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Fennovoima Oy

A NEW NUCLEAR POWER PLANT, FINLAND

ENVIRONMENTAL IMPACT ASSESSMENT PROGRAMME, INTERNATIONAL HEARING

1 INTRODUCTION

Fennovoima Oy, a Finnish energy company, has launched an environmental impact assessment procedure (EIA) regarding the construction of a new nuclear power plant in Finland. Fennovoima is evaluating the construction of a 1,500-2,500 MW nuclear power plant consisting of one or two reactors to one of the following municipalities: Kristinestad, Pyhäjoki, Ruotsinpyhtää or Simo.

The consumption of electricity is constantly increasing in Finland. In 2006, about 90 TWh of electricity was used in Finland. The use of electricity is estimated to increase by 1.2% annually until 2020 when the total consumption would be 107 TWh (*Finnish Energy Industries*). Shareholders of Fennovoima will be provided with electricity produced by the company at a reasonable and stable price in proportion to their share of ownership.

The convention on environmental impact assessment in a trans-boundary context by the United Nations' Economic Commission for Europe (Espoo Convention 67/1997) will be applied to Fennovoima's nuclear power plant project. This document presents the summary of the project at the EIA stage for international hearing pertaining to the Espoo Convention.

2 ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURE AND THE REQUIRED PERMITS

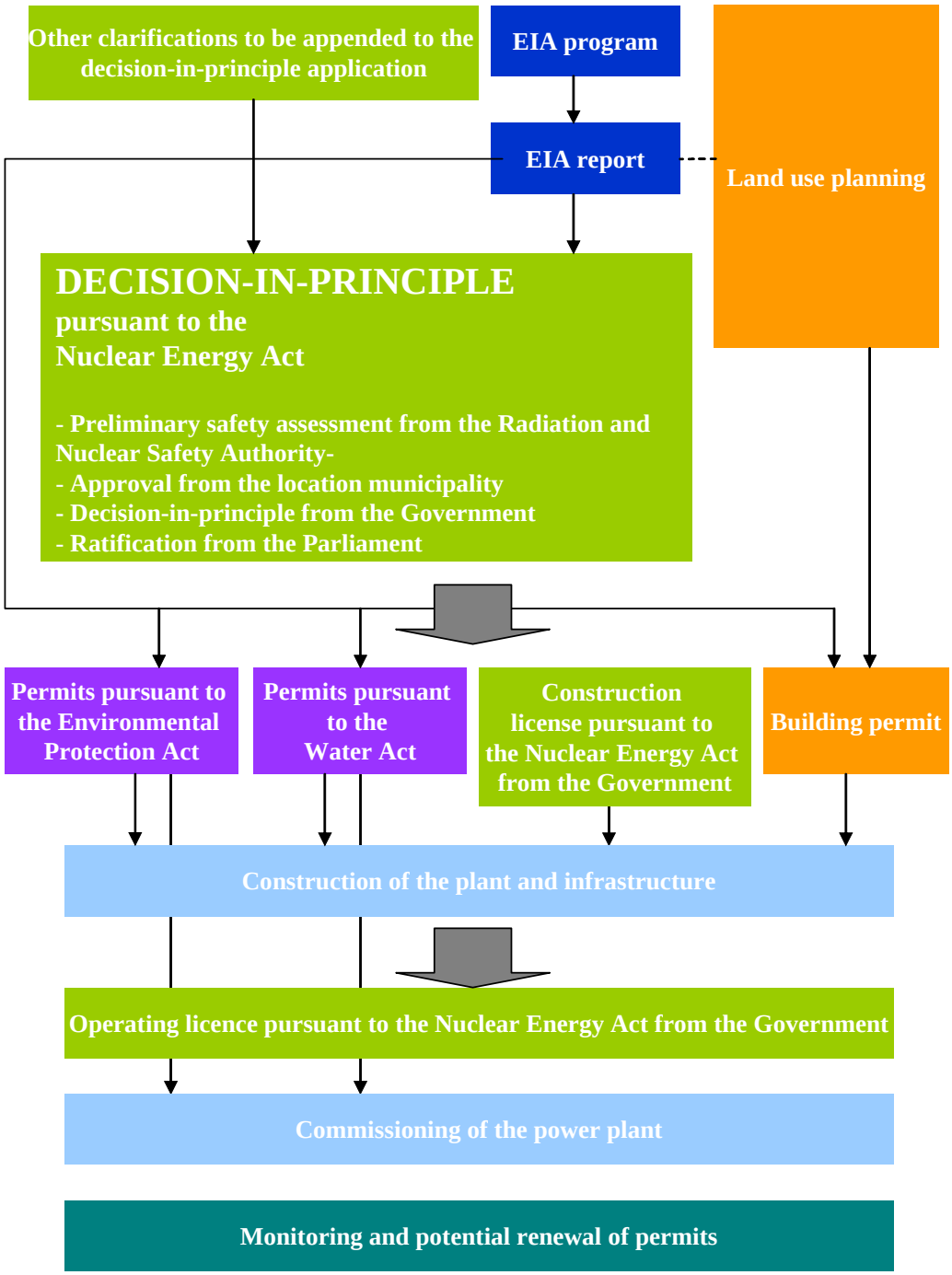
2.1 Environmental impact assessment procedure

