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EXTENDING THE SERVICE LIFE OF THE OLKILUOTO 1 AND OLKILUOTO 2 PLANT UNITS AND UPRATING THEIR THERMAL POWER

tvo

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The original language of the environmental impact assessment is Finnish. Versions in other languages are translations of the original document which is the document TVO is committed to.

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Introduction

Agreements on the assessment of crossborder environmental impacts have been made in the Espoo Convention (Convention on Environmental Impact Assessment in a Transboundary Context). The countries party to these convention are entitled to participate in an environmental impact assessment process under way in another country when a project planned in a specific country (party of origin) is estimated to be likely to have transboundary impacts within the area of another country (affected party).

This document is a summary of Teollisuuden Voima Oyj's environmental impact assessment report for the purpose of an international hearing regarding the project in accordance with the Espoo Convention. The summary presents, among other things, the information regarding the planned project and its alternatives and schedule, the main characteristics of the arrangement of an environmental impact assessment process, a summary of the results of the environmental impact assessment as regards the most significant environmental impacts and the results from the transboundary impact assessment.

Further information regarding the project and the environmental impacts is available in the national environmental impact assessment report which has been translated into English and Swedish.

1. Project owner and project background

1.1. Project owner

The project owner for the EIA procedure is Teollisuuden Voima Oyj (TVO). TVO produces zerocarbon energy domestically, all year round and regardless of the weather at Olkiluoto in Eurajoki by using three nuclear power plant units: Olkiluoto 1 (OL1), Olkiluoto 2 (OL2) and Olkiluoto 3 (OL3). In 2023, the combined electricity output of the plant units OL1, OL2 and OL3 was 24.67 terawatt hours (TWh). This corresponded to approximately 31% of the electricity produced in Finland.

TVO has been generating electricity for its owners safely and reliably for more than 45 years. TVO's shareholders are Finnish industrial and energy companies which, in turn, are partly owned by 131 Finnish municipalities. TVO operates under the cost price principle (Mankala principle) in the manner described in its Articles of Association.

Together with Fortum Power and Heat Oy, TVO owns Posiva Oy (Posiva) which is tasked with the final disposal research related to the spent nuclear fuel of its owners, the construction and operation of the disposal facility and its closure. TVO's ownership share of Posiva is 60 %.

1.2. Background for the project

As part of service life management for the Olkiluoto nuclear power plant, TVO is analysing the possibility of extending the service life of the OL1 and OL2 plant units and uprating their thermal power.

The OL1 and OL2 plant units are identical boiling water reactors that were commissioned in 1978 (OL1) and 1980 (OL2). They have been generating electricity for the good of Finnish society for more than 40 years already. The current net electrical output of the OL1 and OL2 plant units is 890 megawatts (MW) per plant unit and their annual electricity production in 2023 was 14.29 terawatt hours (TWh) in total, corresponding to approximately 18% of the electricity consumption in Finland. Since the early 1990s, the capacity factors for OL1 and OL2 have been around 90%. High capacity factors indicate that the plant units operate reliably.

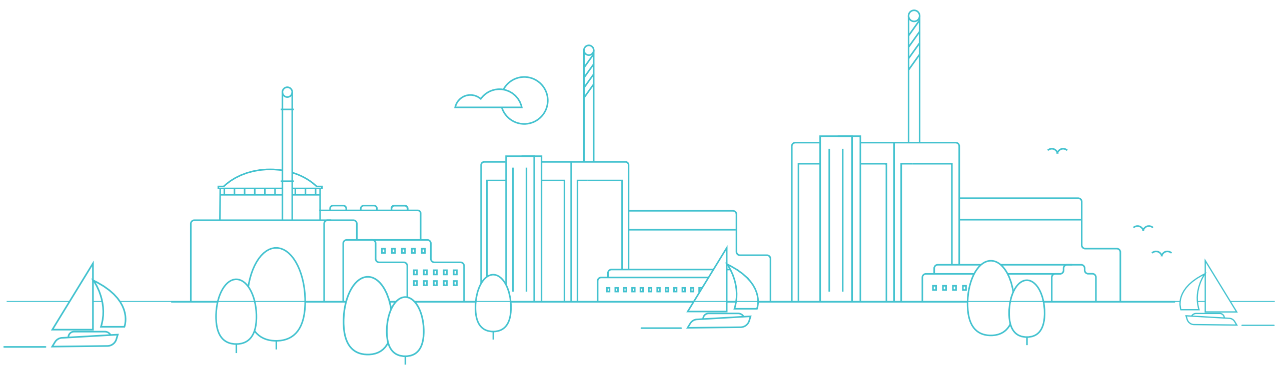
The original planned service life of the OL1 and OL2 plant units was 40 years, until 2018. During their years of operation, the plant units have been modernised in many ways through annual outages, while also improving their safety. Due to significant investments, the power plant units remain in excellent operating condition. Approximately EUR 50 million has been invested in OL1 and OL2 each year. As a result, it has been possible to extend the service life of the plant units to 60 years, and their current operating licences are in force until the end of 2038. The currently examined project involves analysing the possible extension of the service life of the plant units until 2048 or, alternatively, until 2058. The analyses related to extending the operation have considered the impacts of service life extensions on plant technology, nuclear safety, nuclear waste management and licensing, among other things.

At the time of commissioning, the thermal power of the plant units' reactors was 2,000 MW, from which it has been uprated to the current 2,500 MW in two stages: in 1984 (to 2,160 MW) and between 1994 and 1998 (to 2,500 MW). Correspondingly, the nominal (net) electrical power of the plant units has gone up from the original 660 MW to 710 MW in 1984 and to 840 MW in 1998. As a result of the turbine plant modernisations carried out in 2005–2006 and 2010–2012 and the improvement in efficiency, the current nominal value for electrical power is 890 MW.

In the presently examined power uprating, the starting point is an increase of the reactor's thermal power by 10% to 2,750 MW, which corresponds to increasing the plant units' nominal electrical power output from the current 890 MW to 970 MW. The total additional electricity generated by the OL1 and OL2 plant units each year would be approximately 1,200,000 MWh, roughly equivalent to the annual consumption in a city the size of Jyväskylä or Kuopio.

A preliminary analysis for the uprating of the thermal power for the plant units' reactors was drawn up during 2022. In addition to the technical analyses regarding plant engineering and nuclear fuel, the preliminary analysis included assessments related to nuclear safety, preliminary licensing and permit plans for the project and the analyses related to the management and implementation of the power uprating project. Following the preliminary analysis, the project planning stage of the power uprating project has been launched. During the project planning stage, safety analyses were drawn up, the required plant modifications were defined and, on their basis, a plantlevel plan for principles for the power uprating was drawn up that was completed in spring 2024.

If the decision is made to advance as regards the power uprating process, new operating licences must be sought for the plant units. The plant modifications required for the power uprating may be implemented and taken into use within the scope of the existing operating licence. At the earliest, the new operating licences would be sought in a manner in which the permits pursuant to the uprated thermal power would be in force in 2028. Test operation for the power uprating may be carried out under the supervision of the Radiation and Nuclear Safety Authority (STUK) pursuant to a binding advance information decision from the Ministry of Economic Affairs and Employment (MEAE). According to the terms of the valid operating licences, TVO must draw up a periodic safety assessment for the OL1 and OL2 plant units and submit it to STUK for approval by the end of 2028. The documents drawn up in connection with the periodic safety assessment may be utilised when applying for new operating licences as a result of the power uprating. If the power uprating were to be implemented, the operation of the plant units would be extended until 2048 or 2058.



2. Alternatives being examined

The service life extension and thermal power uprating of the OL1 and OL2 plant units necessitate an environmental impact assessment in accordance with the Finnish EIA Act (252/2017). Under Section 3 of the EIA Act, the environmental impact assessment procedure is applied to projects and changes thereto that are likely to have significant environmental impacts. Appendix 1 to the EIA Act lists projects to which the EIA procedure applies. Under section 7 b of the list of projects, an assessment process pursuant to the EIA Act applies to nuclear power plants and other nuclear reactors. The EIA report and its reasoned conclusion must be enclosed with the new operating licence applications for the plant units.

In this EIA procedure, the implementation alternatives being examined for the project are continuing the operation of the OL1 and OL2 plant units at the current power level until 2048 or 2058 (VE1) and continuing the operation at an uprated power level until 2048 or 2058 (VE2). In the zero alternative, the operation of the plant units will continue until the expiration of the valid operating licences in 2038 (VE0). The alternatives being considered are presented in the enclosed figure (Figure 1).

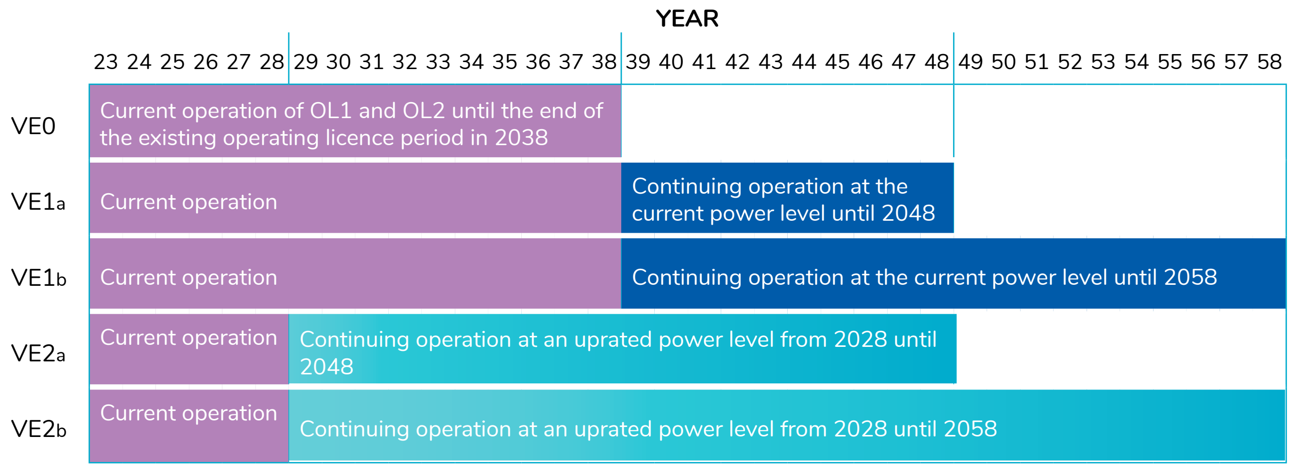


Figure 1. The alternatives examined in the EIA procedure and their preliminary planned schedules.

New operating licences pursuant to the Nuclear Energy Act (990/1987) must be applied for in all implementation alternatives. In alternative VE1, the new operating licences will be applied for before 2038 at the latest, as this will be the year of expiration for the existing operating licences. For alternative VE2, this will be carried out during 2028.

If the operation of the OL1 and OL2 plant units is not continued (VE0), the decommissioning of the plant units will take place following the expiration of the current operating licences, from 2038 onwards. If the operation of the plant units is continued, decommissioning will take place after the expiration of the new operating licences, from either 2048 or 2058 onwards. According to the current decommissioning plan, however, the actual dismantling and related waste management would mainly take place in the 2080s. The decommissioning of nuclear power plants is subject to licence and regulated according to the Nuclear Energy Act and Decree and STUK's regulations and guides. According to the current EIA Act (252/2017), the dismantling or decommissioning of a nuclear power plant requires an EIA procedure. A separate environmental impact assessment will be drawn up for the decommissioning of the OL1 and OL2 plant units, according to the legislation in force, once decommissioning becomes relevant.

3. Location of the project area and its functions

The Olkiluoto nuclear power plant area owned by TVO is located in Finland, on Olkiluoto Island in the municipality of Eurajoki. Generally speaking, the Olkiluoto power plant area refers to the area which houses TVO's plant units OL1, OL2 and OL3, the interim storage for spent fuel (KPA storage), the operating waste repository (VLJ repository) and Posiva's encapsulation plant and disposal facility for spent nuclear fuel.

