

Empowering the Community

Durham's
Nuclear Sector Strategy
2022-2032



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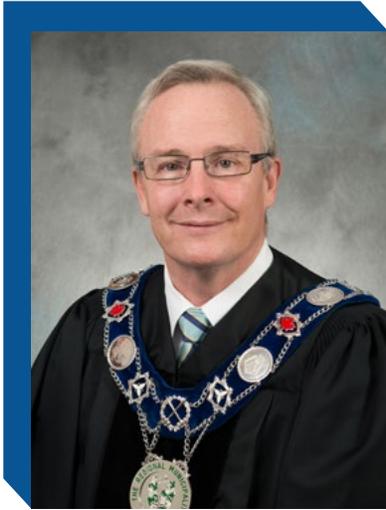
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Durham Region reached out to forty-five organizations and communities with a potential interest in the development of the strategy. In addition to those who responded anonymously to our surveys, we thank the following for participating in focus group sessions and providing us with feedback:

Canadian Association of Nuclear Host Communities
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Message from Regional Chair & CAO

In Durham Region, nuclear energy is a vital part of our story. Since the Region's creation in 1974, we have been a proud nuclear host community at the forefront of nuclear innovation. The nuclear facilities, supply chain, research and development capacity, and academic expertise found within our borders, make Durham Canada's premier nuclear jurisdiction. We are pleased to share with you the Region of Durham's Nuclear Sector Strategy, 2022-2032.

Globally, our future depends on decarbonizing our communities and economy. Nuclear energy can play a pivotal role in that transition, and Darlington is the only site in Canada currently licenced for new nuclear development with an accepted Environmental Assessment. Powering our Region (and the province) with clean electricity will spark energy innovation, investment and job creation in Durham while helping to achieve our climate change goals.

Durham's nuclear future holds both challenges and opportunities. A key goal of the strategy is to build our capacity to engage effectively and proactively in processes that will frame that future. As a regional municipality, Durham has responsibilities to protect the well-being of our residents and the environment and to sustain our local economy. Staying informed on the changes that leading-edge nuclear projects will bring to our community is a complex, ongoing task for Regional Council, staff, and citizens. Passing on this understanding to future residents will require a multi-generational effort. Collaboration with existing and potential nuclear host communities, Indigenous rights holders, regulatory bodies, industry, and academic partners over the next decade and beyond will be essential. This strategy positions us to partner in developing best practices.

We will work diligently to play a leadership role in the nuclear sector and shape our future with a bold, forward-thinking, community-based strategy.

Yours truly,

John Henry, Durham Regional Chair and CEO

Elaine C. Baxter-Trahair, Chief Administrative Officer

Summary of Durham's Nuclear Sector Strategy 2022-2032

Purpose

To ensure that Regional Council and staff:

- Are well-versed on the nuclear sector
- Have capacity to participate effectively in nuclear policy and regulatory matters
- Have a framework for setting priorities and investing effort
- Are equipped to manage uncertainty, make evidence-based decisions, recognize opportunities, and work collaboratively with partners

Mission

To empower our community by building understanding of the nuclear sector, working with partners to seize opportunities, and preparing for an evolving future.

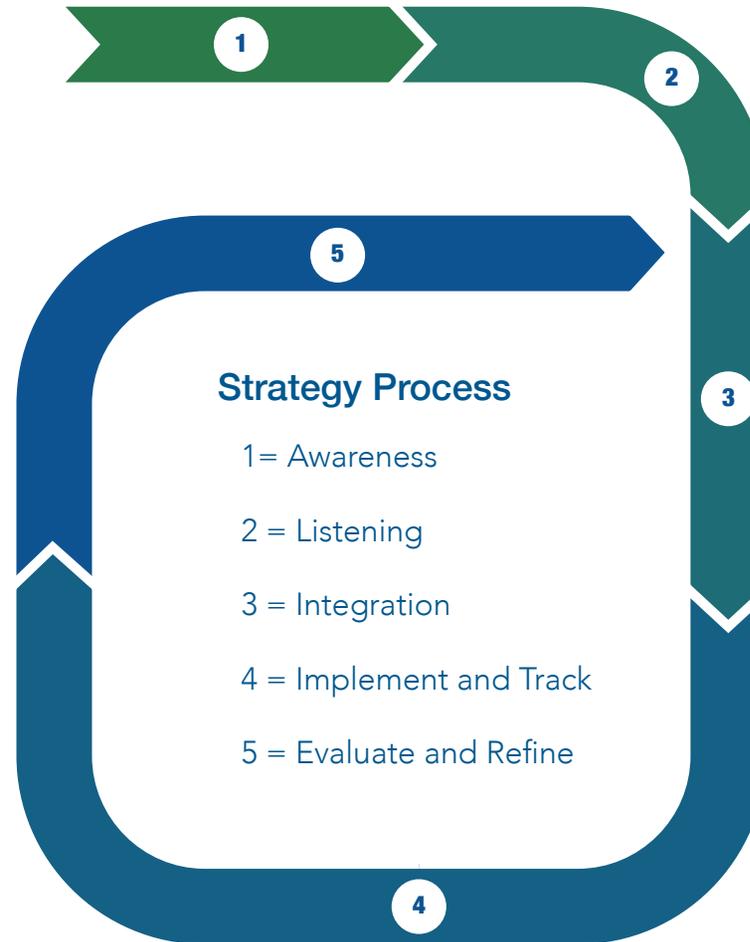
Vision

A healthy, prosperous community for all.

Summary of Durham's Nuclear Sector Strategy 2022-2032

Principles

- Aligned
- Future-focused
- Community-centred
- Respects Indigenous Rights and Treaties
- Connected



Goals

**Grow
Understanding**

**Maximize
Prosperity**

**Sustain
and Protect**

**Develop
Partnerships**

Summary of Durham's Nuclear Sector Strategy 2022-2032

Actions

- Research & innovation
- Education
- Convening, sharing, learning
- Capacity Building
- Engagement
- Collaboration
- Partnerships
- Financial arrangements
- Supply chain development
- Advocacy
- Measuring & reporting

Strategy Delivery Mechanisms

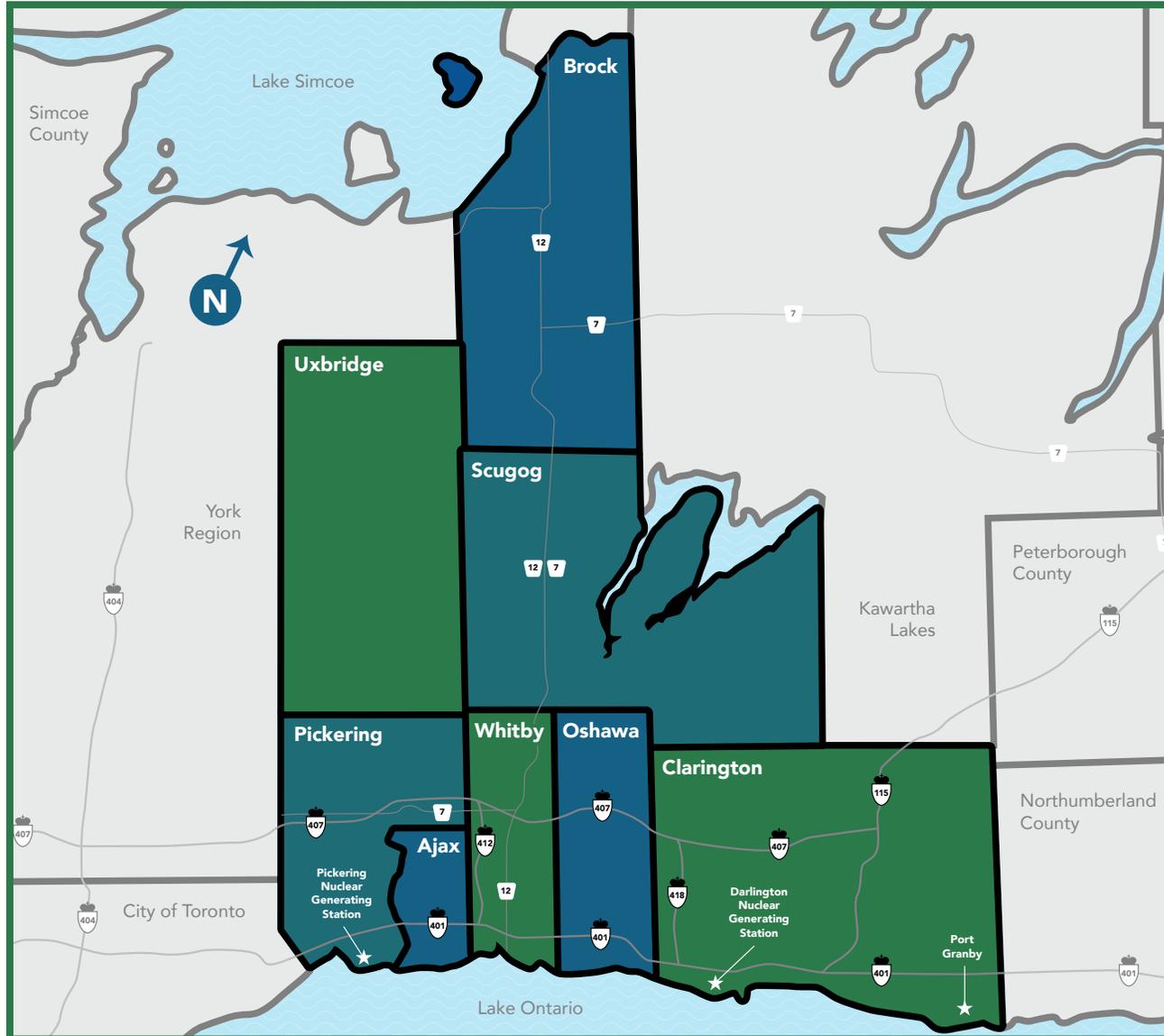
- Led by Region's Nuclear Sector Working Group
- Nuclear sector forum for information sharing, advice, feedback
- Create 5, 10 and 10+ year action plans
- Delivered via annual business planning and budget process
- Policy positions approved by Council
- Research, submissions posted on Durham.ca
- Annual reporting to Council
- 5- year review and update of strategy

Delivered by Regional staff working with:

- The community
- Nuclear industry
- Indigenous rights-holders
- Post-secondary institutions
- Government agencies
- Non-governmental organizations
- Subject matter experts

Introduction: Canada's premier nuclear community

Our community has been one of Canada's principal nuclear jurisdictions since the 1960s. With two provincially owned nuclear generating stations and a robust local supply chain, Durham Region has become a hub of nuclear academia, engineering, and manufacturing.



These lands are the treaty and traditional territories of Michi Saagiig and Chippewa nations including the Mississaugas of Scugog Island First Nation, Alderville First Nation, Hiawatha First Nation, Curve Lake First Nation, and the Chippewa Nations of Georgina Island, Beausoleil and Rama.

The Region of Durham was established in 1974 as one of several new regional governments in Ontario. What began as 21 local municipalities in the counties of Ontario, Northumberland, and Durham, became known as The Regional Municipality of Durham. Located on the east side of the Greater Toronto Area (GTA), the Region of Durham exists on the lands occupied by the Michi Saagiig Anishinaabeg for thousands of years prior to European colonization. These lands are the treaty and traditional territories of Michi Saagiig and Chippewa nations including the Mississaugas of Scugog Island First Nation, Alderville First Nation, Hiawatha First Nation, Curve Lake First Nation, and the Chippewa Nations of Georgina Island, Beausoleil and Rama.

Indigenous communities were progressively forced off these lands, then, in the Williams Treaties of 1923, they received one-time compensation representing a fraction of the estimated value of three tracts of land (more than 52,000 km²) in the area from the Ottawa River, south to Lake Ontario and west to Lake Huron. They also were denied fishing and hunting rights in these territories.