The Directive on Environmental Impact Assessment (EIA, 85/337/EEC) issued by the Council of the European Community (EC) has been implemented in Finland through the EIA Act (468/1994) and Decree (713/2006). Projects that are to be assessed are listed in the EIA Decree. According to this list, nuclear power plants are projects to which the statutory environmental assessment procedure has to be applied.

At the first phase of the EIA procedure, an assessment programme is drawn up. Project information, the alternatives to be assessed, information about the permits required by the project, a description of the environment and the assessment methods are presented in this programme. In addition, a plan on the arrangements of the assessment procedure and participation will be presented, as well as the planning and implementation schedule of the project.

The EIA report will be drawn up on the basis of the EIA programme and the opinions and statements given about it. For nuclear power plant projects, the Ministry of Employment and the Economy will act as the competent authority in the EIA procedure. It ensures that the assessment programme and report are put on display for public inspection, compiles all statements and opinions and issues final, summarizing statements both of the programme and report phase. As far as the international hearing is concerned, the Ministry of the Environment of Finland acts as the contact point and competent authority.

The objective of the EIA procedure is to promote assessment of environmental impacts and their consideration in planning and decision-making. Another objective of the procedure is to increase the availability of information to the public and its possibilities for participation.



Picture 2-1. Phases of the permitting procedures for the construction and use of a nuclear power plant.

2.2 Permits required by the project

According to the Nuclear Energy Act (990/1987), the construction of a nuclear power plant requires a decision in principle made by the Finnish Government and ratified by the Parliament of Finland, confirming that the construction of the nuclear power plant is in accordance with the overall good of society. The decision in principle requires also an acceptance of the municipality, where the nuclear power plant is planned to be located in. The project's investment decision can not be made before the decision in principle.

The construction licence will be granted by the Finnish Government if the requirements for granting the licence prescribed in the Nuclear Energy Act are

fulfilled. The operating licence will be granted by the Finnish Government if the requirements set in the Nuclear Energy Act are fulfilled and Ministry of Employment and the Economy has stated that the budgeting and preparations for the nuclear waste management costs has been organised as required by law.

In addition, the project will, in different phases, require permits pertaining to the Environmental Protection Act, the Water Act and the Land Use and Building Act. The permits cannot be applied for before the EIA procedure has been concluded.

