Case Study 4

# The Canadian geological disposal facility siting process

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# Introduction

The United Kingdom (UK) is one of a significant number of nations currently engaged in a process to identify a suitable site for a Geological Disposal Facility (GDF), a final disposal site for Higher Activity nuclear waste, located many hundreds of metres underground.

The approaches taken in different countries vary. One process that has many characteristics in common with that in the UK, but also some distinct dimensions, is that being undertaken in Canada.

A significant milestone in the Canadian siting process was achieved at the end of 2024, when the **Nuclear Waste Management Organisation (NWMO),** the body responsible for the delivery of a GDF, announced that the **Township of Ignace**, Ontario and the **Wabigoon Lake Ojibway Nation** had been selected as the host community for the Canadian repository for Spent Nuclear Fuel (SNF)[1]. This follows over a decade of engagement between the NWMO and a range of communities across Canada.

This Case Study outlines the Canadian process, the key learning points and how challenges to date have been overcome.

# Background

Canada has been using nuclear power for over 50 years. This has generated SNF which is currently stored at existing reactor sites in Ontario, Quebec and New Brunswick. The Canadian waste inventory is smaller and less complex than the UK's, but still requires a long term solution.

The **Nuclear Fuel Waste Act (2002)[2]** established the **Nuclear Waste Management Organisation (NWMO)** as the body responsible for the safe long term management of Canada's used nuclear fuel, including that created in current and future reactors.

In 2007, NWMO adopted an **Adaptive Phase Management (APM)[3]** approach to the safe long term management of nuclear waste, following three years of dialogue with Canadians and Indigenous people. From this dialogue, common ground emerged:

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[1] Statement from the Minister of Energy and Natural Resources on Site Decision for Canada's Deep Geological Repository
[2] Nuclear Fuel Waste Act
[3] Canada's plan

- Canadians said that they expected the country to assume responsibility now, in this generation, for the waste produced to meet their energy needs.
- Canadians did not want an approach that was irreversible. They wanted a flexible approach that would allow succeeding generations to make improvements based on new knowledge or changing priorities.
- While the chosen approach must obviously meet a number of objectives, Canadians were absolutely clear that safety and security be pre-eminent.

APM covers both what the NWMO wanted to build (a deep geological repository) and a plan as to how they would work with others to deliver it.

## Site selection

The search for a site for the Canadian used nuclear fuel repository began in 2010[4], following a further two year dialogue with a broad cross-section of Canadians who shared their thoughts on what an open, transparent, fair and inclusive process should look like. It was built on a set of **guiding principles**[5] and was developed within NWMO's **ethical framework[6].** The process was designed to ensure:

- The selected site is safe and secure;
- It has informed and willing hosts; and
- It meets the highest scientific, professional and ethical standards.

One of the principles guiding the Canadian site selection process is community well-being. It is recognised that any community that agrees to host the facility has a right to benefit from doing so and that the project must be implemented in a manner that fosters the long-term well-being or quality of life of the community and region in which it is implemented.

As with the UK policy, the Canadian process has been underpinned by a requirement for community consent, as expressed in a 'Compelling Demonstration of Willingness' (i.e. a Test of Public Support). However, the Canadian process differs in that it requires consent both from the host municipality and also from the local rights-bearing Indigenous population[7].

[4] How it was developed
[5] Guiding principles
[6] Ethical and social framework
[7] Section 35 Aboriginal and Treaty Rights - Centre for Constitutional Studies

Prior to 'development', and following the community willingness decision, NWMO requires the go-ahead of the Canadian nuclear regulator (Canadian Nuclear Safety Commission (CNSC)) and the Impact Assessment Agency of Canada (IAAC).

By 2012, 22 communities across Ontario and Saskatchewan had proactively expressed an interest in learning about the project and their potential to host it. Together with communities, 'potential sites' were assessed for their ability to meet the project's safety requirements; the possibility of developing a safe and socially acceptable plan to transport the used nuclear fuel to the site; and the potential to build supportive and resilient partnerships.