After decades of court cases seeking redress for these wrongs, in 2018, the Williams Treaties First Nations and the Governments of Ontario and Canada came to a settlement that included “financial compensation (\$666 million by Canada and \$444 million by Ontario), recognition of treaty harvesting rights, and the ability for each of the First Nations to add 4,452 ha to their reserve. Additionally, the Governments of Ontario and Canada formally apologized to the Williams Treaties First Nations.”¹

Our collective history shows that policies and strategies can be used to strengthen communities or to erode and eradicate their rights. We honour, recognize, and respect Indigenous Peoples as rights holders and stewards of the lands and waters on which we have the privilege to live. Within this strategy, we seek to learn from their values, knowledge, and stewardship roles. We also hope to create a dialogue with Indigenous communities on nuclear issues and build opportunities for collaboration with First Nations in a true government-to-government relationship.

As part of a two-tier regional governance model, Durham Region has strong partnerships with our eight local area municipalities (Brock, Ajax, Clarington, Oshawa, Pickering, Scugog, Whitby and Uxbridge), local post-secondary institutions, and one of North America's largest and most diverse power producers, Ontario Power Generation (OPG).² These relationships have allowed Durham to develop best practices in emergency management, climate change and innovation.

Ontario Power Generation

OPG is a publicly owned electricity generator with over 100 years of operating experience. OPG produces about half of Ontario's electricity.

This legacy of local innovation and expertise continues with isotope production, new nuclear development planned at Darlington Nuclear Generating Station and the world's largest decommissioning project at Pickering Nuclear Generating Station. The newly founded (2020) Centre for Canadian Nuclear Sustainability in Pickering is envisioned as a world-class facility that will attract skilled jobs, innovative businesses, and economic development. Durham Region is positioned to be the centre of excellence in Canada for nuclear generation, research and development, supply chain, deployment of innovative nuclear technology, nuclear waste minimization, decommissioning, and fuel recycling.

Working together, we can ensure the health and prosperity of our community, today and in the future.

The next generation of nuclear scientists, operators and innovators are being trained here.

Durham Region boasts the largest and most skilled talent pool for energy, environment and engineering in Ontario with an existing workforce of over 10,000 and access to a world-class talent pool of more than 400,000 students across the GTA.

Ontario Tech University has the only accredited Nuclear Engineering undergraduate program in Canada and the third biggest in North America. Home to the Centre for Small Modular Reactors (SMRs), Ontario Tech is the first institution in Canada to be designated a Collaborating Centre to support the International Atomic Energy Agency (IAEA) activities on advanced nuclear power technology and non-electric applications of nuclear energy.

Facility profiles

Durham Region is home to five facilities and one proposed facility licensed by the Canadian Nuclear Safety Commission (CNSC):

Pickering Nuclear Generating Station facility profile

- Owned and operated by OPG
- Eight Canada Deuterium Uranium (CANDU) Reactors, one of the world's largest nuclear stations
- Capacity: 3,100 Megawatts or about 14% of Ontario's electricity
- In service: 1971-73 (Pickering A: Units 1-4), 1983-86 (Pickering B: Units 5-8)
- Units 1 and 4 were refurbished between 1997-2005
- CNSC licence renewal: 2024
- The Pickering station employs 2,700 people
- As of 2020, 396,935 used fuel bundles were stored in cooling pools at the station
- Units 2 and 3 were taken out of service in 1997, the remaining units are scheduled to be taken out of service in 2024 and 2025, pending regulatory approval

Pickering Waste Management facility profile

- Owned and operated by OPG
- As of 2020, the facility housed 395,494 used fuel bundles and 1,012 m₃ of intermediate-level waste from the refurbishment of Unit 1 and 4
- Two additional storage buildings and a processing building are planned by 2028
- CNSC licence renewal: 2027

Darlington Nuclear Generating Station facility profile

- Owned and operated by OPG
- Four CANDU Reactors
- Capacity: 3,500 Megawatts or about 20% of Ontario's electricity
- In service: 1990
- Refurbishment: 2016-2026 - \$12.8 billion project
- CNSC licence renewal: 2025
- The Darlington station employs 2,600 people
- As of 2020, 313,853 used fuel bundles were stored in cooling pools at the station
- The station is planned to operate until 2055



Darlington Waste Management facility profile

- Owned and operated by OPG
- As of 2020, the facility housed 271,015 used fuel bundles stored in dry storage containers and 628 m₃ of intermediate-level waste from refurbishment stored in regulated containers
- CNSC licence renewal: 2023

Darlington New Nuclear Project profile

- The site is owned by OPG
- Located at the Darlington site, OPG is planning to construct Canada's first on-grid SMR
- Capacity: Anticipated 300 Megawatt (however the site is approved for up to 4,800 Megawatts of generation)
- CNSC renewed the licence to prepare the site in 2021 for 10 years
- In service: planned for 2028 at the earliest

Port Granby Long-Term Waste Management Facility profile

- Canadian Nuclear Laboratories (CNL) is implementing the Port Hope Area Initiative (PHAI) on behalf of the owner, Atomic Energy of Canada Limited (AECL), a federal Crown corporation
- Permanent storage facility for 1.3 million tonnes of low-level radioactive waste
- Waste was generated by radium and uranium refining at the former Crown corporation, Eldorado Nuclear Limited in Port Hope
- The facility includes an engineered above ground mound that was capped and closed in October 2021
- \$273 million capital project cost
- CNSC licence renewal for Phase 3 of the project: 2022
- The site will be naturalized followed by long-term monitoring, water treatment and maintenance
- AECL is leading a process to potentially create a nature reserve on the surplus federal lands at the site



A rendering of the BWRX-300 SMR to be constructed at the Darlington Nuclear Generating Station. Photo provided by GE Hitachi Nuclear Energy.



Port Granby Long-Term Waste Management Facility. Photo provided by CNL.

The context for the nuclear sector strategy

Nuclear electricity generation has been a cornerstone of our economy since the Region was established in 1974. Today, over 30 per cent of Ontario's electricity is generated in Durham and the nuclear sector is the largest employer in the Region. Decisions that impact the sector affect us all. With many changes and opportunities expected in the coming decade, the Region must be positioned to make strategic choices to achieve our vision of "a healthy, prosperous community for all." Through this strategy, Durham Region will empower our community by growing understanding of the nuclear sector, working with partners to seize opportunities, and preparing for an evolving future. This vision and mission identify key responsibilities of our Regional Municipality: to pursue the parallel objectives of health and prosperity with balance and equity, today and for the future.

The nuclear sector strategy supports several of Durham's strategic plan objectives, including:

- 1.1 Accelerate the adoption of green technologies and clean energy solutions through strategic partnerships and investment
- 2.2 Enhance community safety and well-being
- 3.4 Capitalize on Durham's strengths in key economic sectors to attract high-quality jobs
- 5.1 Optimize resources and partnerships to deliver exceptional quality services and value

Durham's nuclear sector strategy also supports the Region's planned actions to implement the low carbon pathway adopted in the [Durham Community Energy Plan \(2019\)](#) and address the climate emergency [declared by Regional Council \(2020\)](#). The availability of low carbon electricity from nuclear generation will be critical to power the Region's achievement of these targets.

Durham Region's community greenhouse gas (GHG) emissions reduction target is net zero by 2050. The Region has committed to reducing its corporate GHG emissions to net zero by 2045.

The urgency to address climate change through low-carbon energy is also fuelling renewed federal and provincial support for new nuclear development including the first on-grid SMR at Darlington. Expansion of nuclear generation is recognized as a vital step on the path to achieving a net-zero carbon economy. We need every tool in the energy toolkit, including nuclear, renewables, storage, demand management and conservation. Compared to other sources of energy, nuclear generation has a small ecological footprint across its lifecycle. Nuclear energy produces more electricity on less land than any other non-emitting source.³

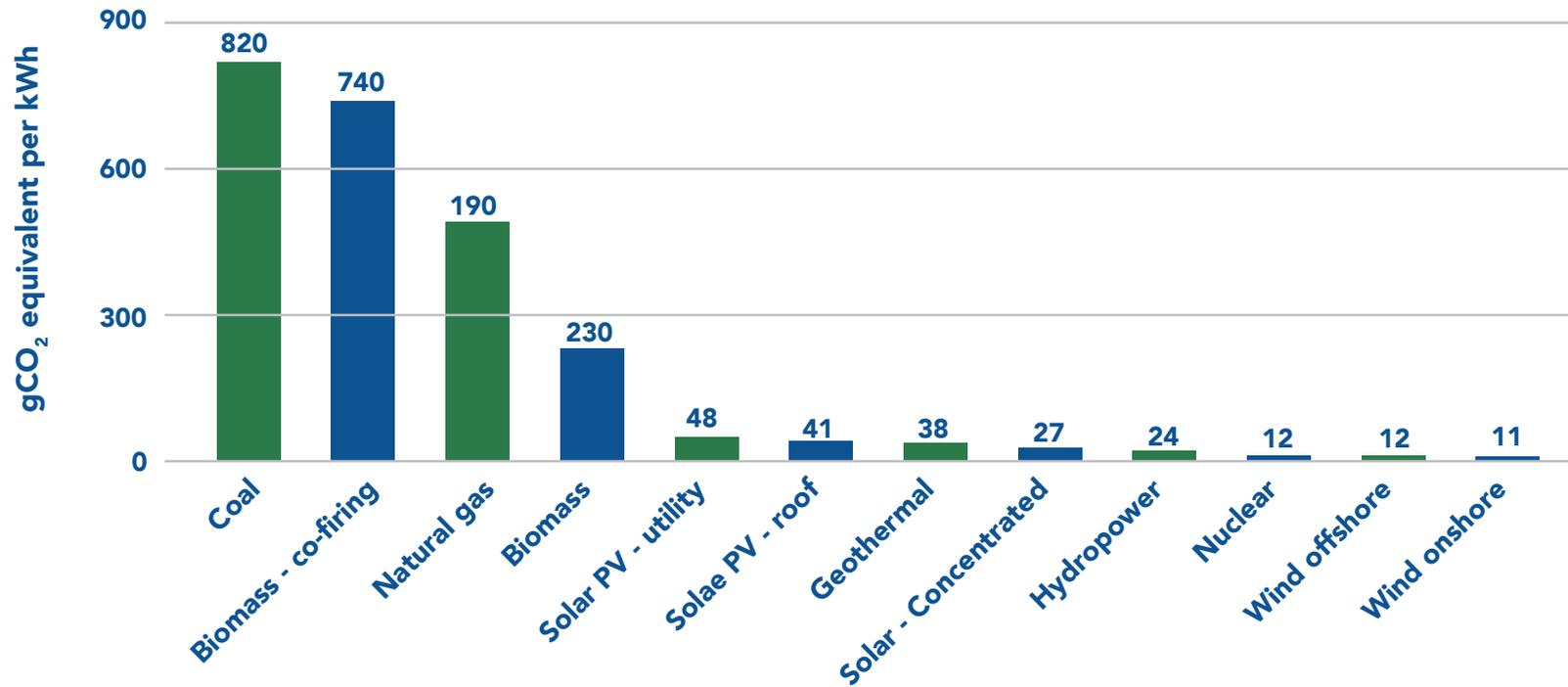


Figure 1: Average lifecycle carbon dioxide equivalent (CO₂e) emissions (including albedo effect) for commercially available electricity technologies.⁴

Nuclear electricity generation is safe. The nuclear industry is closely monitored and regulated by the Canadian Nuclear Safety Commission (CNSC). In 2019, the International Atomic Energy Agency (IAEA) conducted an Emergency Preparedness Review (EPREV) mission in response to a request from the Government of Canada.

The IAEA commended Canada for its implementation of the IAEA Safety Standards and for exceeding them in some cases (for example, for the pre-distribution program for potassium iodide). Durham Region works closely with OPG, local area municipalities, the province and the CNSC to ensure that emergency planning, training and co-ordination reflect industry international best practices to protect human health and safety and the environment.

More than a million packages carrying a variety of nuclear substances are transported safely in Canada each year.⁵

With the phase-out of coal-fired electricity generation in Ontario, nuclear has provided a steady supply of baseload electricity to our grid and much-improved air quality to the province. Ontario transformed its energy supply mix and decreased GHG, nitrogen oxides, sulphur dioxide and mercury emissions.⁶ The Durham Region Health Department has expertise in public health monitoring and undertakes ongoing Population Health Assessments on the local health effects of radiation, specifically concerning cancer, congenital anomalies, and stillbirths.⁷ These studies concluded that there is no indication that the nuclear generating stations cause health effects in the population.

