



2023
ENVIRONMENTAL
REPORT

tvo



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TVO in brief

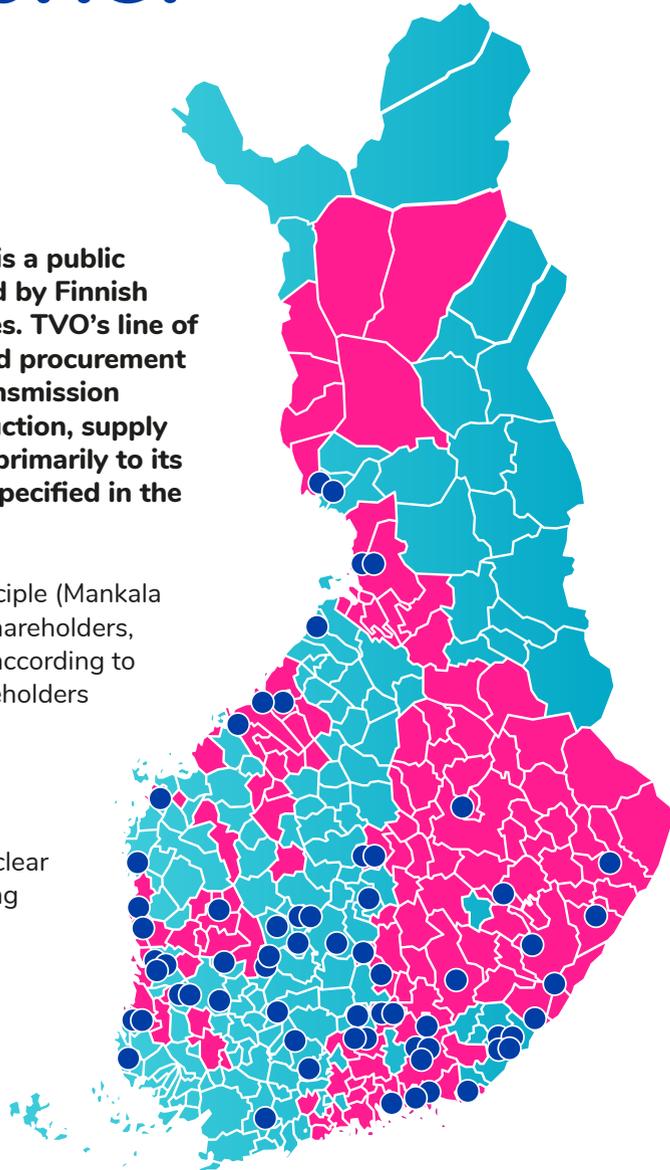
TVO – nuclear power for the good of the climate

Teollisuuden Voima Oyj (TVO) is a public limited liability company owned by Finnish industrial and energy companies. TVO's line of business is the construction and procurement of power plants and power transmission equipment as well as the production, supply and transmission of electricity primarily to its shareholders under the terms specified in the Articles of Association.

TVO operates on a cost-price principle (Mankala principle). TVO is owned by five shareholders, some of which, like TVO, operate according to the Mankala principle. TVO's shareholders are Finnish industrial and energy companies, whose owners include 131 Finnish municipalities.

TVO produces climate-friendly nuclear power at three plant units operating at Olkiluoto in Eurajoki: Olkiluoto 1 (OL1), Olkiluoto 2 (OL2) and Olkiluoto 3 (OL3).

- The Finnish municipalities that are owners of TVO
- The industrial sites of the owners



Key facts



Turnover

€873 million



Electricity production

24.67 TWh



TVO personnel

1,055 people



TVO's values

Responsibility, transparency, proactivity, and continuous improvement.

Subsidiaries and joint ventures



An electricity production company



A consulting services company fully owned by TVO



A final disposal company owned 60% by TVO and 40% by Fortum Power and Heat Oy



A consulting services company fully owned by Posiva



Review by the President and CEO

Becoming Finland's most significant producer of electricity

Electricity is now being talked about more than ever. Be it price, availability, security of supply or degree of self-sufficiency, these topics have been highly visible month after month. A commodity that was previously almost taken for granted has become something to be actively followed in everyday life. Households are scheduling their chores according to the price of electricity.

In recent years, the Finnish electricity system has taken significant steps in a cleaner direction. Imports from Russia have stopped, and capacity for weather-dependent production has increased significantly. At the same time, the importance of balancing power has increased; we need more of it. Price variations have grown and are likely here to stay. It is, of course, important that we have more baseload power to stabilise the price. Over the past year, Olkiluoto became Finland's most significant producer of electricity, and Finland became self-sufficient in terms of electricity on an annual level. We are lucky to have Olkiluoto.

In all of this, the significance of nuclear power as stable and predictable base load power has increased even further, which the Finns have also understood. The majority of Finns stand exceptionally

united behind nuclear power. In Finnish Energy's "Energy Attitudes" survey, which is carried out twice per year, the overall support for nuclear power reached a level of 82% in December 2023. The support for nuclear power is high in all demographics regardless of gender, municipality of residence, age and political views.

Attitudes have warmed towards nuclear power elsewhere in Europe as well. In Sweden, the new government has introduced its new nuclear power programme which has a concrete goal of adding a total of 2,500 megawatts of new nuclear power to electricity generation by 2035. During the UN's Dubai climate summit (COP28), the importance of nuclear power was recognised for the first time, and a total of 22 countries declared that they were tripling nuclear energy production by 2050. Alongside the renewable forms of energy generation, there is demand for clean and reliable base load power that can stabilise prices.

One of the basic pillars for the sustainability and cleanliness of nuclear power is the question related to the final disposal of nuclear fuel. At Olkiluoto, the work of Posiva – a joint venture of TVO and Fortum – for starting the final disposal of spent nuclear fuel is reaching the final stretch. We can confidently state that we have a responsible solution for the final disposal of spent fuel and, thereby, nuclear power can be classified as a sustainable form of production. Nuclear power has been included in the EU Taxonomy for sustainable financing, and our electricity

production at Olkiluoto has been demonstrated to be 100% in alignment with the EU Taxonomy. Last December, we were the first nuclear power company in Europe to issue a Green Bond.

Olkiluoto had a historic year of production: OL3 entered regular electricity production, and we produced approximately 31 per cent of the electricity consumed in Finland in 2023. OL3 is set up to produce electricity far into the future, at least for the next 60 years. OL1 and OL2 plant units have operating licences until 2038, and an analysis is under way that aims at extending the operating licences by at least ten more years, until 2048. At the same time, we are investigating the possibility of a reactor power uprating. The environmental impact assessment related to these analyses that was started in January 2024 is likely to last for several more months.

In the nuclear power industry, sustainability is at the core of everything we do, and its most important aspect is nuclear safety. Safe, predictable, competitive and climate-friendly electricity production and an energetic work community are the things we are leveraging to aim towards our vision of being Finland's most significant producer of electricity. Steadily, the nuclear power industry is taking us to a particle-larly great future.

JARMO TANHUA

President and CEO, TVO





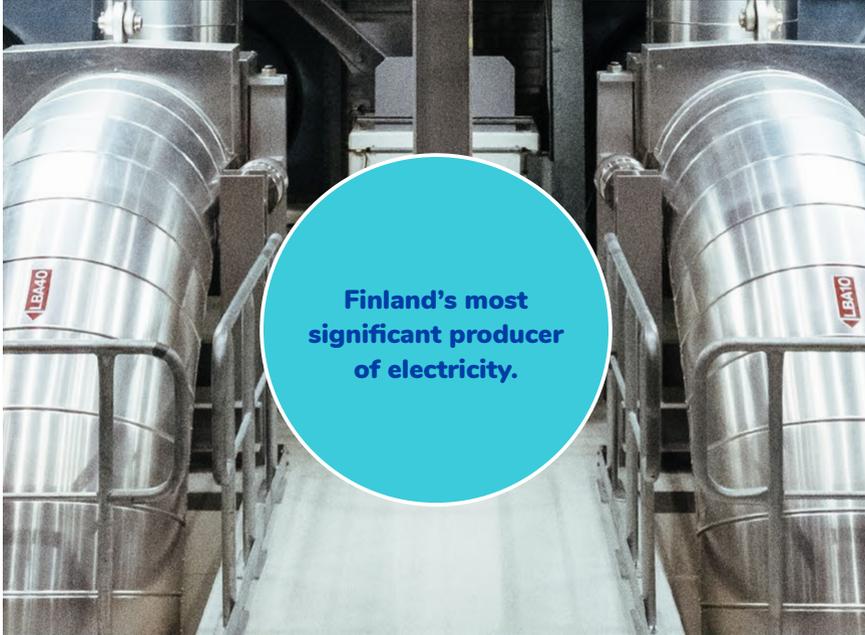
Strategy

MISSION - what is our purpose



We generate climate-friendly nuclear power for our shareholders safely and competitively, thereby creating well-being for Finland.

VISION - what we want to become



Finland's most significant producer of electricity.

VALUES - how we act



- Responsibly
- Proactively
- Transparently
- Continuously improving

The TVO Group's strategy aims at predictable and competitive electricity production with a strong safety brand. The climate-friendliness of electricity production is a cornerstone of the company's operations.

The purpose is to ensure that TVO's average generation cost remains competitive and that the availability of the plant units meets the company's goals. The safety culture is maintained at a high level and safety is systematically upheld and developed further at all stages of the nuclear power life cycle. At Olkiluoto, electricity is produced by nuclear

professionals whose competence and ability to work remain on a high level throughout their career. Everyone works as part of an energetic community by utilising modern ways of working.

As a low-emission form of electricity production, nuclear power has a significant role in achieving climate goals, such as

those set in the Paris Agreement. It is the TVO's vision to be the most significant producer of electricity in Finland.

TVO manages the entire life cycle of nuclear power. Posiva, a company jointly owned by TVO and Fortum Power and Heat Oy (Fortum), is the first in the world to have a solution for the final disposal of

spent nuclear fuel, and industrial final disposal operations are expected to start in the mid-2020s at Olkiluoto

Responsibility for the environment and climate

With its Group-level policies, the TVO Group has committed to the principles of sustainable development, and environmental responsibility is an important part of the company's management system.

TVO and Posiva carry their responsibility for the environment by identifying the environmental and energy efficiency aspects of their operations and by minimising the related adverse impacts. Operational objectives are specified in compliance with the principle of continuous improvement. The Group has set a carbon neutrality target. Environmental research has been conducted on Olkiluoto Island since the 1970s, years before electricity production was launched. The early baseline studies created a basis for the environmental monitoring programmes aimed at facilitating environmental radiation monitoring and determination of the impact on waters. The TVO Group ensures that its personnel and other persons working at the Olkiluoto nuclear facilities have competence and expertise in matters related to the environment and energy efficiency.

The TVO Group acknowledges the importance of its overall responsibility for the environment during all the phases

of the fuel cycle. The safe use of nuclear fuel is ensured from raw material procurement to final disposal. The company monitors and supervises the management of environmental issues implemented by the fuel suppliers.

TVO requires that the suppliers assume responsibility for the securing and development of living conditions in the surroundings of uranium production and processing plants, taking indigenous peoples into consideration.