By 2020, engagement activity had become focussed on two sites, one in the **Wabigoon Lake Ojibway Nation-Ignace** area and one in the **Saugeen Ojibway Nation-South Bruce** area, both in Ontario. Both locations received community benefit payments for their participation in the siting process.

Wabigoon Lake Ojibway Nation has a registered population of around 1,123 people, with approximately 180 living on the reserve. Ignace, a nearby township, has a population of about 1,200 residents. The economy in this area is primarily driven by natural resource-based activities, including forestry and mining, government services  and with some level of tourism due to its natural beauty and outdoor recreational opportunities.

The Saugeen Ojibway Nation, which is comprised of the Saugeen First Nation and Chippewas of Nawash Unceded First Nation, has a population of approximately 6,500 people. Economic drivers include fishing, tourism and administering local government. South Bruce has a population of approximately 6,500 and has a diverse economy with agriculture, manufacturing, and services playing important roles. The Bruce Nuclear Power Plant is also located in the vicinity of both communities and has a significant impact on employment and other industry in the area.

The Municipality of South Bruce worked to develop a Hosting Agreement, which outlines the terms and conditions if South Bruce were to be selected for the location of the GDF. The Hosting Agreement was built on 36 Guiding Principles, developed with community input - focusing on safety, community benefits, and ongoing municipal involvement. The agreement also details the process for South Bruce to exit the selection process if it decides not to be a willing host or if the community was not selected to host the GDF.

The municipality also utilised independent experts to review the work conducted by the NWMO. This process involved continuous interaction, and provided independent assessment to ensure the studies align with the community's Guiding Principles. This approach successfully built trust and equipped the community with reliable information for informed decision-making.

Towards the end of 2024, after almost 14 years of technical study and engagement in the area, **Ignace** and the **Wabigoon Lake Ojibway Nation (WLON),** in northern Ontario were selected as the location for the Canadian GDF[8]. This follows positive votes by both the local Ignace municipality (77% in favour)[9] and the Indigenous community.

The community of **South Bruce** voted more narrowly (51% in favour) to proceed. The **Saugeen Ojibway Nation** was engaged in a willingness process for many years, but at the time of the selection of **Wabigoon Lake Ojibway Nation-Ignace** had not completed this process.

Nuclear Waste Management Organization (NWMO) President and CEO Laurie Swami hailed the decision as an 'historic moment' adding that *'This project will solve an environmental issue and supports Canada's climate change goals. And today's decision was driven by a consent-based siting process led by Canadians and Indigenous peoples. This is what making history looks like.'*

## Taking the process forward

The project has now progressed to the regulatory decision-making stage. Again this is distinct from the UK in that the Indigenous community will oversee a parallel regulatory process.

The NWMO has agreed to an Indigenous-led **Regulatory Assessment and Approval Process (RAAP)** that will be developed and implemented by Wabigoon Lake Ojibway Nation. This will assess the potential impacts of the project against WLON's community values, with conditions to mitigate any impacts designed by Wabigoon Lake Ojibway Nation and complied with by the NWMO.

RAAP will run alongside the regulatory decision-making processes of the Canadian Nuclear Safety Commission and the Government of Canada's impact assessment process.

Public participation and Crown consultation are other important parts of the assessment process. These will begin in 2025 and continue throughout the regulatory decision-making process. In addition, a public participation plan will be developed by the Impact Assessment Agency of Canada (IAAC), in consultation with the Canadian Nuclear Safety Commission (CNSC). Some of these activities will involve coordinating with the NWMO, while others will be separate.

[8] Canada selects location for used nuclear fuel repository - World Nuclear News
[9] Ignace council votes in favour of potential nuclear waste repository | CBC News

It is currently anticipated that construction of the repository could begin in the early 2030s, with the GDF becoming operational in the 2040s.

SNF is currently located at nuclear electricity generating sites across Canada, and the NWMO is still looking at road, or a combination of road and rail transport to move waste to the repository site. Regulations do not allow NWMO to disclose security information on the location, routes and timing of shipments or the procedures specific to the transportation of used nuclear fuel. What NWMO can say is that routes will predominantly be along major provincial highways or class 1 rail lines.

