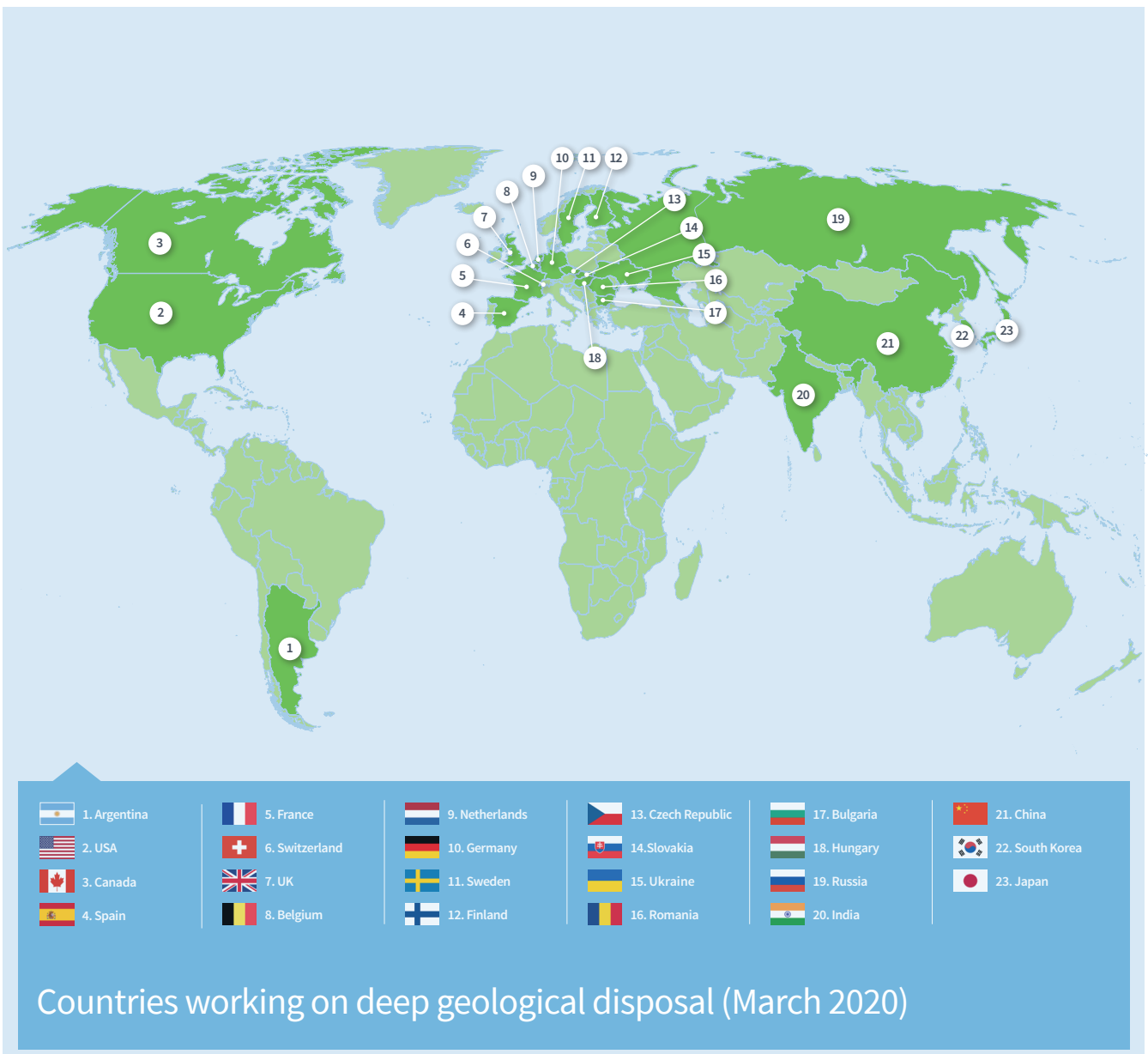


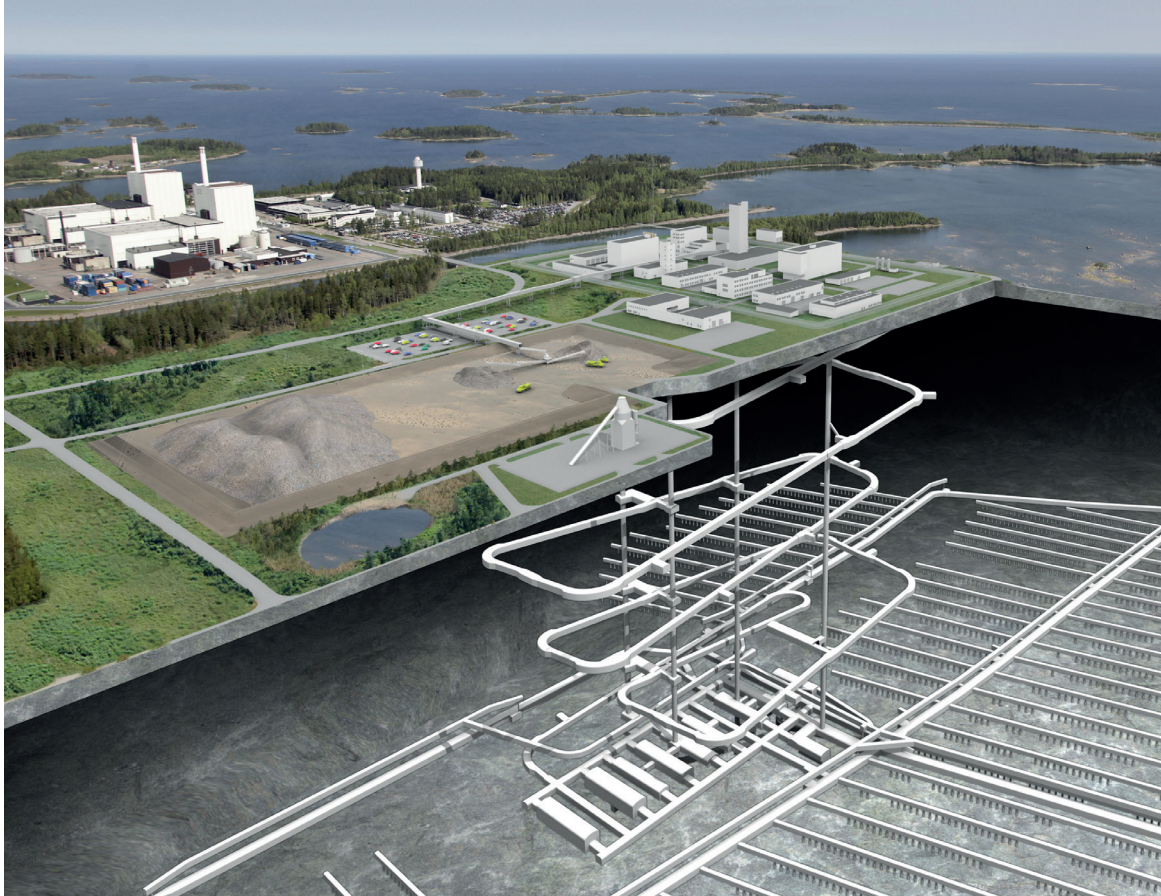
# Geological disposal around the world





## What are other countries doing?

Geological disposal is accepted worldwide as being the best long-term solution for the management of higher-activity radioactive waste.



Source: Swedish Nuclear Fuel and Waste Management Co

Many countries have already taken the decision to build a GDF. In Finland, construction of a GDF is already well-advanced. In France and Sweden, a site has already been found where construction of a GDF is planned, and several other countries have started the process for finding a suitable site.

Whatever stage each country is at, they all seek to share good practice and learn from one another through international groups. Here in the UK, we take part in these groups, learning from all sectors of the industry, from waste management organisations and regulators to research entities and even civil society groups.

Over the next few pages you will find a summary of the progress being made by some of the world's most advanced geological disposal programmes in Finland, France, Sweden, Canada and Switzerland.

More information on how other countries are implementing geological disposal can be found in our **Overview of International Siting Approaches**.