3 PROJECT DESCRIPTION

3.1 Location and alternatives to be assessed

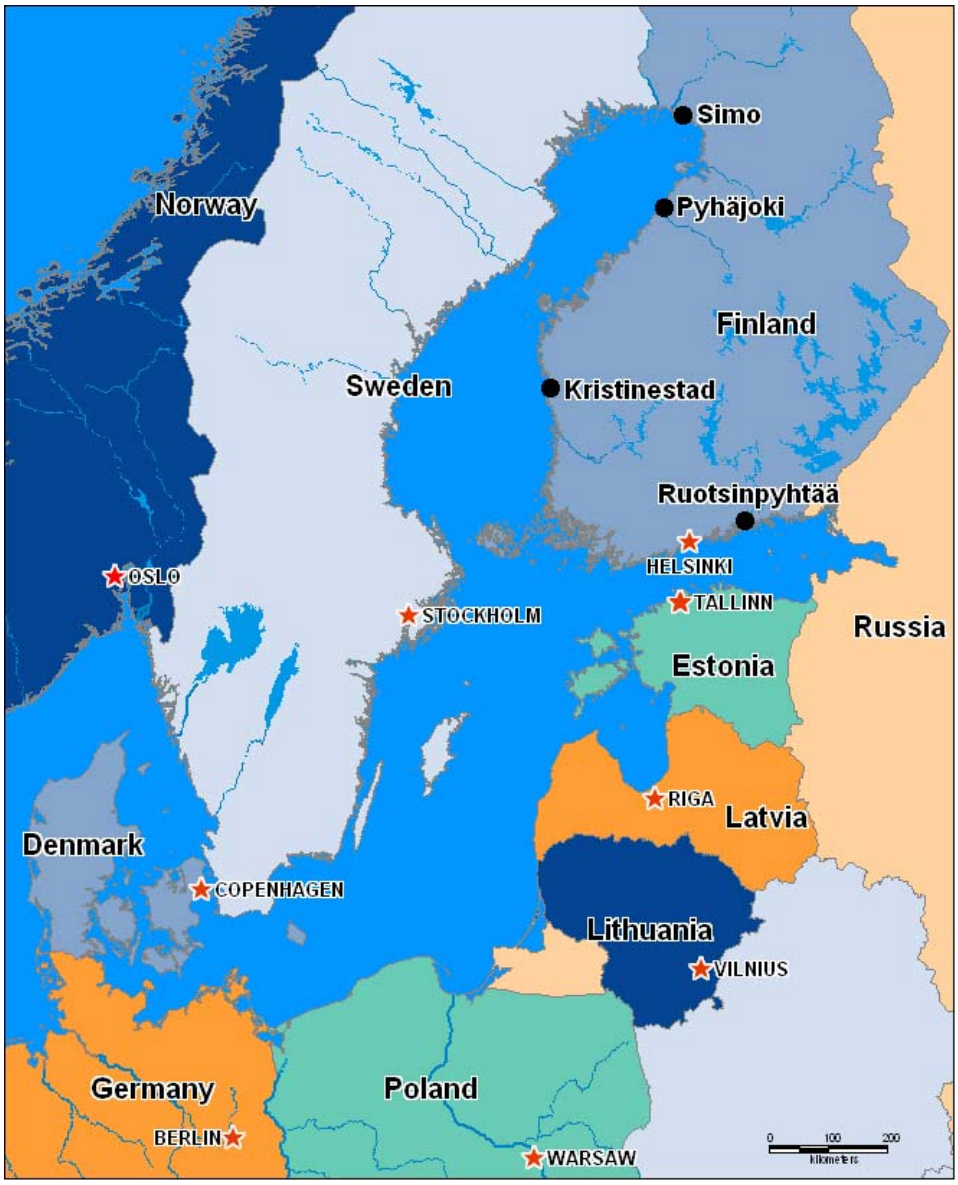
There are four alternative locations for the nuclear power plant (**Picture 3-1**).

- The Norrskogen area and Kilgrund island on the west coast of Finland, in the municipality of Kristinestad. The distance to the town centre of Kristinestad is about 35 km.
- The Hanhikivi cape on the west coast of Finland, in the municipality of Pyhäjoki. The distance to the town centre of Pyhäjoki is about 12 km.
- The island of Kampuslandet and the Gäddbergsö cape on the south coast of Finland, in the municipality of Ruotsinpyhtää. The distance to the town centre of Ruotsinpyhtää is about 30 km.
- The Karsikkoniemi cape and the island of Laitakari located off the cape at the bottom of the Bothnian Bay, in the municipality of Simo. The distance to the town centre of Simo is about 20 km.

