommissioning of buildings at the Chalk River site

Overview: The Chalk River site includes multiple redundant and outdated buildings which require decontamination, decommissioning, and demolition. The site has been in existence since the 1940s, and some buildings standing today date back to that era. Some facilities were used as nuclear science and technology facilities (and therefore may have some level of radioactive contamination), while others were used as support buildings (for example machine shops, garages, etc.). Most of these facilities and buildings are outdated, no longer required to meet operational needs, and contribute to high site costs through ongoing maintenance for safety and security purposes, energy consumption, etc. Buildings also need to be removed to make way for the Chalk River site revitalization.

Status: Since 2015, there has been significant acceleration of decommissioning work at the Chalk River site, 117 buildings and structures having been decontaminated, decommissioned and demolished. To build capability in the workforce, CNL first undertook projects which were less complex and presented lower risks and hazards. This has allowed it to build Canadian expertise and experience in work teams as it moved towards higher hazard and more complex projects. CNL continues to be fully engaged with the decommissioning of building 250, a large multi-purpose laboratory, which houses a former tritium facility, hot cells, and an active liquid storage tank, and the building 200 series which represent the highest risks at the Chalk River site. The Building 200 series includes three large structures used for

laboratories and nuclear materials storage and handling for fuel from NRX reactor (a former thorium fuel reprocessing facility, a former plutonium plant, and former fuel rod storage and handling bays). Furthermore, CNL is in the process of successfully completing hazardous waste abatement on the former nuclear fuel fabrication facility and the former corrosion laboratory and SLOPOKE fuel fabrication facility, which will lead to their demolition by the end of 2025-26. It should be noted that delays in the approval for the Near Surface Disposal Facility have required expanded interim waste storage so that building decontamination and demolition can continue to progress.

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Complete the decommissioning of 20 buildings and structures.	Complete the decommissioning or highest risk buildings and the MAPLE reactors. Advance the non-radioactive decommissioning activities for the NRX and NRU reactors.	Reduce long-term liabilities through the safe environmentally responsible removal of redundant facilities and structures.

Management of used fuel and repatriation of highly enriched uranium

Overview: Highly enriched uranium originating in the United States was used at the Chalk River site as reactor fuel and in the production of medical isotopes. This material requires high levels of security as well as costly and complex storage. As part of the Global Threat Reduction Initiative (an initiative which aims at reducing proliferation risks by consolidating highly enriched uranium inventories in fewer locations around the world), AECL is working with the United States Department of Energy and CNL to return (repatriate) this material to the United States for conversion and reuse. This initiative provides for a safe, secure, timely, and permanent solution to Canada's long-term management of this material. Repatriation of highly enriched uranium is planned to be completed by 2035.

CNL also manages AECL's used fuel inventory. The Fuel Packaging and Storage facility is used to safely store fuel from existing tile holes that have shown signs of corrosion and place it in a state-of-the-art, above-ground storage facility for continued storage until a final repository for the used fuel is available.

Status: The repatriation program for highly enriched uranium continues to focus on the repatriation of nuclear fuel and fuel material to their respective countries of origin, thereby removing this risk and liability from Canada, and contributing to our non-proliferation and nuclear security objectives. Repatriation shipments of highly enriched uranium continue to be made to the US under an approved contract.

CNL has continued to advance efforts to consolidate AECL's inventory of used fuel at the Chalk River site from the Whiteshell and Gentilly-1 sites, with the active commissioning of the first phase of storage canisters and the construction and inactive commissioning of the second phase of storage canisters in the Waste Management areas. The objective of the consolidation program is to reduce the number of locations where used fuel is stored to safeguard the material in a central location, as opposed to having the material distributed across the country with associated safety and security-related costs.

In addition to the planning and shipping of nuclear fuel material, CNL maintained positive momentum with enabling projects for the design and construction of a new facility to remove tritium from AECL's inventory of used heavy water.

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Planning activities, including stakeholder and Indigenous engagement, for used fuel retrieval, characterization, packaging and storage.	Planning activities continued.	
Continue to investigate and pursue the disposition or repatriation of fresh and irradiated fuel material to further reduce liabilities for Canada.	Continue to investigate and pursue the disposition or repatriation of fresh and irradiated fuel material to further reduce liabilities for Canada.	
Advance plans and engagement for the shipment of AECL used fuel to the Chalk River site.	Used fuel is shipped from the Whiteshell Laboratories and other sites to the Chalk River Laboratories.	Complete AECL fuel consolidation at the Chalk River Laboratories for interim storage.

Decommissioning of prototype reactors

Overview: Gentilly-1 and Douglas Point are shutdown prototype nuclear reactors owned by AECL and located in Bécancour, Quebec and Kincardine, Ontario, respectively. The reactors operated in the late 1960's through the mid 1980's to advance the understanding of boiling light waterpower reactors (Gentilly-1) and steam condenser power reactors (Douglas Point). Both reactors are now in a safe shutdown state prior to being fully decommissioned.

Planned Results

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Demolish supporting and/or redundant facilities at the Douglas Point reactor. Review options for Douglas Point and Gentilly-1 for transport of fuel to the Chalk River Laboratories.	Continue to advance planning and Indigenous and community engagement for the decommissioning of the Douglas Point and Gentilly-1 reactors. Complete hearings for both the Gentilly and Douglas Point Sites to allow the decommissioning of the sites to proceed.	Decommission and remove all plant, equipment, and fuel from both the Douglas Point and Gentilly-1 facilities.

