

**Expansion of the
repository for
spent nuclear fuel**

**A summary of the
environmental impact
assessment programme**



POSIVA



1 The project and its justification

Teollisuuden Voima Oyj (hereinafter “TVO”) and Fortum Power and Heat Oy (“Fortum”) plan to dispose of spent fuel in the disposal facilities to be excavated in the bedrock of Olkiluoto in Finland. The purpose is to dispose of the nuclear fuel at a depth of 400–700 metres inside the Olkiluoto bedrock. The final disposal of spent nuclear fuel is scheduled to start in 2020.

Posiva Oy (hereinafter “Posiva”) is inspecting the expansion of the repository for spent nuclear fuel located in Olkiluoto by 3,000 tons of uranium so that the repository will have space for 12,000 uranium-tons of spent nuclear fuel instead of the previously planned 9,000 tons of uranium.

Posiva has started the environmental impact assessment procedure (EIA procedure) concerning the expansion of its repository and is preparing to take into account the disposal of spent fuel of any new nuclear power plant projects of its owners TVO and Fortum. On the basis of the ongoing EIA procedures of Posiva’s owners, the total volume of spent fuel is estimated to increase to about 12,000 tons of uranium. The expansion of the repository requires that an environmental impact assessment procedure is carried out.

This document presents a brief summary of the EIA programme stage at a general level. This also serves as a document for the international hearing process. More detailed information about the project is presented in the EIA programme.

1.1 Environmental impact assessment procedure

According to the Act on the Environmental Impact Assessment Procedure (468/1994), projects to be assessed in the environmental impact assessment procedure are prescribed by the EIA Decree (713/2006). Facilities intended for the processing, storage and

final disposal of nuclear waste created through the production of nuclear energy fall within the scope of the Act on the Environmental Impact Assessment Procedure and require an environmental impact assessment.

At the first stage of the EIA procedure, an assessment programme is prepared presenting information about the project, the options under assessment, the licences required by the project, a description of the environment and the assessment procedures. In addition, a plan regarding the organisation of the assessment procedure and participation is to be presented, as well as the planning and implementation schedule.

An assessment report will be prepared on the basis of the assessment programme and related statements and opinions. In nuclear power plant projects, the Ministry of Employment and the Economy (MEE) acts as the EIA procedure’s statutory coordinating authority and it will be responsible for the public display of the assessment programme and report, compile any statements and opinions regarding them and issue its own statements. Special emphasis will be placed on the opinions and statements of the municipality in which the repository is located.

The objective of the EIA procedure is to promote the assessment and uniform observation of environmental impacts in planning and decision-making. Another objective of the procedure is to increase the amount of information available to citizens and their possibilities of participation in Finland and in its surrounding countries.

1.2 Licences required for the project under the Nuclear Energy Act

The EIA report constitutes a document to be enclosed with the decision application (PAP applica-



Figure 1-2. The location of Eurajoki and Olkiluoto. Eurajoki is located along highway 8. (Base map © Affecto Finland Oy, licence number L 7630/08.)

