# Nuclear Sustainability & Decommissioning Strategies

April 2024 • Pickering Community Advisory Committee

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# Nuclear Sustainability & Decommissioning Overview


**New Nuclear**

**Darlington NGS**
**(4 Candu Reactors)**

**Bruce NGS**
**(8 Candu Reactors)**

**Pickering NGS**
**(8 Candu Reactors)**

Waste Facilities – PN, DN and Western Waste

We have the responsibility to safely manage the Operating & Decommissioning wastes from 3 Nuclear Stations ► 20 Reactors, and OPG's 3 Waste Facilities

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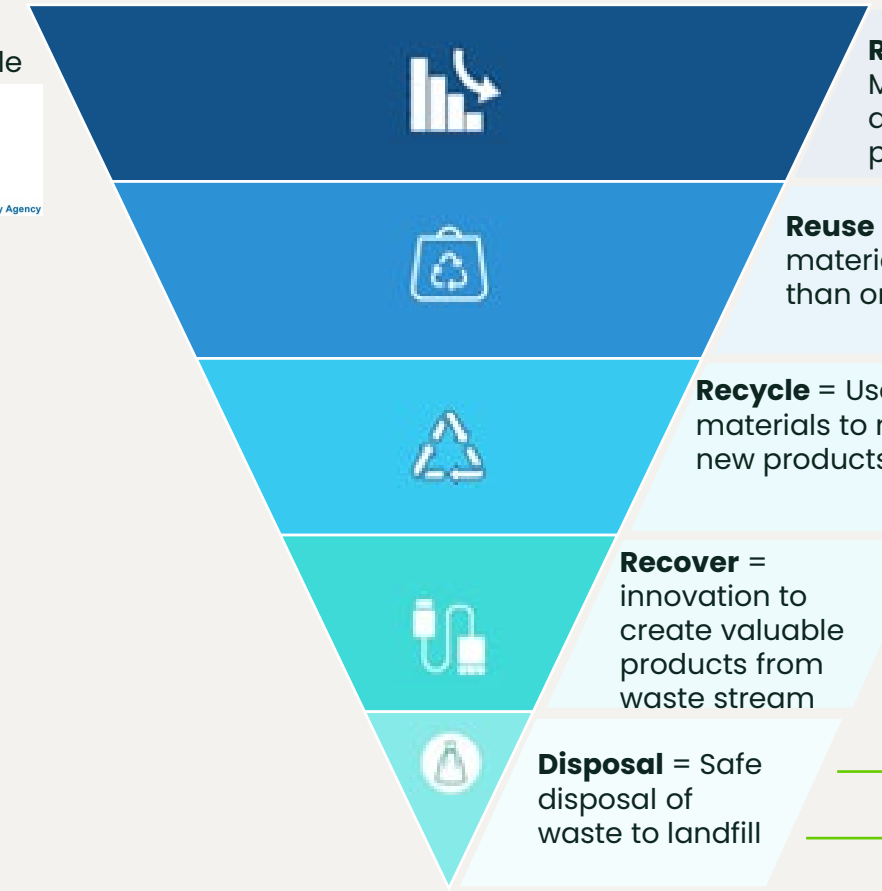
# Strategic Plan: Focus on Waste Minimization

**Why are we focusing on waste minimization?** In 2021, we embraced the **3R's** and developed key initiatives to **reduce** our environmental footprint, to **be ready for OPG's nuclear growth program**.

Most Desirable

IAEA International Atomic Energy Agency



**Reduce** = Minimize the amount of waste produced

**Reuse** = Use materials more than once

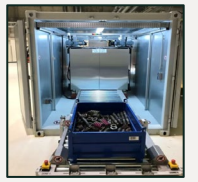
**Recycle** = Use materials to make new products

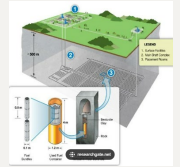
**Recover** = innovation to create valuable products from waste stream

**Disposal** = Safe disposal of waste to landfill

## Strategic Plan Main Initiatives

- Waste minimization at stations
- **WCSR Sort & Seg Facility**
- **Resin processing & C-14 isotope capture**
- **Free release governance & research (LEP)**
- **Metal decontamination and processing**
- **By-product Isotopes** Strategy: Tritium, Helium-3, Heavy Water, Carbon-14
- LLW disposal consent-based siting
- Support NWMO DGR siting (HLW/ILW)







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# Lasting Solutions for Waste