Within the power plant area, the OL1 and OL2 plant units are located in the site area that is delimited in the western part of Olkiluoto Island. The site area contains the OL1, OL2 and OL3 plant units as well as facilities, equipment and functions related to the plant units; these include the KPA storage and the interim storage facilities for very low, low and intermediatelevel operating waste (HMAJ, MAJ and KAJ storages). The proposed project alternatives do not require new space reservations in the power plant area; any modifications will be implemented within the existing, constructed power plant area.

The location of the Olkiluoto power plant area within Finland and key functions within the power plant area are presented in the enclosed figures (Figure 2 and Figure 3).

Figure 2. Location of Eurajoki in Finland.

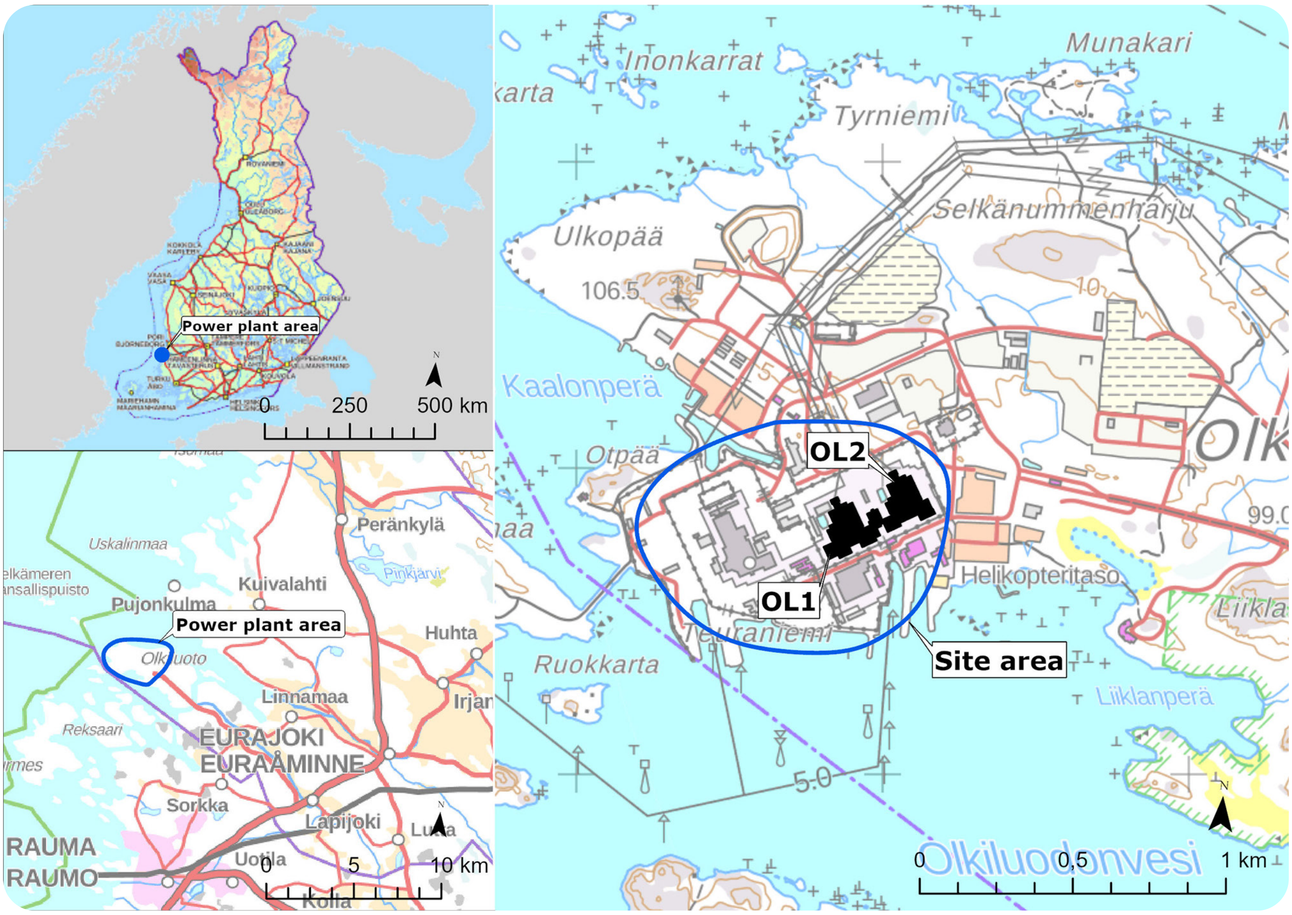


Figure 3. The location of the Olkiluoto power plant area and the location of the OL1 and OL2 plant units within the site area.

4. Project description

4.1. Current operation

The Olkiluoto nuclear power plant is an electricity generating power plant, where uranium dioxide (UO_2) manufactured from enriched uranium is used as fuel instead of fossil fuels (such as coal, natural gas or peat). The use of uranium as fuel is mainly based on the fission of uranium235 atomic nuclei, where a heavy atomic nucleus will split into two or more lighter nuclei as a free neutron collides with it. The reaction also releases a few neutrons that continue the chain reaction. A large amount of energy is released as the result of each splitting. In a nuclear power plant, the thermal energy created through fission is used to generate electricity by means of a steam turbine and an electrical generator. Very small amounts of uranium fuel can generate large amounts of thermal energy. For example, one gram of fissile material corresponds to 24,000 kilowatt hours (kWh) of energy.

The nuclear power plant units OL1 and OL2 are of a boiling water reactor type (BWR). In the reactor of a boiling water reactor plant, water is circulated through the fuel assemblies in the reactor core, causing the water to heat up and vaporise. The steam generated in the reactor is routed, via the steam separator and steam dryer located in the pressure vessel, along the steam lines into the high pressure turbine, and from there to the reheaters and finally to the low pressure turbines. The turbines are connected by means of an axle to a generator that generates electricity for the national grid. The steam coming from the low pressure turbines is condensed into water inside the condenser, using a sea water cooling circuit. The generated condensate is pumped using condensate pumps, through the cleanup system and the condensate preheaters, to the feedwater pumps, which pump it as feedwater back into the reactor via the preheaters. The warmed sea water is routed back into the sea.

Cooling water for the Olkiluoto power plant is taken from the southern side of Olkiluoto Island, on the shore of Olkiluodonvesi to the south of the OL1 and OL2 plant units. The volume of cooling water consumed by the OL1 and OL2 plant units is approximately 38 m^3/s per unit, with the OL3 plant unit consuming approximately 57 m^3/s. Therefore, the total consumption is approximately 133 m^3/s. At present, the process heats the cooling water by approximately 10°C, and the water is routed back into the sea along the discharge tunnels and outlet channel. The cooling water ends up on the Iso-Kaalonperä bay located at the western end of the island. The largest environmental impacts from the current operation of the Olkiluoto power plant are the result of the cooling water's thermal load on the sea. The impacts of cooling water are local, mainly focusing on the area near the cooling water discharge location.

The very low, low and intermediatelevel waste generated during the operation of the power plant is processed at the power plant and initially stored in the waste storage facilities of the plant units or, according to their radioactivity, transferred to the interim storage for very lowlevel waste (HMAJ storage), lowlevel waste (MAJ storage) or intermediatelevel waste (KAJ storage). Low and intermediatelevel waste is placed in final disposal in the operating waste repository (VLJ repository), which is located in the power plant area. Very lowlevel waste will be placed in the nearsurface final disposal facility for very lowlevel waste that is currently being planned. Spent nuclear fuel from Olkiluoto power plant is placed in interim storage within the power plant area, inside the water pools of the spent fuel interim storage facility. In time, the spent nuclear fuel will be placed in final disposal at Posiva Oy's encapsulation plant and disposal facility at Olkiluoto in Eurajoki.

4.2. Changes to current operation

The enclosed tables (Table 1, Table 2 and Table 3) present key figures for OL1 and OL2 during the current operation (VE0) and compare them to extending the service life at the current power level (VE1) and extending the service life at an uprated power level (VE2).

Table 1. Key figures in the various alternatives (per plant unit).

	VE0 current operation	VE1 Continuing operation at current power level	VE2 Continuing operation at uprated power level
Plant type	Boiling water reactor		
Electrical power output	890 MW		970 MW
Thermal power	2,500 MW		2,750 MW
Efficiency	35.6 %		35.3 %
Reactor operating pressure	70 bar		
Electricity production	approx. 7 TWh/a		approx. 7.6 TWh/a

Table 2. Key figures in the various alternatives (OL1 and OL2 plant units in total)

	VE0 current operation	VE1 Continuing operation at current power level	VE2 Continuing operation at uprated power level
Thermal power routed into the water system	98,000 TJ/a		109,000 TJ/a
Volume of cooling water	38 m^3/s per plant unit		
Increase in cooling water temperature	10 °C		11 °C
Fuel procurement and accumulation of spent fuel	18 tU/a per plant unit		
Fuel procurement and accumulation of spent fuel (during the entire service life)	2,483 tU (in 2038)	2,861 tU (in 2048) 3,240 tU (in 2058)	
Very low, low and intermediatelevel waste	50 m^3/a		
Very low, low and intermediatelevel waste (entire service life)	8,250 m^3 (in 2038)	8,750 m^3 (in 2048) 9,250 m^3 (in 2058)	
Chemicals	Sulphuric acid 18 t/a Sodium hydroxide 14 t/a Ion exchange resins 14 t/a Sodium hypochlorite (100 %) 8 t/a Glycol 5 t/a Nitrogen 140 t/a Bitumen 14 t/a Light fuel oil 255 t/a		
Releases of radioactive substances into the air*	Noble gases (Kr-87equiv.): 0–9.7 TBq/a. Release limit: 9,420 TBq/a Iodine (I-131): 0.00000008–0.002 TBq/a. Release limit: 0.1 TBq/a Aerosols: 0.000007–0.2 TBq/a Carbon-14 (C-14): 0.6–1.2 TBq/a Tritium (H-3): 0.2–2.7 TBq/a		

	VE0 current operation	VE1 Continuing operation at current power level	VE2 Continuing operation at uprated power level
Releases of radioactive substances into water*	Fission and activation products: 0.00008–0.0006 TBq/a. Release limit: 0.3 TBq Tritium (H-3): 1.3–2.5 TBq/a. Release limit: 18.3 TBq		
Greenhouse gas emissions (emergency generators)	914 t CO_{2e}/a		927 t CO_{2e}/a
Other releases into the air	NO_x: 1.2 t/a SO_2: 0.0 t/a Particles: 0.1 t/a		
Process waste water	total 25,000 m^3/a Phosphorus: 5 kg/a, Nitrogen: 100 kg/a		

* Range of variation for OL1 and OL2 in 2007–2022. The highest values in the actual release ranges have been related to rare fuel leakages.

Table 3. Key figures in the various alternatives (OL1, OL2 and OL3 plant units in total).

	VE0 current operation	VE1 Continuing operation at current power level	VE2 Continuing operation at uprated power level
Service water	268,000 m^3/a		
Household waste water*	total 78,905 m^3/a Phosphorus: 15 kg/a, Nitrogen: 3,642 kg/a, BOD_{7ATU}: 629 kg/a		
Conventional waste	Recyclable waste: 2,650 t/a Hazardous waste: 210 t/a Landfill waste: 0 t/a		
Noise*	Nearest holiday housing (Leppäkarta) 39.4–42.1 dB, main gate 48.6–56.3 dB		
Traffic*	Approximately 1,050 vehicles/day. During annual outages, increases by approximately 1,000 vehicles/day.		

* Includes the operations of Teollisuuden Voima and Posiva.