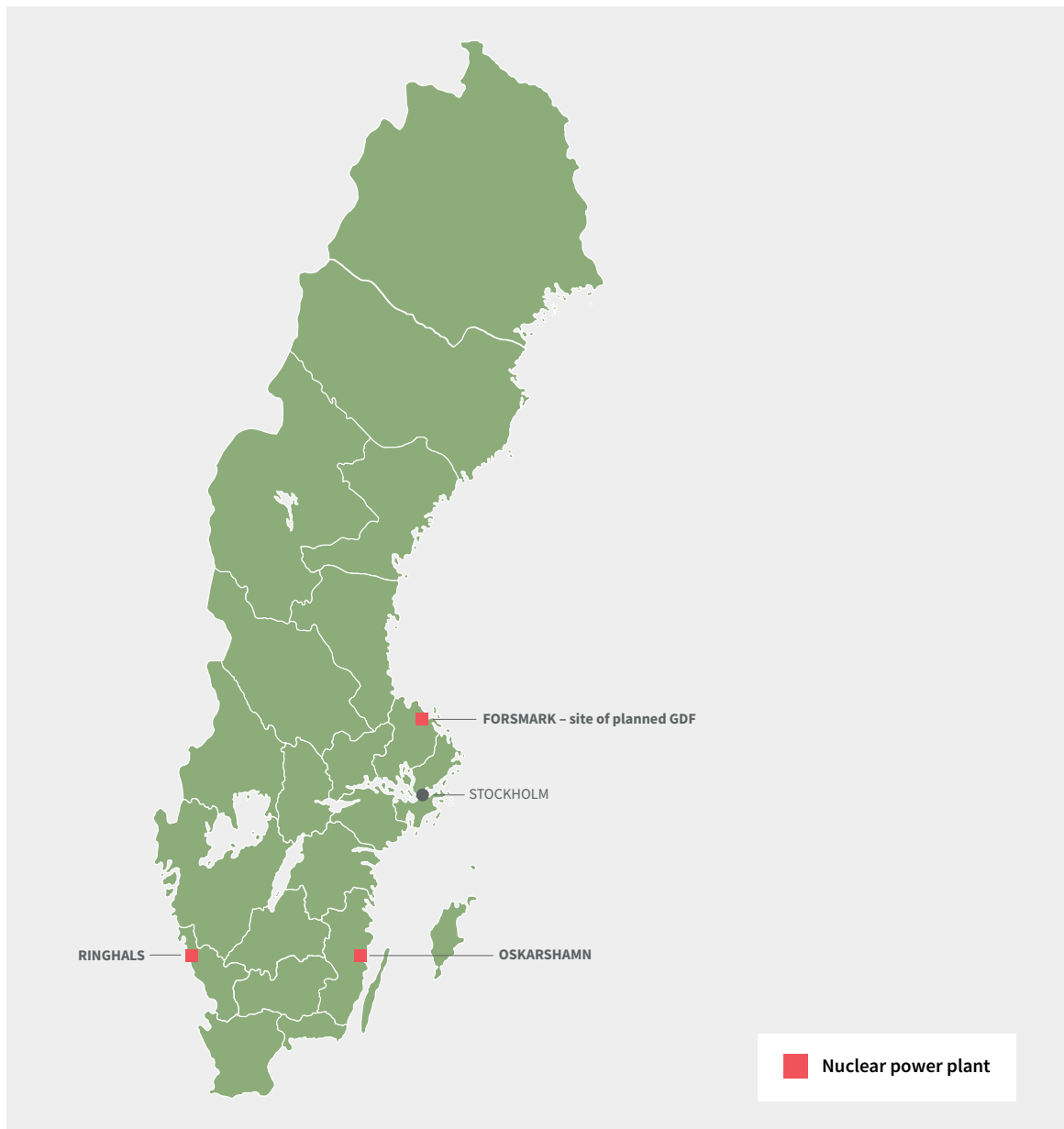


## Sweden

The Swedish Nuclear Fuel and Waste Management Organisation, SKB, plans to permanently dispose of its spent fuel from its nuclear power plants in a GDF that will be built about 500m below the surface in granite bedrock close to the Forsmark nuclear power plant in Osthhammar on the Baltic coast.

In 2011 SKB applied to Swedish nuclear and environmental authorities to build the GDF. The nuclear authority has recommended that the Government grants a licence, and the environmental authority has also approved many parts of the application but has asked for more information on the potential for corrosion of the copper disposal canisters.

SKB has now conducted some additional laboratory studies and provided the information requested by the environmental authorities. If the Swedish government is satisfied with the information provided, it should be possible to start construction in the 2020s, with the facility becoming operational around 10 years later.