**OPG remains committed to the safe and permanent disposal of nuclear waste; technically sound and international best practice**

## Used fuel or High-Level Waste

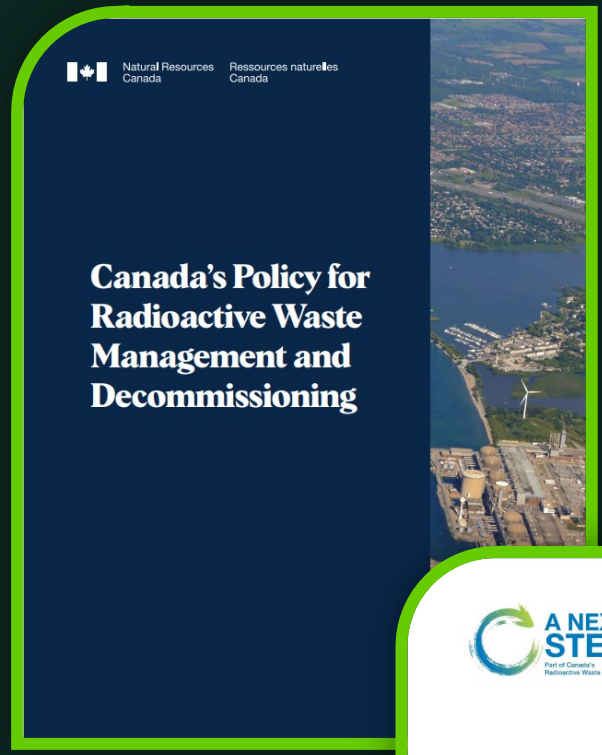
- OPG supports Nuclear Waste Management Organization (NWMO) process to site a Deep Geological Repository for Canada

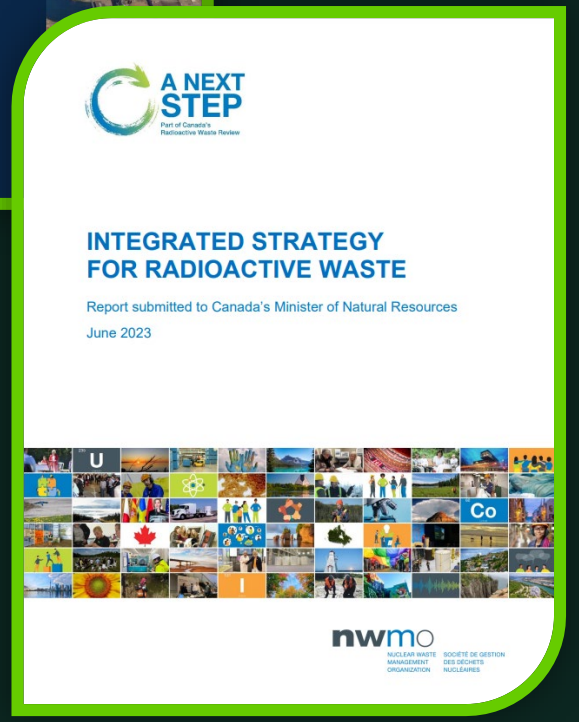
## Intermediate-Level waste (ILW)

- Federal Government's *Integrated Strategy for Radioactive Waste* (ISRW) outlines the Nuclear Waste Management Organization (NWMO) as responsible for the ILW disposal

## Low-level waste (LLW)

- OPG is responsible for LLW, as outlined in the ISRW
- Currently developing a long-term plan



# All waste in our care falls under three categories of action.

## Preventing

**We prevent waste before it is created.**

**OPG's NS division takes many actions to reduce the amount of total waste we produce.**

**Within every level of waste we manage we are successfully finding solutions to ensure we prevent waste from being created.**

## Managing

**We manage the waste in our care.**

**A small percentage of the waste generated by nuclear power must be effectively disposed of for the long term.**

**This action - Managing Waste - speaks to our long-term stewardship and commitment to safety. While abiding by federal and international regulations we ensure not even an ounce of waste is left unmanaged.**

## Harnessing

**We harness waste and by-products to make nuclear power useful beyond just generation.**

**Here we find the most innovative and directly beneficial of our actions. The nuclear industry has made massive leaps in creating a more circular economy. Our waste and by-products benefit many industries including: Healthcare, Food, Pharmaceuticals, Computing, and new nuclear.**