Status: Originally the decommissioning of these prototype reactors was not planned to occur for many decades. However, in an attempt to reduce costs associated with storage and surveillance of this aging infrastructure, decommissioning plans are being prepared to advance this work. In order to move forward with the decommissioning of certain non-nuclear buildings at the Douglas Point site, CNL requested an amendment to its operating license and was granted permission to move forward in 2021 and work began to remove these facilities. Further characterization of the reactor and associated nuclear facilities is ongoing and this provides the information required for more detailed decommissioning plans, which will be the subject of future licensing decisions. Gentilly-1 expects to submit an application for a licence amendment in 2024 to permit decommissioning. In the meantime, CNL will continue to engage with the public and Indigenous communities on these plans. At Gentilly-1, bulk dry active waste removal and asbestos removal was completed. For Douglas Point the decommissioning of the non-active facilities has begun and will be complete in 2024-25. CNL continues to develop plans to advance decommissioning of the facility, with further licensing approvals to be sought in the coming years to permit the full decommissioning of the reactor. In the meantime, the current license permits decommissioning of activated systems within the service building and the reactor building, which are required to gain access to the reactor for characterization. CNL will continue with engagement of local communities and Indigenous communities on their plans to inform decisions going forward.

Whiteshell Laboratories

Overview: The Whiteshell Laboratories, located in Pinawa, Manitoba, is the second largest of AECL's sites operated by CNL. It was established in 1963 as a research laboratory, with a focus on the largest organically cooled, heavy water moderated nuclear reactor in the world, the WR-1. Facilities also included a SLOWPOKE reactor as well as shielded hot cell facilities and other nuclear research laboratories. The site also includes a radioactive waste management area which serves to provide interim storage primarily of radioactive waste for the Whiteshell site which was created as a result of the operations of the research reactor and nuclear laboratories.

In 1998, AECL announced the closure of the Whiteshell Laboratories, and decommissioning activities have been underway since then. With the implementation of the GoCo model and the increased emphasis placed on tackling its environmental and decommissioning responsibilities, AECL has asked CNL to accelerate and complete the decommissioning and closure of the site. As a result, CNL is proposed to decommission and close the site by 2027 approximately 30 years ahead of the original schedule, though numerous project risks, explained below, may yet extend this ambitious deadline closer to 2030. The acceleration of the decommissioning of the site is based on the bid that was accepted by Canada as part of the procurement process and includes a proposal to decommission the WR-1 reactor *in situ*. *In-situ* decommissioning means the remaining reactor components and systems remain underground inside the thick concrete foundation structure which is then filled with grout and the current above ground structures demolished. The grouted structure is then capped with concrete and covered with an engineered barrier. *In-situ* decommissioning serves to isolate the remaining radiological inventory inside the below-grade structure. Long-term monitoring activities are maintained until the radioactivity levels reach background levels. This approach minimizes the risks to the health, safety and security of the public, workers, and the environment. The project is currently undergoing an Environmental Assessment.

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Begin manual retrieval of selected standpipes.	Remove and transport all high-level radioactive waste and used fuel to the Chalk River Laboratories.	Complete Whiteshell site contamination remediation, as well as a long-term surveillance plan.
Prepare the robotic retrieval system for the standpipes and bunkers to start operations.		Complete waste retrieval for all the standpipes in the waste management area.
Submit the final Environmental Impact Statement for the proposed *in-situ* decommissioning of the WR-1 reactor.		The Canadian Nuclear Safety Commission accepts as complete all active decommissioning and waste management activities, with only long-term monitoring and surveillance activities remaining.

Status: CNL has been progressing the decommissioning of the site, with several buildings being decontaminated and demolished. However, significant challenges have emerged with respect to the complexity and level of hazard related to the retrieval, processing, and transport of radioactive waste currently being stored in a radioactive waste management area known as the 'standpipes and bunkers'. These are concrete structures, mostly below grade, which contain intermediate-level waste and potentially fissile nuclear material that cannot be fully characterized before retrieval begins. Given the level of risk involved with their remediation, CNL has had to adjust its approach which is now more complex and costly (as it is based on remote tooling and robotics), in order to protect workers and the environment from the higher risk standpipes. CNL has also adjusted their approach to standpipes waste retrieval by identifying select standpipes that are suitable for safely retrieving the waste using manual retrieval methods so that the number of retrievals using the complex equipment is reduced and work may begin sooner. The process to obtain the necessary approval for manual retrieval is underway.

Overall, these changes in plans have had an important impact on the cost of the project, and the planned closure date for the site, has shifted from the original 2024 to 2027 and now closer to 2030. This is explained by complexity in the standpipes and bunkers, as noted above, as well as delays to the WR-1 environmental assessment, and the CNL compliance issues which have resulted in a standdown of activity at the site. AECL provided close oversight of these changes, utilizing third party experts to assist in the review of CNL's revised plans, and is still in the process of reviewing the most recent proposed changes. AECL's oversight highlights that there are still considerable risks and uncertainties that remain.

CNL also continued its activities to engage the public and Indigenous communities on its proposal to decommission the WR-1 reactor in situ, and now other key areas such as site end-state. This has included extensive engagement with Indigenous and local communities, providing funding for traditional knowledge studies, other capacity building activities and liaison positions, hosting site tours, and open houses, etc. AECL has also been participating in many of these engagement activities, with a view to building relationships over the long-term. That said, and as noted in the previous sections, higher-than-anticipated public and Indigenous engagement, as well as requests from the Canadian Nuclear Safety Commission to provide additional technical studies have led to delays in the project of almost three years. While these have had a financial impact on the project, they are allowing for more public and Indigenous engagement, and the development of additional studies in support of the project's safety case (which are also facilitating public and Indigenous engagement). CNL submitted a revised and draft Environmental Impact Statement in early 2022, and another revised draft in late 2022 following the regulator's technical review, leading up to a public licensing hearing expected in 2024-25. CNSC staff have determined that the submission (draft EIS) has the required information for the federal, provincial, and Indigenous review team to proceed with the EIS technical review. A significant delay or rejection of the WR-1 in situ reactor decommissioning approach by the regulator remains a significant risk to the project which, if realized, will cause further delays and increased cost.