While all energy sources create by-products, nuclear is energy-dense, meaning that it creates immense amounts of electricity and minimal amounts of waste when compared to other energy sources. Some nuclear by-products, such as isotopes, are extremely valuable and save lives every day by sterilizing medical equipment and diagnosing and treating deadly diseases or are used for products such as exit signs and tactical devices. Today, almost half of the used nuclear fuel in Canada is safely stored and monitored in highly regulated interim facilities in Durham. In addition, Durham has a permanent engineered above-ground mound in Port Granby containing low-level radioactive waste and marginally contaminated soil from historic radium and uranium refining in Port Hope. As nuclear generation continues in Durham, additional nuclear waste will be produced and stored locally until permanent facilities, such as the used-fuel deep geologic repository (DGR), are operational.

The Nuclear Waste Management Organization (NWMO) is a not-for-profit organization established in 2002 by Canada's nuclear electricity producers under the Nuclear Fuel Waste Act. It is mandated to site and develop a DGR for the permanent storage for Canada's used nuclear fuel. The NWMO is investigating two potential locations in Ontario for the DGR, Ignace and South Bruce, and is working with the communities towards site selection in 2023. The selected community must be a willing and informed host.

Canada's deep geologic repository

DGRs are considered best practice for permanent disposal of intermediate- and high-level materials, such as used fuel. They have been adopted by other countries with nuclear power programs, such as Finland, France, Sweden, Switzerland, and the United Kingdom. Suitable geology at great depths can contain the materials, using the geosphere to protect the biosphere. The materials are stored in deep rock with no valuable minerals that might interest future generations, and where no seismic activity has occurred for millions of years.⁸ Used fuel from nuclear generation will be moved to Canada's DGR starting in the mid-2040s.

The federal government is leading [Canada's SMR Action Plan](#) for the development, demonstration, and deployment of SMRs. The Region has endorsed the principles of the SMR Action Plan and is a participating organization. Several Canadian provinces are also undertaking early planning for SMRs.

Provincial-level planning for SMRs

Ontario, New Brunswick, Saskatchewan and Alberta envision SMRs as a key mechanism in the transition away from fossil fuels. SMRs are nuclear reactors that produce 300 megawatts of electricity or less. They can support large established grids, small grids, and energy parity in remote off-grid communities and resource projects.

The SMR at Darlington is intended to be the first of many in Canada and will create opportunities to support domestic energy needs, curb greenhouse gas emissions, and position Canada as a global leader in this emerging technology.⁹

Natural Resources Canada (NRCan) is developing [just transition legislation](#) to help prepare the Canadian workforce and communities to transition to a low-carbon economy. NRCan is also leading the process of modernizing Canada's [policy framework](#) for managing the radioactive by-products of nuclear energy. Recognizing that Durham Region will be directly affected by the new policy approach, the Region participated in the federal review, meeting with NRCan staff and making a formal submission. Reviews like this are opportunities for Durham, as an experienced nuclear host community, to speak about the effects of the current policy on the community and make suggestions for improvement. The time horizon involved in safely managing radioactive materials further highlights the need for the Region to take a strategic approach.

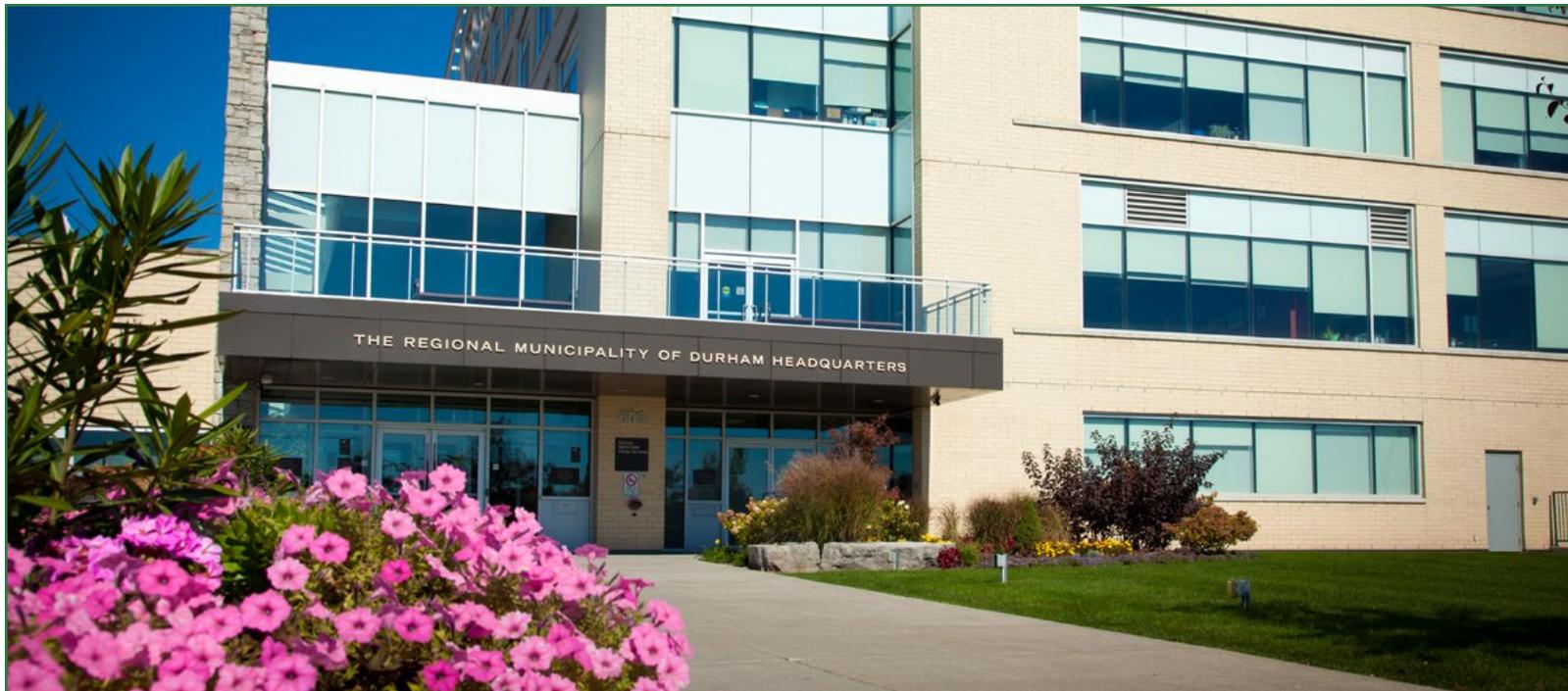
Modernizing Canada's radioactive waste policy

In late 2020, NRCan launched a process to review and modernize the radioactive waste policy framework. The goals are to ensure that Canada's policy aligns with international practices, is based on the best available science, and reflects the values and principles of Canadians. It will address Indigenous reconciliation in accordance with the [United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#), which was introduced in Canada through Bill C-15 the *United Nations Declaration on the Rights of Indigenous Peoples Act (2020)*. It will also elaborate on the existing policy, add direction for the long-term management of low- and intermediate-level radioactive waste and incorporate evolving practices in the sector such as waste minimization.

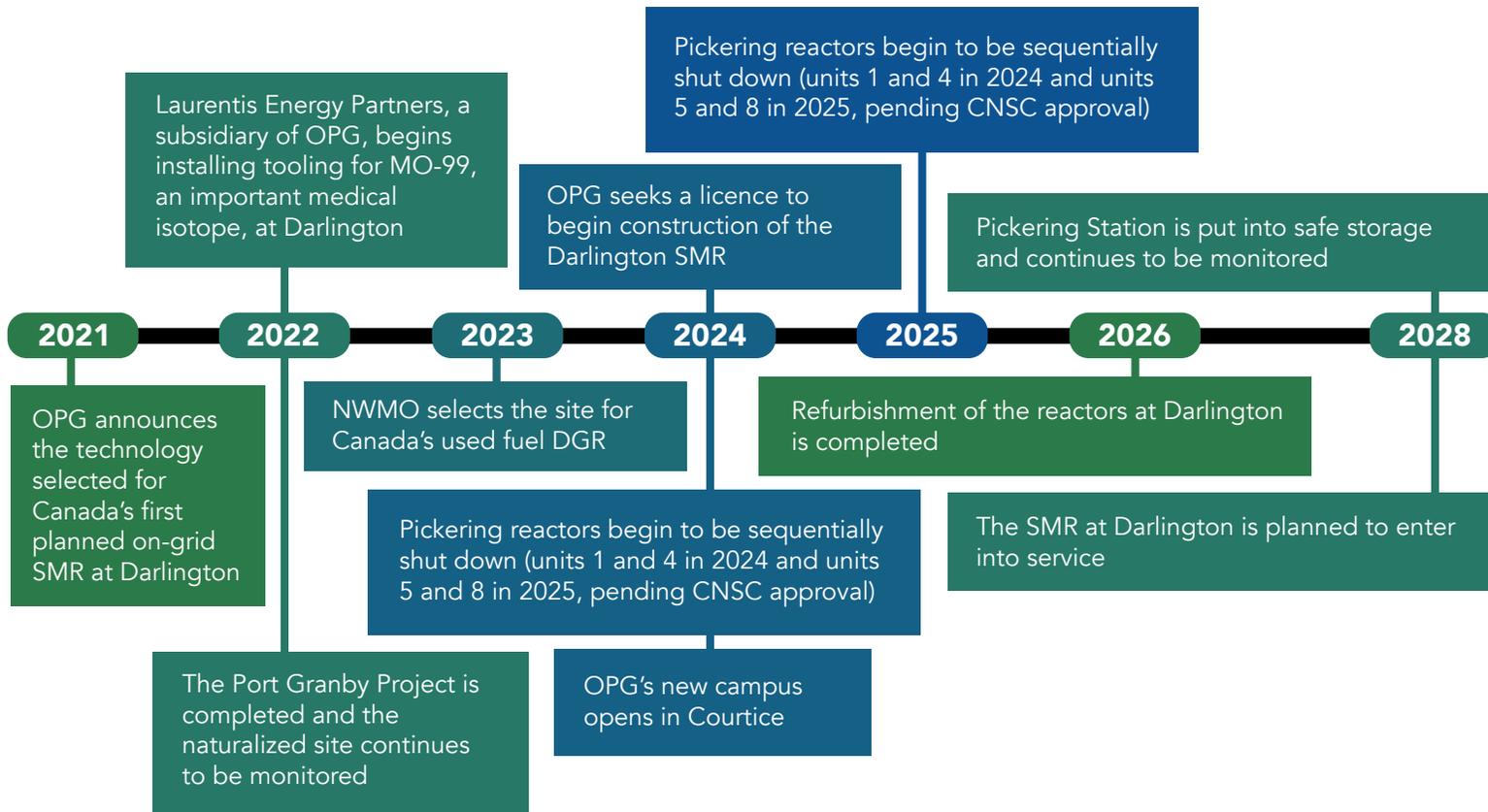
As a regional municipality, the safety and well-being of our community are our top priorities. We are responsible for protecting the environmental, social, and economic sustainability of our Region in the short and longer term. One way that we are doing so is by updating the Region's Official Plan, Envision Durham, which will define how land in our community should be used for years to come. [Policy directions proposed for the new Official Plan](#) support energy generation in the Region and will include the Pickering and Darlington station properties as employment areas to recognize and promote job creation. The proposed policy directions also include station planning zones and direct local area municipalities to restrict sensitive uses around the stations. At the Port Granby facility, the Official Plan will recognize the nature reserve recommended as part of site recovery.

Over the coming decade, Ontario and Canada will make decisions on our energy supply mix, the site of Canada's DGR, the deployment of SMRs, the management of used nuclear fuel and by-products, and our continued transition to low carbon electricity.