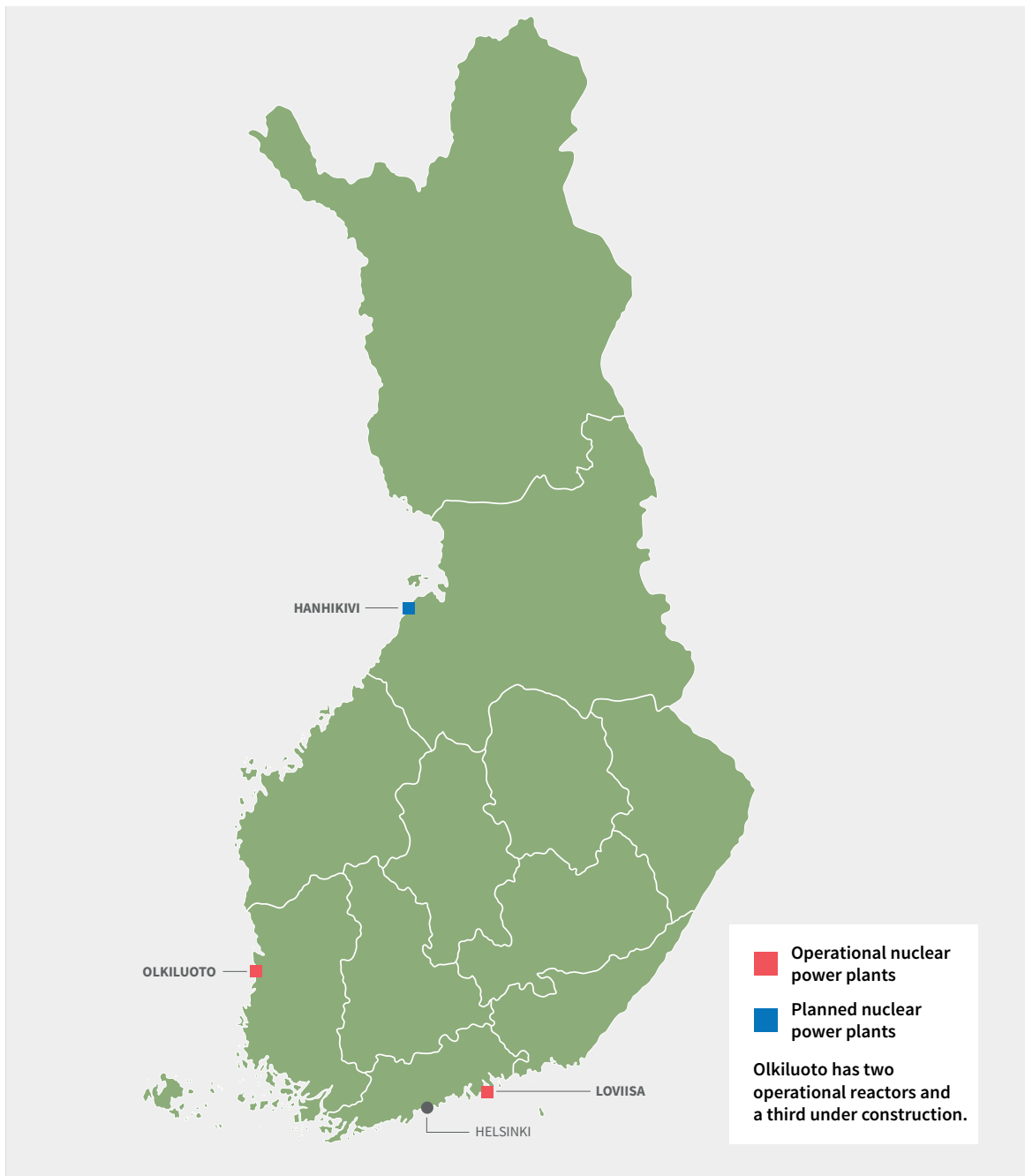


## + Finland

In Finland, construction of a GDF for the spent fuel from its nuclear power plants is underway. It is being built at a site in Olkiluoto in the south west. The GDF will be 400-450m below the surface in granite bedrock.

Construction of the GDF is well-advanced. **Posiva** is currently carrying out full scale in-situ testing in a purpose-built demonstration tunnel in the GDF. Canister emplacement is being tested using simulated canisters, similar in mass, size and temperature to the real canisters but without the radioactive content.

Posiva is preparing an application to the nuclear and environmental regulators for a licence to operate the GDF, and will submit this in 2020. Disposal is scheduled to start in the 2020s, and according to current plans would be closed and sealed by the 2120s.