CNL has adjusted its strategy to complete the shutdown of the main campus by putting some buildings in a safe state to await demolition, while others were demolished to better enable decommissioning activities in those areas. The construction and implementation of a trailer complex provides a temporary facility to house the majority of the employees on site, which can easily be dispositioned at the end of use. Delays to the fabrication and testing of the Standpipes Bunkers Waste Retrieval System at the mock-up facility are, in turn, causing delays in the overall decommissioning schedule. To augment retrieval efforts and reduce schedule time, CNL is now planning manual waste retrieval methods at select standpipes and bunkers. Manual retrieval also requires hot cell capability at some point, so CNL is evaluating potential options. Looking to the final site closure and being mindful of the impact on the local community, AECL will continue to work with the Local Government District of Pinawa and the Government of Manitoba to discuss the future of AECL's lands, with a view to finding acceptable solutions which support the local and Indigenous communities in advancing plans related to economic development, which could include consideration for siting a small modular reactor at the Whiteshell site. CNL is engaging with communities to contribute to the development of a land-use and end-sate plan.

Risk Overview: Significant risk remains to this project in multiple areas. Executing the standpipes and bunkers waste retrieval with first-of-a-kind equipment, adding manual retrieval methods, and concurrent operations in the waste management area are among the highest. Furthermore, CNL has paused work for multiple safety stand-downs, which has delayed execution of the project. During 2023, CNL discovered non-conformances with its fire program, resulting in a long stand-down period requiring significant remedial efforts by CNL.

A significant risk remains relating to the ability to secure and retain the required number and quality of resources at Whiteshell that are required to match the decommissioning plans. CNL is currently adjusting and refining a resource plan to what is reasonably achievable.

Port Hope Area Initiative

Overview: The Port Hope Area Initiative represents Canada's commitment to clean up and safely manage historic low-level radioactive waste situated in the municipalities of Port Hope and Clarington, in Ontario. The objective is to safely relocate and manage roughly 2.7 million cubic meters of historic low-level radioactive waste and contaminated soils. To achieve this, two projects are being undertaken: the Port Granby Project and the Port Hope Project. Both involve the remediation of contaminated material and the construction of a near surface long-term waste management facility (one in each municipality). Whereas the Port Granby Project is virtually complete, the Port Hope Project is significantly more complex and will remain ongoing for the coming years.

Status: The project has faced challenges associated with scope increase on many fronts as remediation work has progressed, with higher-than-anticipated volumes of waste needing to be remediated. At the Port Granby site, the total estimated waste volume increased 1.36 times from the original estimates (550,000 m3 to 750,000 m3) due to the wider spread of contamination. That said, remediation was completed in the fall of 2020 and the facility is now capped and closed, with internal roads having been removed. The Port Granby site has now been transitioned to a long-term monitoring and maintenance phase.

As part of the Port Hope Project, the Long-term Waste Management Facility is receiving waste transfers to from the Port Hope remediation sites. The remediation of the Port Hope harbour has also continued to progress after work stoppages due to both COVID-19 and then safety related issues with the subcontractor. Remediation of all four temporary storage sites, Pine Street consolidation site, Strachan Street site, waterworks east site, and the Mill Street site are all now completed. Remediation of the remaining major sites has advanced considerably in 2023-24. All the major remediation sites have now either been completed or have begun remediation. Remediation and backfill of a number of major sites are now completed (Lions Park, Chemetron Lagoon, and Water Works West), and the remainder sites are on schedule for 2024-25 (Highland Drive landfill and South Ravine, Coal Gasification Site, and Alexander Street Ravine). The harbour remediation is expected to be mostly completed in 2025, with final restoration completed in 2026.

The largest challenge as part of the Port Hope Area Initiative relates to the scope and execution of the remediation of residential properties (or "small scale sites"). As characterization activities have advanced, the number of individual properties requiring remediation work has increased, a risk indicator identified early in the project's development. The number of residential properties requiring remediation was originally estimated to be 375; this number has now increased to 1,280. CNL is facing challenges with respect to the level of remediation required due to two main factors: the presence and spread of low levels of arsenic contamination, as well as requests from homeowners for partial remediation. This has the potential to increase the complexity and total waste volumes anticipated, from the original estimate of 1.2 million cubic meters to 1.9 million cubic meters. As a result, the overall cost of the program was increased to reflect known increases in scope.

That said, after conducting comprehensive and thorough scientific and technical studies, and in response to feedback received from the community about the impacts of the project, CNL has made an application to the Canadian Nuclear Safety Commission to amend the cleanup criteria which would in effect increase the acceptable threshold for arsenic. This would minimize unintended negative environmental impacts and the disruption caused by the project in the community while still being protective of human health and the environment. Importantly, it would continue to meet the intent of the Government of Canada's commitment in the original Legal Agreement with the municipalities to leave properties such that they can be used for "all current and foreseeable unrestricted uses". Should the revised cleanup criteria be accepted by the regulator, this would have the effect of reducing the scope of the cleanup and the overall number of properties requiring remediation. AECL and CNL continue to work with regulators, stakeholders, and Indigenous communities to revise the clean-up criteria for the remediation of residential properties.

Risk Overview: As the project has progressed, the risk of increased scope and contamination has been realized, particularly with respect to residential properties requiring remediation. Efforts are underway to explore options to mitigate the level of increased scope. Other risks include stakeholder and community relations given the large scale and personal nature of the cleanup activities which are mitigated through close relationships with the municipalities and ongoing and open communications with residents.