Fuel is dealt with in a responsible manner all the way from uranium mines to final disposal, according to the principle of "from bedrock to bedrock". The environmental responsibility of final disposal is also on financially stable ground, since nuclear power companies in Finland bear the costs of nuclear waste management, and the funds for that purpose are collected into the Finnish State Nuclear Waste Management Fund.

The aim of the Olkiluoto nuclear power plant is to prevent and further reduce conventional emissions and the already low releases of radioactive substances. Abnormal events in the plant process are anticipated and preparedness for the



prevention of environmental damage caused by them has been established.

Energy and material efficiency is taken into account in all operations

Energy efficiency requirements are observed and energy efficiency is improved in all operations at Olkiluoto. The efficiency of energy consumption is monitored and continuously improved by taking energy aspects into account

in project planning, the procurement of components and the development of operating practices. Plant unit modernisation projects are implemented to improve the energy efficiency of the power plant process.

TVO participates in the Energy Efficiency Agreement and complies with the associated Action Plan for Energy Production that describes the implementation of actions designed to make the use of energy more efficient and to improve the

efficiency of primary energy use as well as the total efficiency of energy production.

TVO and Posiva improve the efficiency of the use of energy and raw materials and improve the reuse of waste by considering circular economy in their operations. The goals are to increase the relative share of waste delivered to reuse and to decrease the amount of radioactive waste generated. TVO also strives to reduce the amount of spent fuel by optimising the use and properties of the fuel.

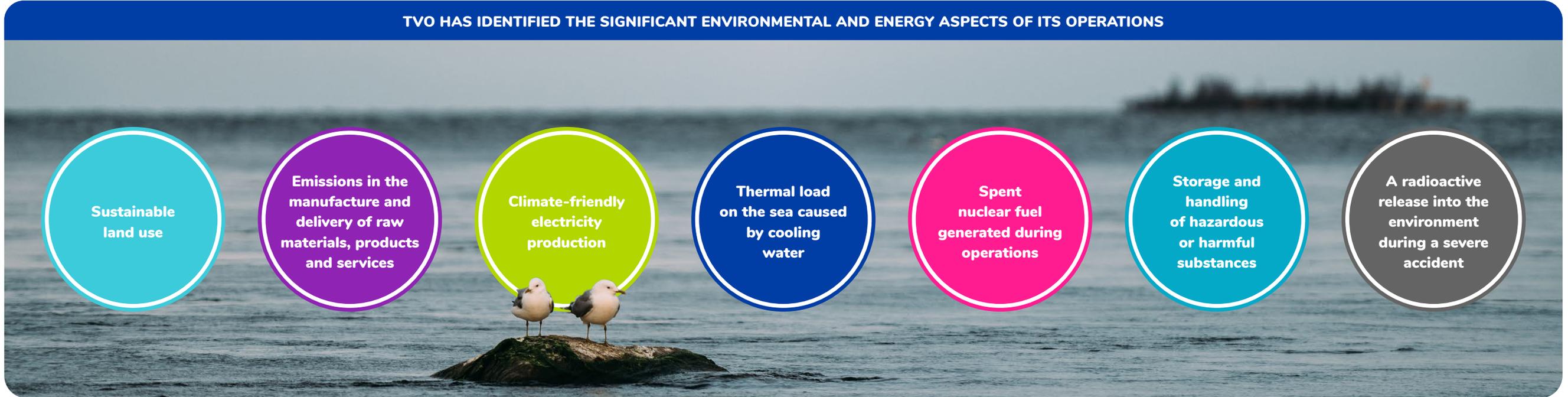
Sustainable utilisation of the environment and biodiversity are taken into account in the development of the Olkiluoto area and the expansion of operations. Surrounded by four nature conservation areas, the small island of Olkiluoto currently produces around one-third of all the electricity in Finland. The concentration of energy production in a small geographic area minimises the environmental impact and allows for the preservation of other areas in their natural state.

Employees as well as companies and partners working in the power plant area are expected to demonstrate a responsible attitude towards environmental matters in accordance with Group-level policies.



Environmental management

TVO HAS IDENTIFIED THE SIGNIFICANT ENVIRONMENTAL AND ENERGY ASPECTS OF ITS OPERATIONS



The TVO Group’s operations are managed with a certified environmental management system that complies with the international standard ISO 14001:2015 and includes an integrated energy efficiency system.

The goals of the management system are increasing the level of environmental protection and its continuous improvement.

TVO and Posiva have identified environmental and energy aspects related to their operations and assessed their significance. The significance of environmental and energy aspects is assessed based on statutory and permit requirements as well as by observing the severity/utility, probability and effects on stakeholder groups of each impact. Furthermore, opportunities to influence the issue affect the assessment.

Targets for significant environmental and energy aspects have been specified in the Environment and Energy Efficiency Programme and confirmed by the Management Group. A team of environmental experts from various organisational units monitors the progress of the targets regularly. Other subjects discussed at the team meetings include the possible environmental deviations and observations,

current regulatory matters and other environmental matters. The team acts as an expert, advisor and provider of information in environmental matters.

The feasibility of the environmental management system is assessed every six months in conjunction with the management review. If necessary, corrective actions are defined to ensure that the

targets are reached. The TVO Group identifies all statutory and other requirements pertaining to its operations and systematically monitors the requirements for any changes. Compliance with the requirements is also assessed in conjunction with management reviews. Furthermore, the operations are regularly assessed with audits by the organisation as well as external evaluators.

Targets:

Increasing environmental and energy efficiency awareness

- » The environmental safety guidelines are used to guide both our own personnel and partners to environmentally safe operations in the Olkiluoto area. During the year, the training of project managers in environmental and energy efficiency matters was renewed.

Zero environmental damage: No serious or significant environmental damage occurs and the number of predictive environmental safety observations is at least 100

- » The goal of environmental damage was achieved. 104 preventive environmental safety observations were made, most of which concerned the treatment of municipal waste, the management of chemicals and energy efficiency. Good practices and practices were also recorded.

Optimized and controlled environmental load on the use of chemicals

- » The condition of the structures and equipment used for storage, handling and leakage monitoring of chemicals was monitored in accordance with the preventive maintenance programme. The project to improve the handling of chemicals at the logistics terminal was continued and staff were trained.

Proactive environmental safety

The assessment of environmental risks is part of TVO's comprehensive risk management process. Environmental risks have been identified and assessed, and no risks with significant impact were detected. TVO and Posiva also utilises a proactive safety observation procedure to prevent environmental damage. A total of 104 observations regarding the environment and energy efficiency were made over the course of the year. They involved matters such as the processing of waste, the management of chemicals, energy efficiency, cleanliness and general order. TVO's initiative operations also support stakeholder groups' involvement in TVO's environmental management. All of the safety observations and initiatives are monitored, and all deficiencies are corrected without delay.

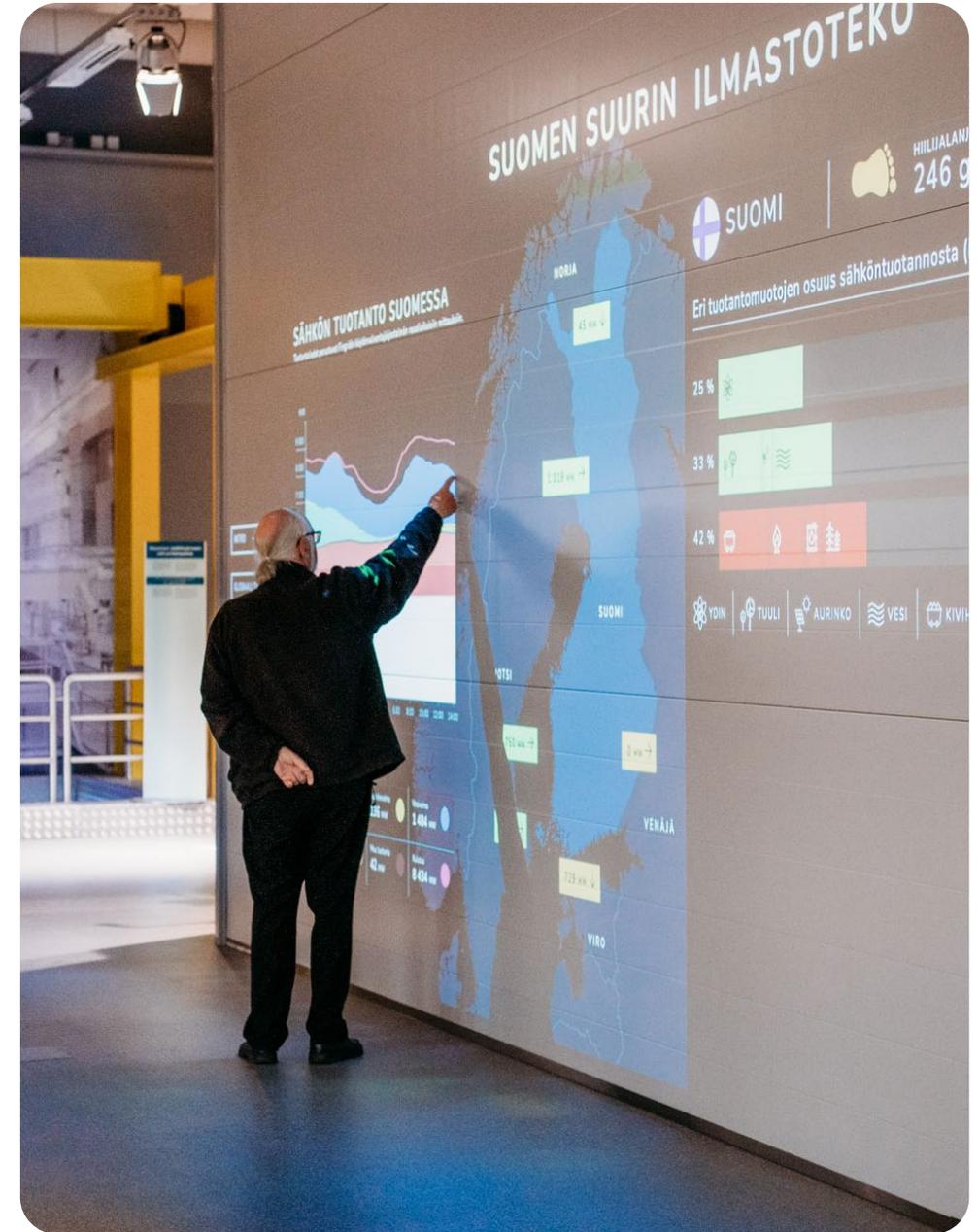
In 2023, a total of 12 litres of oil were released into the soil as a result of the breakage of machinery and equipment. All of the oil was successfully recovered. There were also minor refrigerant leaks from cooling equipment. The environmental authorities are informed of all significant environmental non-conformances and events.

READ MORE ON PAGE 30:
about environmental legislation and permits

Active stakeholder cooperation

Stakeholders play a key role for a company that is engaged in sustainable operations. The Olkiluoto Visitor Centre normally receives some 13,000-15,000 visitors each year. The visitors are openly told about TVO's and Posiva's operations, and their questions are answered. In 2023, interest towards operations at Olkiluoto grew especially.

TVO publishes the "Uutisia Olkiluodosta" (News from Olkiluoto) magazine for people living in the immediate region and engages in diverse communication through digital channels. The aim is to provide understandable, open and timely communication regarding everything that happens at Olkiluoto. Stakeholders also have the opportunity to submit feedback and questions to TVO via the TVO website. TVO replies to all inquiries that include contact details. TVO did not receive any expressions of concern related to environmental issues from external sources in 2023.