5. Nuclear safety and radiation safety

5.1. Legislation and regulatory monitoring concerning nuclear energy

In Finland, the starting point of the Nuclear Energy Act *(990/1987)* is that the use of nuclear energy shall be in line with the overall good of society, and it must not cause harm to people, the environment or property. The Nuclear Energy Act forms the basis for the Nuclear Energy Decree *(161/1988)* and the supplementary regulations from STUK concerning the use of nuclear energy. STUK's regulations concern the safety of nuclear power plants *(STUK Y/1/2018)*, emergency arrangements, *(STUK Y/2/2024)*, security in the use of nuclear energy *(STUK Y/3/2020)* and the safety of disposal of nuclear waste *(STUK Y/4/2018)*. Radiation safety is set forth in the Radiation Act *(859/2018)* and the Government Decree on Ionizing Radiation *(1034/2018)*. According to the Nuclear Liability Act *(484/1972)*, the holder of a nuclear power plant shall have nuclear liability insurance that compensates for any damage caused by a possible nuclear accident to outside parties, up to an upper limit defined in the Act.

The Ministry of Economic Affairs and Employment has started the preparation of legislation aiming at the complete renewal of the Nuclear Energy Act *(Ministry of Economic Affairs and Employment 2023)*. The Nuclear Energy Act and its executive regulations will be renewed during the term of this Government in a manner that supports the fluent progress of projects and Finland's competitiveness as an investment target (*Government 2023)*. The work to renew STUK's nuclear safety provisions, i.e. the regulations and guides, is also under way. The preparation of STUK's regulations is done in parallel with the preparatory work for the Nuclear Energy Act and Decrees *(STUK 2024f)*.

The limit values defined for the operation of a nuclear power plant are included the Nuclear Energy Decree, STUK's regulation concerning the safety of nuclear power plants, the YVL Guides and regulations and the operating limits and conditions approved for the plant by the Radiation and Nuclear Safety Authority. Limit values are also included in the Government Decree on Ionizing Radiation. The limit values concerning radiation exposure are related to the radiation doses of the personnel and the environment, the releases of radioactive substances and various different technical operating values related to the plant's operation. An essential part of the operating limits and conditions for the plant are the operability requirements for safetyrelated components and systems that are a prerequisite for continuing the operation of the plant.

5.2. Nuclear Safety

The safe operation of the Olkiluoto nuclear power plant is based on a high level of plant technology, the principle of continuous improvement, nuclear professionalism i.e. competent and responsible personnel, and independent internal and external oversight. The safety and safety requirements of the Olkiluoto nuclear power plant have been developed, and are being continuously developed, based on results from safety studies and operating experience, for example.

In order to ensure safe operation, the level of safety is being systematically assessed at TVO. TVO regularly assesses the status of overall safety from the perspectives of production, nuclear safety and radiation safety, corporate safety and security, plant unit service life management and leadership, the organisation and personnel. TVO regularly assesses and develops the operation of the plant units using internationally applied safety indicators. These include, for example, the unavailability of safety systems, the collective radiation dose, unplanned energy unavailability and unplanned automatic scrams/trips.

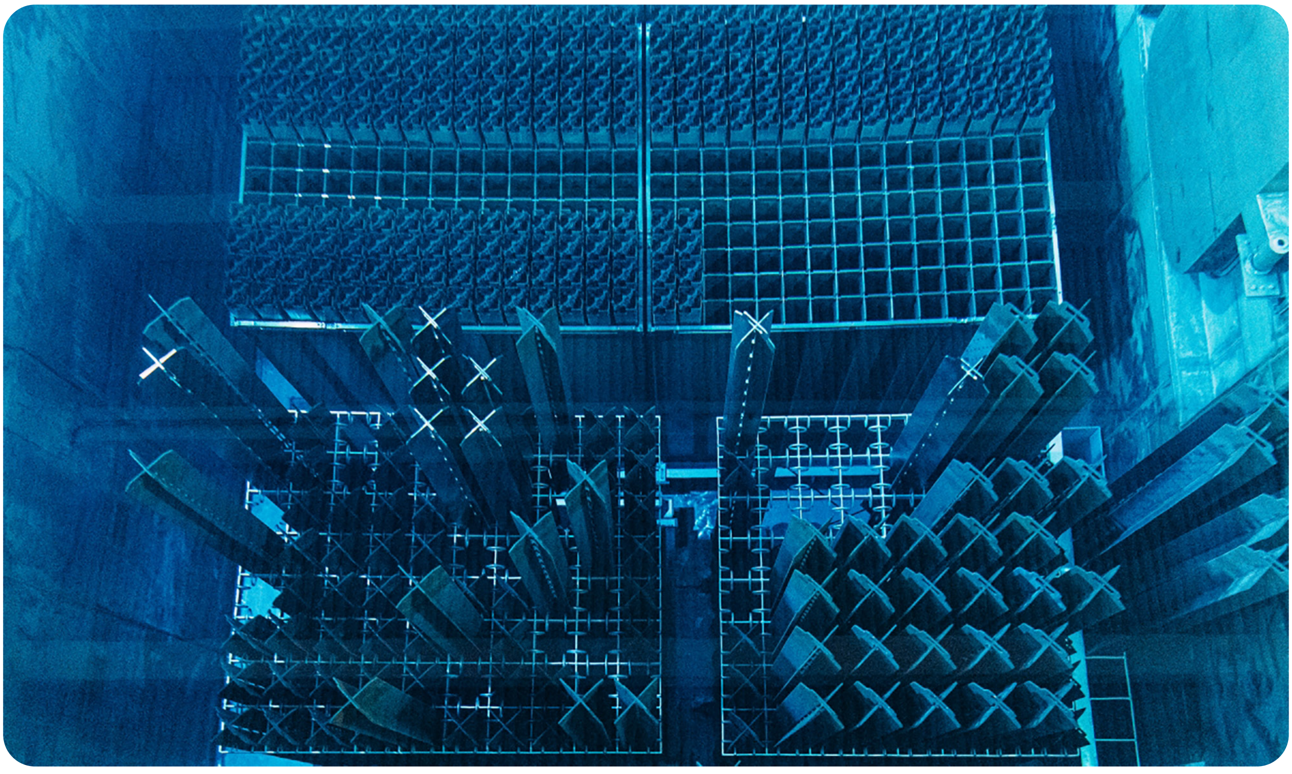
The basic principle for nuclear and radiation safety is to prevent the release of radioactive material into the environment. In order to prevent any releases, the safety of the plant units is ensured many times over by using diverse structural barriers and safety systems. Nuclear safety and radiation safety are developed by analysing risks and preparing for them.

The nuclear safety of the OL1 and OL2 plant units is ensured by means of safety functions that are intended to prevent the occurrence of incidents and accidents, to stop them from progressing or to mitigate the consequences of accidents. Safety functions have been defined in order to ensure the integrity of the release barriers for radioactive substances. The functions are supported by means of support actions that start automatically or are started by an operator.

The key safety functions of a nuclear power plant are as follows:

- Reactivity management, which aims at stopping the chain reaction inside the reactor if necessary.
- Residual heat removal, which aims at cooling the fuel and, thereby, ensuring the integrity of the fuel and primary circuit.
- Preventing the spread of radioactivity, which aims at isolating the containment and ensuring its integrity, thereby managing radioactive releases during an accident.

A nuclear power plant has systems for regular operation as well as safety systems that are used to implement the abovementioned safety functions both during normal operation and in case of incidents and accidents. The safety systems are used to ensure the cooling of the nuclear fuel inside the reactor even when normal systems for operation are not available. The most important safety systems are the systems related to shutting down the reactor and residual heat removal.



A nuclear power plant must be prepared for a severe reactor accident. A severe reactor accident refers to an accident where the fuel inside the reactor becomes significantly damaged. Even though such an accident is very unlikely, the OL1 and OL2 plant units are equipped with systems for managing a severe reactor accident. These systems are used to ensure that the power plant will not release radioactive substances in amounts that would cause major hazards to people, the environment or property.

During the operating history of the OL1 and OL2 plant units, numerous projects have been implemented to improve nuclear safety; as a result, the plant units are significantly safer now than when they first started. These safety improvements have been based on continuously seeking the highest possible level of safety in accordance with a high level of safety culture as well as STUK's evolved requirements. Following the Fukushima accident, for example, several changes that improve safety have been made, as a result of which the calculated probability of a severe reactor accident has been significantly reduced.

5.3. Radiation and its monitoring

In all their radiation protection activities, TVO and its personnel are committed to following the principle of ALARA (As Low As Reasonably Achievable). According to the principle, individual and collective radiation doses are kept as low as possible by practical measures. Limiting the doses and keeping the level of radioactive releases as low as possible are already taken into account when designing the plant structures and functions. Each employee must take radiation protection matters into account in their own work. In addition to authority guidelines, the development of radiation protection operations also takes international recommendations into account.

At a nuclear power plant, radioactive substances are mainly formed as fission products as the atom nuclei in the fuel split, inside the reactor and in its vicinity by means of neutron activation, and as the products of radioactive decay chains of the substances mentioned above. Systems containing radioactive substances are located inside what is known as the radiation controlled area. In the radiation controlled area, specific safety instructions are followed in order to protect against radiation. Continuous radiation monitoring has been arranged for personnel working in the radiation controlled area, and radiation measurements are performed on people and items when leaving the radiation controlled area.

Radioactive releases from the OL1 and OL2 plant units are monitored by means of release measurements, and the dispersion of the releases into the environment are tracked in accordance with an environmental radiation monitoring programme approved by STUK. Environmental radiation monitoring is based on continuous dose rate measurements, air and fallout samples, sea water samples and samples taken from the food chain. The releases from the OL1 and OL2 plant units are reported to STUK for each quarter. Independent monitoring performed by STUK supplements the monitoring performed by TVO. Structural radiation protection, radiation monitoring for the personnel, release monitoring and environmental radiation monitoring are implemented under STUK's supervision.

According to section 13 of the Government Decree on Ionizing Radiation, the effective dose of a radiation worker must not exceed 20 mSv (millisieverts) per year. TVO's own targets regarding individual annual doses are keeping the dose obtained by all Olkiluoto employees from their work below 10 mSv per year and keeping doses caused by internal contamination below 0.5 mSv. During the normal operation of the OL1 and OL2 plant units, radiation doses incurred by the personnel are clearly below these dose limits.

The Nuclear Energy Decree *(161/1988)* and the Government Decree on Ionizing Radiation *(1034/2018)* set the limit values for radiation doses for the normal operation of nuclear facilities as well as for accident conditions. The limit value for the annual dose incurred by an individual from the normal operation of a nuclear power plant is 0.1 mSv, which is less than 2% of the average annual dose of 5.9 mSv incurred by Finns due to radiation. In recent years, the actual radiation dose incurred by individuals in the vicinity of the OL1 and OL2 plant units has been approximately 0.2% (approx. 0.0002 mSv) of the dose limit set in the Nuclear Energy Decree, and less than one tenthousandth of the normal annual radiation dose received by Finns from other sources on average.

5.4. Service life management and maintenance

The OL1 and OL2 plant units are among the best nuclear power plants in the world in terms of operability and safety. The annual capacity factors for the OL1 and OL2 plant units have been consistently around 90%, on average, and the indicators measuring safety are at a good level. This has been due, in part, to the approach chosen by TVO, which has been one of continuously improving safety and ensuring operability. The result has been achieved through proactive equipment replacements, comprehensive preventive maintenance and the development of the plant units' processes, which allow for good operability and the gradual improvement of the plant units' efficiency.