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Port Granby: Continue long term monitoring and surveillance of the closed waste management facility. Port Hope: Complete Remediation of large scale and industrial sites.	Port Hope Project: Complete Restoration of Harbour Centre Pier.	Complete the remediation of low-level radioactive waste for residential properties in Port Hope. The Port Hope long-term waste management facility is closed and capped and placed into long-term surveillance.
Engage local Indigenous Nations and communities to explore options and gather feedback on potential changes to the cleanup criteria for the Port Hope Project.		

Low-level Radioactive Waste Management Office

Overview: The Government of Canada, through AECL, has assumed responsibility for historic, low-level radioactive waste where the original owner no longer exists, or where the current owner cannot reasonably be held responsible. Through CNL, AECL is managing these responsibilities which include the cleanup of historic low-level radioactive waste at various sites across Canada (excluding the Port Hope Area Initiative, discussed above). This includes ongoing interim waste management and remediation projects mostly in Ontario, Alberta, and the Northwest Territories.

Status: Planning, stakeholder, and Indigenous engagement continues to enable the remediation of sites along the Northern Transportation Route. The field work planned for 2020 that was pushed to 2021 due to COVID-19 was successfully completed. This includes the removal for disposal of the material in the temporary storage sites at the Fort Smith landfill in the Northwest Territories and at Fort Fitzgerald, in Northern Alberta. Planning and design activities for the next phase of clean-up activities that will closely follow remediation of the temporary storage sites continue to be progressed, including engagement with the Indigenous communities and capacity building through contribution agreements. The next phase of cleanup is anticipated to start as scheduled in the summer of 2024.

Risk Overview: Risks to this scope include the time needed to engage and incorporate feedback from stakeholders and Indigenous communities into the plans and designs required to obtain permits. AECL and CNL are actively engaging to secure acceptance of the project and the work involved so as to obtain permits in a timely manner.

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Engage local stakeholders and Indigenous communities to agree on cleanup plans for sites along the Northern Transportation Route located in the southeastern Northwest Territories and northern Alberta.	Continue to engage local stakeholders and Indigenous communities. Complete remediation activities for sites along the Northern Transportation Route locations in the southeastern Northwest Territories and northern Alberta. Commence remediation for sites in the Sahtu region along the Northern Transportation Route.	Complete remediation for all sites along the Northern Transportation Route. Complete remediation of Greater Toronto Area sites where the Government of Canada has accepted the liability.

Nuclear Power Demonstration Reactor

Overview: The Nuclear Power Demonstration reactor, located in Rolphton, Ontario, was the first Canadian nuclear power reactor and the prototype for the CANDU reactor design. For 25 years, the reactor produced low-carbon energy and operated as a training centre for nuclear operators and engineers from Canada and around the world. Operations at the Nuclear Power Demonstration reactor ended in 1987, after which the first stages of decommissioning were completed, including the removal of all fuel from the site and the draining of the systems. The site has been in a safe shutdown state for the last 30 years. As part of its objectives to protect the environment and address its environmental and decommissioning responsibilities, AECL has asked CNL to propose plans to safely decommission and close the Nuclear Power Demonstration reactor site. As a result, CNL is proposing to decommission the reactor in situ, meaning that it would be immobilized in place by grouting (i.e., cementing) the reactor which is located below the surface. The project is currently undergoing an Environmental Assessment.

Plans to close the site are based on the bid that was accepted by Canada as part of the procurement process to implement a GoCo model. As such, CNL is currently implementing the plans proposed, which include planning and seeking regulatory approval for *in-situ* disposal of the reactor.

TARGETS		
Short-term 1-2 years	Medium-term 3-4 years	Long-term 5+ years
Submit the final Environmental Impact Statement for the proposed *in-situ* decommissioning of the Nuclear Power Demonstration reactor.	Should approval be granted by the Canadian Nuclear Safety Commission, complete the decommissioning of the Nuclear Power Demonstration reactor. CNSC accepts as complete all active decommissioning and waste management activities, with only long-term monitoring and surveillance activities remaining.	Long term monitoring and surveillance continues.

Status: Since the launch of the Environmental Assessment process in 2016, CNL has been developing its safety case and preparing scientific studies with a view to providing all necessary documentation and responding to stakeholders and Indigenous groups' concerns.

While the project is more than four years delayed against the original schedule, it has allowed for additional engagement of stakeholders and Indigenous communities on the project in order to gather input and adjust the proposed approach as necessary. Activities have included multiple meetings, site tours and outreach to Indigenous communities, including providing funding for capacity building and traditional knowledge studies, and to enable Indigenous communities to engage technical experts to comment on the Environmental Impact Statement.

CNL will also continue to actively engage with local stakeholders and Indigenous communities on its proposal. Based on the delays to the original schedule and other project factors, there is upward pressure on the target price of the project which AECL is monitoring closely. These pressures have been managed within existing resources as a short-term measure.

Risk Overview: Similar to Whiteshell, significant risk remains pending completion of the required Environmental Assessment and subsequent regulatory licensing decision for *in-situ* decommissioning of the reactor.

Third-party waste

Historically, AECL has accepted small amounts of radioactive waste from Canadian facilities, most notably hospitals and universities or federal sites (e.g. Department of Defense Research Canada). CNL continues to provide these services to third parties on a case-by-case basis and when they fall within approved plans and corporate commitments. The modernized Policy for Radioactive Waste Management and Decommissioning was published by the Government of Canada in 2023, and the associated proposed Integrated Strategy for Radioactive Waste developed by the Nuclear Waste Management Organization was accepted by the Minister of Energy and Natural Resources later that year. The modernized policy reinforces that the responsibility for full life-cycle management of radioactive waste (including disposal) rests with the waste owner or producer and the strategy for low-level waste disposal foresees multiple disposal facilities implemented by the waste owner(s).