Effects of climate change on the business

TCFD (Task Force on Climate-Related Financial Disclosures) is an international reporting recommendation, which offers companies a framework for reporting on the financial risks and opportunities connected with climate change in relation to four thematic areas: governance, strategy, risk management, and metrics and targets. TVO has conducted reporting in accordance with TCFD since 2020.

Climate-friendly electricity production is one of the TVO Group's most significant sustainability aspects because nuclear power plays a significant role in the mitigation of climate change as a low-emission form of electricity production. CO₂-free electricity production and the increase in production capacity provide TVO with significant business opportunities. The TVO Group's objective is to also assess climate change and environmentally responsible operations from the perspective of possible risks and follow the principle of continuous improvement.

Governance

The governance related to the TVO Group's sustainable development is discussed in the section **Responsible leadership**.

With its policies, the TVO Group has committed to the principles of sustainable development, and environmental responsibility is an important part of the management system. In its Group-level policies, TVO requires a responsible attitude towards environmental matters not only from its own employees but also from all the companies and partners working in the power plant area.

Strategy

TVO's mission is to create a better quality of life in Finland by producing climate-friendly electricity with nuclear power for its shareholders in a safe and competitive manner. Thus, the mitigation of climate change is an essential part of the TVO Group's strategy. In order to support the strategy planning process, an operating environment analysis is carried out, which recognises the central role of nuclear power in achieving the climate targets.

The TVO Group has made a strategic decision to invest in the production of clean electricity. This is reflected in the increase in production capacity of nuclear power with OL3 and in TVO relinquishing its share in the Meri-Pori coal-fired plant in 2020. Today, nuclear

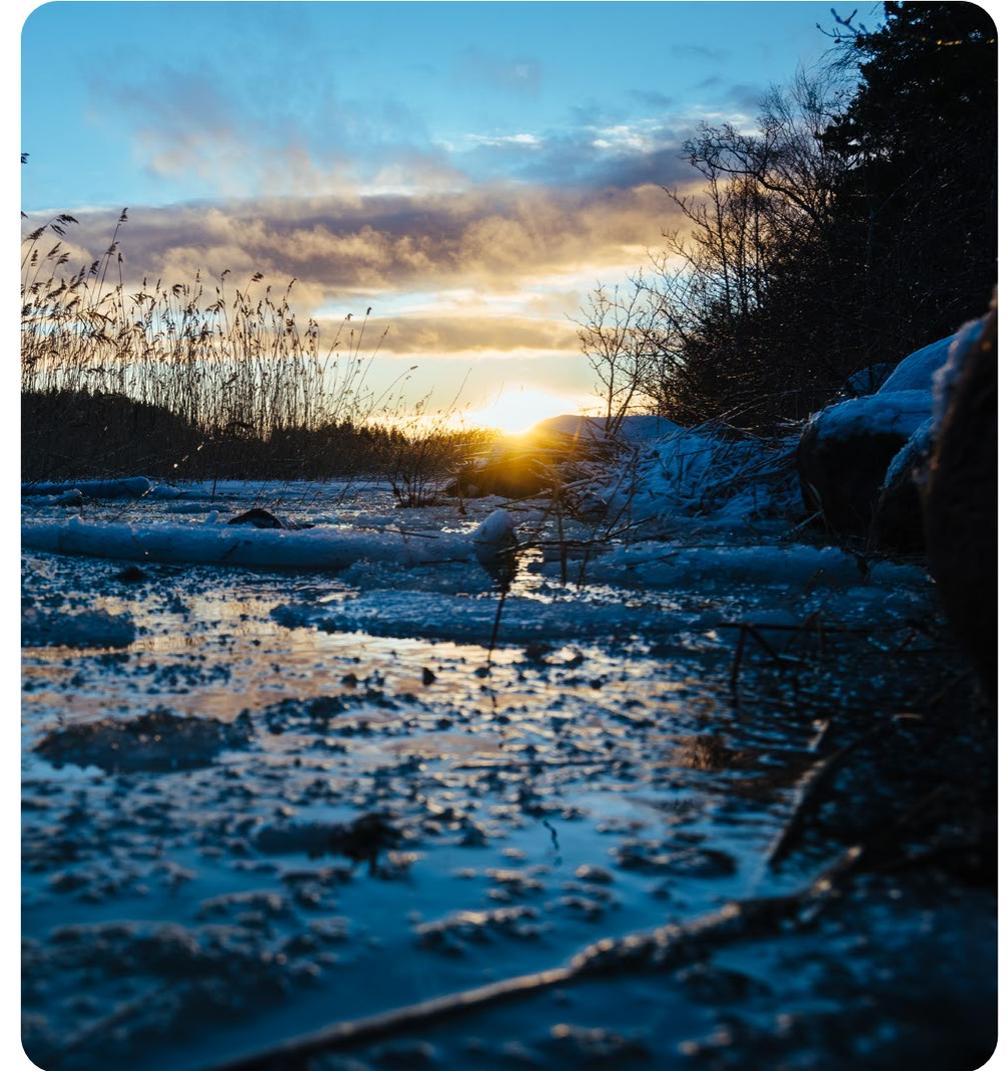
power comprises 100 per cent of TVO's electricity production.

Through its strategy, the TVO Group aims to support broader climate targets such as the Paris Agreement. In addition, the TVO Group aims to keep the emissions from its own operations as low as possible and is committed to promoting climate neutrality.

The future strategic opportunities include small modular reactors (SMRs), and TVO has a currently ongoing project in which it is investigating the technical and economic possibilities of using SMRs for climate-friendly electricity and heat production. TVO's R&D activities aim at advancing future technological solutions, which can also function as ways to mitigate climate change.

Risk management

Climate change does not pose significant risks to TVO's nuclear power plants. Rising temperature of seawater is one impact that could, in the worst case, impact production as a power limitation. Seawater temperature is constantly monitored in order to ensure the effect of the cooling water.





Two SSP (Shared Socioeconomic Pathways) scenarios have been used in order to examine the impact of climate change on TVO's operations: SSP 2.0–4.5 and 3.0–7.0. The scenarios examine the effects of climate change if the global temperature rises by 2.0–4.5 or 3.0–7.0 degrees Celsius compared with the preindustrial period. Both scenarios will have significant impacts on the Finnish climate. Climate change will introduce changes in all seasons. The geographical area in which TVO operates is not expected to undergo significant changes that would impact the plant units' safety or production. The plants are designed to withstand sudden external threats, and scenario reviews and change planning enable preparing for upcoming challenges through plant modifications. Furthermore, there are emergency preparedness plans that address sudden external challenges.

Probabilistic Risk Assessments (PRA) are carried out as part of risk management. The PRAs are based on STUK's nuclear safety guides (YVL Guides). The PRAs consider the plants' internal threats as well as external threats, such as impacts from weather conditions, floods, changes occurring in seawater and seismic phenomena. STUK oversees the licensee's risk management and the actualisation of PRAs. Plant modifications are implemented in order to improve the nuclear plant units' availability, safety, efficiency and climate-friendliness. By examining climate scenarios, plant modifications can be carried out in order to prepare for the challenges

brought about by climate change without compromising on the Company's values and strategic goals. Change planning takes into account the results from PRAs and complies with STUK's YVL Guides.

The TVO Group also collects learnings from other operators in the nuclear sector in order to continuously improve the plants' safety and availability and to avoid events that have previously occurred elsewhere. For example, the effects of extreme weather and climate phenomena have been taken into account in the plant units' improvements implemented after the Fukushima nuclear accident.

Metrics and targets

Metrics and targets for climate-friendly electricity production and the climate neutrality of operations are specified in the TVO Group's Sustainability Roadmap 2030.

The progress of achieving climate neutrality is monitored through the TVO Group's Scope 1 and 2 greenhouse gas emissions, which have been calculated according to the Greenhouse Gas Protocol (GHG Protocol) for activities under the TVO Group's operational control. In addition, significant metrics concerning the climate and the environment are presented in the Environmental Balance Sheet of this report (p. 15).

Furthermore, an environment and energy efficiency programme has been prepared

to ensure the achievement of the environmental targets specified in Group-level policies and to improve the efficiency of the management of significant aspects related to the environment and energy. The targets and results are presented annually in the Environmental Report.

Greenhouse gas emissions

TVO's and Posiva's emissions calculated according to the GHG protocol are shown below. The calculation was developed during the reporting year so that the scope 3 emissions were also calculated for 2022 and 2023.

Teollisuuden Voima GHG emissions, t CO ₂ eq	2023	2022
Scope 1	1,976	2,421
Scope 2	34,559	63,843
Scope 3	79,221	92,707

Posiva GHG emissions, t CO ₂ eq	2023	2022
Scope 1	361	655
Scope 2	3,429	1,792
Scope 3	10,069	24,463

READ MORE ON TCFD REPORTING:
www.fsb-tcdf.org

**READ MORE ON GREENHOUSE GAS
PROTOCOL REPORTING:**
www.ghgprotocol.org

Electricity production at Olkiluoto has a small carbon footprint

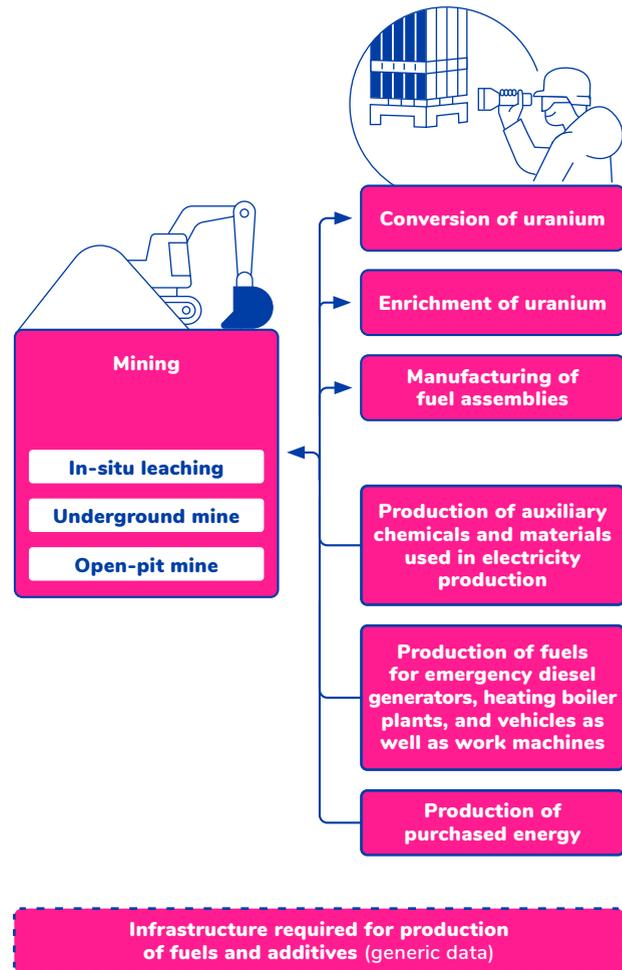
The carbon footprint of electricity produced at the three nuclear power plant units at Olkiluoto is 9.1 g CO₂e/kWh.