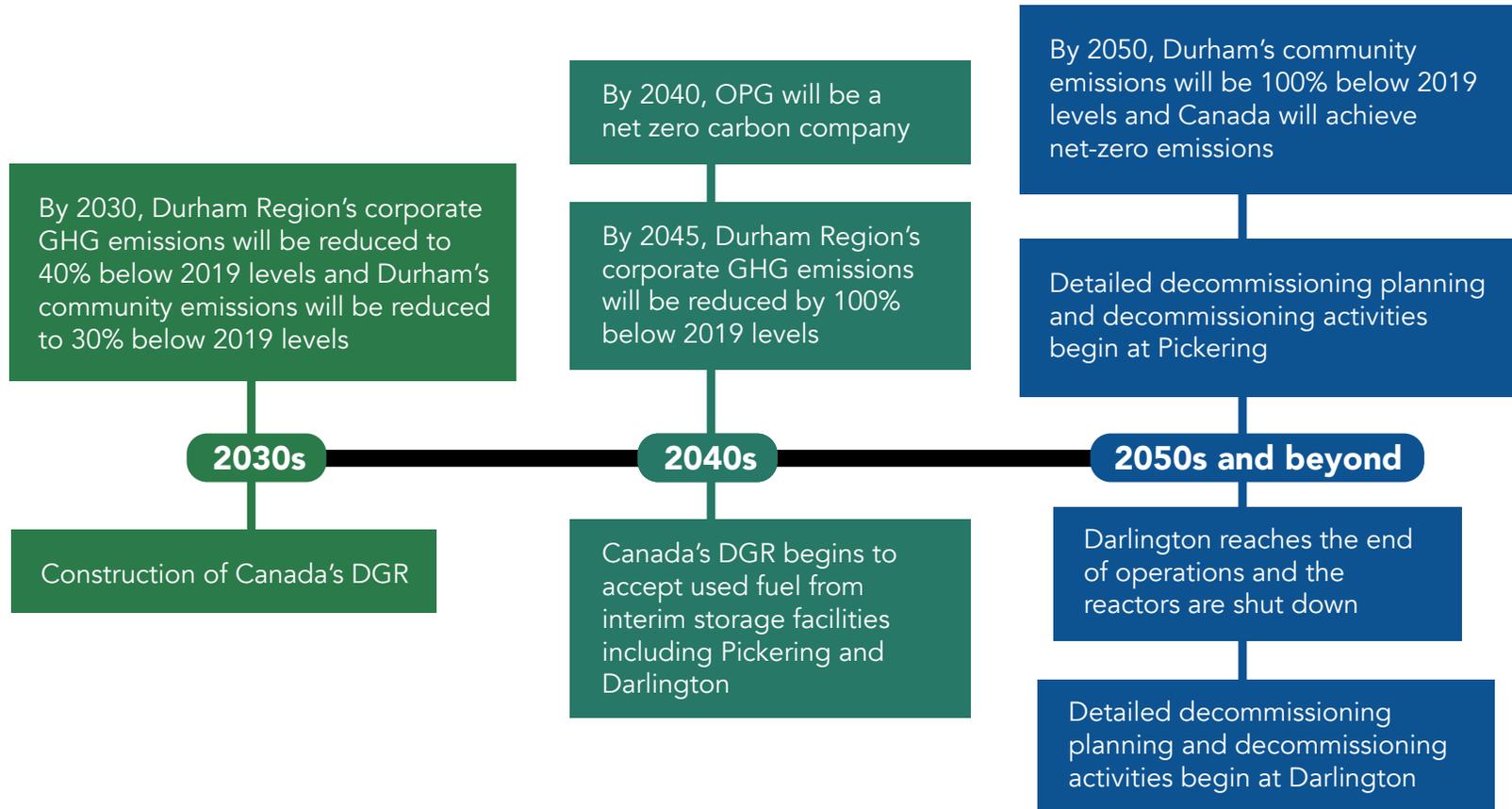
As these projects gain momentum, they will create tremendous opportunities for Durham Region. This strategy aims to empower Durham Region as an astute and forward-thinking partner to the nuclear sector. Information, education, and preparation can support Regional Council and residents in understanding the opportunities and effects of the nuclear facilities in the Region across their entire life cycle. We have a vital role to play in creating our future.



Powering the future: key milestones for Durham Region



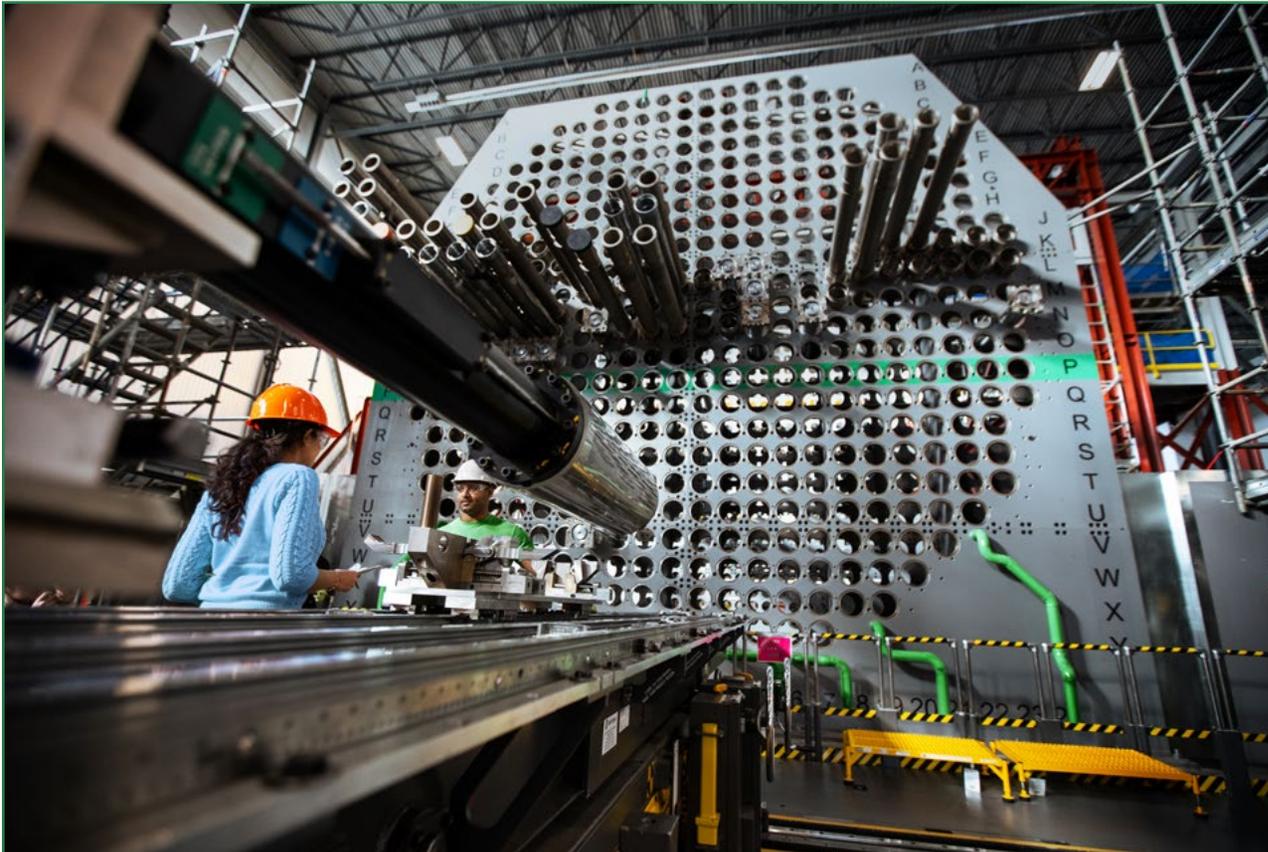
Note: project dates may change.



Note: project dates may change.

Darlington Refurbishment Project

The Darlington Nuclear Generating Station, one of the top performing nuclear generating stations in the world, has been powering Ontario since the early 1990s. The refurbishment project will extend Darlington's operations to 2055. Together with the additional years of operation, the project is expected to generate \$89.9 billion in economic benefits for Ontario. The project creates 14,200 jobs per year. Once completed in late 2026, the continued operation of the station will allow Ontario to avoid 297 mega tonnes CO₂e compared to carbon-based generation over its lifetime.



Developing the strategy

Guiding principles

The following guiding principles were used to develop Durham's Nuclear Sector Strategy:

Aligned

The nuclear sector strategy recognizes the Region's legislated responsibilities, will align with our strategic plan vision, mission and values, and support our strategic plan objectives.

Future-focused

The nuclear sector strategy considers the short, medium and long-term timelines associated with nuclear facilities with the intent of creating positive socio-economic and environmental benefits for seven generations to come. We are striving to be good ancestors by being good stewards of the land and community.

Community-centred

The nuclear sector strategy puts community safety and well-being first and balances the impacts and opportunities associated with being a nuclear host community.

Respects Indigenous rights and treaties

The Region is committed to engaging with Indigenous peoples on nuclear matters and nurturing a meaningful relationship by building trust, reciprocity and respect.

Connected

The nuclear sector strategy recognizes that Durham Region is one agent in a complex nuclear ecosystem (see Appendix B: nuclear sector ecosystem).

Phase 1: awareness (January 2019 - May 2021)

Regional staff formed a Nuclear Sector Working Group with representatives from all departments. We held a series of workshops where we inventoried our mandated and current activities. We recognized the pressing need to improve the knowledge and capacity within the Region to respond on nuclear matters. We knew we needed to organize staff internally to support greater collaboration, and efficient and effective participation in hearings, consultations, and policy reviews and brainstormed ways we might achieve this.

We identified Indigenous rights holders, potential partners, and stakeholders, sought out new and renewed relationships and invited virtual presentations from sector experts. Keeping in mind our guiding principles, this working group developed draft goals and preliminary actions to improve the Region's role and performance in the nuclear sector.

Throughout 2020 and 2021 the working group collaborated on multiple nuclear initiatives including:

- Participating in Natural Resources Canada's (NRCan) [SMR Action Plan](#)
- Partnering with OPG and the City of Pickering on a study of the socio-economic and fiscal impacts of the retirement of the Pickering Nuclear Generating Station
- Submitting an [intervention to the CNSC hearing](#) to support the renewal of OPG's licence to prepare the site at Darlington for new nuclear development
- Responding with a [Regional submission](#) to the NRCan review of Canada's radioactive waste policy
- Engaging with the Nuclear Waste Management Organization (NWMO) on their plans for low- and intermediate-level waste and transportation of used fuel
- Increased engagement in initiatives led by the [Canadian Association of Nuclear Host Communities \(CANHC\)](#)

The reviews, research, analysis, and consultation that went into each of these efforts supported the development of the nuclear sector strategy.

Phase 2: listening (June 2021- October 2021)

The nuclear sector benefits from cross-pollination that facilitates innovation and partnership. As the Region began to develop this strategy, we recognized the importance of engaging broadly with partners, Indigenous rights holders, stakeholders, and the community. The nuclear sector working group formed a communications subcommittee and developed a consultation and engagement plan to tap into this extensive knowledge and experience as inputs to the strategy.

Our consultation aimed to gather feedback on the draft strategy goals and gain insight into how the Region might establish itself as an active, engaged leader in the nuclear sector with the capacity to influence decisions that affect the well-being, economic development, and sustainability of our community.

We directly surveyed rights holders, partners, and key stakeholders for their thoughts on the draft goals and potential actions, asking what the Region might do – more of, better, in addition to – the actions we already undertake. We held follow-up discussions with interested groups and two First Nations to get a richer understanding of their perspectives.

To reach the community, we also posted the draft goals on Durham's community engagement platform and polled registered users.