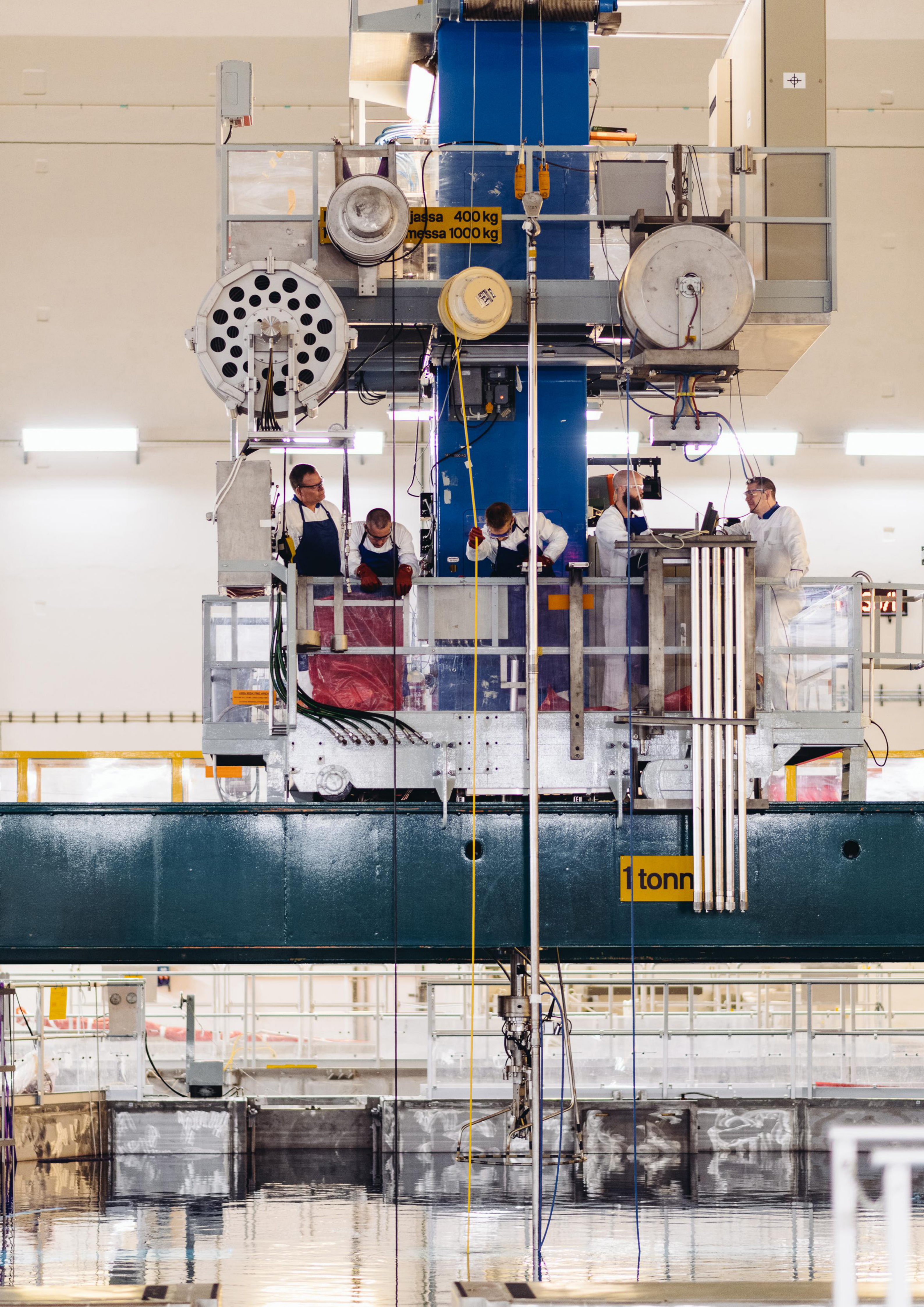
As regards the service life extension and power uprating, the same basic principles for nuclear safety and radiological safety will be observed as are used during the current operation of the power plant, taking into account the requirements of evolving legislation. Furthermore, safety improvements will be made in adherence to good safety culture.

The OL1 and OL2 plant units have been systematically developed over the decades. TVO systematically modernises the plant units during annual outages and through modernisation projects. State-of-the-art solutions that improve operability, productivity and safety are being commissioned throughout the service life. The nuclear power plant units at Olkiluoto are constantly kept in good condition by alternating between refuelling outages and service outages at the plant units.

The ageing management for the plant units is integrated into TVO's daily operations. The goal for ageing management is to keep the plants up to date and in good condition in terms of their safety and availability. TVO's ageing management covers the safetyrelevant systems, structures and components of the OL1 and OL2 plant units, the VLJ repository and the KPA storage. Substantial investments have been made in the plant units during their entire service life, thereby guaranteeing their disturbancefree and safe operation. A high level of investment has also enabled efficient and proactive ageing management. Efficient anticipation and management of ageing allows for extending the service life in line with current processes. The key analyses for the ageing of structures and components at the OL1 and OL2 plant units have been drawn up for a service life of 60 years; if the service life is extended, they will be updated for 80 years of operation. At the moment, no ageing mechanisms are known that would limit the technical service life of the plant units, taking into account the planned schedules of the project alternatives examined in the EIA. During continued operation of the plant units, ageing management and its related processes as well as maintenance will continue under STUK's supervision, similarly to the current operation.

By means of highquality operations, TVO aims to minimise releases from the OL1 and OL2 plant units. The prevention of fuel leakages and minimising the volume of generated waste aims to preserve the low release levels into the water and air, which have been seen over the past years, even during the continuation of operation and following the potential power uprating. Technological developments are also tracked at the Olkiluoto power plant in order to ensure that the BAT (Best Available Technique) principle is implemented. In connection with limiting releases, the starting point for the BAT principle is to use the best available techniques that are technically and financially feasible and can be implemented at a reasonable cost to limit releases. When pursuing the BAT principle, however, the broader perspective of the radiation protection optimisation principle ALARA (As Low As Reasonably Achievable) must also be considered. According to the ALARA principle, the radiation exposure of the power plant employees must be considered in addition to the exposure of the inhabitants in nearby areas. The feasibility of a technique depends on the overall picture formed from these perspectives.

More information regarding service life management and maintenance is available in chapters 3.2.1 and 3.3.1 of the EIA report.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6. Environmental impact assessment procedure

The aim of the environmental impact assessment procedure (EIA procedure) is to ensure that the significant environmental impacts of the planned project are analysed to a sufficient level of precision. Its aim is to produce information to support the planning and decisionmaking of the project but also to provide the various parties with increased access to information and opportunities for participation in the project's planning stage.

In Finland, the need for an EIA procedure is based on the Act on Environmental Impact Assessment Procedure. This project also applies the Espoo Convention on the assessment of transboundary impacts (international hearing).

6.1. International hearing

A procedure pursuant to chapter 5 of the Act on the environmental impact assessment *(252/2017)* that concerns any possible transboundary environmental impacts is applied to this project.

The principles of international cooperation in environmental impact assessment are defined in the United Nations Economic Commission for Europe's Convention on Environmental Impact Assessment in a Transboundary Context *(SopS 67/1997, Espoo Convention)*. The Espoo Convention defines the general obligations for arranging a hearing of the member states' authorities and citizens in all projects that are likely to have major transboundary environmental impacts. The EIA Directive also contains provisions concerning communication on the project, and the EIA Directive further requires that a member state must be able to participate in the assessment procedure of another member state if so required. In addition to the EIA Directive, the Convention on Access to Information, Public Participation in Decisionmaking and Access to Justice in Environmental Matters *(SopS 121–122/2004, Aarhus Convention)* contains provisions regarding the participation and appeal rights of the international public. One of the goals of the Aarhus Convention is to allow the public to participate in decisionmaking on environmental matters. The Aarhus Convention has been enacted within the EU by means of several directives, such as the EIA Directive and national EIA acts and decrees. Finland and Estonia have a mutual EIA agreement that further specifies the Espoo Convention. Furthermore, Finland and Sweden have a transboundary reactor agreement *(SopS 19/1977)*.

On 15 January 2024, the Ministry of Economic Affairs and Employment submitted to the Finnish Environment Institute a request to initiate an international hearing at the EIA programme stage. The Finnish Environment Institute notified the environmental authorities in the target countries that an EIA procedure has been started for the project and enquired whether they are willing to participate in the EIA procedure. A summary document for the EIA programme that had been translated into the target country's language and the EIA programme translated into Swedish or English was enclosed with the notification. The documents were submitted to Sweden, Estonia, Latvia, Lithuania, Norway, Denmark, Poland and Germany. The Finnish Environment Institute also notified the parties to the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention). Bulgaria, Hungary and Austria requested a notification concerning the project, which the Finnish Environment Institute has submitted to the nations in question.

The Finnish Environment Institute received responses from various nations. Bulgaria, Austria, Latvia, Sweden, Germany, Denmark and Estonia have notified that they will participate in the environmental impact assessment procedure concerning the project. Lithuania, Norway, Poland, Greece, Ireland, Switzerland, Hungary and Canada notified that they will not be participating in the procedure. Some nations have requested the documents for information. The Finnish Environment Institute relayed any feedback that it had received to the Ministry of Economic Affairs and Employment for consideration in its statement regarding the EIA programme.

A corresponding international hearing will also be arranged at the EIA report stage to the affected parties who have expressed that they will participate in the EIA procedure.

6.2. The EIA procedure in Finland

The EIA procedure is stipulated by law. The directive *(2011/92/EU)* of the European Parliament and of the Council on the assessment of the effects of certain public and private projects on the environment has been enacted in Finland via the Act on the Environmental Impact Assessment Procedure *(EIA Act, 252/2017)* and the Government Decree on the Environmental Impact Assessment Procedure *(EIA Decree, 277/2017)*. The first EIA directive is from 1985 *(85/337/EEC)*, and it entered into force in Finland in 1995. The directive, similarly to the EIA Act and Decree, has been amended on several occasions.

The service life extension and thermal power uprating of the OL1 and OL2 plant units necessitate an environmental impact assessment procedure in accordance with the EIA Act *(252/2017)*. Under Section 3 of the EIA Act, the environmental impact assessment procedure is applied to projects and changes thereto that are likely to have significant environmental impacts. Appendix 1 to the EIA Act lists projects to which the EIA procedure applies. Under section 7b of the list of projects, an assessment process pursuant to the EIA Act applies to nuclear power plants and other nuclear reactors. The EIA report and its reasoned conclusion must be enclosed with the new operating licence applications for the plant units.

The EIA procedure has two stages. In the first stage, an EIA programme programme was drawn up, regarding which the Ministry of Economic Affairs and Employment, acting as the coordinating authority for this project, provided a statement on 25 Apr 2024. In the second stage of the EIA procedure, the actual environmental impact assessment is performed on the basis of the EIA programme and the coordinating authority's statement regarding it. The results of the assessment are compiled into an EIA report that is submitted to the coordinating authority when complete.

According to the EIA Decree, the EIA report shall present the following information to a necessary extent:

- A description of the project and its aim, location, scope, land use needs and key characteristics, taking into account the various stages of the projects and exceptional circumstances;
- Information on the project owner, the schedule for the project's design and implementation, the plans, permits and similar decisions required for the implementation and the project's interfaces with other projects;
- An account of the interfaces of the project and its alternatives with land use plans as well as plans and programmes pertaining to the use of natural resources and environmental protection that are relevant in terms of the project;
- A description of the current state of the environment within the area of impact and its likely development if the project is not implemented;
- An estimate and description of the likely significant environmental impacts of the project and its reasonable alternatives as well as a description of the transboundary environmental impacts. The estimate and description of likely significant environmental impacts shall cover the immediate and indirect, cumulative, shortterm, mediumterm and longterm permanent and temporary, positive and negative impacts as well as joint impacts with other existing and approved projects;
- An estimate of potential accidents and their consequences as well as actions for preparing for these situations, including the actions taken for prevention and mitigation;
- A comparison of the environmental impacts of the alternatives;
- Information on the main reasons leading to the selection of the chosen alternative(s), including any environmental impacts;
- A proposal for actions to avoid, prevent, limit or eliminate any identified significant and detrimental environmental impacts;
- A proposal regarding any potential monitoring arrangements related to significant detrimental environmental impacts;
- An account of the phases of the assessment procedure with their participation processes and their interfaces with the project planning;
- A list of sources used when drawing up the descriptions and assessments included in the report;
- A description of the methods that have been used in the identification, prediction and assessment of significant environmental impacts as well as information on the shortcomings observed and key uncertainty factors identified when compiling the necessary information;
- Information on the qualifications of the authors of the assessment report;
- An account of how the coordinating authority's statement regarding the assessment programme has been considered.