The carbon footprint calculation considers the entire life cycle of nuclear power, from uranium mining to the final disposal of spent nuclear fuel and the dismantling of the plant units. If power transmission is included, the carbon footprint is 13.8 g CO₂e/kWh. Electricity generated by nuclear power is clearly below the threshold value for climate-friendliness of 100 g CO₂e/kWh.

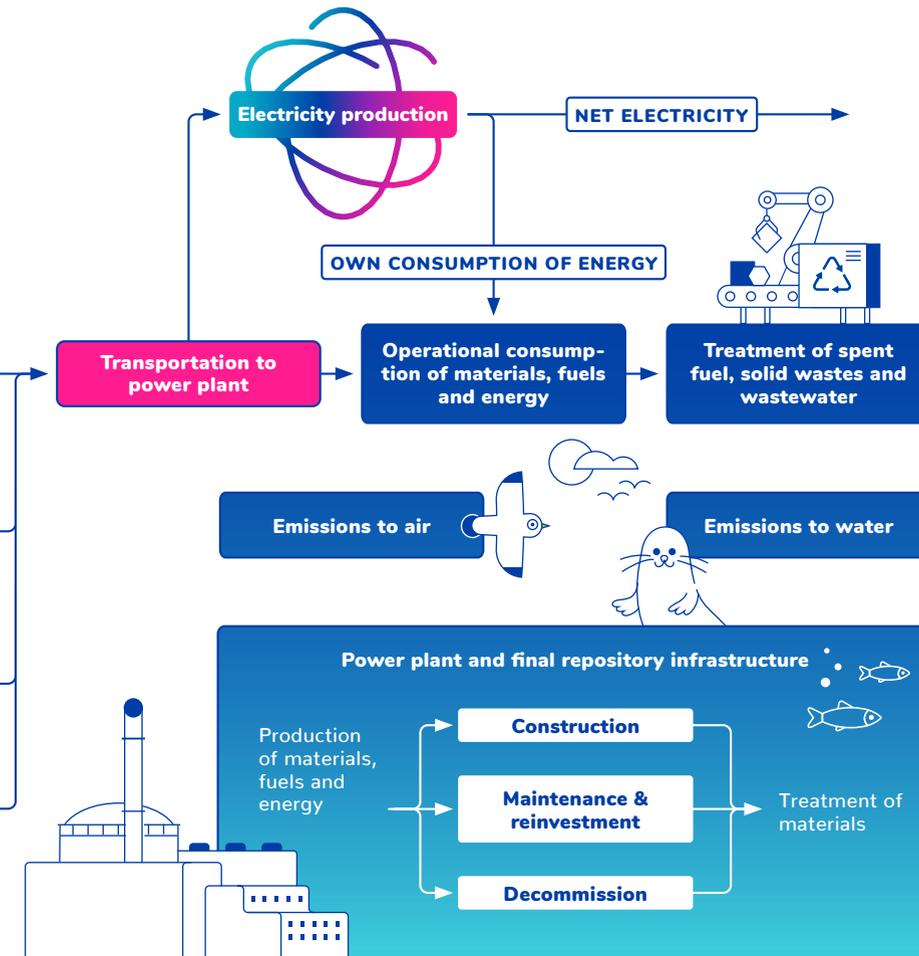
The carbon footprint has been calculated for the production in 2022. At that time, the Olkiluoto 3 plant unit was still in test operation, and electricity was generated by the Olkiluoto 1 and Olkiluoto 2 plant units. Therefore, the carbon footprint is expected to reduce further when production from OL3 is considered in the calculation.

The carbon footprint calculation has been critically assessed by a third party. More information on the carbon footprint calculation is available on [TVO's website](#).

Production of fuel and auxiliaries



Nuclear power plant operation



The carbon footprint* electricity produced at Olkiluoto

9.1g
CO₂e/kWh**

which is significantly below the EU taxonomy threshold (100 g CO₂e/kWh).

* Global Warming Potential total
** excluding end-of-life infrastructure (where the total is 13.8 g CO₂e/kWh)



Environment and energy efficiency programme



The Environmental and Energy Efficiency Programme has been launched in order to achieve the environmental goals set in Group-level policies and to improve the efficiency of the management of significant environmental and energy aspects.

The foundation for the targets to be set is the production of stable and environmentally friendly electricity to the society and the minimisation of the impacts of environmental aspects in all phases of the electricity production chain.

Measures, responsibilities, and schedules are defined for the achievement of the goals. In order to ascertain the continuous improvement of operation, the implementation of the goals is monitored regularly.

In 2023, efforts related to the goals focused on introducing to the personnel the environmental guidelines to be observed in projects and modifications and on monitoring compliance with them. Long-term efforts were continued at the power plant also as concerns the

management of radioactive emissions and the thermal load of the cooling water.

The achievement of the goals of the year 2023 Environmental and Energy Efficiency Programme is presented in the report in connection with pertinent text sections. The goals were achieved, with the exception of those related to electricity production and efficient land use.

As of the year 2024, a reduction in purchased electricity, the development of consumption monitoring, and increased

procurement of carbon neutral electricity will also be included in the goals. Another goal is to adopt and become certified to the ISO 50001 Energy Management System by the year 2027. Furthermore, the procedures for the procurement of chemical spill containment products will be developed in compliance with the Safety in Olkiluoto Programme.

UN Sustainable Development Goals:

The TVO Group is committed to the promotion of the following climate-related UN Sustainable Development Goals:





Supply of electricity in Finland and its climate impact

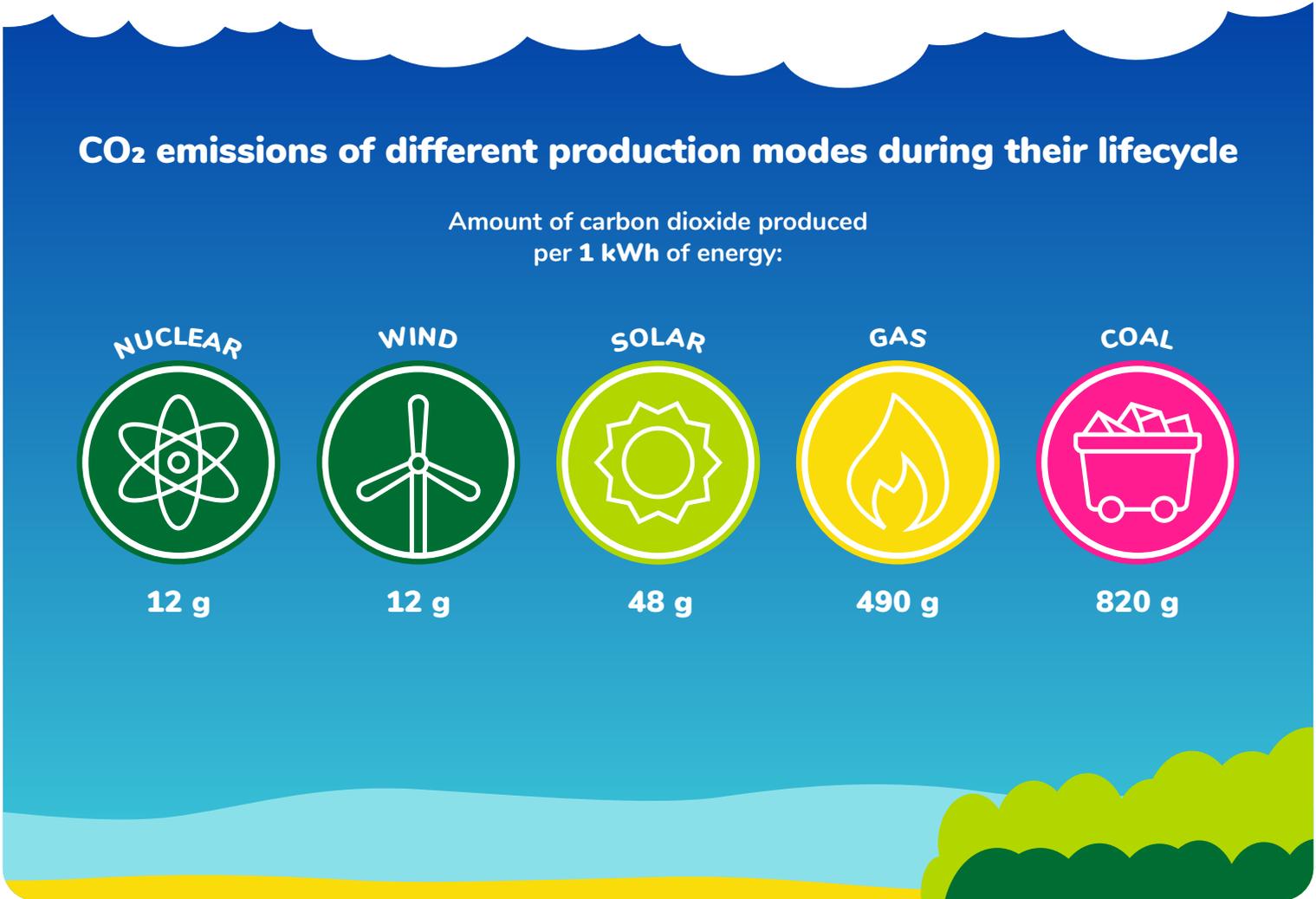
The volume of electricity production at Olkiluoto will be nearly doubled when the OL3 plant unit starts regular electricity production. This means that the low-emission nuclear electricity produced at Olkiluoto will play a significant role in the economic development, electricity self-sufficiency and general well-being of all of Finland for decades to come.

In 2023, the share of nuclear power was about 41 per cent of all the electricity produced in Finland. In total, Olkiluoto generated approximately 31 per cent of all electricity produced in Finland and about one-fifth of all electricity consumed in Finland in 2023.

Electricity in every weather

The electrification of society and phasing out of fossil fuels will require increasingly larger amounts of emission-free electricity. The role of low-carbon energy, such as renewable energy and nuclear power, is crucial in the mitigation of climate change. One benefit that nuclear power provides is stable production independent of the weather conditions, which supports the renewable energy production forms in the electricity system.

In Finland, 72 per cent of greenhouse gas emissions are generated in energy production, energy consumption and traffic. 39 per cent of the emissions are generated by the energy industry. Thus, any emission reductions in the energy industry significantly impact the total emissions in Finland.



Source: IPCC



The environmental impacts of nuclear power



The production of nuclear power generates low carbon dioxide emissions – over the entire life cycle of nuclear power, its total emissions remain on the same level as wind power and hydropower. The long service life of nuclear power plants and their small land use requirements make them even more environmentally friendly.

Nuclear power causes some negative environmental effects as well, such as slight warming of the surrounding sea areas, minor releases into the air, water and soil during production as well as nuclear waste consisting of spent nuclear fuel.

In particular, the final disposal of nuclear waste is a key question in the use of nuclear power. The TVO Group has a

unique solution for the final disposal of nuclear waste that is even known all around the world: ONKALO.