The community and survey respondents were supportive of the strategy and the four proposed goals. The most often-heard themes and ideas are presented below:

- Develop a comprehensive plan to assess the current knowledge base of elected officials and increase their expertise and interest in the nuclear sector.
- Strengthen co-operation and alignment among local area municipalities (e.g., by sharing information on employment and supply chain supported by the nuclear industry within each municipality).
- Empower representatives from all levels of government to champion shared goals and interests (e.g., net zero carbon future; high quality, well-paying jobs; research and investment attraction).
- Continue to educate Regional staff on the nuclear sector, sharing knowledge across departments and ensuring institutional knowledge transfer. Include local area municipal staff (e.g., Pickering and Clarington) who have deep insight and expertise in the nuclear sector built over decades of work.
- Generate enthusiasm in our community about the benefits and value of the nuclear sector to Durham Region, Ontario and Canada and foster pride in achievements.
- Support more youth engagement on nuclear issues through outreach to local school boards and by leveraging [CityStudio Durham](#).
- Durham Region, OPG, nuclear supply chain companies, and local post-secondary institutions should better educate the community and dispel common myths and misconceptions.
- Address gaps in community knowledge with clear, credible, and accessible information using formal and informal approaches.
- Convene regional-scale and sector-wide opportunities for sharing information and identifying potential partnership opportunities – leveraging and strengthening existing forums where they exist and addressing gaps where regular dialogue does not occur on nuclear matters.
- Continue to participate in nuclear regulatory processes and policy development across all levels of government to stay abreast of impacts to the Durham community and influence decision-making.
- Share Durham Region's experience as a nuclear host community with current and future potential nuclear host communities.
- Advocate for formal funding agreements for municipal activities required by nuclear host communities using a strong, unified municipal voice.
- Seek opportunities for growing the local nuclear supply chain and research sector by creating an economic vision focused on clean energy, a low carbon economy and life-saving medical isotopes.
- Advocate that Canada's SMR technology development be rooted in Durham Region.
- Seize the opportunity to showcase globally the decommissioning of the Pickering Nuclear Generating Station.

Through our engagement with First Nations communities, we understand:

- The ongoing impact of colonization, including policies, practices and discriminatory laws that have devalued Indigenous communities and created longstanding negative impacts on Indigenous peoples. The development of settler communities and industries, including nuclear power generation, was part of this process. There are significant treaty rights related to nuclear projects.
- Both the Mississaugas of Scugog Island First Nation and Curve Lake First Nation expressed strong interests in the evolution of nuclear projects in the Region from both economic and environmental perspectives and a desire to be engaged as partners.
- That co-creating language incorporated in the strategy that goes beyond land acknowledgement is a step forward towards building opportunities for true collaboration.

Mutual interests were expressed in the Region establishing ongoing conversations with the Mississaugas of Scugog Island and Curve Lake First Nations communities, and potentially other First Nations communities in the territory on nuclear and other issues.

This input from rights holders, partners, stakeholders, and the community helped us identify where investment of time and resources by the Region can make a difference.

View the full [Engagement Summary Report](#).

Phase 3: integrating input and lessons learned (September 2021 - November 2021)

Feedback received from the community, rights holders, partners, and stakeholders was incorporated into all areas of the strategy, and particularly influenced the goals, actions and outcomes.

In parallel with our work on this strategy, Regional staff responded to several nuclear policy and regulatory consultations. We also participated in studies, conducted research on nuclear decommissioning and responded to requests for Regional staff reviews of plans and documents related to upcoming regulatory processes. This involvement provided opportunities to adopt some ideas suggested during the listening phase.

The key goals and areas for action outlined in this strategy focus on the Region being well-informed, prepared, ready to collaborate, and engaged in framing a future that will continue to evolve. There is much uncertainty: the urgency of society's response to climate change, the demand for sustainable energy, the speed of innovation, and public acceptance of science-based solutions, all have the potential to shape and shift our future. Other processes such as reconciliation with Indigenous peoples, federal policy development and international co-operation also will drive change in the nuclear sector.

Accordingly, the Region should reconfirm priority actions as part of the annual business planning and budget process and refocus as needed. Implementation plans will need fiscal flexibility to address changing circumstances and emerging opportunities such as new partnerships or the availability of grant funding.

Our goals

This strategy is our long-range plan to build capacity within our organization and community to understand, anticipate and respond to the evolving nuclear activities in Durham and influence policy and decision-making that affect the Region.

Recognizing the importance of the nuclear sector to the Region's residents, businesses and institutions, the nuclear sector strategy has four key goals:

- Grow understanding of the nuclear sector among Regional Council, staff, and the community
- Build prosperity by maximizing the benefits of being a nuclear host community and Canada's premier centre of the nuclear industry and innovation
- Protect and sustain the community by addressing the impacts and opportunities of being a nuclear host community
- Lead and develop partnerships within the nuclear sector to build leadership capacity and influence decision-making

Listed with each goal are the desired outcomes and actions necessary to achieve them.

Grow understanding



Whether residents have lived in Durham for many years or are new to the area, an understanding of the nuclear sector and its local significance is important. With a rapidly growing population, keeping the community informed and updated over the decades to come will require an ongoing effort. The Region has mandated education and awareness programs in place, however, communicating technical information produced by nuclear operators and regulators in ways that are clear, meaningful, and credible to residents is a challenge. The Region, with help from post-secondary institutions, Indigenous knowledge holders and subject matter experts, should play an important role as a trusted source of balanced information.

The local effects of federal and provincial policy and regulatory processes related to nuclear facilities are complex (see Appendix C: legislative and regulatory framework). Regional Council and staff must be well-versed about this key industry in our community to support proper planning and strategic decision making. Durham Region will grow understanding of the nuclear sector to ensure that our community members, municipal staff and Regional Council are knowledgeable and engaged.

Today, just over 700,000 people live in Durham Region. By 2051, the Region's population is expected to be 1.3 million. Maintaining a nuclear-aware community will be an ongoing challenge.

Desired outcomes:

- Increased understanding by Durham Regional Council, staff and the community of the effects and opportunities associated with being one of Canada's premier nuclear jurisdictions including the role of nuclear in electrifying transportation and heating to reduce greenhouse gas emissions.
- Improved intergenerational knowledge transfer among Regional Council, staff, and community members throughout the nuclear lifecycle (see Appendix D: nuclear generating station lifecycle).
- Improved alignment and consistency among Regional staff communications.
- Increased community engagement and participation in nuclear sector engagement opportunities and planning.

To achieve these outcomes, Durham Region will:

- Continue and expand the nuclear sector working group to grow understanding of the nuclear sector by educating Regional and municipal staff on nuclear topics and projects, sharing knowledge, and ensuring institutional knowledge transfer.
- Engage effectively with Regional Council and other elected officials on topics related to the nuclear sector through presentations, reports for information or endorsement.
- Survey elected officials, staff, and the community regularly to monitor awareness, identify and address knowledge gaps.
- Develop and maintain a nuclear education package for Council orientation.
- Develop and implement an integrated community awareness program to make accessible and current information available, increase knowledge and promote participation in planning and regulatory processes.
- Conduct research on topics related to being a nuclear host community (e.g., decommissioning) and share findings with the community, rights holders, stakeholders and partners.
- Use research findings to identify opportunities and best practices to continually improve community outreach and engagement.

Maximize prosperity



As a premier centre of nuclear industry, academic research and innovation, Durham Region is positioned to be Canada's centre of excellence for nuclear generation and supply chain, research and development, and deployment of innovative nuclear technology, nuclear waste minimization and fuel recycling. Additionally, the retirement of Pickering will be the largest decommissioning project in the world and will create significant economic development opportunities.

In 2024, OPG will open its new corporate campus in Clarington. OPG is one of the largest, most diverse clean power producers in North America. In addition to nuclear¹⁰, their energy portfolio includes oil and natural gas, hydroelectricity, biomass and solar.¹¹ The relocation of their headquarters to the Region will solidify our status as a centre for nuclear expertise and a focal point for sustainable energy in North America.

Decommissioning, medical isotope production, the development of Canada's first on-grid SMR and OPG's new headquarters will create direct and indirect jobs in science, technology, engineering, and mathematics (STEM) disciplines but also in a diverse array of professions and trades in Durham.

The nuclear industry keeps 76,000 Canadians working.¹²

We recognize that this economic activity takes place on the traditional lands of Michi Saagiig Anishinaabeg. In the past, generations of Indigenous peoples were systemically excluded from the decision-making processes that created the nuclear industry in this area. The Region is committed to engaging and nurturing the relationship with First Nations to participate in, support and share in the benefits of the nuclear sector in a way that preserves the land and waters for future generations.

We will capitalize on our strengths and continue our legacy of facilitating nuclear innovations to accelerate the adoption of non-emitting electricity solutions and maximize the benefits of being a nuclear community.

Medical isotopes

Nuclear medicine advances human health and saves lives. Canada is a global leader in medical isotope production, used to sterilize medical devices and diagnose and treat deadly diseases such as cancer. The Pickering and Darlington Nuclear Generating Stations currently produce Cobalt-60 and will soon produce Molybdenum-99 making Durham Region a key source and exporter of these important life-saving radioisotopes.¹³ The nuclear medicine industry supports 8,500 jobs in Canada.

Desired outcomes:

- Increased investment, research, and job creation in Durham's nuclear energy sector.
- Develop a strong, diverse talent pipeline to support a nuclear energy innovation ecosystem in partnership with industry and post-secondary institutions.
- Develop a reputation as a respected, innovative source of medical isotopes.
- Increased local manufacturing to support Canada's SMR technology development.
- Develop a reputation internationally as the global centre of nuclear expertise.

To achieve these outcomes, Durham Region will:

- Continue to participate in the pan-Canadian SMR Action Plan and work with other levels of government, Indigenous communities, the nuclear industry, post-secondary partners, and local area municipalities to help energize Canada's low carbon economy.
- Advocate for Canada's SMR technology development and manufacturing to be rooted in Durham Region.
- Work with OPG and other stakeholders to advance and accelerate repurposing plans for Pickering Nuclear Generating Station such as attracting medical isotope production and processing operation, a research facility, and other innovative low-carbon energy facilities.
- Work to attract nuclear sector supply chain companies to relocate to Durham Region.
- Continue to foster our partnership with the Canadian Centre for Nuclear Sustainability to realize local investments and nuclear decommissioning research, supply chain and employment opportunities to Durham Region.
- Work with industry and post-secondary institutions to support nuclear sector experiential learning through CityStudio Durham.
- Support the development of OPG's new headquarters in Clarington.

Sustain and protect



Durham Region is transforming into a complete community, where residents live, learn, work and play. As a primary nuclear host jurisdiction in Canada, the Region must be well-informed about the sector and participate in policy reviews and regulatory processes that safeguard nuclear operations. The effects of a nuclear generating facility on the host community vary over the potential century-long life cycle of the station (see Appendix D: nuclear generating station lifecycle). It is vital for the Region to understand the implications and plan for the cumulative short and long-term effects (e.g., on employment, regional service demands, property taxation, research, supply chain and broader community economic considerations). In this way, Durham Region will be able to create the conditions for community success and ensure that future generations experience the benefits of being the clean energy capital of Canada.

Nuclear emergency preparedness

The Region has an established emergency management program. In the unlikely event of a nuclear emergency, Durham Region, the province and OPG have plans in place to respond and keep our community safe.

As a key industry in Durham, OPG has supported our quality of life by providing high-quality jobs and property taxes (payments in lieu of taxes) which contribute to the Regional and local property tax base. These contributions vary over the lifespan of each facility. When the stations are operating, these payments help support the provision of Regional and municipal services. Forecasting and planning for the retirement of the Pickering Nuclear Generating Station and changes in related employment and property taxation are important steps toward mitigating impacts and identifying new opportunities.

Planning for the future

Durham Region, the City of Pickering, and OPG are currently undertaking a Financial, Economic, and Social Impact study on the retirement of the Pickering Nuclear Generating station. The study will provide a thorough understanding of decommissioning impacts and economic opportunities, as well as recommendations for maximizing opportunities with the Canadian Centre for Nuclear Sustainability to stimulate research, technology development, and innovation, while also attracting industry and talent. The study will be completed in 2022.

In Durham, with multiple large nuclear sector facilities and projects, we may experience cumulative and connected effects over their life cycles. The demands on the Region related to tracking changes in policies and projects at several facilities is one reason for developing this strategy. These cumulative effects have a particular impact on the Indigenous rights holders engaged in this strategy.

Durham Region will continue to advocate for policies that protect and sustain the environment and quality of life of current and future residents, and the fiscal health of the municipality, and for financial arrangements that ensure the social sustainability of nuclear facilities across their lifecycle.

Desired outcomes:

- Development of financial arrangements that recognize the responsibilities associated with being a nuclear host community.
- Offset municipal and broader community socio-economic impacts associated with the retirement of Pickering Nuclear Generating Station.
- Increased capacity for the Region to anticipate and prepare for changes related to nuclear projects in Durham.
- Preserve/restore affected lands and waters.