This, coupled with the evolving relationships that AECL has with Indigenous communities, and the expectation of increased investments in nuclear going forward (which would lead to increased volumes of radioactive waste that AECL does not have the mandate to take), has led AECL to adapt its approach to accepting third-party waste. While current agreements remain in place, AECL is closely considering its current position and will continue to do so in light of the evolving context.

Any waste that is accepted is done so on a full cost-recovery basis and hence does not require government funding. Budgets have been included for completeness.

Other Areas of Focus

Wrap-Up Office (retained liabilities from former CANDU Reactor Division)

Given the reduced number of AECL legal matters arising from its CANDU Reactor Division, in 2016-17 AECL closed down its physical Wrap-up Office location, dissolving the team (save one employee) which had been dedicated to resolving matters related to outstanding liabilities from AECL's former CANDU Reactor Division. The few remaining disputes, claims and litigations that comprise the business of the Wrap-up Office are now being managed by AECL's internal team, supported by external counsel and advisors. This includes the commercial and legal work required to defend, assert and settle outstanding claims.

Procurement Process to Renew the GoCo Contract

CNL has been managed since September 2015 by Canadian National Energy Alliance (CNEA), a consortium currently made up of three partner companies – AtkinsRéalis, Jacobs Engineering and Fluor Federal Services – under a GoCo contract that will expire in September 2025. AECL has launched a procurement process to award a follow-on GoCo contract to continue the management of CNL beyond this period.

AECL is conducting the procurement process in three stages:

1. **The Planning and Request for Expressions of Interest ("RFEOI") stage,** completed in October 2022, during which AECL put together a team to start planning for the procurement and released a RFEOI to industry. The purpose of the RFEOI was to solicit input via capability statements from interested parties with the specialized experience and capabilities necessary to meet all the major elements of scope required to manage and operate CNL (essentially, high-level market research). Benchmarking was also undertaken to consider GoCo models and contracts in the United States Department of Energy and the United Kingdom's Nuclear Decommissioning Authority, as well as the lessons learned from AECL's management of its own GoCo model and contract.

Targeted Alpha Therapies

While current forms of radiation treatments affect many cells in the body, both healthy and cancerous, targeted alpha therapy is significantly more focused and delivers the radiation directly to the cancerous cells by chemically binding appropriate radionuclides with targeting biomolecules. This is both more effective in killing cancer cells as well as protecting healthy cells. A radionuclide with significant potential in this therapy is Actinium-225, but it is extremely rare and difficult to produce. CNL first demonstrated research quantity production of Actinium-225 through the Federal Nuclear Science and Technology Work Plan. Subsequently, and in partnership with TRIUMF (Canada's particle accelerator centre), the first production run of Actinium-225 has recently been completed. The objective is to demonstrate commercial viability in order to support this important and exciting healthcare research and treatment.

2. **The Request for Pre-Qualification ("RFPQ") stage,** currently underway (started in March 2023 and expected to conclude in spring 2024), in which interested parties submit a response that will be evaluated to confirm that mandatory technical criteria, financial capability requirements, integrity provisions, and national security requirements are met. The RFPQ stage also includes detailed consultations with respondents that have met the pre-qualification requirements of the RFPQ (the "Qualified Respondents"). The key requirements and terms of the draft Request for Proposal ("RFP") and resulting contract will be made available during the detailed consultations during the RFPQ stage for feedback from Qualified Respondents. The Qualified Respondents will also be provided significant volumes of documents and data pertaining to CNL, as well as participate in site tours and consultations. During this stage, AECL will finalize all RFP documentation, including evaluation criteria, as well as GoCo contracts.

3. **The RFP stage,** or bid solicitation process, expected in spring 2024, is when bids will be solicited from Qualified Respondents. Only Qualified Respondents from the RFPQ stage will be eligible to submit bids in the RFP stage. In the RFP stage, bids will typically be evaluated against rated technical criteria as well as financial criteria. Contract award is anticipated at the end of the RFP stage, which AECL would complete in two stages: a preferred bidder agreement expected to be signed in the spring of 2025, and full contract execution in September 2025. This would allow for a transition-in period for the new contractor to overlap with a transition-out period for the existing contractor. In September 2025, the new contractor would take over.

Annex 1 –

Financial Overview

Financial statements and notes

This section presents AECL's financial statements reflective of AECL's role under the Government-owned, Contractor-operated model, which include payments to CNL and its parent company, Canadian National Energy Alliance. The CNL-related mission budgets (e.g., science and technology, decommissioning and waste management and capital) include both direct and indirect costs. These statements exclude Wrap-Up Office activities.

Under the Government-owned, Contractor-operated model, AECL receives funding from the Government of Canada to deliver on commitments, priorities and objectives related to the nuclear laboratories (including nuclear science and technology and the revitalization of the Chalk River site), as well as environmental stewardship (decommissioning and waste management). CNL manages and operates AECL's sites and undertakes the necessary activities to respond to AECL priorities as per its contractual arrangement with AECL. Revenue from third-party work performed by CNL using AECL sites, facilities and assets is recognized by AECL. These revenues come from work conducted in support of the nuclear energy industry, the sale or lease of heavy water, and research and development services provided to third parties. AECL also earns interest income on cash, short-term investments from appropriations and investments held in trust.

AECL's financial statements are prepared under Public Sector Accounting Standards. Changes to Public Sector Accounting Standards adopted during the year did not result in any changes to the financial statements while changes proposed have yet to be incorporated in the financial statements.

The statements below have been updated to reflect AECL's current projection of approved and required funding. This includes projections for all areas, currently unfunded, for the second half of 2025-26 and all of 2026-27, 2027-28 and 2028-29.