The coordinating authority sets the assessment report on display for public inspection, similarly to the EIA programme; for this project, the duration of the public inspection has been set at 60 days by agreement with the coordinating authority. An international hearing will also be arranged at the EIA report stage. Based on the EIA report and the statements provided concerning it, the coordinating authority draws up a reasoned conclusion on the key environmental impacts of the project that must be considered in the later permit processes. The assessment report and the coordinating authority's reasoned conclusion are enclosed with the permit application documents.

6.3. Stages and schedule for the EIA procedure

The figure below (Figure 4) presents a summary of the stages of the EIA procedure in Finland and how the international hearing links to it. The key stages and preliminary schedule for the EIA procedure are presented in the figure below (Figure 5). The EIA procedure ends when the coordinating authority has issued its reasoned conclusion regarding the EIA report.

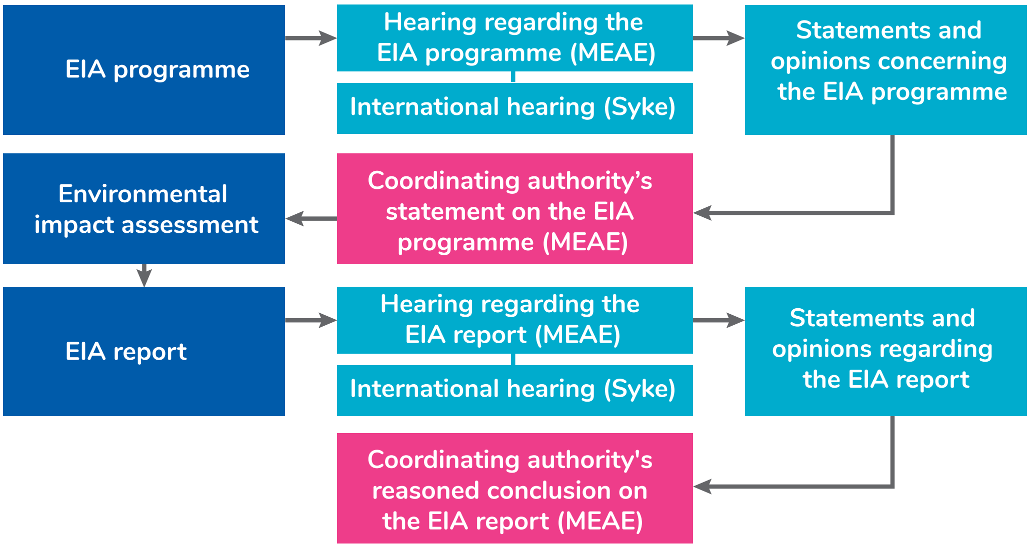

Figure 4. Stages of the EIA procedure. MEAE = Ministry of Economic Affairs and Employment. Syke = Finnish Environment Institute.

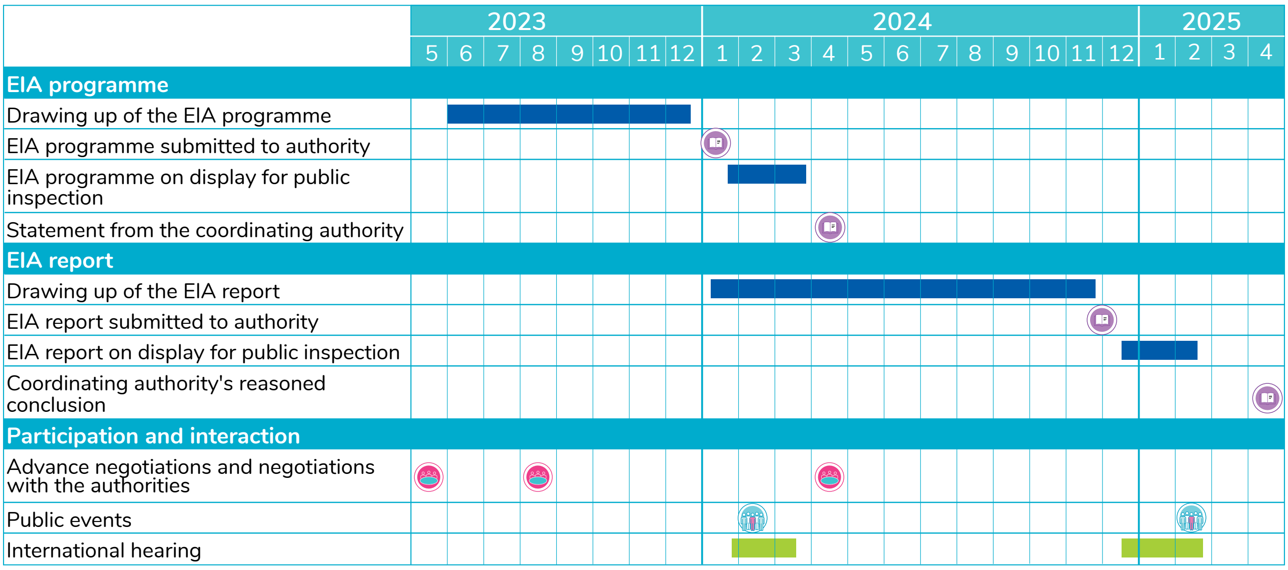

Figure 5. Preliminary schedule for the EIA procedure.


KAAPELI

7. Environmental impact assessment in Finland

7.1. Impacts to be assessed

The purpose of an environmental impact assessment is to assess, in the manner and accuracy required by the EIA Act and Decree, the environmental impacts caused by the project. The estimate and description of likely significant environmental impacts shall cover the immediate and indirect, cumulative, shortterm, mediumterm and longterm permanent and temporary, positive and negative impacts as well as joint impacts with other existing and approved projects; According to the EIA Act, the EIA procedure assesses the impacts of functions related to the project which target the following:

- The population as well as the health, living conditions and comfort of people;
- Soil, ground, water, air, climate, vegetation as well as organisms and biodiversity, especially as regards protected species and habitats;
- Community structure, tangible property, landscape, townscape and cultural heritage;
- Use of natural resources;
- The mutual interactions between the aforementioned factors.

Furthermore, the impact assessment has examined other potential impacts that are related to the project and have been identified as significant but which are not listed in the Finnish EIA Act.

Pursuant to Section 4 of the EIA Decree, the assessment report presents an estimate and description of the likely significant environmental impacts of the project and its reasonable alternatives as well as a comparison of the alternatives' environmental impacts. The environmental impact assessment takes into account the impacts of the potential project alternatives during any possible modifications and operation. Furthermore, the project's possible joint impacts with other functions or other planned projects are assessed.

The results of the environmental impact work are presented, per impact, in chapter 6 of the EIA report. The following matters have been discussed for each impact:

- Initial data and assessment methods
- Current state of the environment
- The environmental impacts of continued operation
- The environmental impacts of power uprating
- Comparison of the alternatives and an assessment of the significance of the impacts
- Actions to prevent and mitigate detrimental impacts
- Uncertainty factors related to the assessment.

Transboundary impacts have been assessed in chapter 6.19 of the EIA report, and the severe reactor accident discussed therein and its impacts have also been described in more detail in chapter 6.18.

7.2. Schedule and review of impacts

One of the implementation alternatives being examined for the project is continuing the operation of the OL1 and OL2 plant units at the current power level following the expiration of the existing operating licences, from 2038 until 2048 or 2058 (VE1). The operating impacts of this alternative take place across 10 or 20 additional years of operation. The second implementation alternative being examined for the project is continuing the operation of the OL1 and OL2 plant units at an uprated power level, from around 2028 until 2048 or 2058 (VE2). The operating impacts of this alternative take place across 20 or 30 years. For both alternatives, the assessment takes into account the impacts of potential modification or construction work in addition to the impacts during operation.

In the zero alternative, the operation of the plant units will continue until the expiration of the valid operating licences in 2038 (VE0). As regards the zero alternative, the potential impacts resulting from the end of the current operation have been described on a general level. A separate environmental impact assessment will be drawn up for the decommissioning of the OL1 and OL2 plant units, according to the legislation in force, once decommissioning becomes relevant; therefore, the impact assessment for the decommissioning is not included in this EIA procedure.

7.3. Impact assessment approach and methods

The purpose of the environmental impact assessment is to systematically identify and assess the environmental impacts caused and their significance. An impact refers to a change in relation to the current state of the environment brought about by the project, its alternative or a function related to them. When assessing the significance of an impact, the magnitude of the change caused by the impact and the capability of the environment to receive changes, that is, the sensitivity of the affected aspect are considered.

7.3.1. Sensitivity of the affected aspect

The sensitivity of the affected aspect refers to the environment's capability to receive changes. The sensitivity is determined on the basis of the characteristic features and current status of the aspect or area. Characteristic features may include, for example, current traffic conditions, the current status for noise and air quality or natural values, scenic values or recreational values.

The affected aspect's sensitivity to change describes the capability of the asset to receive, withstand or tolerate changes caused by the project. For example, a recreational area is generally more sensitive to changes than an industrial area. Sensitivity is also affected by whether the aspect is protected by law or if there are any defined guideline values, norms or recommendations for the impact (e.g. guideline values for noise or environmental quality norms for surface waters). For impacts affecting humans, the number of people using or experiencing the aspect and their experience are also taken into account.

The sensitivity of the affected aspect is assessed by using a scale of four steps: minor, moderate, large and very large, and it is based on the current state of the environment.

7.3.2. Magnitude of change

The magnitude of the change may be affected by, among other things, its scope, duration or intensity. Therefore, a change may be a direct impact on the environment caused by a change in operations or a longterm activity that maintains a change targeting the environment.

The magnitude of the change caused by the project is defined and assessed on the basis of several variables:

- The magnitude of the change: its scope, duration and strength
- The direction of the change: positive, negative or no change
- Geographical scope: regional, local or transboundary
- Duration: temporary, shortterm, longterm or permanent
- Other factors: for example, the recurrence and timing of the change and its accumulation and restorability.

In some cases, the magnitude of measurable changes can be modelled from the initial data (for example, the spreading of cooling water). In order to determine the magnitude of qualitative changes, an expert assessment is prepared; in order to reduce its subjectivity, the initial data which the assessment is based on will be presented as transparently as possible.

Several methods are employed in the acquisition of initial data:

- Monitoring data from existing activities
- Field visits and studies carried out
- Various modelling techniques (e.g. cooling water modelling)
- Location of affected aspects and areas using the location data system
- Utilisation of literature, databases and research results
- Employment of participatory data acquisition methods (e.g. public events, monitoring group)
- Previous experience and expertise from the assessment workgroup
- Analysis of matters expressed in the statements and opinions.

The magnitude of the change is assessed on a fourstep scale: low, medium, high and very high. It is also possible that the project will not cause a change when compared to the current status.

7.3.3. Significance of the impacts

The significance of an impact is determined by the sensitivity of the affected aspect and the magnitude of the change. The significance of the impact is determined by crosstabulating the sensitivity of the affected aspect and the magnitude of the change for the various alternatives in connection with the assessment of each impact. The significance of the impact is determined on a scale of four steps: minor, moderate, large and very large. The significance of the impact may be negative or positive or there may be no impacts at all. The significance of each impact is presented in a separate summary table in chapter 6 of the EIA report.

The assessment of each impact has been implemented as follows:

1. Identifying the origin of the impact and describing the initial data and methods used in the assessment.
2. Describing the current status of the affected aspect and, based on that, assessing its sensitivity or capability to receive the change being examined.
3. Describing the environmental impacts and the magnitude of the change that they cause.
4. Assessing the significance of the impact on the basis of the sensitivity of the affected aspect and the magnitude of the change and drawing conclusions on the significant impacts.
5. Comparing the different alternatives and identifying their differences in terms of feasibility.
6. Presenting any potentially required mitigation actions for detrimental impacts.
7. Analysing the uncertainty factors affecting the impact assessment.