To achieve these outcomes, Durham Region will:

- Research, plan for and mitigate socio-economic and fiscal impacts (e.g., direct and indirect job loss, loss of property tax, user rate and other municipal revenue) of each phase of the decommissioning process at Pickering Nuclear Generating Station.
- Participate in nuclear regulatory processes and policy development across all levels of government to protect Regional interests.
- Incorporate Indigenous knowledge into our policies and practices by making decisions with future generations in mind and focusing on principles of environmental stewardship.
- Work with federal and provincial ministries and agencies to ensure that community well-being is a key consideration in nuclear policy decisions (e.g., around waste management, transportation, and decommissioning).
- Negotiate formal financial arrangements that sustain the fiscal and socio-economic well-being of the Regional community and maintain the social licence for nuclear facilities throughout their life cycle.
- Seek federal support in advance of generating station closure, during safe storage and during decommissioning phases to mitigate economic impacts and assist the Region and City of Pickering with economic diversification and renewal.
- Apply policy techniques to identify strengths and weaknesses, review trends and future alternatives for the sector to consider how the Region might respond to potential changes and opportunities.
- Assess the opportunities to engage existing Regional Council advisory committees (e.g., Durham Nuclear Health Committee, Durham Region Roundtable on Climate Change) and Regional engagement in other advisory committees on strategy implementation.

Lead and develop partnerships



The nuclear sector is broad with many organizations and industry groups each with a unique focus and role. Additionally, several provincial and federal ministries set policies and regulations for the nuclear sector. Durham has an opportunity to leverage our position as a key nuclear jurisdiction to develop new partnerships with these stakeholders to advance the goals of the nuclear sector strategy. The Region will also work to strengthen our partnerships with Indigenous communities, OPG and academia in key areas such as environmental stewardship, climate change and education.

As a long-time nuclear community, Durham Region has confidence in the technology and municipal experience and expertise that it can share with other existing or potential host communities in Canada. By increasing our participation in organizations like CANHC, Durham Region will build leadership capacity, influence decision-making, and achieve our vision of a healthy, prosperous community for all.

OPG's climate change plan

The goals of [OPG's climate change plan](#) align with many of Durham Region's climate change objectives. For example, OPG is striving to be a net-zero carbon company by 2040, to lead the decarbonization of Ontario's economy, to ensure their operations are resilient to the impacts of a changing climate and that their host communities are protected.

With major nuclear projects underway, new opportunities will arise. The Region will seek out opportunities where collaborative effort can help us meet our targets.

CITYSTUDIO

DURHAM



CityStudio Durham

CityStudio is a proven model of experiential learning and civic engagement focused on developing tomorrow's leaders by bringing municipal government to the classroom. CityStudio Durham is a collaboration between the Region of Durham, Durham Regional Police Services, Durham College, Ontario Tech University and Trent University Durham-GTA. By furthering connections between municipal government, academic institutions, and the community, post-secondary students in Durham can apply their skills, creativity, and entrepreneurial spirit to real-world challenges facing our community to shape a better future for Durham.

CityStudio also presents an opportunity for Indigenous students to become engaged in placemaking in their treaty lands, leading to potential career paths in various disciplines.

CityStudio Durham helps to attract students and build the talent pipeline. This partnership has already resulted in studies on nuclear emergency preparedness, decommissioning and international nuclear host communities.

Desired outcomes:

- Increased knowledge sharing between the Region and other municipalities, Indigenous communities, and provincial and federal ministries and agencies on the experience of being a nuclear host community.
- Improved capacity for Durham Region to engage in and influence nuclear policy and provincial and federal decision making.
- Increased collaboration on environmental stewardship and economic opportunities with Indigenous communities, OPG and other stakeholders.
- Improved communication, co-operation and alignment with local area municipalities, other nuclear communities, Indigenous rights holders, and local elected officials on matters related to the nuclear sector.
- Increased interaction and co-operation with the nuclear industry, academia, and provincial and federal ministries and agencies on nuclear sector matters.

To achieve these outcomes, Durham Region will:

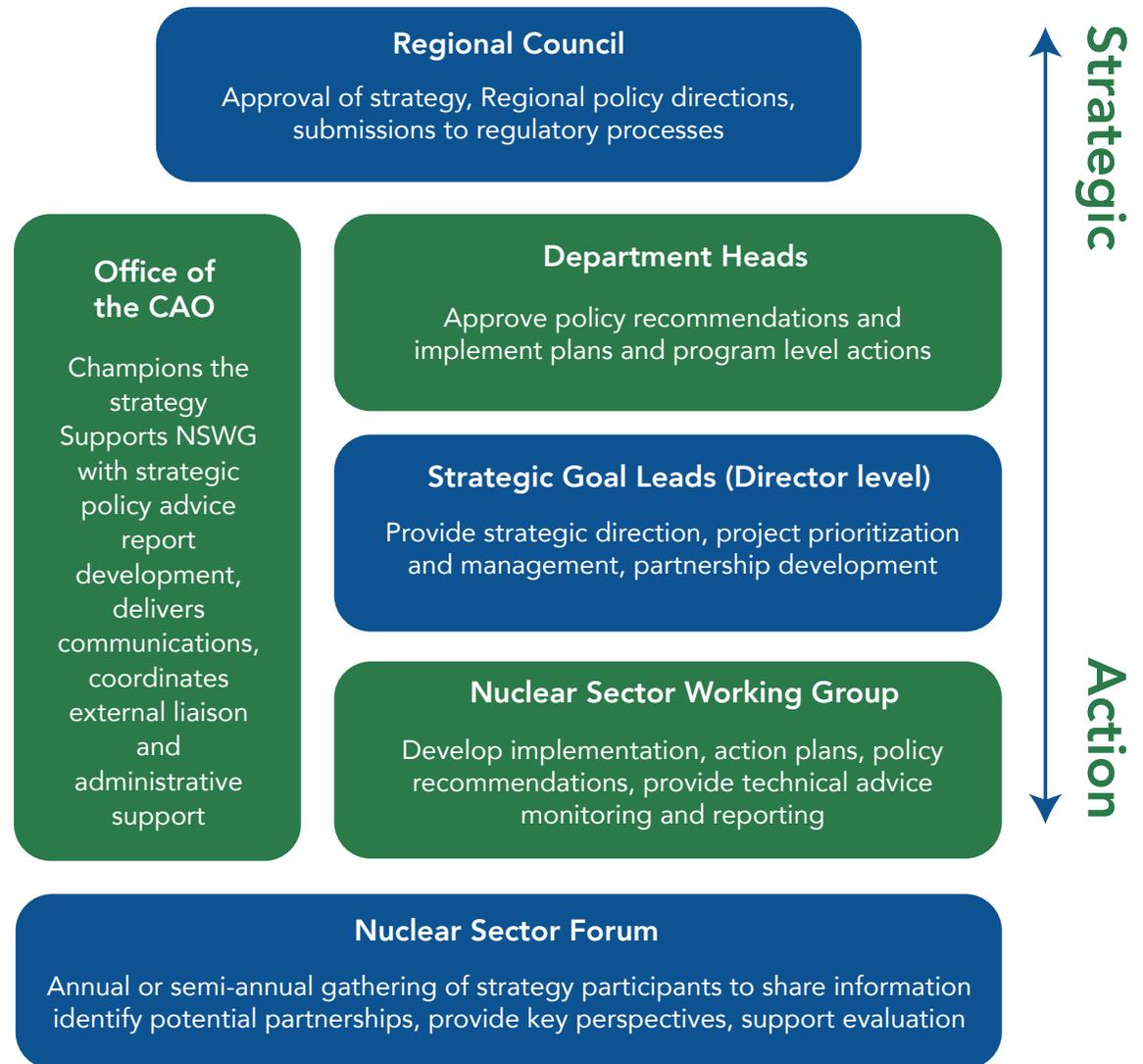
- Foster relationships with and among Indigenous rights holders and key stakeholders to increase communication and identify partnership opportunities.
- Establish formal partnerships with OPG, academia, Indigenous communities, and other nuclear sector organizations (e.g., AECL).
- Create regular opportunities to discuss and advocate on nuclear matters with MPs and MPPs.
- Actively participate in, and work with other nuclear host communities to build capacity and strengthen the role of CANHC.
- Establish a regular information forum to learn from leading nuclear sector experts, local area municipalities, Indigenous rights holders, partners, and stakeholders and engage in discussions, network, and share lessons learned.
- Attend and participate in nuclear sector conferences and events.

Governance

Delivery of the strategy actions will be the responsibility of Regional staff, with endorsement from Regional Council and in partnership with willing organizations in the sector.

The Region's internal Nuclear Sector Working Group has representatives from all departments and Director-level leads for each of the four goals in this strategy. This group will develop workplans to support the implementation of the strategy. With support from the CAO's Office, the Director-level strategy leads will be accountable for advancing key actions under their goal, in an integrated manner. Subcommittees of the working group will support key activities such as communications, preparation for CNSC hearings and research projects. The Working Group will bring reports and recommendations on nuclear issues to Regional Council via Committee of the Whole to establish Regional positions and submissions.

Recognizing the need for external advice and perspectives on the implementation of the strategy, the Region will explore new and leverage existing mechanisms to support community engagement and awareness, help identify partnership opportunities, and participate in strategy evaluation and renewal.



Implementation and financial plans

The Nuclear Sector Working Group will prepare an implementation plan identifying priorities for action to achieve the stated desired outcomes in the short (5 year), medium (10 year), and long-term future (beyond 10 years). The implementation plan will provide the framework for establishing annual workplans and budgets as part of the Region's regular business planning and budget cycle. However, flexibility to meet emerging opportunities will be essential. While some of the activity, such as community outreach or CNSC hearings, may occur on a predictable timeline, policy reviews, research projects, and grants or intervenor funding opportunities may occur at any time. These allocations will be tracked as investments in the nuclear sector strategy and linked to the goals. The results of the previous year's work plan will inform the development of subsequent work plans.

Example of implementation plan chart:

Goal	Action Item	Short Term	Longer Term	Resource Required	Partners
Grow understanding	Community awareness program	2022-2024	Ongoing	\$ Staff Time	OnTechU, OPG
Sustain and protect	Advocate for funding to support Regional and host municipal participation in CNSC hearings and nuclear policy reviews/development	2022-2023	Ongoing if required	Staff Time	NRCAN, CNSC, CANHC, LAMs
Maximize prosperity	Support OPG headquarters development	2022-2024		Staff Time	Clarington, OPG
Lead partnership	Participate in CANHC and other nuclear organizations, conferences	Annually	Ongoing	\$ Staff Time	CANHC, sectoral/partner organizations

Monitoring and evaluation plan

Within the strategy for each of the four major goal areas, we have outlined desired outcomes and actions. An evaluation plan including indicators, milestones and metrics related to the actions will be developed to gauge effectiveness or progress toward the desired outcomes.

Where appropriate and meaningful, quantitative data will be tracked (e.g., survey results, Durham's community engagement platform, website and social media analytics, number of new supply chain companies moving into the Region, change in employment associated with nuclear projects). Qualitative data will also be gathered such as evaluations of partnerships, forums and outreach efforts, storytelling about new local business development, exports of innovative nuclear technology, and results of research projects.

In the early years of the strategy, the establishment of structures to support the program will be reported as milestones. Early milestones will include:

- Launching the nuclear sector strategy with a virtual event
- Presenting the results of the Pickering fiscal and socioeconomic study to Regional Council
- Using the consultation and research findings to identify areas for improved communication in partnership with OPG, post-secondary institutions, rights holders, and other nuclear agencies
- Developing orientation materials/sessions for Regional staff and the next Regional Council on the sector and the strategy
- Developing outreach tools and surveys to gauge progress in improving levels of nuclear sector awareness among Regional staff, elected officials and the broader community
- Establishing a nuclear sector information sharing forum

Once these foundational actions are in place and the program evaluation plan is established, results will be tracked. The Nuclear Sector Working Group will provide a short annual report of actions to Regional Council, highlighting early results beginning in 2023.

Conclusion

With this strategy, the Region has set out actions within the scope of our authority and areas of interest so that our community and partners know how we plan to engage in the sector.