Statement of Financial Position

(millions of Canadian dollars)	Actual 2022-23	Budget 2023-24	Plan 2024-25	2025-26	2026-27	2027-28	2028-29
Financial Assets							
Cash	146	146	146	146	146	146	146
Short-term investments	92	141	126	97	70	38	7
Long-term disposal of waste fund	33	38	43	49	55	60	66
Investments held in trust	74	76	78	80	82	84	86
Trade and other receivables	41	45	45	45	45	45	45
Appropriations receivable	161	215	240	260	215	180	175
Inventories held for resale	61	43	24	10	11	10	10
	607	704	702	687	624	563	535
Liabilities							
Accounts payable and accrued liabilities	27	26	25	23	28	26	24
Employee future benefits	13	11	10	8	7	5	4
Due to Canadian Nuclear Laboratories	248	305	330	350	300	265	260
Decommissioning and waste management provision	8,723	8,290	7,685	6,959	6,294	5,661	5,025
Contaminated sites liability	1,334	1,040	730	476	262	136	50
	10,346	9,673	8,780	7,817	6,891	6,093	5,363
Net Debt	(9,739)	(8,968)	(8,078)	(7,130)	(6,268)	(5,530)	(4,828)
Non-Financial Assets							
Tangible capital assets	974	1,100	1,231	1,550	1,815	2,058	2,291
Prepaid expenses	1	1	1	1	1	1	1
	975	1,101	1,232	1,551	1,816	2,059	2,292
Accumulated Deficit	**(8,764)**	**(7,867)**	**(6,845)**	**(5,579)**	**(4,451)**	**(3,471)**	**(2,536)**
Accumulated deficit is comprised of:							
Accumulated operating deficit	(8,761)	(7,867)	(6,845)	(5,579)	(4,451)	(3,471)	(2,536)
Accumulated remeasurement losses	(3)	–	–	–	–	–	–
	(8,764)	**(7,867)**	**(6,845)**	**(5,579)**	**(4,451)**	**(3,471)**	**(2,536)**

The long-term disposal of waste fund will increase as AECL sets aside funding to account for future waste disposal activities arising from the ongoing operation of the site which create radioactive waste and/or decommissioning liabilities.

The Decommissioning and waste management provision and Contaminated sites liability represent the future obligation to address waste management and decommissioning liabilities. The liability is expressed in terms of the net present value of future expenditures required to discharge the obligation. AECL's decommissioning and waste management provision and contaminated sites liability are adjusted annually to reflect progress to date, new estimates as they become available and new waste liabilities arising from ongoing CNL operations.

The year-over-year change in these accounts represents the increase in the net present value with the passage of time (accretion) offset by the reduction in the liability from the spending incurred each year. Other changes to the liability may occur as CNL advances decommissioning activities. The assessment and planning of projects, which are understood in more detail as projects are undertaken, could result in adjustments to expected cost estimates, which would impact the value of the liability.

However, as decommissioning work continues in the coming years, the liability will be decreasing commensurate with the liabilities being settled. As the decommissioning and waste management provision and contaminated sites liability decrease, so will AECL's overall negative Accumulated Deficit. The above projections do not attempt to capture the impact of potential future changes in the interest rate used to derive the net present value changes of the reported liability.

Tangible capital assets are expected to increase in line with increased investment in infrastructure at the Chalk River site, as reflected by the important funding provided for the revitalization of the Chalk River Laboratories.

Accumulated deficit changes are largely reflective of changes in surplus for the period.

Statement of Operations and Accumulated Deficit

(millions of Canadian dollars)	Notes	Actual 2022-23	Budget 2023-24	Plan 2024-25	Plan 2025-26	Plan 2026-27	Plan 2027-28	Plan 2028-29	5 Year Total
Revenues									
Parliamentary appropriations	1	1,083	1,436	1,591	1,859	1,581	1,426	1,369	7,826
Commercial revenue		137	116	129	121	123	121	128	622
Interest income		16	4	4	4	4	4	4	20
Other proceeds		7	–	–	–	–	–	–	–
		1,243	1,557	1,724	1,984	1,708	1,551	1,501	8,467
Expenses									
Cost of sales		87	81	90	84	86	85	90	435
Operating expenses	2	75	72	73	73	77	77	76	376
Contractual expenses	3	247	208	258	308	193	213	226	1,198
Decommissioning, waste management and contaminated sites expenses	4	(27)	302	280	253	223	197	174	1,127
		381	663	702	718	579	571	566	3,136
Surplus for the year	5	862	894	1,022	1,265	1,128	980	936	5,331
Accumulated operating deficit, beginning of year		**(9,623)**	**(8,761)**	**(7,867)**	**(6,845)**	**(5,579)**	**(4,451)**	**(3,471)**	
Accumulated operating deficit, end of year		**(8,761)**	**(7,867)**	**(6,845)**	**(5,579)**	**(4,451)**	**(3,471)**	**(2,536)**	

1 Parliamentary appropriations have been updated to reflect AECL's current projection of spend and required funding, and include planned spending reductions discussed in Annex 11.

2 These amounts represent AECL's operating expenses associated with its oversight activities.

3 Contractual expenses include payments to CNL (less payments for decommissioning and waste management, cost of sales and capital) and contractor fees.

4 Decommissioning, waste management and contaminated sites expenses represent the accretion expense on the decommissioning and waste management provision and Contaminated sites liability, as well as any revisions in estimate and timing of expenditures.

5 Large surpluses are a result of Capital and DWM funding received for which there are smaller corresponding accrual expenses. Capital funding received is partially offset by amortization expense, and DWM funding is partially offset by accretion expense.

Operating expenses are comprised of AECL operations associated with its oversight activities. Decommissioning, waste management and contaminated sites expenses include the increase in the net present value (accretion of discount) of the decommissioning and waste management provision and contaminated sites liability. As these obligations decrease, the decommissioning, waste management and contaminated sites expenses will decrease as well.