The approach to the assessment method has been described in more detail in chapter 5 of the EIA report and the assessment methods applied for each impact are described in chapter 6. As regards transboundary impacts, the assessment methods are presented in chapters 6.19 and 6.18.3 of the EIA report.

7.4. Analyses and other documentation used for the assessment

Environmental analyses and surveillance have been performed near the Olkiluoto power plant area for decades. Therefore, comprehensive information is available regarding the power plant area and, in particular, the sea environment in the nearby areas which could be used in the environmental impact assessment. Furthermore, the environmental impact assessment used available information on the current activities, emissions and impacts in the area and the technical information that becomes more detailed as the project is being planned.

The initial data and documentation used in the assessment are described in chapter 6 of the EIA report.

7.5. Uncertainties related to the impact assessment

The EIA procedure is part of the project's preplanning stage, and the design data concerning the project are specified as the project proceeds to its later stages, such as the permit processes. Therefore, there may be various assumptions and generalisations related to the initial data and impact assessments that were being used, which may cause uncertainty in the environmental impact assessment work. The EIA report has aimed to identify potential uncertainty factors per impact and to assess their significance in terms of the reliability of the impact assessments' results. For none of the impacts are the uncertainties large enough to change the direction of the assessment or the outcome in terms of the significance of the impact. The aim has been to assess the impacts on the basis of the socalled worst case scenario, and to round the outcome of the significance of impacts up rather than down.

7.6. Summary of the current state of the environment in Finland

The current state of the environment in Finland has been described in connection with the impact assessment for each affected aspect in chapter 6 of the EIA report.

The total surface area of Olkiluoto Island is approximately 900 hectares. Teollisuuden Voima Oyj owns approximately 90% of the land areas on Olkiluoto Island. In addition, TVO partly owns the water areas north and south of the island. The Satakunta provincial plan indicates that the Olkiluoto power plant area and its surroundings are a target area for the development of energy supply, and the area for the OL1 and OL2 plant units is an energy supply area. At the master plan level, the power plant area, in its entirety, is indicated as an energy supply area. A nuclear power plant precautionary action zone, spanning to a distance of 5 km, has been established around the power plant area. A restriction on movement has been put in place around the power plant area. Furthermore, the surroundings of the power plant area have been defined as a nofly zone.

In 2022, the population of Eurajoki was 9,211. Approximately 50 to 60 people permanently lived within a distance of 5 km from the site area. Holiday housing is located in the coastal areas and islands near Olkiluoto. The Olkiluoto area has functional transport connections for vehicles, with roads, parking areas and harbours. Olkiluodontie, with a length of approximately 13 km, branches out from main road 8 towards the power plant area; the average traffic volume along its busiest road section was approximately 2,319 vehicles per day. Of these, 5% were heavy vehicles.

The noise levels in the Olkiluoto power plant area and its surroundings are affected by the industrial functions located on Olkiluoto Island, which are TVO's plant units OL1, OL2 and OL3 as well as their auxiliary functions, Posiva's encapsulation plant and disposal facility for spent nuclear fuel that is under construction and Fingrid Oy's gas turbine plant. Furthermore, Olkiluoto harbour located on the northern edge of the island and traffic along Olkiluodontie, which crosses the island, cause noise on Olkiluoto Island. Noise levels in the area have mainly been in compliance with the requirements in TVO's environmental permit. Vibration in the power plant area is mainly caused by traffic, and it is very local.

On Olkiluoto Island, releases into the air (such as sulphur and nitrogen oxides and particles) are low and the air quality has been estimated to be good. Electricity production based on nuclear power does not cause direct greenhouse gas emissions from the power plant. Low amounts of greenhouse gas emissions are generated from the fuel consumption of emergency power generation and traffic. The power plant releases low amounts of radioactive substances into the air and water, in a controlled manner and following cleanup. Releases of radioactive substances into the air and water have been clearly below the release limits. The radioactive releases from normal operation of the power plant are so low that the radiation dose incurred by the population as a result of them is impossible to measure. Because of this, the radiation doses for the population are determined by means of calculations. In Finland, the limit for the radiation dose incurred by an individual resident in the surrounding areas, attributable to normal operation of nuclear power plant units, has been set at 0.1 millisievert (mSv) per year in the Nuclear Energy Decree *(161/1988)*. In 2013–2022, the calculated dose for the most exposed individual at Olkiluoto has been less than 1% of the limit of 0.1 mSv. The radiation exposure of the residents in nearby areas is assessed each year on the basis of release data from the Olkiluoto nuclear power plant, environmental samples and meteorological measurements.

The power plant area has been in its current use since the late 1970s, so there is no direct use of natural resources in the area. Nuclear fuel is procured from a nuclear fuel supplier. Natural uranium is a nonrenewable natural resource and, at the current global levels of consumption, uranium reserves have been estimated to last for more than 130 years in an open fuel cycle. New methods for utilising uranium reserves may be commissioned in the future, should the price of uranium increase, which will mean that uranium deposits will last for clearly longer. Finland applies an open fuel cycle principle, where spent nuclear fuel is placed in final disposal inside durable canisters that are buried deep in the bedrock. Final disposal of TVO's spent nuclear fuel at Olkiluoto is managed by Posiva Oy.

In 2023, Finland generated 32.7 TWh of electricity by nuclear power, which corresponded to a share of 41% of the electricity consumption. TVO's plant units OL1, OL2 and OL3 generate a total of approximately 25 TWh of electricity per year. As regards the regional economy, Olkiluoto nuclear power plant has a significant impact on the vitality of the Rauma region. Its current operation maintains and increases financial activity both locally, regionally and at the national level in Finland.

Olkiluoto Island is located on the coastal area of the Bothnian Sea. Environmental monitoring has been carried out in the sea area off Olkiluoto since 1979. The thermal impact from the power plant's cooling water has mainly affected the surface layer of the seawater. Currents mix the heat in the large water volume and some of the heat will also dissipate into the air, so the thermal impact is equalised fairly quickly as the distance from the power plant increases. During open water season, the increase in seawater temperature has been relatively local. In winter, the cooling water is mixed with the sea area's surface layer, and the local temperature increase caused by it has been observed at a distance of 3–5 km from the Olkiluoto coast The ice situation in the Olkiluoto sea area varies depending on the prevailing weather conditions, the currents in the sea area and the ice conditions on the Bothnian Sea. The most significant nutrient load sources in the Olkiluoto sea area are the rivers Eurajoki, which runs into Eurajoensalmi, and Lapinjoki, which runs east of Olkiluoto. In terms of its level of eutrophy, the Olkiluoto sea area is slightly eutrophic based on the average total phosphorus content, but barren based on the total nitrogen content. The ecological status of the water formations in the sea areas near Olkiluoto (3rd planning period) varies from satisfactory to good. The vicinity of the power plant is home to species of fish that are typical of the Baltic Sea and not significantly different from fish populations occurring elsewhere.

In the provincial distribution of landscapes, Olkiluoto Island belongs to the Satakunta coastal region of the Southwestern landscape province. In addition to the structures in the power plant area, the landscape image of Olkiluoto Island is dominated by the closed forest areas and shores, between which there are local open coastal cliffs. Olkiluoto is part of the south boreal vegetation zone. The sea area surrounding the island is part of the archipelago and sea area of the Bothnian sea, which is characterised by rapid land upheaval in the coastal areas and distinct zones in the shore vegetation. The Natura 2000 network area closest to the power plant area is the Natura area for the Rauma Archipelago, which is located to the southeast. Soil in the Olkiluoto area mostly consists of rocky fines moraine. The main bedrock mineral in the area is migmatite. There are no classified groundwater areas at Olkiluoto, and the area is not significant in terms of supplying water to the communities.

7.7. Summary of the environmental impacts in Finland

The environmental impacts from the normal operation of Olkiluoto power plant are local, focusing mainly on the immediate surroundings of the power plant area in Finland. In the EIA report, environmental impacts and their significance have been described for each impact in chapter 6. Transboundary impacts may mainly occur in the case of incidents and accidents, which are described in chapter 8 of this document and chapter 6.19 of the EIA report. Furthermore, chapter 6.18 of the EIA report describes the accident modelling and its results in more detail. Chapter 7 of the EIA report presents a comparison of the alternatives and the conclusions.

The OL1 and OL2 plant units have been in operation since 1978 and 1980, respectively. The environment in the Olkiluoto area has been monitored for decades, and comprehensive research data is available on the area. The impacts of the plant units are known well. The largest environmental impact has been the discharge of warm cooling water into the sea area, which will increase the surface temperature of the seawater by a few degrees in Iso Kaalonperä bay when compared to the rest of the sea area. The cooling water discharge area remains unfrozen throughout the winter. Currently, cooling water is warmed by approximately 10°C in the process. When the operation is continued at the present power level (VE1), the temperature of the water being discharged will remain the same; when the operation is continued at an uprated power level (VE2), the temperature will increase by approximately 1°C.

If the operation of the OL1 and OL2 plant units is continued at the present power level or an uprated power level, the environmental impacts of both alternatives will be similar, and the impacts are not substantially different from the impacts of the current operation of the plant units. The largest change will be the extension of the operating time, that is, the current operation will continue for a longer time, until either 2048 or 2058, instead of electricity production at the plant units ceasing when the current operating licences expire in late 2038. In this case, both the positive and negative impacts of the current operation will continue with the additional years of operation. Extending the service life at the current power level (VE1) will take place following the existing operating licences, during 2038–2048 or 2038–2058. Extending the service life at an uprated power level (VE2) could be implemented at the earliest in 2028, in which case the operation would continue until 2048 or 2058.

7.7.1. The impacts of continued operation and power uprating

In terms of both continued operation and power uprating, the most significant positive impacts target the climate, the energy market and the regional economy.

Both alternatives support Finland's goal of being carbon neutral by 2035. The production of electricity and heat in Finland needs to become nearly emissionsfree during the 2030s, taking into account the security of supply aspects. The electricity production of the nuclear power plant does not produce significant greenhouse gas emissions, and the emissionfree electricity produced by the OL1 and OL2 plant units can replace other forms of electricity production that use fossil fuels. According to the estimate, at the level of Finland the cumulative emission reduction potential in alternative VE1 would be approximately 1,100,000 t CO_{2e}, and in the case of VE2 approximately 1,600,000 t CO_{2e}, if the plant units were to operate until 2058. For the power uprating alone, the emission reduction potential in Finland is approximately 500,000 t CO_{2e}. The total significance of the impacts on climate have been estimated to be a moderate positive in the case of VE1 and a large positive in the case of VE2. Greenhouse gas emissions during the life cycle of electricity produced by nuclear power are at the same level as with electricity produced by wind power.

If the operation of the plant units is continued at the current power level or an uprated power level, both alternatives will have a large positive impact on Finland's electricity market. In the future, as electricity consumption grows, extending the operation of the plant units will support the security of supply of Finland's energy system and reduce the need to import electricity. The emissionsfree electricity generated by the plant units will also enable electricity exports.

In both alternatives, the significance of regional economic impacts at the local level in the Rauma region has been estimated to be a large positive, since the additional years of the plant units' operation will accumulate substantial financial gains through the multiplicative impacts of the value chain and consumption. The total effects in the region are more than €3,380 million in turnover, €1,520 million in added value and more than 7,080 person years in labour demand. In both alternatives, the significance of the regional economic impacts at the regional level in Satakunta and at the Finnish national level has been estimated to be a minor positive, when considering the size of the area being examined.

Most of the other impacts have been estimated to be at most a minor negative. Even though the impacts will remain similar to the current operation, the assessment takes into account the continuation of current impacts for a longer time when compared to a situation where electricity production at the plant units were to cease in 2038.