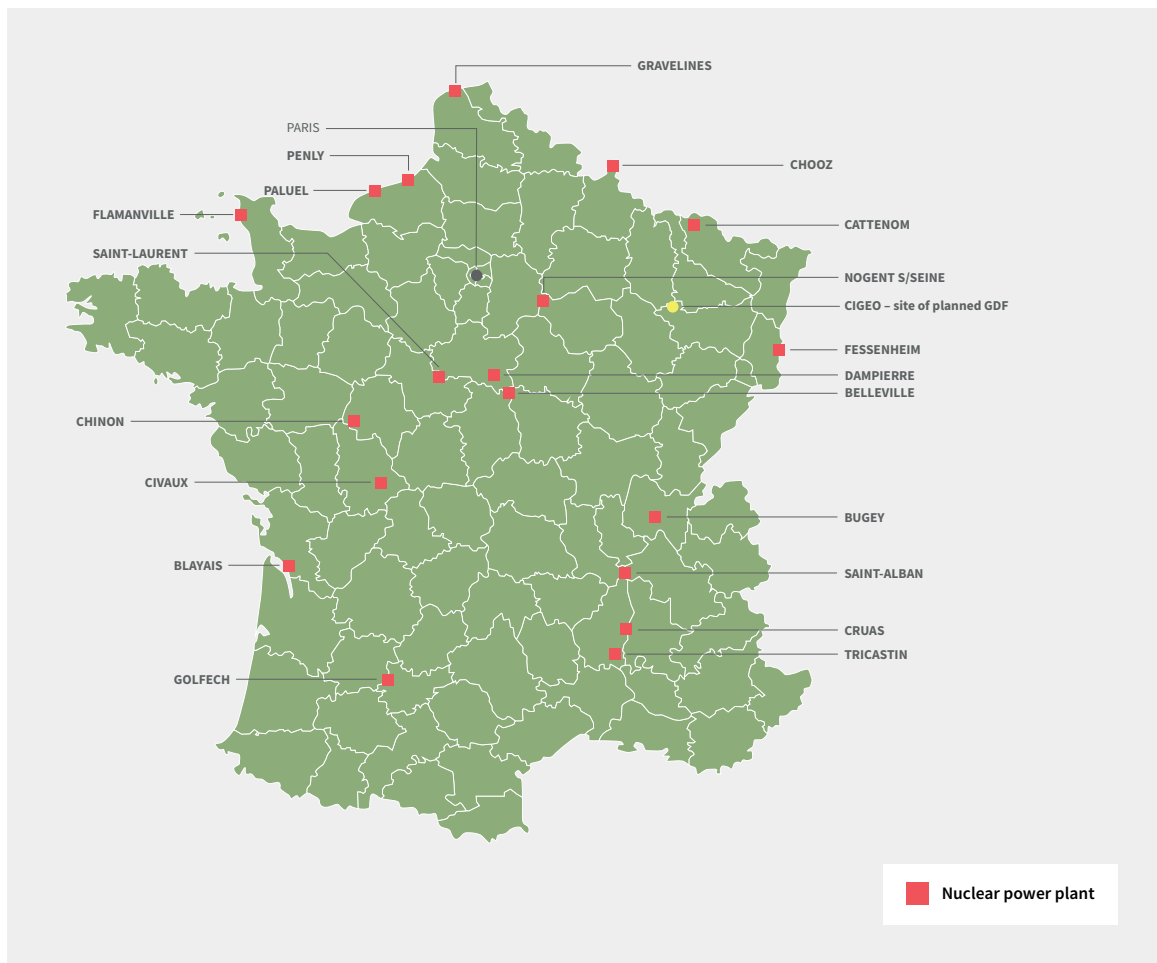


## France

Andra, France's waste management organisation, plans to build and operate a GDF for high level waste and long-lived intermediate-level waste at Bure, in the north-east of the country. The planned GDF will be at a depth of about 500m in a type of clay known as Callovo-Oxfordian clay.

Andra has been developing an underground laboratory in the clay beneath Bure since the late 1990s. The choice of site was confirmed following a public consultation exercise in 2013 and in 2015 Andra submitted a 'safety options dossier' to the French Nuclear Authority, for the creation of a deep geological disposal facility, called Cigéo, for long lived ILW and HLW. The proposed siting area is located around five kilometers from Andra's existing underground laboratory. This was a preliminary step towards submitting an application for a licence to construct, and an opportunity for the French Nuclear Authority to provide feedback prior to the licence submission.