## Cost and funding

The anticipated cost of the project from beginning to end is $26 billion CAD (*circa* £16.2 billion GBP) over the lifetime of the project's 175 years (in 2022 dollars).

In contrast to the UK, where the liability for management of waste and SNF from early nuclear sites rests with the Government/taxpayer, the project is funded by the waste owners in Canada: Ontario Power Generation, New Brunswick Power, Hydro-Québec and Atomic Energy of Canada Limited with this being met through a levy on bills.

The **Nuclear Fuel Waste Act (NFWA)** requires each of these four companies to establish independently managed trust funds and make annual deposits to ensure the money to fund this project will be available when needed. The estimate includes costs to develop, construct, operate, monitor, and decommission the repository, as well as build a Centre of Expertise and transport the fuel. This funding model is similar to that applied to the UK's current nuclear fleet, operated by EDF, although it is not clear if the funds set aside in the UK will cover all liabilities for decommissioning and waste management from these sites.

Paying for the long-term management of used nuclear fuel is a relatively small portion of the cost of electricity in Canada – the bill levy equates to about 0.1 cent per kilowatt hour of electricity produced

## Key messages from the Canadian experience

Three years of engagement on the potential approach to long term management/disposal of SNF was undertaken with Canadians and Indigenous peoples before the policy of Adaptive Phase Management (APM) and geological disposal was agreed. Through this engagement, the majority view of Canadians and Indigenous people was that it is essential for this generation to safely manage

Canada's used nuclear fuel for the long-term. It should not be left as a burden for future generations to manage.

It was essential to recognise and respect the distinct views and the priorities that both Canadians and Indigenous peoples identified as important at the outset of the site selection process.

Finding a consenting community took more than 14 years of technical study and engagement. The host communities of Ignace (Municipality) and Wabigoon Lake Ojibway Nation (First Nation) have demonstrated in a compelling way that they are informed and willing – that they have an awareness, then an understanding, and then a confidence in the safety of hosting a Deep Geological Repository (i.e. GDF) and support moving forward in the process.

Ignace and WLON had distinct paths to get to their demonstrations of Willingness. Both had a decade or more of ongoing engagement in the community, talking about many topics described throughout this document. NWMO engaged though coffee chats, individually with members of the community, open houses, guest speakers, tours of nuclear facilities and delegations to Council.

Choosing a single site was a difficult decision. Safety was the first criteria and from that perspective, both remaining siting areas had potential to host the project. But NWMO always worked toward one preferred site and so tough decisions had to be made to proceed in the **Wabigoon Lake Ojibway Nation-Ignace** area in advance of a final decision in the other remaining siting area.

Following negotiation of a hosting (benefits agreement), community members were informed of the benefits. NWMO gave the final siting communities annual budgets for staffing, learning, consultants, travel and studies, amounting to around $2M CAD per year for four years. Earlier funding when more communities were in the process was less. Community 'investments' for the final siting communities totalled $4M CAD over three years for local infrastructure investments and $300K per year for community defined well-being projects. Community well-being is a guiding principle for the site selection process and any community entering the process has the right to benefit from it now and in the longer term. However, the offering of community investment did lead to accusations that communities are being 'bribed.' The two communities in the selected area benefited from having strong leadership that helped to advance the project on behalf of Canadians and Indigenous peoples.

As the process enters regulatory decision-making stage, NWMO recognises that it remains important to listen to many diverse points of view, including those opposed to geological disposal. This engagement will continue, both in the siting area and beyond.

# Information sources:

Nuleaf is grateful to Jamie Matear, Director of Siting Co-ordination of NWMO and Edward Wright of Lincolnshire County Council for their advice and support in preparing this case study. Further information on the Canadian process can be found here:

Home | The Nuclear Waste Management Organization (NWMO)

About the site selection process

How Canada's plan was developed: Canada's plan

Reconciliation (Indigenous approach): Reconciliation

Canada's used nuclear waste: Canada's used nuclear fuel

Q&As are available to cover a variety of topics and are located at the searchable FAQ section of the NWMO website.

Ignace's Hosting Agreement Ignace_Hosting_Agreement_Execution_Copy88.pdf