Nuclear power for a clean climate

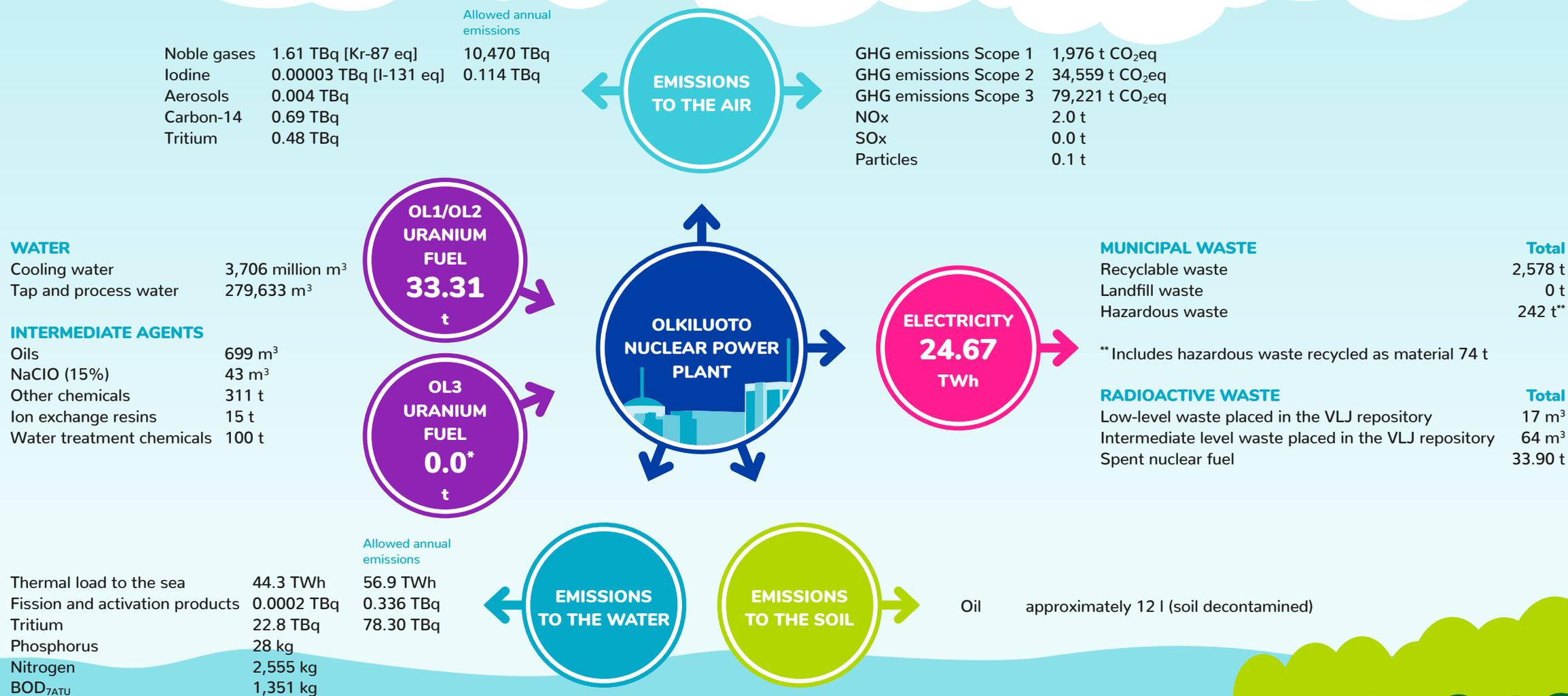
Nuclear power plays an important role in climate change mitigation. With the current nuclear power production in the

EU countries, approximately 580 million tonnes of CO₂ emissions are avoided annually, of which Finland's share accounts for 27 million tonnes.

Over the course of its entire history, the Olkiluoto nuclear power plant has generated more than 580 TWh of electricity. This production volume has prevented greenhouse gas emissions of more than

455 million tonnes. This corresponds to all the greenhouse gas emissions in Finland during a period of approximately 9 years if nuclear power were replaced with condensing coal power, the specific emissions of which amount to 820 g/kWh.

Environmental balance sheet



* Fuel was not loaded at OL3 during the year.

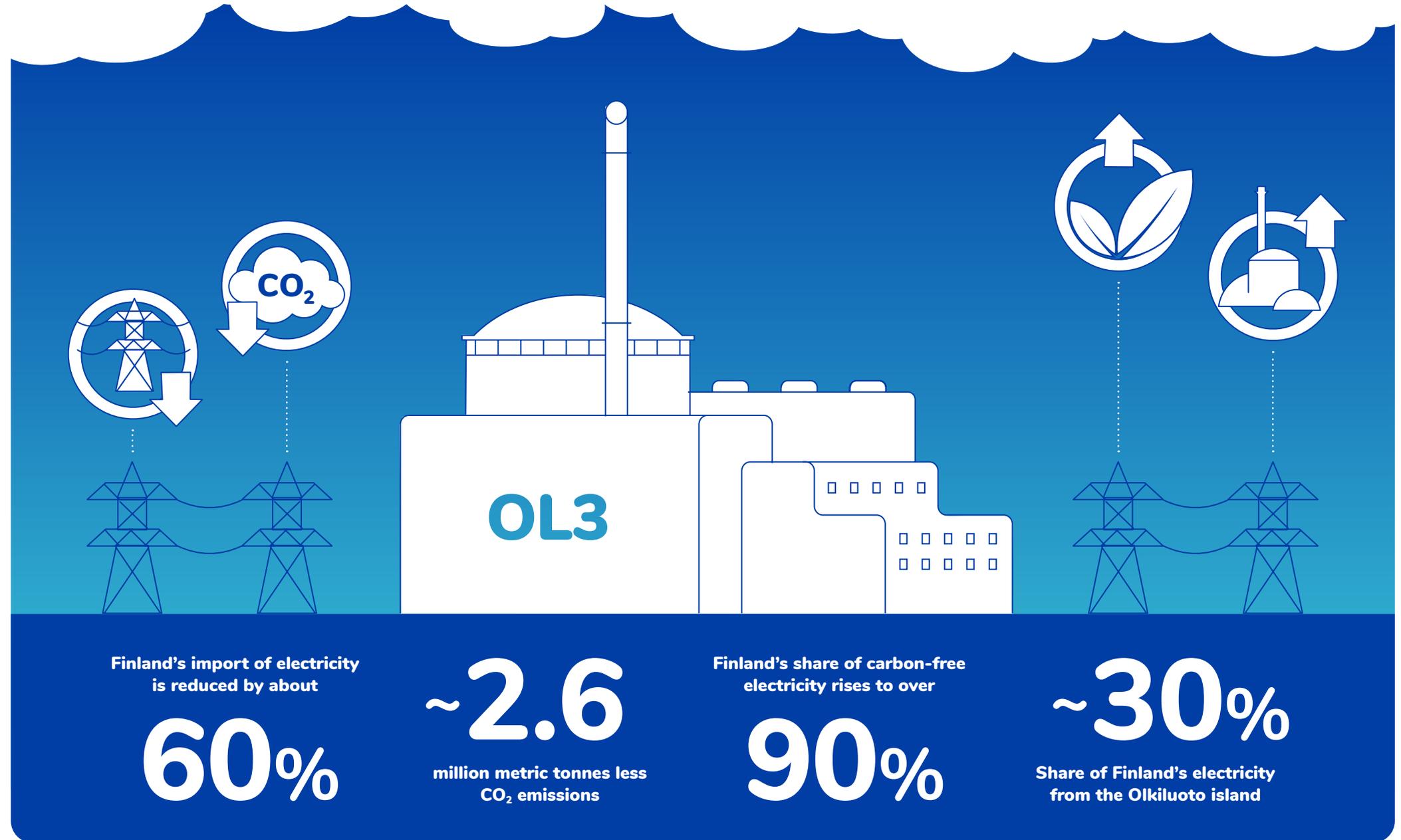


Finland's greatest climate act

Regular electricity production at the OL3 plant unit, the single greatest climate act in Finland, started on 16 April 2023. With this third most powerful nuclear power unit in the world, approximately 30 per cent of Finland's electricity can be produced on one island, where the entire life cycle of nuclear power is managed.

By replacing the average electricity production carbon dioxide emissions in EU-27 countries, OL3's production reduces annual carbon dioxide emissions by approximately 2.6 million tonnes. Simultaneously, Finland's self-sufficiency in clean electricity grows – the share of zero-emission electricity production will rise from 89 per cent to approximately 92 per cent. OL3's electricity production will reduce the import of electricity by approximately 60 per cent.

The commissioning of OL3 can be seen in some of the environmental indicators for 2023.

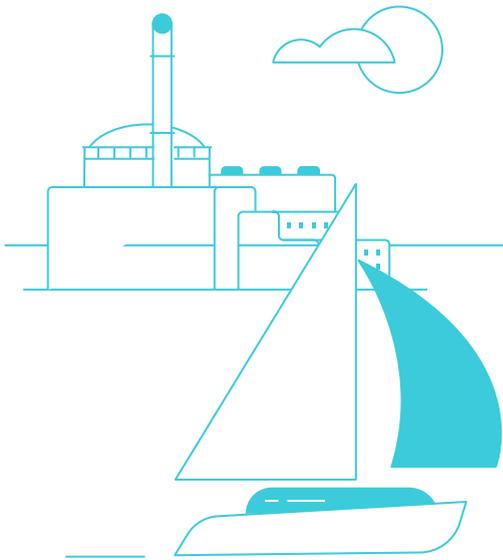




Targets:

EMISSIONS

- » Cooling water thermal load management (maximum 56,9 TWh)
- » The temperature of the cooling water remained below the environmental permit target values. The heat load to the sea was 44.3 TWh.



Cooling water

The warming of the seawater due to the thermal load from the cooling water is the most important adverse environmental impact of the Olkiluoto nuclear power plant. The total volume of seawater used for the cooling is approximately 76 m³/sec at the OL1 and OL2 plant units and approximately 57 m³/sec at the OL3 plant unit.

In 2023, 3,706 million cubic metres of seawater were used for cooling, and the resulting thermal load on the sea was 44.3 TWh. Seawater temperature is monitored as required by the environmental permit. The permit states that the seawater temperature must not exceed the target value of 30°C when measured as a weekly rolling average at a distance of 500 metres from the cooling water discharge channel. Limit values have also been specified for the amount of cooling water (max. 4,415 million m³) and the thermal load (max. 56.9 TWh) in the environmental permit. None of the permit limits were exceeded in 2023.

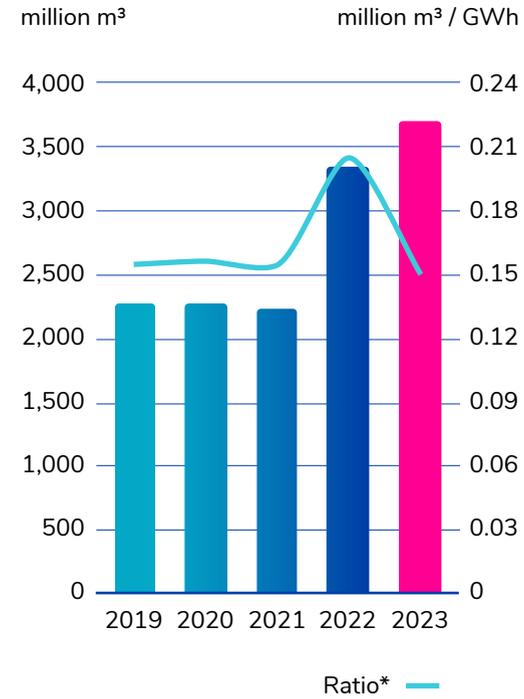
As the cooling water passes through the plant, its temperature increases by approximately 10°C, after which it mixes with seawater. The cooling water does

not come into direct contact with the power plant's process water. Throughout the operation of the power plant, TVO has monitored the impact of cooling water and conducted related surveys. The cooling water accumulates in an extensive sea area in the surface layer, from where part of the heat transfers into the air. Depending on the weather conditions, an increase in temperature can be observed at an approximate distance of 3–5 kilometres from the cooling water discharge location.