# Path to minimization – Strategic Initiatives

**Western Clean-Energy Sorting & Recycling**


**Metal Reduction**

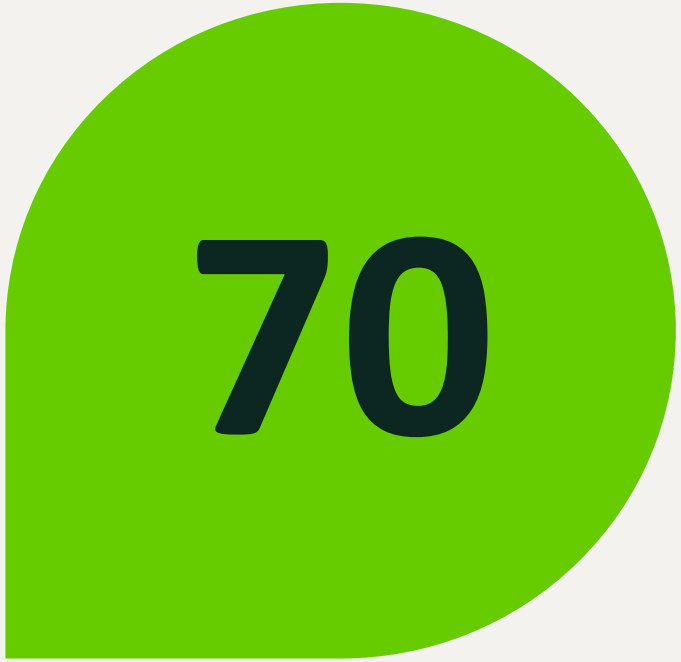
**ILW Resin Processing**

**Waste Minimization & Diversion at the Site/Source**

# Nuclear Sustainability Services – Pickering Waste Management Facility (NSS-PWMF)

## Operations

- In 2023 Used Fuel from Pickering Nuclear Generating Station (PNGS) continued to be removed from the station, and stored safely and on time.
- In 2023, Pickering loaded 70 Dry Storage Containers (DSCs), hitting our 2023 target of 70.
- Current 10-year operating licence to 2028.




**Dry Storage Containers loaded and transferred in 2023**

# Safety

## Nuclear Safety

- Public and employee safety remains OPG's top priority.
- Safety Analysis demonstrates that public and worker dose remains within CNSC regulatory limits during normal operations, and within Safety Report acceptance criteria due to credible accidents and malfunctions.
- OPG's exemplary record of public and employee safety is supported by the Waste Management Facility Safety Report summary, available on Reporting > Regulatory reporting - OPG

## Radiation Safety

Radiation Protection has four key objectives:

- Keeping individual doses below regulatory limits.
- Preventing unplanned exposures.
- Maintaining individual risk from lifetime radiation exposure at an acceptable level.
- Ensuring collective doses are As Low As Reasonably Achievable (ALARA).

## Recent Provincial Announcement

## Pickering Nuclear Units 5-8 Refurbishment

## Jan 30, 2023

## Pickering Units 1-4 will be decommissioned as planned


- Secure more than 2,100 MW of clean, reliable nuclear power for 30+ years.
- Powering 2 million homes
- Maintain and secure highly skilled jobs.
- Create $19 billion economic impact over the refurbishment period

# Loading 6-Year Cooled Fuel into DSCs at NSS-PWMF PN

- OPG has requested an amendment to the Waste Facility Operating Licence (WFOL) at NSS- PWMF to allow for the storage of minimum 6-year cooled fuel to support PNGS Units 5-8 Refurbishment defuelling activities.
- Submission to the Canadian Nuclear Safety Commission (CNSC) for this Licence amendment was completed in June 2023 with a written hearing scheduled Q2 2024.
- The storage of 6-year cooled fuel at NSS-PWMF has been assessed and will have negligible effect on the safe operation of PWMF, public, environment and worker safety.

# Storage Building 5

- A new storage building is required to provide adequate storage space for DSCs at NSS-PWMF until a permeant Deep Geological Repository (DGR) is in-service in mid 2040s. The planned capacity of Storage Building 5 is 1,400 DSCs.
- Initial planning is underway to construct the storage building, with construction planned for 2026.
- Existing WFOL allows for up to a total of six (6) storage buildings onsite.