The main alternative for the project to be analysed in the environmental impact assessment is a nuclear power plant with electric power of 1,500-2,500 MW. The nuclear power plant will consist of one or two light-water reactors (pressurised-water or boiling water reactors) and the disposal site for low- and medium-level waste.

The intake and discharge location alternatives for cooling water required by the power plant will be assessed for each power plant location as the environmental impact assessment advances and they will be presented in the EIA report.

In addition, the zero alternative, i.e. that the project will not be implemented, will be studied. Fennovoima Oy is established only for the construction and use of the nuclear power plant. Thus the environmental impacts of the zero alternative will be illustrated by presenting a review of publicly available assessments of environmental impacts of electricity production.



Picture 3-1. Countries in the Baltic Sea region and Norway, and the alternative locations of the new nuclear power plant. (Source: Pöyry Energy Oy)

3.2 Nuclear safety

According to the Nuclear Energy Act, nuclear power plants shall be safe and they shall not cause any danger to people, the environment or property. The general principles of safety requirements for nuclear power plants valid in Finland are prescribed in the Finnish Government decisions 395-397/1991 and 478/1999, and their details are issued in the YVL (NPP) Guides published by the Radiation and Nuclear Safety Authority (STUK, Nuclear Power Plant Guide, see www.stuk.fi).

The Radiation and Nuclear Safety Authority regulates the safety of Finnish nuclear power plants and issues detailed regulations and instructions concerning the safety of nuclear energy use, safety and emergency arrangements. STUK is also responsible for controlling the use of nuclear materials and the storage and handling of nuclear waste. The licencee has to comply with the YVL Guides.

Safety is the central principle when designing the new nuclear power plant to be constructed. The safety of nuclear power plants is based on the “defence in depth”

-principle. Several simultaneous and independent protection levels will be applied to the design and use of the power plant. These include:

- prevention of operating failures and accidents
- control of operating failures and accidents
- reduction of consequences of accidents

Nuclear power plants are designed so that a failure on any protection level does not result in danger to people, the environment or property. In order to guarantee reliability, each of the levels is built on several supplementing technical systems and limitations and regulations related to the use of the power plant.

Safety planning ensures that release of the radioactive substances contained by the plant, and fuel in particular, can be prevented as reliably as possible in all situations. Release of the radioactivity of the fuel into the environment is prevented by several consecutive technical barriers.

3.3 Spent fuel and power plant waste

After the spent fuel has been removed from the reactor, it will be stored for a few decades in a storage for spent fuel to be built next to the power plant. One proven option is to store spent fuel in large water pools where water acts as a radiation shield and cools the used fuel. After the storage period, the spent fuel will be transported to the final disposal plant to be built in Finland for this particular purpose.

Low- and medium-active waste will be disposed of into a disposal facility to be built in the bedrock of the selected plant site.

According to the Nuclear Energy Act, the producer of nuclear waste is responsible for the spent fuel management until the final disposal location is sealed. The producer is also obligated to cover all the costs of nuclear waste management.

The same procedures and methods, which are applied to the final disposal of the spent fuel produced by the other Finnish nuclear power plants will be applied Fennovoima, too.

3.4 Current status and monitoring of radiation

The power plant is required to have an environmental radiation monitoring programme described in STUK's YVL Guide 7.7 and referred to in §26 of the Finnish Government decision 395/1991. The programme is used to monitor the emissions and the concentrations of radioactive substances in the environment. The monitoring programme will include measurements of external radiation and radioactivity of ambient air, human body and samples representing the different levels of food chains leading to humans. In addition, the programme will include samples of indicator organisms that gather or accumulate radionuclides contained by the emissions. The programme will define the sampling and analyses to be carried out. Samples will be taken from different locations in different seasons.

The external radiation will be measured continuously, resulting in real-time data about the changes in the environmental radiation status. The equipment will be part of the national radiation measurement network thus serving the needs of radiation control of the Finnish territory. The measurement results can be read on-line at the Ministry of the Interior and at the Radiation and Nuclear Safety Authority. Radioactive substances can be easily detected in nature using measurement devices, and even a small amount of different substances can be recognised. As a result, artificial radioactive substances can be differentiated from nature's radioactive substances. These include uranium in the ground and

different radioactive products born as it decays, such as radon. The average annual radiation dose for Finnish people is about 3.8 mSv, more than half of which is caused by radon in indoor air.