Open:

The strategy, action plans, associated budgets and progress reporting will be posted on the Region's website.

Accountable:

We will monitor the impact and effectiveness of our actions in supporting the four goals reporting annually on strategy milestones, progress indicators, research findings, etc.

Evolving:

We will use the results of previous years' plans and scans/analysis of emerging trends and opportunities in the sector to update and adapt implementation plans and review and update the strategy at least every 5 years.

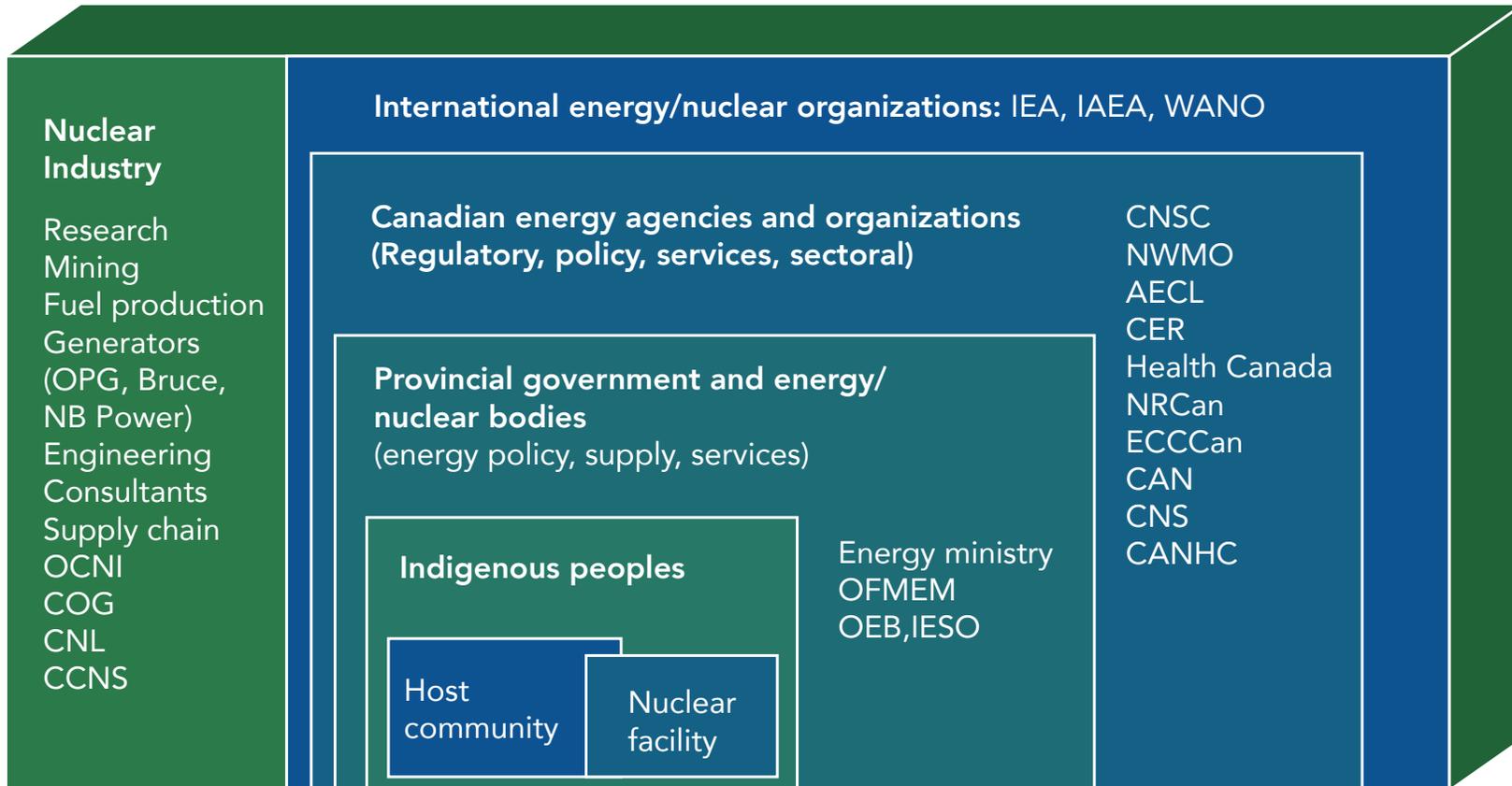
As a nuclear community for more than four decades, Durham Region has developed significant expertise in energy policy, nuclear regulatory processes, and community health and safety. Regional staff and decision-makers will track how this critical sector is evolving in Durham so we can plan and prepare for the changes and help shape decisions by others.

The strategy will assist the Region in prioritizing and aligning our actions internally and with external partners. It will enhance our capacity to keep pace with new developments in the sector, manage uncertainty and identify new opportunities. It will allow us to gauge our effectiveness over time and refocus our efforts as needed to shape Durham's nuclear future and achieve our vision of a healthy prosperous community for all.

Appendix A: acronyms

AECL	Atomic Energy of Canada Limited	PHWR	Pressurized Heavy Water Reactor
CANDU	Canada deuterium uranium (reactor)	REGDOC	Canadian Nuclear Safety Commission Regulatory Documents
CANHC	Canadian Association of Nuclear Host Communities	SMR	Small Modular Reactor
CER	Canada Energy Regulator	STEM	Science, Technology, Engineering and Mathematics
CNA	Canadian Nuclear Association	UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
CNL	Canadian Nuclear Laboratories	UNENE	University Network of Excellence in Nuclear Engineering
CNS	Canadian Nuclear Society	WANO	World Association of Nuclear Operators
CNSC	Canadian Nuclear Safety Commission		
CO ₂ e	Carbon dioxide equivalent		
COG	CANDU Owners Group		
CSA	Canadian Safety Association		
CSA	Canadian Standards Association		
DGR	Deep Geologic Repository		
DNNP	Darlington New Nuclear Project		
EA	Environmental Assessment		
ECCC	Environment and Climate Change Canada		
EPREV	Emergency Preparedness Review		
FNEP	Federal Nuclear Emergency Plan		
GHG	Greenhouse Gas		
IAAC	Impact Assessment Agency of Canada		
IAEA	International Atomic Energy Agency		
IEA	International Energy Agency		
IESO	Independent Electricity System Operator		
ILW	Intermediate Level Waste		
KI	Potassium Iodide		
LAM	Local area municipalities		
LLW	Low Level Waste		
MPAC	Municipal Property Assessment Corporation		
NRCan	Natural Resources Canada		
NWMO	Nuclear Waste Management Organization		
OCNI	Organization of Canadian Nuclear Industries		
OEB	Ontario Energy Board		
OFMEM	Office of the Fire Marshall and Emergency Management		
OPG	Ontario Power Generation		
PDP	Preliminary Decommissioning Plan		
PHAI	Port Hope Area Initiative		

Appendix B: nuclear sector ecosystem



Appendix C: legislative and regulatory framework

The direction and regulation of the nuclear sector in Canada and Ontario is complex.

Provincial framework

Ministry of Energy

Electricity Act

- Oversees the energy regulatory framework
- Develops broad energy policy guiding generation mix, energy efficiency and conservation through the Long Term Energy Plan
- Administers Smart Grid Fund

Ministry of Finance

Assessment Act

Municipal Property Assessment Corporation Act

- Sets property tax rates on energy facilities through legislation
- Oversees assessment system delivery agency, Municipal Property Assessment Corporation (MPAC) (which is funded by municipalities)

Ministry of the Solicitor General

Emergency Management and Civil Protection Act

- Responsible for administration of the Provincial Nuclear Emergency Response Plan (administered by the Office of the Fire Marshall and Emergency Management)

Ontario Energy Board

Sets rules, establishes rates, licenses energy companies, monitors the wholesale market, develops new rate structure policies and educates consumers.

Independent Electricity System Operator

Competitively procures power, operates the power system, balances supply and demand, oversees the electricity market, plans for Ontario's future energy needs (i.e., plans resources for supply), promotes energy efficiency (Save ON energy programs) and operates the Smart Meter program.

Local Distribution Companies

(e.g., Elexicon, Oshawa Power and Utilities Corporation, Hydro One)

Distribute energy to homes and businesses via local energy transmission systems which they own and maintain.

Ontario Power Generation

Primary generator of bulk electricity in Ontario with nuclear, hydro, gas fired and renewable generation. Wholly owned by the Province of Ontario.

Bruce Power

Operates the Bruce Nuclear Generating Station under contract. The station is owned by Ontario Power Generation.

Distributed Energy Resources

Dispersed capacity for electricity generation (e.g., wind turbines, solar installations) and storage. There are various ownership models (e.g., Indigenous energy projects).

Hydro One

Owns, plans and operates the bulk electricity transmission system in Ontario. Also acts as a local distribution company in parts of the Province (mainly northern Ontario, but also Brock Township). Majority of shared owned by the Province. OPG is also a shareholder.

Municipalities

Develop community energy plans, climate change plans, may wholly or partially own a local distribution company.

Federal framework

Canada Energy Regulator

The Canada Energy Regulator (CER) regulates pipelines, energy development and trade in the Canadian public interest. CER regulates pipeline and power line projects across their lifecycle.

Ministry of Natural Resources

Nuclear Energy Act

Nuclear Safety and Control Act

Nuclear Fuel Waste Act

Nuclear Liability and Compensation Act

Public Safety Canada

Emergency Management Act

Health Canada

Health Canada leads the Federal Nuclear Emergency Plan (FNEP) and is responsible for coordinating the nuclear emergency response of more than 18 federal organizations to support affected provinces and territories.

Ministry of Environment and Climate Change

Environmental Assessment Act 2012

Impact Assessment Act 2019 (administered by Impact Assessment Agency of Canada)

Canada Environmental Protection Act

Species at Risk Act

Minister of Transportation

Navigation Protection Act

Transportation of Dangerous Goods Act

Minister of Fisheries and Oceans

Fisheries Act

Agencies

Canadian Nuclear Safety Commission

The Canadian Nuclear Safety Commission (CNSC) regulates the use of nuclear energy and materials to protect health, safety, security and the environment; to implement Canada's international commitments on the peaceful use of nuclear energy; and to disseminate objective scientific, technical and regulatory information to the public.

CNSC was established in 2000 under the Nuclear Safety and Control Act and reports to Parliament through the Minister of Natural Resources. CNSC was created to replace the former Atomic Energy Control Board, which was founded in 1946.

Regulates nuclear facilities at all life cycle stages from planning to operation to decommissioning through licensing and regulatory processes.

The CNSC has up to seven appointed permanent members whose decisions are supported by more than 800 employees. These employees review applications for licences according to regulatory requirements, make recommendations to the Commission, and enforce compliance with the Nuclear Safety and Control Act, regulations, and any licence conditions imposed by the Commission.

The CNSC issues regulatory documents (REGDOCs) that outline policies that guide the nuclear sector in Canada and practices required of the sector. For example, REGDOC-2.11, Framework for Radioactive Waste Management and Decommissioning in Canada provides an overview of the governance and regulatory framework for radioactive waste management and decommissioning in Canada. These documents are periodically updated through a process that offers opportunities for public and industry comment.

The CNSC regulates operations through monitoring, compliance and enforcement.

Impact Assessment Agency of Canada (formerly Canadian Environmental Assessment Agency)

Conducts EAs for major infrastructure and energy projects including new nuclear reactors, nuclear refurbishments, and new nuclear storage.

Joint Review Panels

Formed by the Impact Assessment Agency of Canada (IAAC) for Environmental Assessments (EA) / licencing of major nuclear projects and may include experts from both CNSC and IAAC.

Atomic Energy of Canada Limited

As a federal Crown corporation, Atomic Energy of Canada Limited's (AECL) mandate is to enable nuclear science and technology and to protect the environment by fulfilling the government of Canada's radioactive waste and decommissioning responsibilities.

AECL's mission is to realize value to Canadians by driving nuclear innovation, creating a state-of-the-art nuclear campus, and cleaning up our legacy wastes.

AECL receives federal funding to deliver on its mandate and reports to Parliament through the Minister of Natural Resources. It also leverages the unique capabilities at its sites to support industry and other third parties on commercial terms.