The most significant surface water impact from continued operation and power uprating results from the thermal load of the cooling water which targets the sea area. The impacts from the thermal load are local and mainly limited to Iso Kaalonperä bay. The magnitude of the impacts or the size of the affected area do not significantly differ from current operation, and they do not differ from each other in the continued operation and power uprating case. In the long term, the thermal load may contribute to the local eutrophication of the sea area due to the joint impacts of nutrient loads carried over by the river water and climate change. In both cases, the significance of the impacts targeting surface waters was estimated to be a minor negative, when considering the extended operation of the plant units and the additional impact brought about by climate change. Climate change will strengthen the impacts of the thermal load in the long term, which means that operating the plant units at the current or an uprated power level until 2048 will cause less load on the sea environment than a situation where operation is continued until 2058. In the nearby sea area, water quality and the state of the marine environment are mostly impacted by the longterm development of the nutrient loads in the river water and the general development of the state of the Bothnian Sea.

In the continued operation and power uprating case, the impacts of cooling water from the plant units on the Olkiluoto sea area and, thereby, on fish stocks and fishery will remain as they are. The continuation of the warming effect of the cooling water will maintain a situation that favours species of fish that are adapted to warm water, such as cyprinids. Water that is warmer than the rest of the sea area may also cause the invasive alien species round goby to become more abundant in the area. Fishing opportunities in the winter will remain at the present level; however, due to climate change, the thickness of the ice cover may be reduced and the time of ice cover may be reduced. The significance of the impact of continued operation and power uprating is a minor negative in terms of fish stocks and fishery.

In the continued operation and power uprating case, cooling waters will continue to make the Olkiluoto sea area a favourable wintering ground for aquatic birds. In the long term, the combined eutrophication impact of the cooling waters' thermal load, climate change and nutrients carried by rivers may degrade the status of the underwater habitats located in the affected area. Overall, continued operation and power uprating were assessed to have a minor negative impact on the nature of the sea area. Impacts on terrestrial habitats will remain as they are.

The extended service life will continue to define land use and the landscape in both the power plant area and its surrounding areas in the coming decades as well. In both alternatives, the impacts on land use and zoning are similar to those of current operations. The continuation of operations and the power uprating are in line with the zoning in the area and do not require any zoning changes. On the other hand, the restrictions caused by the operation of the nuclear power plant are taken into account in the zoning of the affected area. The magnitude of the impact was estimated to be a minor negative, because the extension of the service life of the plant units will limit land use in both the site area and its surrounding areas in the coming decades as well. The impacts on the landscape, its valuable areas and locations and the archaeological cultural heritage are similar to those of the current activities. When considering the continuation of the current landscape impact within the area due to additional years of operation, the impacts were, overall, estimated to be, at most, a minor negative, since the plant units will continue to impact the otherwise minute and wooded landscape visible from the sea, even over the coming decades.

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In both alternatives, the impacts on traffic will remain as they are but continue with additional years of operation. Traffic safety on the roads leading into the site area will remain at the present level. However, especially during the annual outages, when traffic volumes are at their highest, the traffic flow may be temporarily degraded, which is also similar to current activities. The significance of the impacts has been estimated as a minor negative.

The continued operation of the plant units at their current power level or an uprated power level will not have an additional impact on the soil and bedrock or on the quality, quantity or surface level of the groundwater, but the current effects will continue during the additional years of operation. The capacity of the facilities excavated earlier is also estimated to be sufficient for the final disposal of low and intermediatelevel waste generated during the service life extension of the power plant and the power uprating. Taking into account the extended operating time of the plant units and possible additional construction, the effects on the soil, bedrock and groundwater are estimated to be a minor negative at most.

The impacts on people's living conditions and comfort and the detrimental impacts experienced by people will mainly remain as they are. In both alternatives, potential concerns among people regarding safety risks will continue to exist. In the power uprating case, the discharge of warm cooling water combined with the changes brought about by climate change may affect the recreational value of the water systems in the nearby sea area in the long term. Taking into account the extended operating time of the plant units, the significance of the impacts is assessed to be a minor negative.

The continued operation of the plant units and the power uprating do not change the power plant area's current limitations on the utilisation of natural resources. In both alternatives, the use of natural uranium in nuclear fuel will continue. Natural uranium is classified as a nonrenewable natural resource that is practically only used by the nuclear power and defence industries. When compared to the current global uranium reserves, the amount of uranium procured during the operation of the plant units is very low, on the basis of which the significance of the impacts has been estimated to be, at most, a minor negative with the additional years of operation.

In both alternatives, with the additional years of operation, the volume of spent nuclear fuel as well as very low, low and intermediatelevel waste being processed will increase and the radiation exposure caused to the processing personnel by the waste management activities will continue. However, the increase in total waste volumes will not significantly increase the radiation doses of the personnel when compared to current operations. The limit value set by the Government for the annual dose incurred by an individual of the population as a result of the entire normal operation of the nuclear power plant, including the various stages of waste management for the spent nuclear fuel and the very low, low and intermediatelevel waste, is 0.1 mSv. During normal operation, the impacts caused by waste management activities are very minor and the statutory limits will not be exceeded. The significance of the impacts has been estimated as a minor negative.

The radiation dose caused by the Olkiluoto nuclear power plant to the residents of the surrounding areas has been clearly below one per cent of the dose limit of 0.1 mSv per year set by the Government. In both the service life extension and power uprating case, the releases of radioactive substances into the environment caused by normal operation are estimated to remain low and to continue to fall below the release limits set for them in the future. The impact of the releases on the radiation exposure of the residents in the surrounding areas and the radiationinduced load on the surrounding nature will remain at the present level, and the significance of the impacts is estimated to be, at most, a minor negative when considering the additional years of operation.

The activities taking place in the power plant area are not estimated to cause detrimental health effects on the residents of nearby areas. The exhaust gas emissions and dust resulting from road traffic are restricted to areas near the road network, where exposure to conventional health hazards is low. The alternatives do not cause air quality limit values or guideline values to be exceeded, and the alternatives are not estimated to have an impact on current air quality in the area. In both alternatives, the noise from the plant units and traffic as well as the vibration caused by traffic will remain at the present level, which is considered to be very low. Noise and vibration are not estimated to cause significant impacts during the additional years of operation.

7.7.2. Impacts during construction

The modification work required by the service life extension of the plant units will be implemented mainly inside the plant units. In the power uprating case, a new dieselpowered makeup water system and a new battery energy storage system would be built outside the plant units to improve the safety of the plant units. It is also possible that the capacity of the KPA storage will be expanded in both alternatives. The construction work taking place outside of the plant units is estimated to take approximately 2–3 years. During construction, shortterm noise and vibration may occur due to earthmoving, the erection of buildings and equipment installation that mainly affects the nearby areas of the construction site. Furthermore, excavation of bedrock in relation to the KPA storage expansion may cause temporary increased noise. Traffic volumes will not increase significantly and will not, therefore, increase the resulting impacts on nearby roads. In terms of landscape, the additional construction will only affect the landscape image within the area, where the change will not be significant. The new structures will be located in areas already shaped by human activity, and they will not affect the natural environment in the area. If the KPA storage is expanded, the bedrock in its area will be excavated, and the surface layers and structures will be partly removed. The possible need for increasing storage capacity has been considered in the plans for the area.

7.7.3. Impacts of the ending of current activities

With the end of the commercial operation of the plant units, the major positive impacts of extending the power plant's operation on climate, the energy market and the regional economy will end. During the decommissioning of the plant units, some compensatory regional economic impacts will be generated for other actors and in other sectors, but they will be smaller than the impacts of commercial operation. With the end of operation, the impacts of cooling water discharge from the OL1 and OL2 plant units will also end.

7.7.4. Feasibility of the project

On the basis of the performed assessments, the project alternatives are feasible in terms of environmental impacts. The prevention and mitigation methods for adverse impacts presented in the assessment report may be used to mitigate the potential environmental impacts when they are considered, wherever possible, in the further planning and implementation of the project.

8. Assessment of transboundary impacts

The operation of the Olkiluoto nuclear power plant has become very stable and its environmental impacts are known well. The techniques, processes and means for mitigating impacts are well known. When operation is continued, attention will be paid to the ageing management of the plant units. These actions help to ensure the safe continued operation of the plant units. During operation, the development of best available techniques (BAT), the requirements of legislation in the field and experience from other nuclear power plants will be monitored. The project plan will be updated and specified as the project progresses.

Transboundary impacts are only possible in the case of a severe reactor accident. A severe reactor accident at a nuclear power plant is a very unlikely, extreme event, and its occurrence would require several defects in the plant's systems as well as problems with controlling the plant. Preparations have been made in the design and operation of a nuclear power plant for various incidents and accidents, including a severe reactor accident, in order to keep their consequences as low as possible.

8.1. Severe reactor accident

8.1.1. Assessment methods

In order to assess transboundary impacts, a modelling has been performed concerning the spread of a radioactive release caused by a severe reactor accident, the resulting fallout and population radiation doses at distances up to 1,000 km from the OL1 and OL2 plant units. The modelling examined the highly unlikely scenario of a severe reactor accident that would release into the environment 100 TBq of the Caesium137 (Cs137) nuclide – corresponding to the limit specified in Section 22b of the Nuclear Energy Decree 161/1988 – as well as other radionuclides from the reactor inventory in proportion. Based on the amount of radioactivity released, this would be classified as an INES 6 class accident.

The modelling methods and the impacts of the modelled imaginary severe reactor accident have been described in detail in chapter 6.18 of the EIA report. The results of accident analyses prepared for the OL1 and OL2 plant units were used as the starting point for the modelling. The modelling uses assumptions for ensuring that the assessed fallout and radiation doses are conservative. The modelling does not consider, for example, civil protection measures and limitations on consuming foods that would allow the radiation doses to be reduced in the short and long term.

8.1.2. Summary of the results

The figure (Figure 6) visualises the distances to other countries up to 1,000 km from the OL1 and OL2 plant units. The radiation dose resulting from the radioactive release caused by a severe reactor accident is calculated for each elementary cell in the pictured grid, even outside Finland's borders. The distances provided are from the centre of the elementary cell of the OL1 and OL2 plant units.

Figure 6. Indicative distances from the OL1 and OL2 plant units, up to 1,000 km.

Based on the results of the modelling, a severe reactor accident will not have immediate health impacts for people living close to the power plant or outside the Finnish borders. At 5 kilometres from the power plant, the modelled severe reactor accident would result in a radiation dose of 9.0–9.6 mSv over the course of two days, depending on the age group. Based on the dose criteria set by Finnish legislation and authority requirements, the dose criteria for sheltering indoors and evacuation are only exceeded within the power plant's precautionary action zone, and the civil protection measures only extend up to 5 km from the power plant. Therefore, the need for civil protection measures does not extend outside the Finnish borders.

When examined in accordance with the limit values used in Finland, the distance up to less than one kilometre from the power plant is very heavily contaminated according to the modelling, that is, the area contains a lot of radioactivity on all surfaces. At the outer limit of the power plant's emergency planning zone (distance of 20 km from the plant), the area is heavily contaminated. The area at a distance of 50 km is contaminated and, from 300 km onwards, the area is slightly contaminated or nearly clean. The modelled severe reactor accident would cause, among other things, the cleaning of the builtup environment, limitations on the recreational use of areas in their natural state and the organising of measurements and cleanup for people within a radius of less than 20 km from the OL1 and OL2 plant units. Furthermore, the use of constructed recreational facilities would need to be limited up to a distance of 100 km. Authorities would also set limitations on the use of products used for nutrition, such as berries, fungi, fish, game and milk products on the basis of their activity concentrations.

The table (Table 4) presents countryspecific radiation doses resulting from a radioactive release caused by a severe reactor accident up to 1,000 km from the OL1 and OL2 plant units. The annual doses from natural background radiation in Europe amount to approximately 1.5–6.2 mSv/a, and the average is 3.2 mSv/a *(European Commission 2019)*. Compared to this, the radiation doses resulting from a release caused by a severe reactor accident will remain statistically insignificant outside Finland's borders. The table (Table 4) presents, on a coarse level, the order of magnitude of the radiation doses in various countries according to the calculation points used in the modelling and presented in a figure (Figure 6). According to the model, the estimated lifetime radiation doses from a severe reactor accident to an adult are 0.43 mSv at most and ≤0.02 mSv at the minimum. The lifetime radiation doses estimated for children are slightly higher but in the same order of magnitude.

