

## Site Selection of the Finnish Repository for Spent Nuclear Fuel

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### 1. Nuclear waste management in Finland

The Finnish nuclear power plants have been in operation for more than 25 years. Two BWR units are operated at Olkiluoto (2 x 860 MWe) by Teollisuuden Voima Oy (TVO), and two PWR units at Loviisa (2 x 488 MWe) by Fortum Power and Heat Oy (Fortum). One PWR unit (1600 MWe) is under construction at Olkiluoto.

According to the Nuclear Energy Act, all nuclear waste generated in Finland must be handled, stored and permanently disposed of in Finland. The two nuclear power companies, TVO and Fortum, are responsible for the safe management of the waste and for all associated expenses. TVO and Fortum established a joint company, Posiva Oy, in 1995 to implement the disposal programme for spent fuel, whilst other nuclear wastes are handled and disposed of by the power companies themselves.

### 2. Overall schedule

Preparations for nuclear waste management were commenced in Finland already in the 1970s when the power plants were still under construction. In 1983, the Government confirmed a target schedule for spent fuel management, in which the construction of the final disposal facility was scheduled for the 2010s and the start of final disposal for 2020.

Potential sites for the disposal of spent fuel were screened in the 1980s, followed by detailed site investigations in the 1990s and an environmental impact assessment in late 1990s. In 1999, Posiva submitted an application for a Decision-in-Principle to choose Olkiluoto as the site of the final disposal facility. The Government issued a DiP in favour of the project in December 2000, and the Parliament ratified the decision in May 2001 [1].

Pursuant to the DiP the repository would be located in crystalline bedrock at Olkiluoto and disposal would be based on the KBS-3 concept. According to the target schedule, Posiva shall submit an application for the construction licence in 2012. This constitutes a major milestone for research and technology development activities in Posiva at present. [2]

### 3. Site selection

Studies to evaluate the suitability of the Finnish bedrock for the final disposal of spent fuel began in the late 1970s. The first site characterisation programme for a Finnish repository for spent nuclear fuel was introduced in 1982, implying a countrywide survey of the principal geologic features of Finland. The research proceeded in steps following the objectives of the Government's decision of 1983.

In 1985, about 100 candidate areas were selected for site investigations (Fig. 1). Field investigations, aiming at selection of the repository site, were started in 1987 on five of these sites. Deep drillings to a depth of 1000 m were a vital part of the field investigations. In 1993 Eurajoki, Äänekoski and Kuhmo were shortlisted for detailed investigations, but the final number of candidate sites was actually four after the decision to start investigations also on Loviisa NPP site.

The final site selection was based on the scientific material accumulated from site characterisation and evaluation during 15 years as well as on the Environmental Impact Assessment (EIA) conducted during

1997-1999. A safety assessment on long-term safety was produced to support the EIA and to enable site-specific evaluation of long-term safety. The main outcome of this work was that regulatory requirements on long-term safety could be met on all the sites with considerable safety margins. An assessment of the operational safety of the disposal facility as well as an assessment of the transportation safety produced similar conclusions. [3]

As none of the sites was clearly superior or inferior in terms of safety aspects, other criteria proved to be more important. Social impact and the infrastructure of the sites were highlighted in the final selection. The infrastructure of Olkiluoto was shown to provide the best support to the disposal facility. Finally, most of the spent fuel will be accumulated at the Olkiluoto power plant. As an outcome of these studies, Posiva proposed Olkiluoto as the site for the spent fuel repository in 1999.

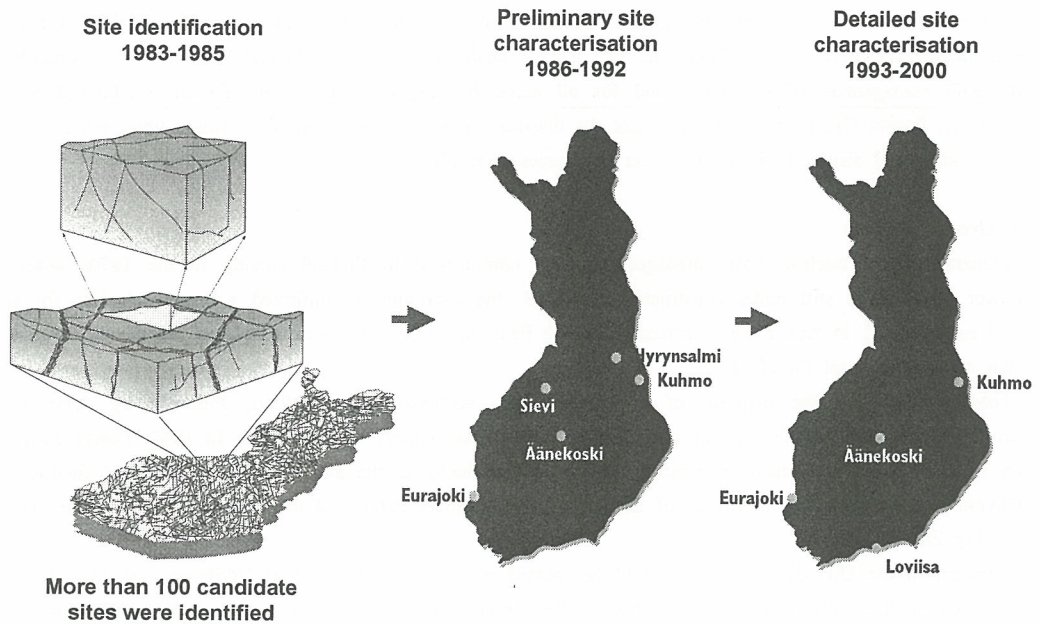


Fig. 1. Site selection research programme 1983-2000.

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