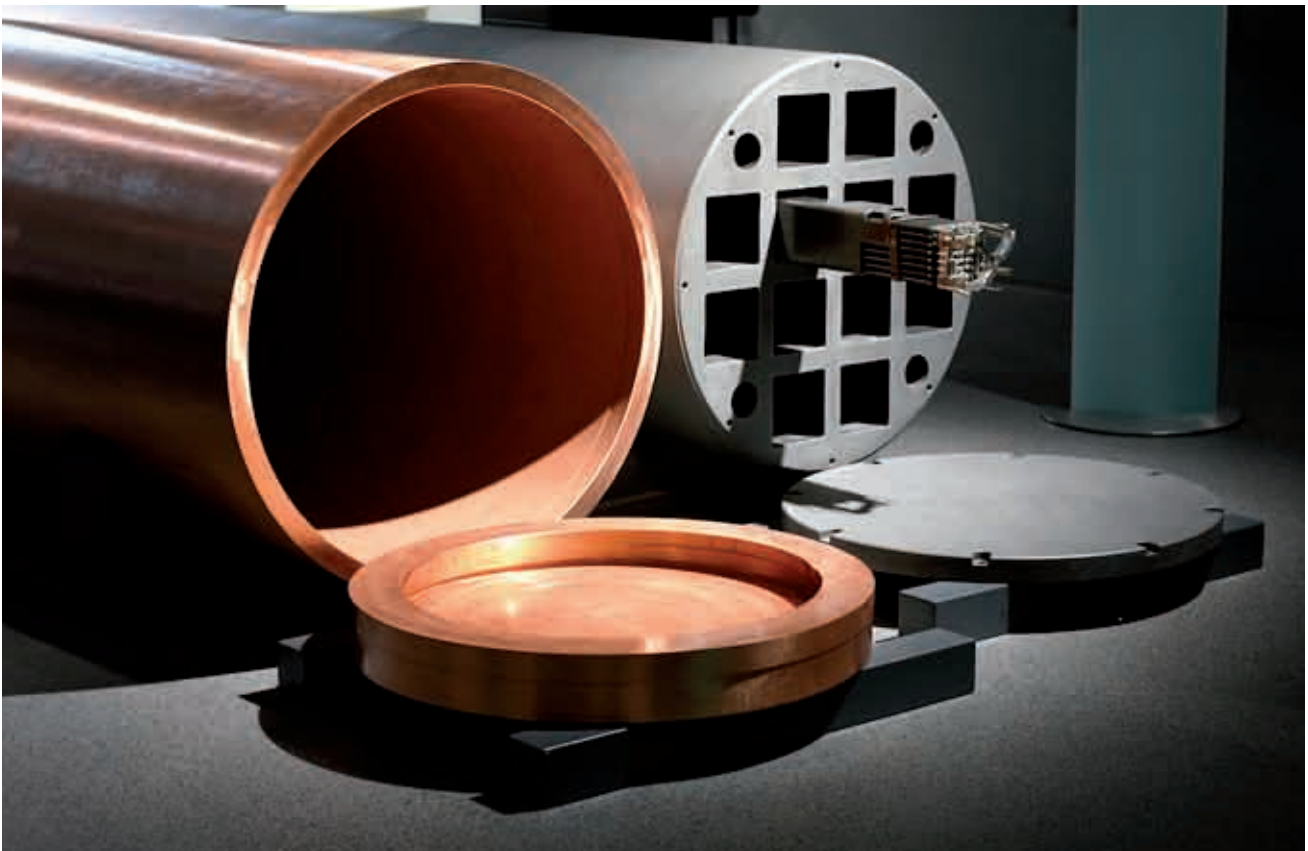
tion). According to the Finnish Nuclear Energy Act, the construction of a nuclear facility of considerable general significance requires a decision, issued by the Government and ratified by the Parliament, stating that the construction project is in line with the overall good of society. The expansion of the repository is regarded as such a significant project that it requires the EIA procedure and the Government's decision. The Government will grant the construction and operating licence if the prerequisites for granting a construction licence and an operating licence for a nuclear facility prescribed in the Nuclear Energy Act (990/1987) are met.

1.3 International hearing and the Espoo Convention

The assessment of transboundary environmental impacts will comply with the Convention on Environmental Impact Assessment in a Transboundary Context signed in Espoo in 1991 and entered into

force in Finland in 1997, in which the contracting parties shall, together or separately, implement all required and efficient measures in order to prevent, reduce and control significant detrimental transboundary environmental impacts caused by the proposed activities. According to the Espoo Convention, the party of origin shall be responsible for all of the measures required to launch projects that are likely to cause a significant adverse transboundary impacts.

The party of origin must provide citizens with the possibility of participating in the environmental impact assessment procedure for the proposed projects within the probable affected area and ensure that the target party's citizens shall have equal possibilities as the citizens of the party of origin. As a result, MEE will present the project to the environmental authorities of all countries surrounding Finland and the Baltic Sea region inquiring their willingness to participate in the EIA procedure. This procedure serves to identify all countries that wish to be involved in the project at the EIA report stage.



1.4 Previous decisions related to the project

In 1983, the Government's decision-in-principle defined the objectives and schedules of the implementation of nuclear waste management and related research and design work. This decision-in-principle required that such a disposal site where final disposal facilities can be built was selected and inspected by the end of 2000. According to the decision-in-principle, research and design work must proceed so that it will be possible to start building the repository after 2010 and start final disposal in 2020. The Ministry of Trade and Industry's (currently MEE) decisions made in 1991 and 1995 also refer to this time schedules. The work has advanced according to these intermediate objectives.