Statement of Cash Flows

(millions of Canadian dollars)	Notes	Actual 2022-23	Budget 2023-24	Plan 2024-25	Plan 2025-26	Plan 2026-27	Plan 2027-28	Plan 2028-29	5 Year Total
Operating transactions									
Cash receipts from Parliamentary appropriations	1	923	1,382	1,567	1,839	1,626	1,461	1,374	7,867
Cash receipts from customers and other sources		168	116	129	121	123	121	128	622
Cash paid to suppliers		(278)	(232)	(338)	(391)	(364)	(374)	(364)	(2,341)
Cash paid to employees		(13)	(13)	(14)	(14)	(14)	(14)	(14)	(70)
Cash paid for decommissioning, waste management and contaminated sites activities		(751)	(1,030)	(1,197)	(1,234)	(1,104)	(958)	(898)	(5,391)
Cash designated for future waste management and disposal activities		(2)	(7)	(7)	(8)	(8)	(8)	(8)	(38)
Interest received		11	4	4	4	4	4	4	20
Cash provided by operating transactions		56	220	144	316	263	232	223	668
Capital transactions									
Acquisition of tangible capital assets		(154)	(171)	(159)	(345)	(290)	(264)	(254)	(1,312)
Cash applied to capital transactions		(154)	(171)	(159)	(345)	(290)	(264)	(254)	(1,312)
Investing transactions									
Cash invested in short-term investments		(19)	(49)	(52)	(38)	(40)	(35)	(36)	(201)
Proceeds from disposals of short-term investments		–	–	67	67	67	67	67	335
Cash (applied to) provided by investing transactions		(19)	(49)	15	29	27	32	31	134
Increase in cash		**(117)**	**–**	**–**	**–**	**–**	**–**	**–**	
Cash at beginning of year		**262**	**146**	**146**	**146**	**146**	**146**	**146**	
Cash at end of year		**146**	**146**	**146**	**146**	**146**	**146**	**146**	

1 Parliamentary appropriations have been updated to reflect AECL's current projection of spend and required funding.

Capital Budget and Notes (Revitalization of the Chalk River Laboratories)

Federal Funding Requirements Including Unapproved Funding – Capital

			Plan					
(millions of Canadian dollars)	**Actual 2022-23**	**Budget 2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**5 Year Total**
AECL								
Capital (Revitalization of the Chalk River Laboratories)	147	171	159	345	290	264	254	1,312
Total Government Funding – Capital	**147**	**171**	**159**	**345**	**290**	**264**	**254**	**1,312**

Note that the above table includes currently approved funding and estimates for expected requirements beyond the current contract period.

Approved Federal Funding – Capital

				Plan					
(millions of Canadian dollars)	Notes	**Actual 2022-23**	**Budget 2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**5 Year Total**
AECL									
Capital (Revitalization of the Chalk River Laboratories)		147	171	159	81	–	–	–	240
Total Government Funding – Capital	1	**147**	**171**	**159**	**81**	**–**	**–**	**–**	**240**

1 The current GoCo contract ends September 2025 and current approved funding only extends up until this point.

Operating Budget And Notes

Federal Funding Requirements Including Unapproved Funding - Operating

(millions of Canadian dollars)	Actual 2022-23	Budget 2023-24	Plan 2024-25	2025-26	2026-27	2027-28	2028-29	5 Year Total
AECL								
Environmental stewardship	806	1,030	1,197	1,234	1,104	958	898	5,391
Nuclear Laboratories – Operating	129	236	238	284	194	211	225	1,153
Planned Budget 2023 spending reductions	–	–	(2)	(4)	(8)	(8)	(8)	(30)
Total Government Funding – Operating	**936**	**1,265**	**1,433**	**1,514**	**1,291**	**1,162**	**1,115**	**6,515**

Note that the above table is a projection of funding requirements as used for the financial statements above and includes approved funding as well as assumptions on required funding for those periods outside the current approved funding envelope (latter half of 2025-26 and all of 2026-27).

Approved Federal Funding - Operating

(millions of Canadian dollars)	Actual 2022-23	Budget 2023-24	Plan 2024-25	2025-26	2026-27	2027-28	2028-29	5 Year Total
AECL								
Environmental Stewardship	806	1,030	1,197	471	80	10	–	1,758
Nuclear Laboratories – Operating	129	236	238	221	17	17	17	510
Planned Budget 2023 spending reductions	–	–	(2)	(4)	(8)	(8)	(8)	(30)
Total Government Funding – Operating	**936**	**1,265**	**1,433**	**688**	**89**	**19**	**9**	**2,239**

1 The current GoCo contract ends September 2025 and current approved funding only extends up until this point.

Annex 2 –

Revitalization of the Chalk River Laboratories

AECL's plan to revitalize the Chalk River Laboratories is based on ongoing assessments of infrastructure needs, including consideration for sustainability, health, safety, security, environmental risks, current facility conditions, regulatory requirements, and future business needs. All investments are in support of the renewal and revitalization of the Chalk River site, as assessed by CNL and approved by AECL, to address deficiencies created by decades of low capital investments and the high needs of the site, which is entering its 7th decade of existence.

The plan is intended to address two main areas of focus:

- **New Science Infrastructure –** Consistent with industry best practices, these investments are part of a longer-term plan to revitalize the Chalk River site and construct new science facilities in order to build a modern, world-class nuclear science and technology campus that serves the needs of government and industry.
- **Site Infrastructure –** Investments have been required to support existing and aging infrastructure systems and facilities at the Chalk River site such as potable water, storm sewer, sewage treatment, electrical system, and other utilities. These investments are necessary to respond to regulatory and health, safety, security, and environmental requirements, as well as to maintain a cost efficient and reliable site.

The plan does not include infrastructure which directly supports decommissioning and waste management activities. Such infrastructure (for example the Near Surface Disposal Facility) is captured under the Environmental Stewardship mission, with funding provided by the mission itself.