Andra is preparing an application to the French Nuclear Authority to start construction. The application is expected to be submitted in the early 2020s. If it meets with approval, and subject to the outcome of public debates, construction of Cigéo will commence.



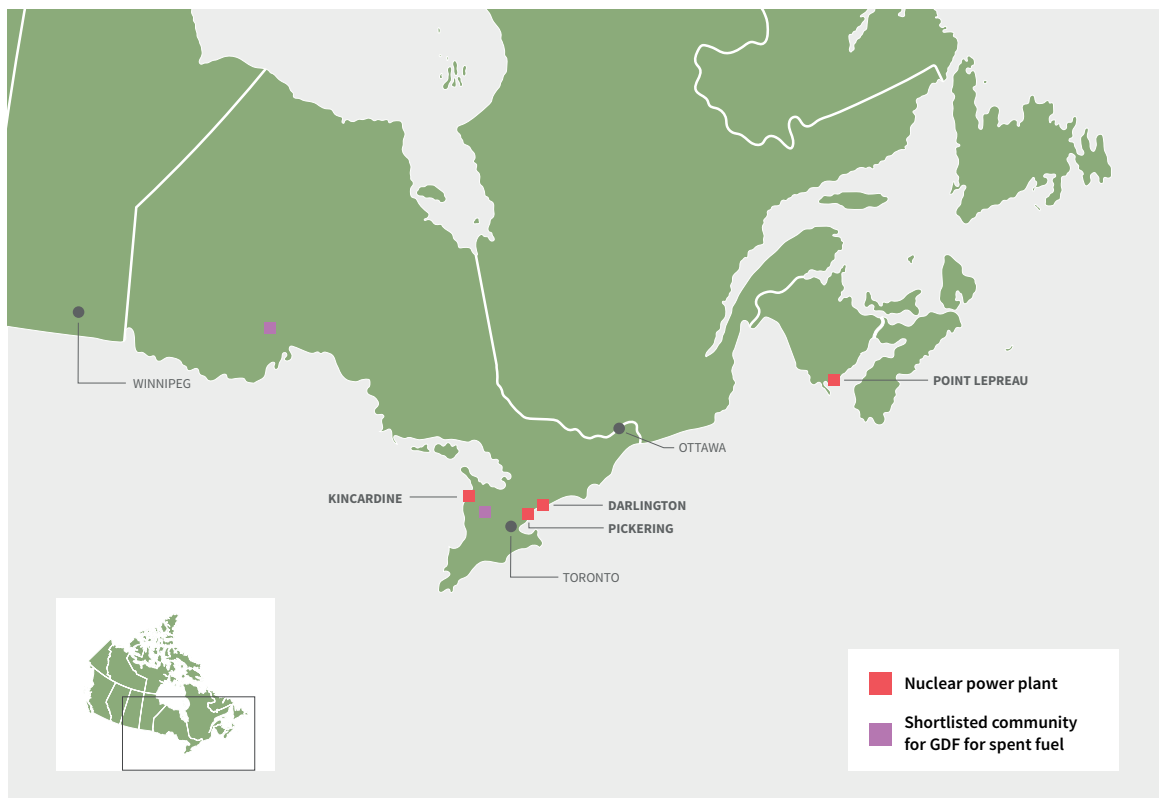


## Canada

The Canadian government has tasked the **Nuclear Waste Management Organisation (NWMO)** with the permanent disposal of Canada's spent fuel, starting with finding a site in a community willing to host a GDF. Twenty two communities voluntarily entered the process. These were assessed for their technical suitability to host a GDF. The NWMO has gradually narrowed its focus to fewer areas through technical site evaluations and social engagement with communities. In November 2019, the NWMO announced that it would narrow its focus from five to two potential siting areas; the Township of Ignace in north-western Ontario, and an area comprising the Township of Huron-Kinloss and Municipality of South Bruce in southern Ontario. In 2020, the southern Ontario area was further narrowed to the Municipality of South Bruce.

Through discussion with people in the Ignace area about a number of potentially geologically suitable areas, the NWMO has identified the general location for initial boreholes in that area. Once specific borehole locations have been identified, the NWMO will submit an application to the provincial government for permission to drill.

NWMO will continue to assess the short list of sites for the spent fuel GDF. In the later stages of the process, it will complete detailed site evaluations at a preferred location. A Centre of Expertise will be established at or near the site to support long term testing and research, and ongoing planning and discussions with the community. Once a formal agreement to host the GDF is confirmed, NWMO will apply to the nuclear and environmental regulators for a construction licence.