Posiva carried out an environmental impact assessment procedure related to the repository for nuclear waste in 1998–1999. In its statement regarding the assessment report the Ministry of Trade and Industry stated that Posiva had inspected the project and its alternatives in accordance with the statement issued by the ministry regarding the EIA programme.

Any changes in the accumulation of the nuclear fuel to be disposed of were taken into account in the assessment so that its maximum volume corresponded to 9,000 tons of uranium.

In December 2000, the Government made, based on Posiva's application, a decision-in-principle, stating that the construction of the repository in Olkiluoto in Eurajoki is in line with the overall good of society. According to this decision-in-principle, an amount of spent nuclear fuel corresponding to a maximum of 4,000 tons of uranium can be processed and disposed of in the repository. A decision-in-principle concerning the fifth nuclear power plant unit (OL3) to be built in Finland was made in 2002. At the same time, a decision-in-principle concerning the construction of the repository for spent nuclear fuel as an expanded facility was made, so that spent fuel from OL3 can be also disposed of in the repository. By virtue of the decision-in-principle issued in 2002, final disposal facilities for a maximum of 2,500 uranium-tons of spent nuclear fuel can be built. On this basis and together with the Government's deci-



sion-in-principle issued in December 2000, a maximum of 6,500 uranium-tons of spent nuclear fuel can be processed and disposed of in the repository.

On the basis of plans concerning the construction of new nuclear power plants (FIN6 and FIN7) for Posiva's owners TVO and Fortum, the total amount of spent nuclear fuel is estimated to increase to 12,000 tons of uranium. Because the environmental impact assessment of the repository has already been carried out for 9,000 tons of uranium, this assessment procedure inspects the expansion of the repository by 3,000 uranium-tons of spent nuclear fuel.

The starting point of the environmental impacts under inspection is the final disposal solution that will remain unchanged regardless of the expansion and is in accordance with the issued decisions-in-principle and the previous EIA procedure.

1.5 Location

Posiva's repository is located on the west coast of Finland, on Olkiluoto Island in the municipality of Eurajoki (Figure 1-1). The distance from Olkiluoto to the nearest town, Rauma, is approximately 13 kilometres (Figure 1-2).

1.6 Project options

The expansion of the repository by 3,000 tons of uranium will be studied as the main option in the environmental impact assessment. After the expansion the repository will have space for 12,000 uranium-tons of spent nuclear fuel instead of the previously planned 9,000 tons of uranium. The expansion will only concern the underground facilities for final disposal.

The zero option to be inspected is a situation where Posiva's repository will not be expanded and a maximum of 9,000 tons of uranium can be disposed of in the repository. In the zero option, the spent nuclear fuel of six nuclear power plant units can be disposed of in the Olkiluoto repository. As a result, spent fuel from the seventh nuclear power plant unit will be stored in water basins in the spent fuel storage.

1.7 Safety of the repository

In addition to the aforementioned decisions-in-principle, Finnish nuclear waste management is prescribed by the Nuclear Energy Act and the Nuclear Energy Decree that entered into force in 1988 defining the obligations of nuclear energy producers, licence procedures and authorities. In 1994, the Nuclear Energy Act was amended so that nuclear waste created through the use of nuclear energy in Finland



must not be transported out of Finland and must be disposed of in Finland. The Nuclear Energy Act also forbids the import of nuclear waste into Finland.

The Radiation and Nuclear Safety Authority (STUK) controls the safety of nuclear waste management, storage and final disposal in Finland. In order to secure appropriate planning for the final disposal of spent nuclear fuel, the authorities have set reporting obligations for nuclear waste producers. STUK, together with other expert organisations, inspects all research and technical plans aimed at safe disposal of nuclear waste and gives feedback to the implementing party.

The Government issues the general safety regulations concerning nuclear waste management. The safety regulations relating to the processing and storage of nuclear waste are included in the Govern-

ment Decision on the Safety of Nuclear Power Plants (VNP 395/1991). There are two Government Decisions on the safety of final disposal, one of which concerns spent nuclear fuel (VNP 478/1999) and the other concerns low- and medium-level operational waste (VNP 398/1991). More detailed regulations on nuclear waste management can be found in STUK's instructions.

According to the general safety principles for nuclear waste management, there must not be any radiation endangering health or any other damage to the environment and property. This principle extends into the future. Final disposal must not cause such future health or environmental damage that exceeds the currently accepted maximum level.

2 Impacts to be examined

The EIA report will present the impacts occurring during the construction and operation of the repository and the long-term safety of the repository. In addition, any other projects related to this project and their environmental impacts are to be identified.