The cooling water also causes changes in the ice conditions, as the cooling water discharge area remains unfrozen throughout the winter. The size of the unfrozen and weak ice area varies depending on the winter weather. Warnings about the unfrozen area are issued to the local residents in newspapers and with ice warning signs. The warm cooling water extends the growth period in the unfrozen sea area and increases its overall biological production. Other biological effects caused by the cooling water are minor.

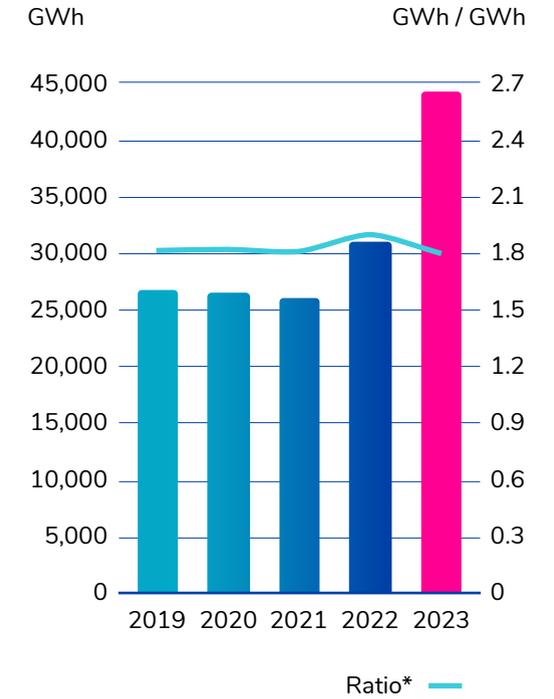
An investigation into fish and fry carried to the power plant by the cooling water was launched in spring 2023, and it will

Water usage Cooling water



*The ratio is given per GWh of electricity produced.

Emissions Thermal load on the sea



*The ratio is given per GWh of electricity produced.

be carried out according to the surveillance plan approved by the authority.

The solid material is extracted from the cooling water at the debris handling building. During 2023, modifications were

performed at the debris handling building for the OL1 and OL2 plant units. From September onwards, debris handling has been implemented according to the provisions of the environmental permit.



Targets:

Suppliers' environmental responsibility

- » Supplier's performance of environmental and energy efficient aspects was improved as planned.

Development of supplier monitoring in Olkiluoto

- » The cooperation and safety forum for contractors operating in Olkiluoto continued. Environmental plans were drawn up for the projects and regular monitoring was carried out on the basis of these plans at work sites.

Raw materials and material efficiency

TVO ensures the safe use of the uranium used as nuclear fuel at all stages of the electricity production chain, from responsible procurement to safe final disposal. TVO's OL1 and OL2 plant units require an annual total of approximately 35 tonnes of low-enriched uranium for fuel. In the future, OL3 will need approximately 32 tonnes of fuel annually.

TVO uses a diversified nuclear fuel procurement chain, meaning that separate contracts are concluded for the different procurement stages, usually with several suppliers for each stage. Procurement operations are based on long-term contracts with leading suppliers. Uranium is only acquired from suppliers who meet the strict requirements specified by TVO.

Material efficiency through recycling

The TVO Group procures products that are durable and have a long lifespan and takes into account opportunities for their recycling and potential reuse at the end of their service life. The procurement operations ensure safe, competitive and reliable production and the long-term operation of the plant units.

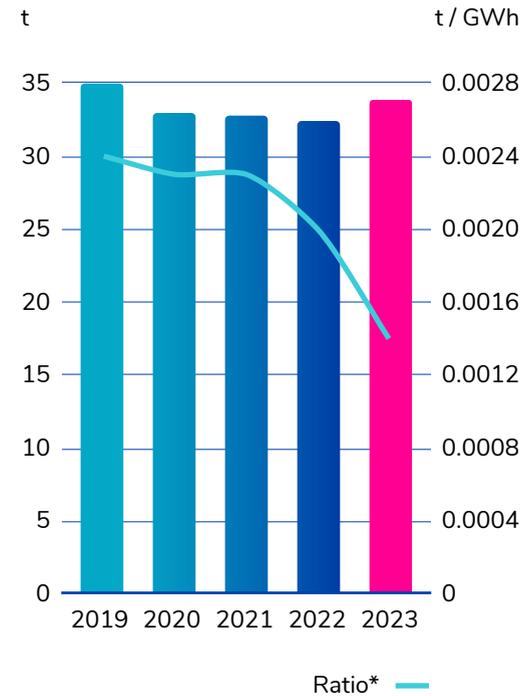
The purchased products and services must meet the TVO Group's requirements concerning quality, occupational safety and the environment. The availability of products and services necessary for the Group's operations is ensured by means of long-term agreements that are based on mutual trust and partnership.

Intermediate agents in production

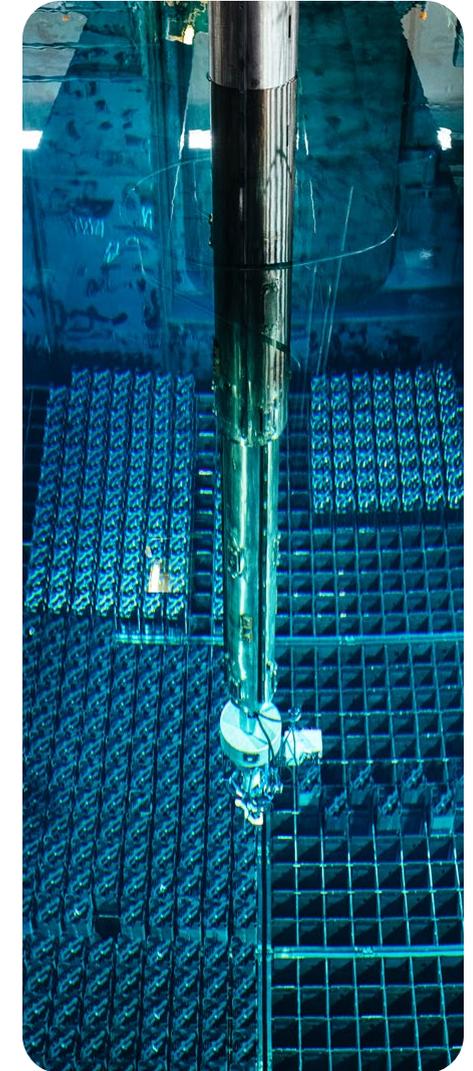
Chemicals are extensively stored and processed by TVO. The Olkiluoto nuclear power plant is a safety report establishment. The intermediate agents include the fuel (oil) for the emergency diesel generators, the reserve power boiler plant and vehicles as well as the sodium hypochlorite (NaClO) used for hydroid control in the seawater systems. The ion-exchange resin used to clean the process water as well as solvents, bitumen, nitrogen, hydrazine and ammonia water, as well as different oils used at the plant (other chemicals) are among the intermediate agents to be reported.

Material efficiency

Nuclear fuel spent



*The ratio is given per GWh of electricity produced.



Reducing water consumption

In addition to the seawater used as cooling water, the Olkiluoto power plant makes use of fresh water, which is used as tap water and process water. The process water that boils in the reactor must not contain any salts, impurities or particles that could damage the reactor internals. Olkiluoto has all the necessary plants for water treatment: a water treatment plant, a demineralisation plant and a laboratory. The tap water and process water are treated at TVO's own water treatment plant. Process water is treated using ion exchange and reverse osmosis technologies, and the water is continuously recirculated and purified. Since December 2023, municipal wastewater from Olkiluoto has been routed to Rauma for treatment via a transfer sewer.

During annual outages, the fuel pool water is stored in storage pools and later reused. The recirculation of water reduces TVO's need for clean process water

and the amount of process wastewater discharged from the plant by approximately 30,000 m³ each year. During the reporting year, 272,713 m³ of fresh water was taken from the Eurajoki river for use at the power plant.

TVO has in place a Water Safety Plan (WSP) for tap water that is in line with the World Health Organization's (WHO) guidelines. Its aim is to identify the risks related to the operating environment of water production and its production chain and to manage them in order to ensure water quality. Water quality at TVO meets the quality requirements set by the authorities.

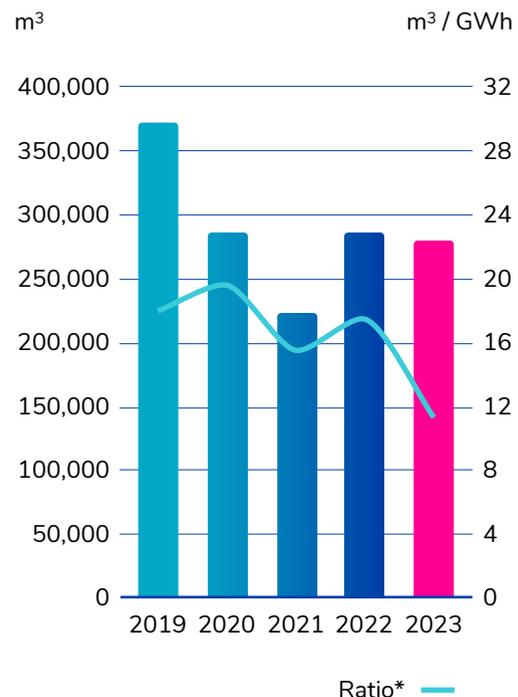


The recirculation of water reduces TVO's need for clean process water by 30,000 m³ each year."

Intermediate agents	2023	2022	2021	2020	2019
Oils (m ³)	699	659	1,046	748	732
NaClO (15%) (m ³)	43	42	42	48	39
Other chemicals (t)	311*	194*	148	223	118
Ion exchange resins (t)	15	17	13	15	15
Water treatment chemicals (t)	100	110	112	83	104

*For OL3, includes only other chemicals procured by TVO.

Water usage



*The ratio is given per GWh of electricity produced.





Targets:

Climate-friendly electricity production: 26,682 GWh and 1/3 of Finland's electricity will be produced after OL3 is started. TVO Group's operations will be carbon neutral by 2030.

» The OL1, OL2 and OL3 plant units produced 24,671 GWh of electricity. The production target was not reached. Electricity produced in Olkiluoto accounted for approximately 31 % of the electricity used in Finland.

Energy savings target for the 2017–2025 contract period: 150 GWh in total

- » The target for the agreement period has already been reached in 2019. Continue to commit to the goals of the Energy Efficiency Agreement, which will be promoted by carrying out at least four site inspections and one plant survey annually in Olkiluoto. This target was not achieved for the target reviews.
- » The expansion of the district heating network was continued in connection with OL3. Upon completion of the project, 20 GWh of district heat will be added to the network.

Production and energy efficiency

In 2023, the combined electricity production of the Olkiluoto plant units, OL1, OL2 and OL3, was 24.67 TWh. TVO produced approximately 31 per cent of all the electricity consumed in Finland.