Further details on specific projects over the planning period are presented below. The projected capital expenditures reflect the estimated inflation adjusted expenditures for the portfolio. It is based on the best current estimates for each planned project within the portfolio. The planned projects have cost estimates commensurate with the stage of the respective projects. As scope, schedule and cost estimates are refined for these projects, the overall plan and funding profile may have to be adjusted. Consistent with best practices in project management, contingency is also included as part of the total planned capital expenditures.

With such a large body of work, certain risks exist in delivery. These include:

- The potential for unexpected capital requirements given the age of the site and certain infrastructure components putting pressure on the available capital funding. This is mitigated through various site and facility assessments so that there is a clear understanding of the state of facilities and infrastructure.
- Risks to project cost and schedule as field work begins and site conditions or supply chain markets change. This is mitigated through subcontract structuring and significant upfront planning activities.

New Science Infrastructure

Projects in this category include modern, world-class science facilities and infrastructure to enable delivery of the commitments established in the long-term plan. The projects to be undertaken are aligned with the strategy to revitalize the Chalk River site and include:

Advanced Nuclear Materials Research Centre

Overview: The Advanced Nuclear Materials Research Centre is AECL's most significant capital investment at the Chalk River Laboratories. The objective is to combine the capabilities of existing, outdated facilities into a modern shielded facility and laboratory research complex essential to Canada's nuclear operations and status as a Tier 1 nuclear nation. The facility will enable continued support to Canada's CANDU fleet, the needs of the federal government (particularly in safety, security, and nuclear forensics), and new and emerging science and technology areas such as SMRs and the associated fuel development technology. It will combine the current capabilities from the Universal Cells building, the Fuel and Materials Hot Cells facility, and the metallographic laboratories into a modern shielded facility and laboratory research complex. This new facility will allow further advancements in the nuclear science and technology program, including on alpha therapy research, small modular reactors, reactor fuel development, nuclear forensics, and response, as well as ongoing work in support of nuclear power utilities with reactor life extension and reliability.

Status: Project progression has picked up significantly, with physical construction work having commenced with mass excavation complete with backfill underway to support the foundation installation. In 2023-24, the detailed design was completed which will enable the construction of the building envelope to begin. Commissioning of the facility is expected in 2028.

Science Collaboration Centre

Overview: This office building was completed in 2023. The building is meant to enable CNL to consolidate office space from across the site and several other locations. The building offers a professional office complex and serves as a key venue to effectively engage with both government and third-party stakeholders in advancing the future program of work for S&T. With a number of older buildings currently housing staff slated for decommissioning, and the overall dependence on trailer systems for office space, the Science Collaboration Centre now fills the gap for the long-term.

Status: Construction proceeded as planned in 2022-23 and 2023-24 with a soft opening completed in September 2023. Turn over to operations occurred in November 2023. This now completes the three conventional new builds for the Chalk River Site (as presented in the table below). The other two buildings which were completed included the Logistics Facility (Minwamon) and the Support Facility which have both been completed and commissioned.

Information Technology (IT) Investment Projects

Overview: Investments in IT infrastructure include upgrades, replacements and implementation of hardware, software, applications, networks, and communications technologies throughout the CNL organization. The multiple improvements being implemented are broken down as follows:

- Base infrastructure – to upgrade current hardware and software company-wide.
- Business enablement – mostly focused on business intelligence solutions to provide dynamic reporting capability in the areas of finance, procurement, and human resources.
- Collaboration – mostly focused on providing collaborative IT workspace through the implementation of solutions such as SharePoint.
- Security – the outcome of a comprehensive cyber program assessment, this project is focused on delivering a strong cyber security framework.

Status: In 2023-24, activities continued to modernize and integrate IT applications and systems, automate business system processes, and improve reporting capabilities. Additional telecommunication services were installed to enable additional capacity at the Chalk River site. A managed security services provider (MSSP) was selected to increase cyber security capability and preparations continue to enable the data centre relocation. Looking ahead, work in 2024-25 has been planned to finalize the relocation of the data centre as well as continued migrations to the cloud where appropriate.

Site Utilities Bridging

Overview: The objective is to further enable reliable electrical power and other essential utility services, continuing the upgrades to aging infrastructure at the Chalk River site. Original plans estimated the cost of full implementation at approximately $115M which cannot be realized within the existing capital envelope. As such, a strategy has been developed that focuses efforts on work which addresses the immediate safety and reliability risks which can be performed within budget.

Status: Recent activities in 2023-24 continue to focus on utilities distributions systems for the newly constructed facilities and upgrades to existing distribution networks. Work has been completed on relocating the buried services and utilities in and around the footprint of the Advanced Nuclear Materials Research Centre project site. In 2024-25, planning activities will continue for the larger investment required to upgrade aging infrastructure beyond the current contract and funding profile.

Building and Facilities Bridging

Overview: Investments under this category include the upkeep of buildings, services, and facilities within the existing site in order to maintain the functionality, safety, integrity, and access arrangements. Work in this area includes maintaining current capabilities while new buildings and facilities are designed and constructed.

Status: Activities over the planning period include continued investment to keep the hot cells (both Fuel Material Cells and Universal Cells) safely operational until the Advanced Nuclear Materials Research Centre is scheduled to be complete. Other work includes the completion of the site-wide fire hazard upgrades on numerous fire systems, the completed installation of new, modern fume hoods in many S&T facilities, and ongoing architectural and electrical upgrades to facilities to improve reliability.

Equipment

This category of capital expenditure includes the acquisition of stand-alone equipment, which is part of normal asset management practices in order to preserve CNL's capabilities. Capital purchases are in support of equipment replacement in the areas of science and technology, health, safety, security and environmental programs, and fleet and facilities.

AECL
EACL