The EIA procedure will primarily assess the environmental impacts of operations taking place on the power plant site. In addition to the transportation of spent fuel, operations extending beyond the area include traffic during the expansion of the facility's underground section and during the repository's final disposal operations. The impacts of these operations will also be assessed to the required extent.

The EIA procedure will assess:

- Impacts during construction
- Impacts of transportation of spent nuclear fuel and other traffic
- Impacts on land use, cultural heritage, landscape, buildings and structures
- Impacts on the soil, bedrock and groundwater
- Impacts on the air and air quality
- Impacts on the water system
- Impacts of waste and by-products
- Impacts of noise and vibration
- Impacts on vegetation, animals and objects of protection
- Impacts on utilising natural resources
- Impacts on people
- Impacts on social structure, regional economy and the image of the municipality of Eurajoki
- Impacts of exceptional and accident situations.

In addition, the following will be assessed to the required extent:

- Long-term safety
- Impacts of associated projects

- Impacts of the zero option
- Comparison between alternatives.

Posiva's EIA report from 1999 and the related updated environmental report inspecting the final disposal of 9,000 tons of uranium constitute the basis for inspecting the zero option. Posiva's current and planned operations will be described on the basis of the previous EIA report and research and design information from previous years. The current environmental status and the estimated changes in it will be described on the basis of the available material illustrating the status of the environment.

Theme interviews will be carried out in order to identify the attitudes of those living in the vicinity of the repository towards the project and to support the social impact assessment. The investigation of health impacts is part of the assessment of the project's social impacts.

The EIA report will inspect the environmental impacts of accidents based on safety analyses and the requirements set for the repository. The ramifications of exceptional situations will be assessed on the basis of the extensive research data on the health and environmental impacts of radiation.

As described above, the environmental impacts caused by the nuclear waste repository and its expansion are very local. Based on the previous EIA report from 1999, the project has no transboundary environmental impacts.

2.1 Limits of environmental impact assessment

The term "observed area" refers to the area defined for each type of impact within which the environmental impact in question is examined and assessed. On the other hand, "affected area" refers to the area where, on the basis of the assessment, the environ-



mental impact in question is expected to manifest itself. The affected area is thus expected to be substantially smaller than the observed area.

The intention was to define the observed area to be so large that significant environmental impacts cannot be expected to manifest themselves outside it. If, however, it becomes apparent during the assessment work that a specific environmental impact has a respective affected area larger than

estimated, the scope of the observed and affected areas will, in that connection, be redefined with regard to the impact in question. The actual definition of affected areas will thus be carried out in the environmental impact assessment report as a result of the assessment work. As a result, all countries surrounding Finland will be provided, at the EIA programme stage, with the possibility to participate in the EIA procedure.

3 Information on possible transboundary environmental impacts

According to the Espoo Agreement, Sweden, Estonia and Russia were notified of the EIA procedure in 1999 and opinions and statements on transboundary environmental impacts were requested.

The Swedish statement was given by The Swedish Nuclear Power Inspectorate (SKI), which assessed that the project in Finland concerning the final repository for spent nuclear fuel has no transboundary environmental effects in Sweden, assuming that the project is in accordance with the EIA report and that the project fulfils all Finnish safety requirements. Estonian authorities stated that there are no transboundary impacts from the repository in Estonia and that Estonia has no further comments on the project. On the basis of EIA programme, Russian authorities stated that there might be some transboundary impacts from the repository, such as a release of radioactive waste into the atmosphere. However,

Finnish authorities pointed out in their reply that the information the Russian authorities are referring to is already represented in other reports delivered by Posiva, and there are no increased environmental risks from the project.

In the statement for the PAP procedure in 2002 given by the STUK, it noted that there are no significant safety risks in the use of the final repository and that the preliminary plans are adequate and sufficient. In addition, STUK stated that there are no environmental risks in the transportation of nuclear waste or in the use of the final repository.

Based on these earlier opinions and statements, the expansion of the final repository has no identified transboundary environmental impacts beyond Finnish territory. This issue will be examined in further detail in the EIA report.

4 Schedule

The project's EIA procedure is intended to be concluded at the beginning of 2009. The final disposal of spent nuclear fuel is to start in 2020. The encapsulation of spent fuel from the new nuclear power plant unit (FIN7) will start in the 2070s at the earliest.



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