AECL delivers its mandate through a long-term contract with Canadian Nuclear Laboratories for the management and operation of its sites.

Nuclear Waste Management Organization

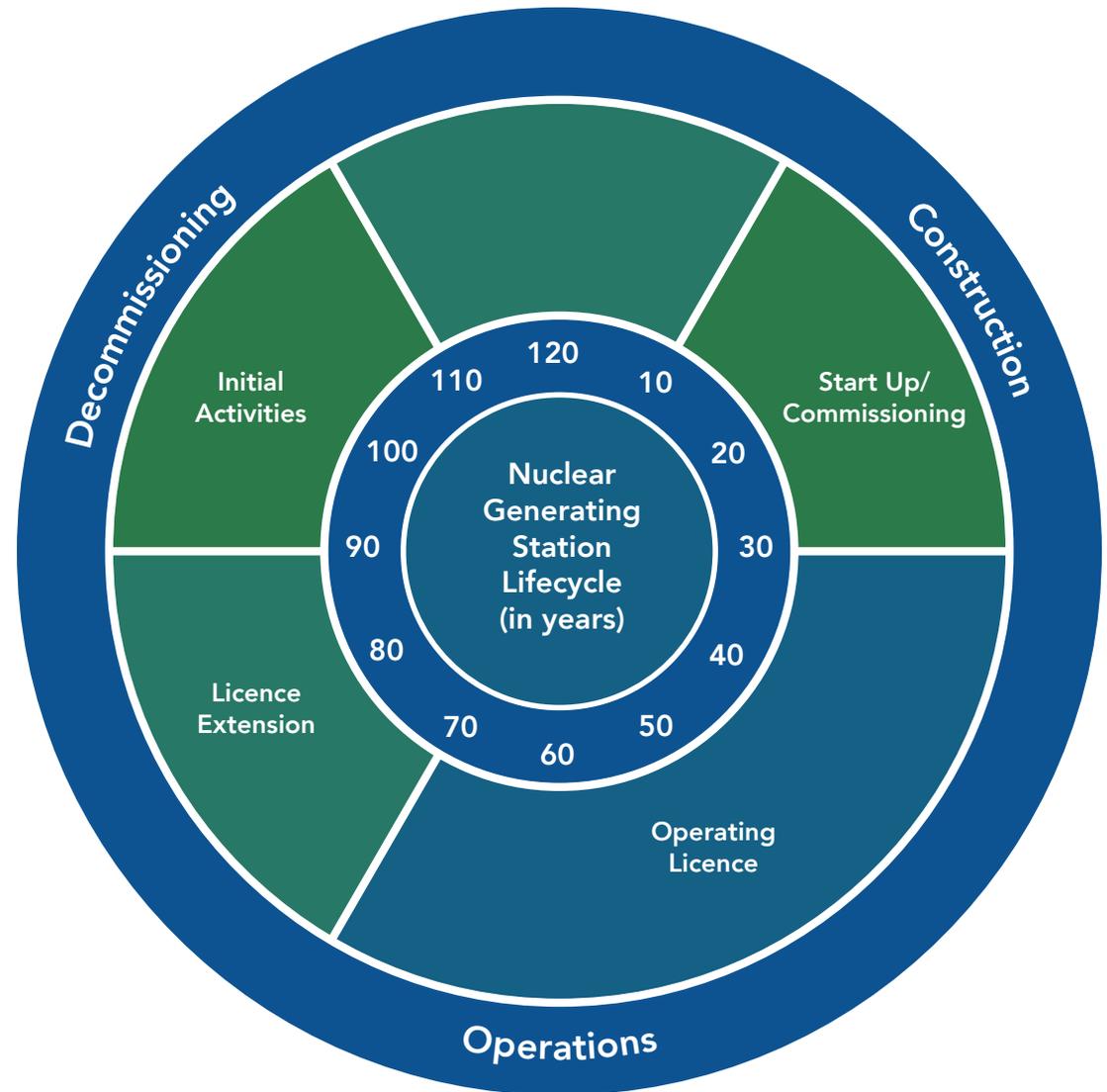
Non-profit agency established in 2002 by the energy generators under the Nuclear Fuel Waste Act. Responsible for designing and implementing Canada's adaptive phased management plan for long-term management of used nuclear fuel.

Includes public engagement, site selection (since 2010) and facilities and equipment design.

Appendix D: nuclear generating station lifecycle

The lifecycle of a nuclear generating station can extend over more than a century. Public engagement and community benefits are highly visible as the station is planned and built. Direct and indirect employment and development of the supply chain are clear benefits during the operational phases and refurbishment. At the end of the facility life cycle, attention turns to declining employment and the need to safely deactivate then dismantle the station, dispose of waste materials and restore the site to new uses.

The CNSC issues four types of licences for a nuclear power plant that align with the lifecycle stages: site preparation, construction, operation, and decommissioning.



Appendix E: radioactive waste stored in Durham Region

A variety of low- and intermediate-level radioactive waste and used nuclear fuel is presently safely stored in Durham Region at facilities licensed by the CNSC. NRCAN is in the process of updating the federal policy governing radioactive waste. In 2007, the NWMO was mandated to develop a deep geological repository for used nuclear fuel. The deep geologic repository will begin to accept used fuel from interim storage facilities including Pickering and Darlington in the mid-2040s. In 2021, they were additionally tasked with developing an integrated strategy for the management of low- and intermediate-level wastes.

NWMO is continuing to monitor worldwide developments in advanced fuel cycles, including fuel reprocessing and recycling technologies and determine if Canada's used fuel may be partially reused.¹⁴

Port Hope Area Initiative

The Port Hope Area Initiative (PHAI) is a federal initiative for the remediation of contaminated sites and safe, long-term management of historic low-level radioactive waste resulting from the operations of Eldorado Nuclear Limited. The site is owned by Atomic Energy of Canada Limited (AECL), a federal crown corporation mandated to enable nuclear science and technology and to fulfil the government of Canada's radioactive waste and decommissioning activities. AECL has a long-term contract with Canadian Nuclear Laboratories to fulfil this mandate.

The Eldorado Nuclear Limited uranium refinery operated in Port Hope from the 1930s to the 1980s. The estimated 1.2 million cubic metres of low-level waste in the Port Hope¹⁵ area represents 93% of the historic low-level radioactive waste in Canada¹⁶.

The Port Granby site at the south-eastern boundary of the Municipality of Clarington contained low-level radioactive waste deposited between 1955 and 1988. Approximately 1.3 million tonnes of waste have been relocated from the former Port Granby waste management facility on the shore of Lake Ontario to a new, engineered above ground mound about 750 metres north of the legacy site. The facility includes an engineered aboveground mound and dedicated wastewater treatment facility.

This management approach was selected following the Environmental Assessment (EA) for the Port Granby Project, conducted from 2002 to 2008, which included detailed environmental and technical studies and extensive public consultation. It was endorsed by the federal government and the Municipality of Clarington Council.

In 2011, the CNSC granted a licence for the Port Granby Project to proceed. In 2012, Canada committed \$1.28 billion for the PHAI, including \$273 million over 10 years for the Port Granby Project. Site preparation work began in 2015 and the mound was successfully capped in October 2021. It has systems in place to monitor the site for hundreds of years. Clarington has confidence in the Port Granby facility.

Pickering Nuclear Generating Station

The Pickering Nuclear Generating Station began operating in 1971. This station currently houses 396,935 bundles of used nuclear fuel in wet storage (cooling pools) and 395,494 bundles in four dry storage facilities.¹⁷ Two additional waste management buildings and a new processing building are planned by 2028. Low- and intermediate-level waste from Pickering operations has historically been shipped for processing and storage at the OPG Western Waste Management Facility in Kincardine. There is also 1,012 cubic metres of intermediate-level waste from the refurbishment of Pickering A stored in dry storage modules.¹⁸ The used fuel and intermediate-level wastes are safely stored in interim waste facilities licensed by the CNSC.

The current operating licence allows OPG to operate the Pickering Nuclear Generating Station until the end of 2024 and then begin the first steps of decommissioning (defueling, dewatering, preparing for safe storage) until 2028. The total projected used fuel waste by the end of that process would be 781,000 bundles. The Province of Ontario has asked OPG to seek CNSC approval to operate some reactors through 2025.

According to OPG's Pickering Preliminary Decommissioning Plan (PDP),¹⁹ the used fuel will remain onsite until the NWMO DGR is available. Dismantling and demolition of the station will not begin until all used fuel has been removed.

The decommissioning process will produce 62,016 cubic metres of low-level radioactive waste and 6,102 cubic metres of intermediate-level waste.²⁰ According to the PDP, this waste was to be sent to the proposed low- and intermediate-level waste DGR in Kincardine, Ontario. However, OPG withdrew the DGR application in Spring 2020. Restoration of the Pickering site for beneficial reuse occurs after the low- and intermediate-level waste is removed.

Darlington Nuclear Generating Station

The Darlington Nuclear Generating Station currently houses 313,853 bundles of used nuclear fuel in wet storage and 271,015 bundles in dry storage containers. In addition, 628 cubic metres of intermediate-level retube waste is stored onsite in regulated containers.²¹ With the refurbishment underway, generation at the site is expected to conclude in 2055, at which point there is expected to be 1.271 million used fuel bundles on site.

The refurbishment project produces low- and intermediate-level waste which is also being stored onsite. Used fuel and intermediate-level wastes are safely stored in interim waste facilities licensed by the CNSC.

Appendix F: upcoming CNSC licence hearings

Over the next decade, eight licensing hearings are anticipated related to the nuclear facilities in Durham Region.

Timeframe	Type of CNSC licence application
2022	Phase III – Consolidation of waste nuclear substance licence for Port Hope/Port Granby Facilities – long-term maintenance and monitoring
2022	Expected – Licence to extend Pickering Nuclear Generating Station operations to 2025
Early 2023	Darlington Waste Management Facility – Licence renewal
2024	Darlington New Nuclear Project – Licence to construct a new reactor
Fall 2025	Darlington Nuclear Generating Station – Licence renewal
Spring 2027	Pickering Waste Management Facility – Licence renewal
2028	Darlington New Nuclear Project – Licence to operate a power reactor
2031	Darlington New Nuclear Project – Renewal of licence to prepare the site for potential future reactors

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Endnotes

- 1 From Wallace, S. I. (2020) in references.
- 2 Ontario Power Generation is an agency of the province of Ontario.
- 3 From Office of Nuclear Energy (2021) in references.
- 4 Adapted from Schlömer S., et al. (2014). See references.
- 5 From Canadian Nuclear Safety Commission Transport FAQs (2021) in references.
- 6 From Ministry of Energy, the end of Coal (2021) in references.
- 7 Radiation Health in Durham Region reports available upon request from the Durham Region Health Department.
- 8 From Ontario's Nuclear Advantage (2021) in references.
- 9 From Office of the Premier (2021) in references.
- 10 Ontario Power Generation also owns two nuclear generating stations that are leased to Bruce Power.
- 11 From Ontario Power Generation, About us (2021) in references.
- 12 From Ontario Power Generation, OPG paving the way for small modular reactor deployment (2020) in references.
- 13 From Ontario Power Generation, the unseen wonders of nuclear power (2021) in references.
- 14 From Nuclear Waste Management Organization, Watching brief on advanced fuel cycles and alternative waste management technology (2021) in references.
- 15 From the Canadian Nuclear Safety Commission, Seventh Canadian National Report for the Joint Convention (2020) in references.
- 16 From Natural Resources Canada, Inventory of Radioactive Waste in Canada (2016) in references.
- 17 From Gobien. M., and Ion, M. (2020) in references.
- 18 From the Canadian Nuclear Safety Commission Inventory of Radioactive Waste in Canada in the Seventh Canadian National Report for the Joint Convention (2019). See references.
- 19 From OPG, letter to CNSC, 2017 Submission of Preliminary Decommissioning Plans including P-Plan-00960-0001 R002 – Pickering Generating Stations A & B, CD#NCORR-00531-18384.
- 20 From the Canadian Nuclear Safety Commission Inventory of Radioactive Waste in Canada in the Seventh Canadian National Report for the Joint Convention (2019). See references.
- 21 Ibid.