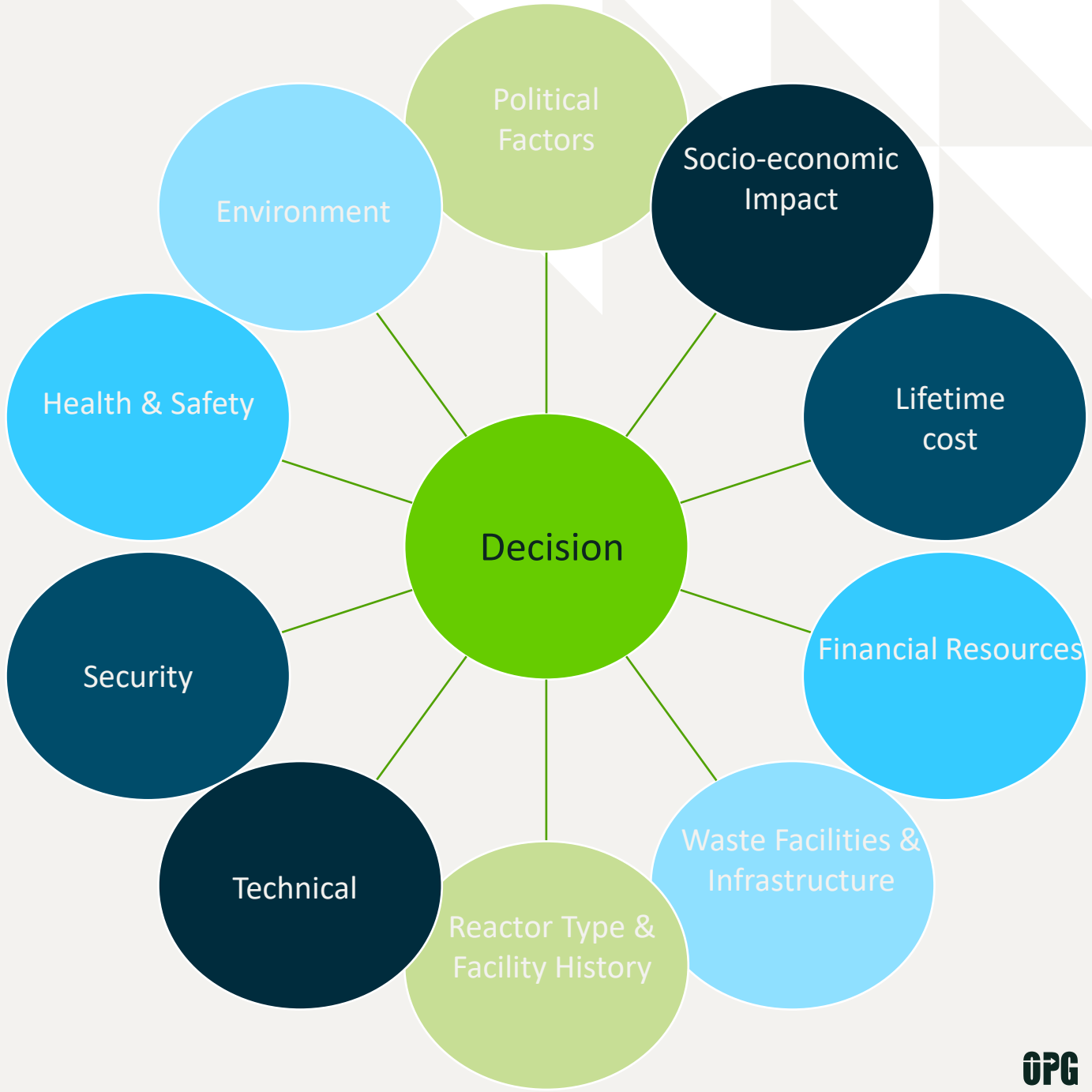
# Pickering Component Storage Structure (PCSS)

- To support the refurbishment of Pickering NGS Units 5-8, additional onsite interim storage space for removed L&ILW reactor components is required.
- A Letter of Intent to construct the PCSS was submitted to the CNSC on February 1, 2024.
- License Amendment Submission to CNSC is planned for Q2 2024.

# Decision Factors

OPG will utilize a Decision Matrix to develop decommissioning plans that are safe, scientifically-sound, sustainable, fiscally responsible, and aligned with international best practices.

The framework will incorporate regulatory requirements, OPEX and input from industry, community and indigenous stakeholders.



# Unlocking the promise of tomorrow

- OPG's reactors also produce Tritium, used in the production of self-powered lights, medical research, and nuclear fusion development
- Laurentis is also helping to extract high-purity Helium-3 (He-3), a rare isotope used in quantum computing, border security, and medical imaging
- Nuclear projects | Nuclear isotopes – OPG

# Electrifying life

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