As regards other nations within the examined area of 1,000 km, the radiation dose estimates are shown in the enclosed table (Table 4). The radiation doses at distances of more than 1,000 km have not been examined in more detail in terms of calculations; however, on the basis of the results and an expert assessment, they are estimated to be ≤ 0.02–0.03 mSv for children and adults in places such as northeastern Germany, Central Poland and the parts of Russia on the European side.

Table 4. Orders of magnitude for the countryspecific radiation doses estimated for children and adults for a severe reactor accident. The range of variation in the radiation doses corresponds to the approximate distance of the nation's areas from the OL1 and OL2 plant units.

Country	The approximate distance of the nation's areas from the OL1 and OL2 plant units (min, max) [km] [a]	Range of variation for the lifetime dose of a 1-year-old individual [mSv]	Range of variation for the lifetime dose of a 10-year-old individual [mSv]	Range of variation for the lifetime dose of an adult [mSv]
Sweden	200, 800	0.03–0.60	0.03–0.49	0.03–0.43
Estonia	300, 500	0.08–0.29	0.07–0.24	0.06–0.22
Latvia	400, 700	0.05–0.19	0.05–0.17	0.04–0.15
Russia	400, 1,000	0.03–0.17	0.02–0.13	0.02–0.10
Norway	500, 1,000	0.02–0.11	0.02–0.08	0.02–0.07
Lithuania	550, 800	0.06–0.10	0.04–0.08	0.04–0.07
Belarus	700, 1,000	0.03–0.06	0.03–0.05	0.02–0.04
Denmark	750, 1,000	0.02–0.03	0.02–0.03	0.02–0.03
Poland	750, 1,000	0.02–0.06	0.02–0.04	0.02–0.04
Germany	900, 1,000	0.02	0.02	0.02

[a] The maximum distance reported here represents the maximum distance of the calculation area from the OL1 and OL2 plant units. The most distant areas of the various countries may be located more than 1,000 km away from the power plant.

The largest radiation doses outside of the Finnish borders are focused on Sweden and Estonia, whose borders are a minimum of approximately 200–300 km from the Olkiluoto nuclear power plant. As the distance increases, the radiation doses will be reduced. The Swedish coast is approximately 200 km from the OL1 and OL2 plant units. Based on a conservative estimate, the lifetime dose within the area of Sweden will be at most 0.60 mSv for children and 0.43 mSv for adults (the doses have been presented for the calculation point of 300 km in sector 1). In northern Sweden, approximately 800 km away in sector 1, lifetime doses will be in the region of 0.07–0.1 mSv depending on age group, whereas in southern Sweden, approximately 800 km away in sector 8, the lifetime radiation doses will be in the region of 0.03 mSv for both children and adults. The difference in doses between the various directions is related to the prevailing weather conditions, since the most common directions of dispersion at Olkiluoto are to the north and northeast of the plant units. Estonia is located approximately 300 km away from the OL1 and OL2 plant units, in the southeast and southsoutheast directions. Based on a conservative estimate, the lifetime dose within the area of Estonia will be at most 0.24–0.29 mSv for children, depending on their age, and 0.22 mSv for adults (the doses have been presented for the calculation point of 300 km in sector 6). In Estonia, the radiation doses are the smallest on the southeast parts of the country where the doses will be 0.06–0.08 mSv depending on age.

8.1.3. Actions to mitigate detrimental impacts

The radiation dose impacts of a release caused by a severe reactor accident may be mitigated by means of various protection actions, such as digesting iodine tablets and sheltering indoors, evacuating the population before the release reaches a specific area or by performing the evacuation of the population at a later stage, if so required by the radiation situation. In terms of the implementation of the evacuation, the key factor is the correct timing, which, in turn, requires an estimate of the time of the radioactive release and the weather conditions, among other things. If the population can be evacuated before the release reaches the area, the radiation dose caused by the accident may even be avoided entirely.

In some cases, such as when the population cannot, for some reason, be evacuated on time before the release plume reaches the area, sheltering indoors is a good way to reduce the radiation exposure caused by the radioactive plume. Sheltering indoors is an action for the early stages of a radiation hazard scenario that allows for avoiding the highest radiation doses at the early stages of the event. The time limit for such is approximately two days, since, during that time, radioactive substances will begin to enter indoors in spite of any protective measures. Two days is also considered a feasible duration in terms of food supply. The efficiency of sheltering indoors depends, among other things, on the materials used in the building and the location within the building of the room used as a shelter.

The impacts of the fallout may be mitigated in many different ways, depending on what the area is like. For example, asphalt roads in urban environments can be washed, which allows for significant parts of the fallout to be removed with the water, and land areas can be formed by removing the top soil with the most fallout and transporting it to controlled storage. In case of fallout, the primary cleanup activities will target living environments where people spend a large part of their time (such as housing) or where the population density is highest (urban areas).

In case of a radiation hazard, the licensee will work in close cooperation with the Radiation and Nuclear Safety Authority. The Radiation and Nuclear Safety Authority will assess the safety significance of the situation and provide recommendations concerning protection activities to the authorities deciding on them.

8.2. Other impacts

In addition to the impacts of a severe reactor accident, the service life extension or power uprating of the OL1 and OL2 plant units have not been estimated to have other transboundary impacts.

The environmental impacts from the normal operation of Olkiluoto power plant are local, focusing mainly on the immediate surroundings of the power plant area in Finland. A summary of the environmental impacts is provided in chapter 7 of this document and, in more detail, in chapter 6 of the EIA report, broken down by impact. Similarly, the actions taken to mitigate conventional detrimental impacts and to limit environmental impacts are described in chapter 6 of the EIA report, where they are broken down by impact.

9. Follow-up and monitoring of impacts

The project owner has various follow-up and monitoring programmes in place for environmental impacts. The prerequisites for the programmes originate from the environmental legislation as well as the regulations and guidelines issued on the basis of the Nuclear Energy Act. During the potential service life extension and power uprating of the power plant, the operation of the power plant will be similar to the present time, which is why follow-up and monitoring are anticipated to continue in a very similar manner. Follow-up and monitoring have been presented in more detail in the EIA report.

Precise measurements for the releases of radioactive substances are used to ensure that the power plant's combined releases into the air or water do not exceed the release limits confirmed by the Radiation and Nuclear Safety Authority and that the radiation doses to the environment fall below the set limits. The surroundings of the Olkiluoto power plant are monitored in accordance with the environmental radiation monitoring programme. The status of radioactive substances in the environment has been monitored for a long time near the power plant. The aim of environmental radiation monitoring is to ensure that the radiation exposure to the population caused by the nuclear power plant is kept as low as reasonably achievable, and that the limit values set forth in the regulations are not exceeded. Furthermore, the Radiation and Nuclear Safety Authority is performing its own independent radiation monitoring in the vicinity of the Olkiluoto power plant. The meteorological measurements in the Olkiluoto power plant's weather observation system are used to assess the dispersion of radioactive substances released into the air during the normal operation of the plant unit and potential accidents. During the operation of the nuclear power plant, meteorological measurements and releases are used to estimate the radiation exposure caused to the population of the surrounding areas each year.

The amount and quality of the cooling water and wastewater being routed into the sea from the power plant are monitored according to the monitoring programme in force. The impact monitoring of the nearby sea areas of the power plant consists of seawater quality monitoring (physicochemical quality) as well as biological monitoring, monitoring of aquatic vegetation and fishery monitoring. In addition to this, the flue gas releases and noise originating from the activity are monitored, records are kept of radioactive and conventional waste, groundwater monitoring is performed and the attitudes of people towards the operations are monitored by means of discussion events and resident surveys, for example.

10. Future permit processes for the project

Once the environmental impact assessment procedure has concluded, the project progresses to the various licence and permit stages. The coordinating authority's reasoned conclusion on the EIA report will be appended to the various licence and permit applications when the applications are submitted.

New operating licences pursuant to the Nuclear Energy Act *(990/1987)* must be applied for in all implementation alternatives of the project. If operation is continued at the current power level (VE1), the new operating licences will be applied for before 2038 at the latest, as this will be the year of expiration for the existing operating licences. If operation is continued at an uprated power level (VE2), the documents drawn up in relation to the periodic safety assessment by the end of 2028 could be utilised when applying for new operating licences. The operating licences are issued by the Government.

If the operation of the OL1 and OL2 plant units is not continued (VE0), the decommissioning of the plant units will take place following the expiration of the current operating licences, from 2038 onwards. If the operation of the plant units is continued, decommissioning will take place after the expiration of the new operating licences, from either 2048 or 2058 onwards. According to the current decommissioning plan, however, the actual dismantling and related waste management would mainly take place in the 2080s. The decommissioning of nuclear power plants is subject to licence and regulated according to the Nuclear Energy Act and Decree and STUK's regulations and guides. According to the current EIA Act *(252/2017)*, the dismantling or decommissioning of a nuclear power plant requires an EIA procedure. A separate environmental impact assessment will be drawn up for the decommissioning of the OL1 and OL2 plant units, according to the legislation in force, once decommissioning becomes relevant.

In addition to the operating licence and decommissioning licence, the project alternatives may require other permits and plans. For example, radiation practices take place at Olkiluoto nuclear power plant in addition to the use of nuclear energy, and this requires a safety permit pursuant to the Radiation Act. The transport of fresh nuclear fuel requires a transport permit pursuant to the Nuclear Energy Act, and the transfers of spent nuclear fuel within the Olkiluoto power plant area require approval from STUK.

The operation of a nuclear power plant requires an environmental permit in accordance with the Finnish Environmental Protection Act and a water permit pursuant to the Finnish Water Act for the water extraction and discharge structures. The Olkiluoto nuclear power plant has a valid environmental permit and water permit. Continuing operation at the current power level does not require an update of the environmental permit. If operation is continued at an uprated power level, the environmental permit will be updated. Olkiluoto power plant has a valid permit for the extensive industrial handling and storage of chemicals, and the power plant is an institution subject to a safety assessment regulated by the Finnish Safety and Chemicals Agency (Tukes). Any possible construction work and modifications in the power plant area may require a construction permit from the municipality. In addition to the above, the project alternatives may require other permits and plans.

11. The coordinating authority's statement on the EIA programme and the consideration given to it when drawing up the assessment report

The Ministry of Economic Affairs and Employment, which acts as the coordinating authority for the environmental impact assessment, received a total of 20 statements from Finland concerning the EIA programme. In addition, the Finnish Environment Institute relayed to the coordinating authority the statements and opinions from various nations related to the international hearing. The statements and opinions from the international hearing brought up matters such as the transboundary impacts of a severe nuclear accident, the consequences of the power plant's ageing and external hazards, such as risks brought about by climate change. The coordinating authority has reviewed the received statements and used them as a basis for compiling its own statement regarding the EIA programme for the project. The Ministry of Economic Affairs and Employment provided its statement on the EIA programme on 25 April 2024. In its statement, the Ministry of Economic Affairs and Employment states that the environmental impact assessment programme covers the content requirements pursuant to Section 3 of the EIA Decree.

The table in Appendix 4 to the EIA report compiles together the main points which, according to the coordinating authority's statement, required attention during the impact assessment or supplementation while drawing up the assessment report. The table also presents how the statement has been considered when drawing up the EIA report. In addition, the themes brought up in the statements have been discussed in the following chapters of the EIA report:

- Severe reactor accident, methods for assessing it, impacts and mitigation of impacts (chapter 6.18.3)
- Transboundary impacts (chapter 6.19)
- Ageing management for the power plant (e.g. chapters 3.2.1 and 3.3.1)
- Preparation for external hazards and climate change (chapter 6.18.4.3).