The plant units operated safely. The net production for OL1 was 7.42 TWh and the load factor was 95.4 per cent. The net production for OL2 was 6.87 TWh and the load factor was 88.3 per cent. The net production for OL3 was 10.37 TWh and the load factor was 73.3 per cent.

Regular electricity production at OL3 started on 16 April 2023.

Improving energy efficiency

For several years, the TVO Group has participated in the voluntary Finnish Energy Efficiency Agreement for Industries. TVO signed the agreement for the first time in 1998. In accordance with the agreement, efforts have been focused on the continuous improvement of energy efficiency at the plant units and in the Olkiluoto area.

TVO has also signed the Energy Efficiency Agreement for 2017–2025. During this period, the associated Action Plan

for Energy Production aims to implement actions designed to make the use of energy more efficient as well as to improve the efficiency of primary energy use and the total efficiency of energy production. TVO's energy savings target for the 2017–2025 agreement period is a total of 150 GWh, which corresponds to the average annual consumption of about 7,500 single-family homes with electric heating. This target was already achieved in 2019, so an additional savings target of 500 MWh was set for 2022–2023 and also reached.

The TVO Group has an Energy Efficiency Group, whose tasks include the monitoring of energy consumption, performing energy reviews and measurements at the plant and, on their basis, discovering and implementing new energy savings measures. Each year, the Energy Efficiency Group sets targets for energy savings and monitors how they are achieved.

Energy efficiency measures carried out in 2023 included switching road and yard lighting to LEDs. Furthermore, plant measurements were carried out at the OL1 and OL2 plant units and an energy review was performed at the Multi-Activity Centre. The district heating network expansion project was continued in

OL1	2023	2022	2021	2020	2019
Net production (GWh)	7,428	6,932	7,404	7,310	7,542
Capacity factor (%)	95.4	89.1	95.1	93.7	96.9
Efficiency (net) (%)	35.5	35.6	35.6	35.5	35.5

OL2	2023	2022	2021	2020	2019
Net production (GWh)	6,871	7,532	7,033	7,277	7,209
Capacity factor (%)	88.3	96.8	90.4	93.3	92.7
Efficiency (net) (%)	35.4	35.4	35.5	35.4	35.5

OL3	2023	2022	2021	2020	2019
Net production (GWh)	10,372	1,887	-	-	-
Capacity factor (%)	73.3	16.9	-	-	-
Efficiency (net) (%)	36.3	28.3	-	-	-

2023 and a project for adding remotely readable meters was launched. The project involves adding remotely readable consumption meters for electricity, water and district heating in the separate buildings. These will improve the monitoring of energy consumption.

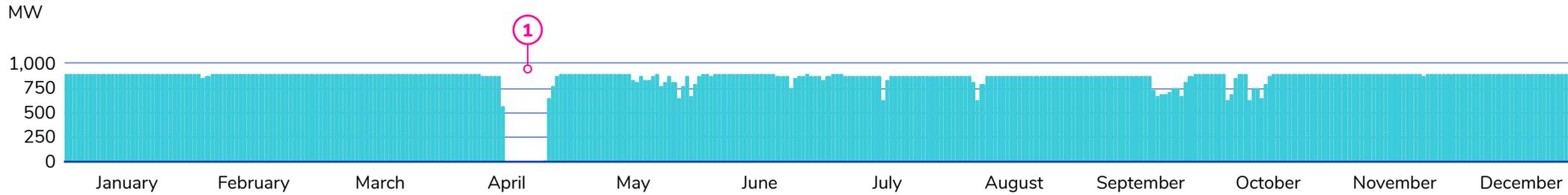
TVO and Posiva carry out activities related to energy efficiency as part of their normal operations. For TVO, the highest potential for savings involves the

improvement of the efficiency of the electricity production process; this has been implemented in the long term by means of modernisation projects at the plant units throughout their operational history. Another area for improvement is the reduction of in-house energy consumption at the Olkiluoto site. The TVO Group's environmental management system incorporates the energy efficiency system ETJ+ that is used to continuously improve energy efficiency across all functions.



OL1 Production

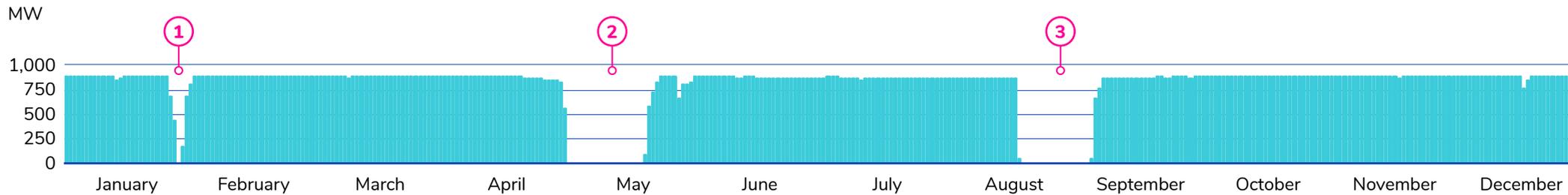
Average output



1. Annual outage

OL2 Production

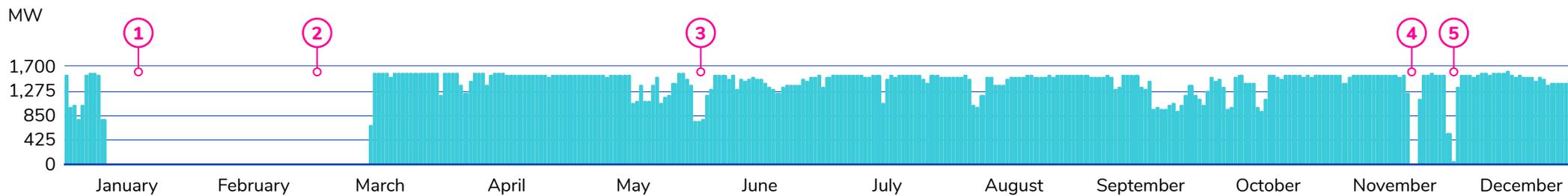
Average output



- 1. Cold shutdown for repair of the main steam valve
- 2. Annual outage
- 3. Cold shutdown, a failed rotor replacement

OL3 Production

Average output



- 1. Maintenance outage for inspections of feedwater pumps and repairs of impellers
- 2. Inspection and maintenance outage related to the pressurizer safety relief valves safety valve units (PSRV)
- 3. Warranty test
- 4. Repairing of the failed temperature measurement in the generator cooling system
- 5. The fault ride-through test



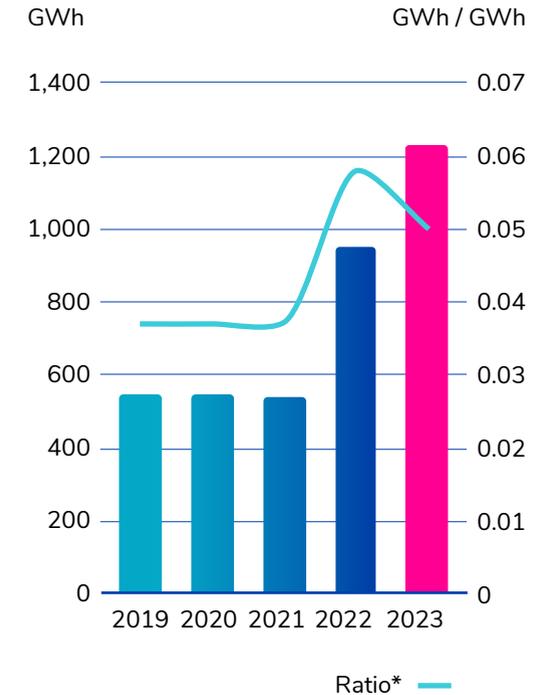
At the moment, district heating is obtained from the OL1 and OL2 plant units. It consists of waste heat from the plants. In 2023, approximately 24 GWh of heat was sent to the district network, where it is used for heating buildings. With the district heating network's expansion project, the OL3 plant unit will also be added to the district heating network.

The electricity used at Olkiluoto consists of electricity produced in-house and electricity purchased from the power market. The plant units use electricity generated in their own production. Currently, electricity is purchased from the power market for the Olkiluoto outdoor areas, Posiva and the plant units when they are not in production operation. The distribution of production methods in the electricity purchased from the power market is calculated according to the residual distribution from the Energy Authority. In 2023, the percentages were as follows: fossil-based energy sources and peat 70.12%, nuclear power 18.20% and renewable energy sources 11.68%.

In addition to in-house and purchased electricity, TVO's total energy consumption consists of the fuel consumption of the emergency diesel generators and reserve boilers. In 2023, total energy consumption was 1,235 GWh, of which 1,227 GWh came from electricity consumption and 7.8 GWh from fuel consumption.



Energy efficiency TVO's electricity consumption



*The ratio is given per GWh of electricity produced.

**24
GWh**

district heating from the plant units to buildings in Olkiluoto.



Targets:

Keeping radioactive air emissions well below official limits

» Radioactive emissions into the air
Radioactive air emissions were well below the limits set by the authorities. TVO's own ALARA programme targets were achieved in terms of air emissions.

Reduction of emissions from emergency diesels and reserve boilers

» A fuel with a bio-part has been approved for use, which reduces Scope 1 emissions in accordance with the GHG protocol. Experimental uses of new emergency power diesels for OL1 and OL2 plant units have temporarily increased air emissions.

Releases into the air

With regard to the management of releases of radioactive substances, TVO always strives to keep any releases well below the limits set by the authorities as well as TVO's own target limits, which are more stringent than the official limits. TVO takes part in Finland's fight against climate change by producing low-emission base load electricity.

Radioactive releases into the air

Noble gas emissions into the air amounted to 0.01 per cent and iodine emissions into the air amounted to 0.07 per cent of the allowed limit value specified by the authorities.

The theoretical radiation dose caused to neighbouring residents at Olkiluoto is estimated to remain clearly below the threshold value. In 2022, the radiation dose was 0.23 µSv (threshold value: 100 µSv). TVO's target value is below 0.8 µSv.

Greenhouse gases and other releases into the air

The Olkiluoto nuclear power plant is included in the European Union's emissions trading scheme that aims at monitoring greenhouse gas emissions and

Radioactive emissions to the air	2023	2022	2021	2020	2019
Noble gas TBq (Kr-87 equivalent)	1.61	1.11	0.20	0.97	1.76
% of allowed amount	0.02	0.01	0.002	0.01	0.02
Iodine TBq (I-131)	0.00003	0.00008	0.00013	0.00012	0.0008
% of allowed amount	0.02	0.07	0.13	0.12	0.74
Aerosols TBq	0.004	0.01	0.00005	0.0002	0.00006
Tritium TBq	0.48	0.59	0.40	0.34	0.82
Carbon-14 TBq	0.69	0.64	0.54	0.65	0.64

Emissions to the air (t), TVO and Posiva	2023	2022	2021	2020	2019
GHG emissions Scope 1 (CO ₂ eq)	2,337	3,076	3,897	3,254	-
TVO CO ₂ emissions included in emissions trading scheme	1,522	1,439	2,436	1,751	1,388
GHG emissions Scope 2 (CO ₂ eq)	37,809	65,635	68,743	29,677	-
GHG emissions Scope 3 (CO ₂ eq)	89,290	117,170			
NO _x	2.0	1.9	3.2	2.2	2.2
SO _x	0.0	0.0	0.0	0.0	0.0
Particles	0.1	0.1	0.2	0.1	0.2

achieving the CO₂ reduction goals. Posiva also plays an important role in the mitigation of climate change, since the final disposal solution is a part of the life cycle of nuclear power.