4 IMPACTS TO BE ASSESSED AND LIMITATIONS OF ASSESSMENT

The EIA report is to present the environmental impacts of the nuclear power plant during its construction and operation, as well as the impacts of decommissioning the power plant.

Assessment of impacts during construction:

- Impacts on the ground, bedrock and groundwater
- Impacts on vegetation, animals and objects of nature conservation
- Impacts on employment and industry
- Impacts on the well-being of residents
- Impacts on noise levels
- Impacts on traffic

Assessment of impacts during operation:

- Impacts on the air quality and climate
- Impacts on aquatic environment and fishing
- Impacts of waste and byproducts and their management
- Impacts on the ground, bedrock and groundwater
- Impacts on vegetation, animals and objects of nature conservation
- Impacts on land use, structures and the landscape
- Impacts on people and society
- Impacts on traffic
- Impacts on the energy market
- Impacts of exceptional and accident situations

The impacts of the production and transport of nuclear fuel, the decommissioning of the nuclear power plant and the final disposal of used nuclear fuel will be described in order to provide a comprehensive picture of the project. The fuel final disposal project requires a separate EIA procedure.

Other projects related to this project will be identified and their environmental impacts assessed. In addition, the impacts of the zero alternative will be assessed and the impacts of different alternatives will be compared.

In practice, the project's environmental impacts will be assessed by first studying the current status of the environment and then evaluating the changes caused by the project and their significance. Planned impact studies include e.g. dispersion model calculations for cooling water, the assessment of the power plant's impact on the landscape and photomontages. The opinions of people living in the area will be studied by queries. This will also be used to support the assessment of the social impacts of the project. The assessment of health impacts is part of the assessment of the project's social impacts.

Each environmental impact will be analysed within an impact-spesific assessment area, which is defined to be large enough so that any significant impacts cannot be presumed to appear outside the area. If however during the assessment work, it is observed that some environmental impact has a larger impact area than estimated, this will naturally be taken into account in the assessment. The actual impact areas will thus be a result of assessment work and they will be presented in the environmental impact assessment report.

The EIA report will study the environmental impacts in exceptional situations based on the requirements set for a nuclear power plant. The existing vast research data about impacts of radiation on health and the environment will be used as the basis for assessing the consequences of serious accidents. The dispersion and transport of radioactive substances released to the environment will be modelled and the radiation impacts assessed in the surroundings of the power plant up to a distance of 1,000 kilometres.

5 POSSIBLE TRANSBOUNDARY ENVIRONMENTAL IMPACTS

Safety is the fundamental principle when designing a new nuclear power plant. If the new plant is to be constructed, currently valid international and Finnish safety requirements will be taken into account. Preparation for serious accidents and reduction of their consequences will be a central part of the planning. Possible risks for dangerous situations will be analysed thoroughly at the plant's design stage and reliable technical protections will be designed for each situation.

In addition, the plant will be protected against external threats. The nuclear power plant design will take into account the possibility of collision of a large passenger aircraft and exceptional weather conditions. In addition, other current external threats, such as the climate change, will be taken into account in the planning process.

In a highly unlikely situation of an accident resulting in a large radioactive emission, regardless of all prevention and consequence reduction actions, there may be a small possibility, under certain weather conditions, of impacts outside the Finnish borders. These impacts will be assessed up to a distance of 1,000 kilometres as stated in Chapter 4.

In addition, it will be assessed whether the project's impacts on the aquatic environment could extend outside of the Finnish territorial waters. So far no other impact types that could extend outside the Finnish territory have been identified. These issues will be studied more thoroughly in the EIA report and the studies to be made to compile it.

6 SCHEDULE

The environmental impact assessment report is estimated to be completed in autumn 2008. The EIA procedure is to be concluded in early spring 2009. The objective is to start the production of the new nuclear power plant by 2018.

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