Source: World Nuclear Association, March 2020



## Switzerland

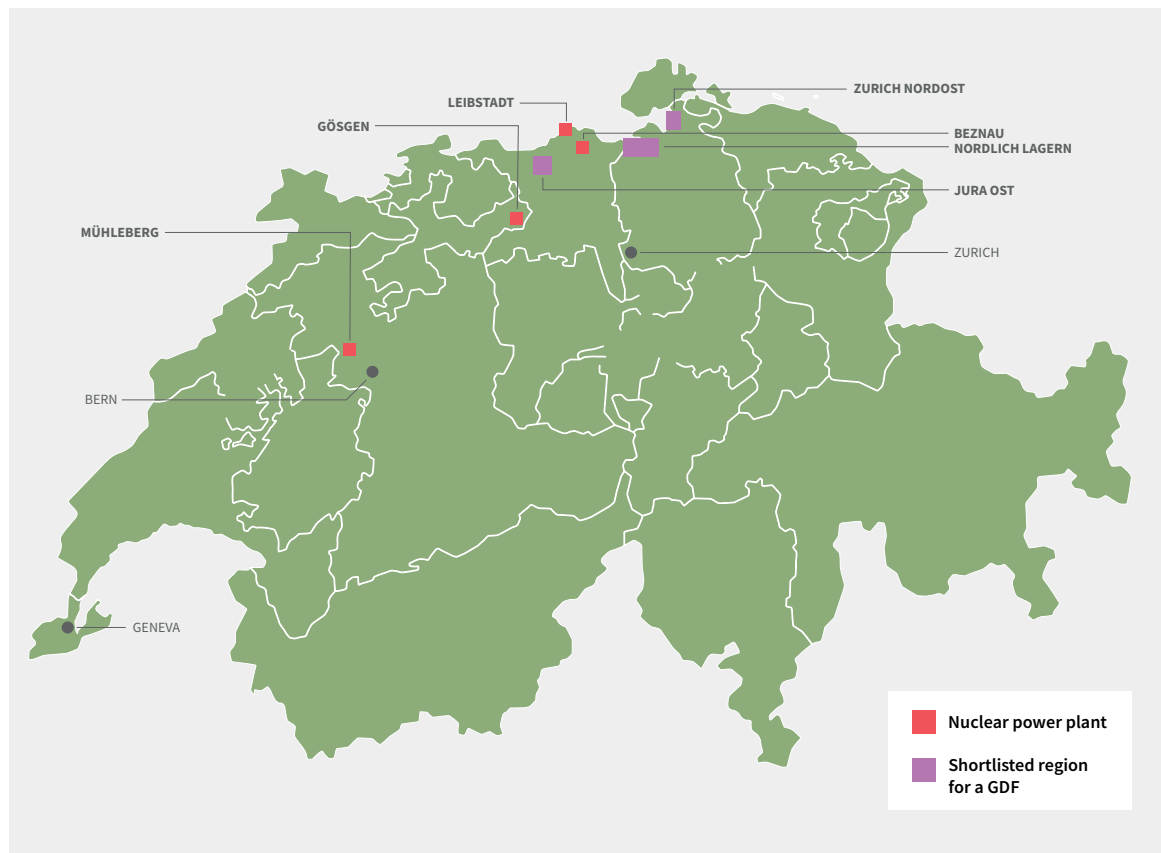
Swiss legislation requires disposal of the country's high level waste and spent fuel, and its intermediate level waste. This may be at two different sites or at the same site.

The organisation responsible for planning and implementing solutions for the management and disposal of Switzerland's radioactive waste is **Nagra**.

The federal authorities first identified six regions with geology potentially suitable for a GDF. Nagra assessed and evaluated all six regions in terms of safety, environmental impact and cost and carried out extensive public engagement. Three regions are being taken forward to the next stage. All three could host both GDFs.

In November 2018, the federal authorities authorised Nagra to continue its investigations in the three regions. Drilling of a series of deep boreholes is now underway at all three locations, which will allow the important characteristics of the geological environments in those regions to be understood. The borehole investigations focus on the thickness, permeability and composition of the Opalinus Clay host rock in which the GDF(s) may to be constructed.

Nagra expects to identify, in 2022 or 2023, which regions it considers most suitable for the GDFs, with submission of an application for a licence to construct in 2024.



Source: World Nuclear Association, March 2020