The power plant's verified CO₂ emissions are generated by the releases of the reserve boilers and the emergency diesel generators. The purpose of the emergency diesel generators is to

automatically ensure the power supply of the plant in a possible but unlikely loss-of-power situation. In order to ensure safety, the emergency diesel generators are regularly tested in compliance with the Technical Specifications, which means that their emissions cannot be lowered.

The replacement of the emergency diesel generators at OL1 and OL2 will reduce particulate emissions into the

atmosphere. The largest modernisation project in the history of the plant units reached a milestone in the summer of 2020 when the ninth emergency diesel generator was deployed. This unit is independent of OL1 and OL2, and it will enable the replacement of the eight original generators one by one. Five emergency diesel generators had been replaced by the end of 2023.

Going forward, the emergency diesel generators and reserve boilers will switch to using a fuel that contains a biocomponent, which makes them more climate-friendly. This transition is included in the goals of the Environment and Energy Efficiency Programme for 2022–2024.

The TVO Group has continued the calculation of greenhouse gas emissions in accordance with the GHG (Greenhouse Gas) Protocol. Scope 1 emissions include direct emissions from the company's operations, and they take into account the emissions from the emergency diesel generators, reserve boilers, vehicles, machinery and equipment as well as refrigerant leaks. Scope 2 accounts for indirect emissions generated by the company's energy consumption.

The TVO Group continued the calculation of Scope 3 emissions in 2023. Scope 3 emissions include indirect emissions connected with the Company's operations from sources which are not owned by the Company itself.



Targets:

Development of water supply

» The Olkiluoto water management project for securing the supply of raw water was completed and a parallel raw water line has been commissioned from Lapinjoki. Since December, Olkiluoto's municipal wastewater has been routed via the transfer sewer to be processed to Rauma. The processing of wastewater in a larger unit allows for its more efficient purification and reduces the load caused on the

Keeping radioactive water discharges well below official limits

» Radioactive water discharges were well below the limits set by the authorities. TVO's own ALARA programme targets were achieved in terms of water emissions.

Releases into water and soil

The releases of radioactive fission and activation products into water amounted to 0.07 per cent and tritium emissions to 29.1 per cent of the allowed annual limit value specified by the authorities.

Sanitary wastewater is treated at the Olkiluoto wastewater treatment plant before it is discharged into the sea. In 2023, the amount of treated sanitary wastewater was 51,328 m³. The phosphorus load discharged into the sea-water was 4.4 kg, the nitrogen load was 3,541 kg and the biological oxygen demand (BOD_{7ATU}) was 584 kg. In the spring of 2023 Olkiluoto's sanitary waste water treatment plant's after-clearer didn't work optimally. The biorotos failed and their lamellas had to be changed as well. As a result, biological oxygen consumption of waste water concentration, calculated as an annual average was 24mg/l, and exceeded the environmental permit requirement, a limit of 13mg/l. The treatment of sanitary wastewater is based on the permit regulations specified for the purification efficiency and loads discharged into water bodies, as well as requirements laid down in legislation. Emissions from the sanitary wastewater treatment plant were a

fraction of the nutrient load of the Eurajoki river running to the north of Olkiluoto. Water quality measurements are taken by a third party.

The Olkiluoto water management project for securing the supply of raw water and building a transfer sewer for wastewater was completed during the reporting period. Going forward, municipal wastewater from Olkiluoto will be routed via the transfer sewer to Rauma for processing. The processing of wastewater in a larger unit allows for its more efficient purification and reduces the load caused on the water systems.

Releases into the soil

Over the course of the year, a total of approximately 12 litres of oil ended up in the soil due to failures of machinery and equipment. All of the oil was recovered. There were also minor refrigerant leaks from cooling devices.

“The processing of wastewater in a larger unit allows for its more efficient purification and reduces the load caused on the water system.”

Radioactive emissions to water	2023	2022	2021	2020	2019
Fission and activation products TBq	0.0002	0.0001	0.0002	0.0004	0.0001
% of allowed amount	0.07	0.04	0.06	0.15	0.04
Tritium TBq	22,8	2.24	1.68	1.55	1.59
% of allowed amount	29.1	2.86	9.2	8.5	8.7

Wastewater treatment	2023	2022	2021	2020	2019
Amount of water (m ³)	51,328	79,387	89,957	90,304	83,545
Concentration (mg/l)¹⁾					
BOD _{7ATU}	24	7.4	3.3	4	6.6
Phosphorus	0.08	0.05	0.05	0.07	0.37
Treatment efficiency average (%)¹⁾					
BOD _{7ATU}	97	97	99	98	97
Phosphorus	96	100	100	99	96
Load on the sea area (kg)					
Phosphorus	28	4.4	4.4	6.2	31
Nitrogen	2,555	3,541	4,380	4,745	2,993
BOD _{7ATU}	1,351	584	296	365	548
Water treatment chemicals (t)	19	23	26	29	32

¹⁾ The permit regulation for the sanitary wastewater: The maximum BOD_{7ATU} value of wastewater discharged into the seas is 13 mg O₂/l and the maximum phosphorus concentration is 0.52 mg P/l. The minimum treating efficiency for the BOD_{7ATU} value and phosphorus is 95%. All values are calculated as annual averages.



Targets:

Reduction and exemption of low- and intermediate-level waste

» The very low-level waste (VLLW) soil disposal facility was granted an environmental permit in October 2023. Procedures for the development of power plant waste sorting continued.

Development of a circular economy: Minimizing the amount of municipal waste and utilising it as material (at least 55% of the total amount of waste excluding waste sludges)

» The amount of waste to be recovered as material accounted for about 64% of the total amount of waste. In addition, decommissioned furniture and computer screens were donated to charity and staff. Land masses stored in the land disposal area were utilised in the Olkiluoto earthworks.

Waste

The TVO Group is committed to reducing the amount of waste and promoting its utilisation. Radioactive waste is isolated from the organic environment until its radioactivity has decreased to a harmless level. The TVO Group disposes of the radioactive waste it generates in a responsible manner.

Radioactive waste

The waste produced at the power plant is classified, based on its radioactivity, into waste exempted from control, very low, low and intermediate-level operating waste, high-level spent fuel and decommissioning waste.

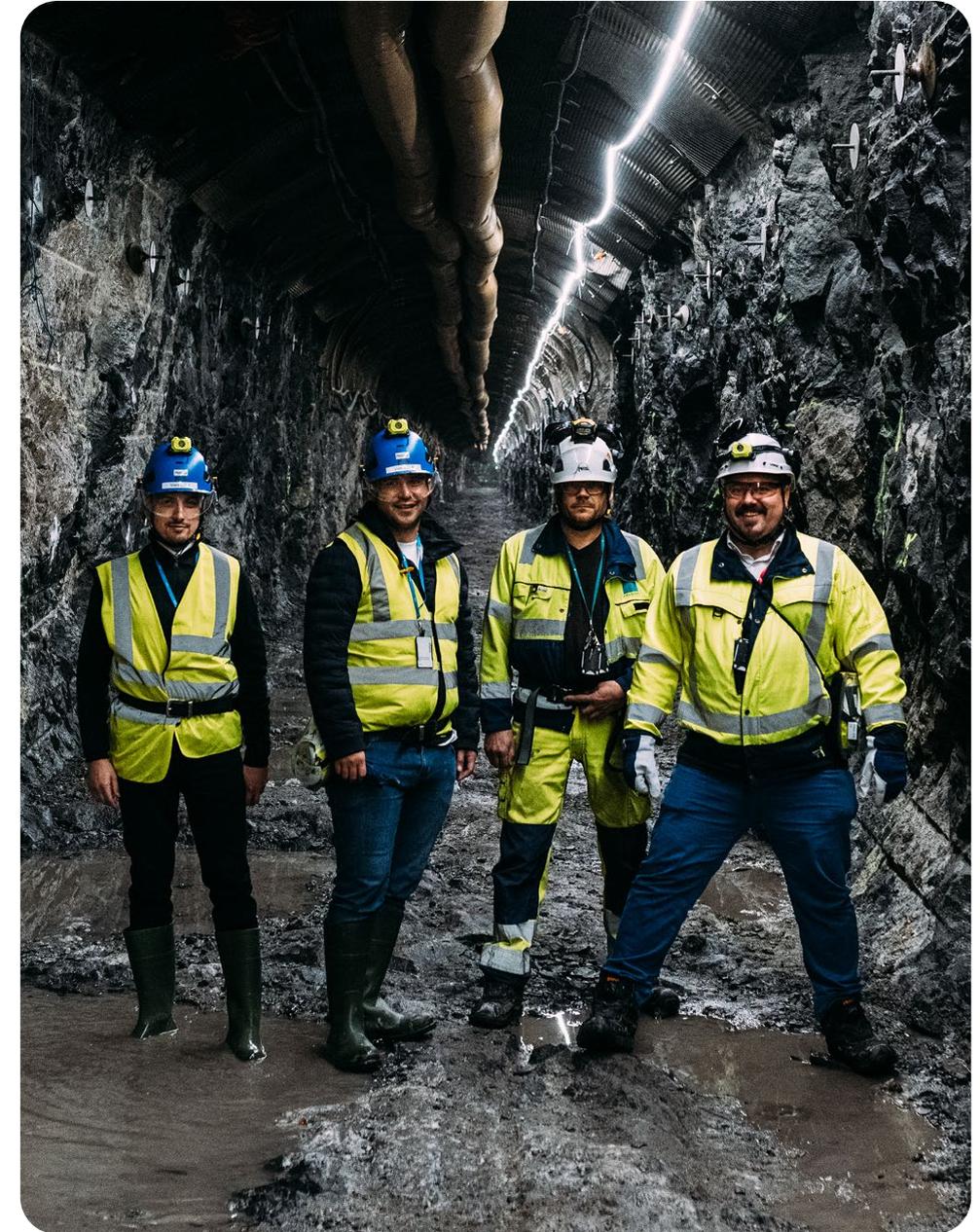
Waste exempted from control contains such a small amount of radioactive substances that the waste can be reused or delivered to the Olkiluoto landfill for final disposal. This waste is produced during the operation and maintenance of the power plant. In 2023, no maintenance waste was exempted from control. Approximately 29 tonnes of metal and mixed scrap were exempted from control.

Protective equipment used in operating and maintaining the power plant,

components removed from the process and insulating materials are either very low or low-level waste; a small portion of the devices removed from the process may also be intermediate-level waste. Low and intermediate-level waste is tightly packaged and placed in the operating waste repository (VLJ repository) located at an approximate depth of 100 metres in the plant area. TVO is planning to construct a disposal repository for very low-level waste (VLLW) at Olkiluoto. It will reduce the amount of low-level waste placed in the VLJ repository. The collection of very low-level waste was started in 2018.

The ion exchange resins used for the treatment of the process water at the OL1 and OL2 plant units are classified as intermediate-level waste which is incorporated in bitumen and placed in the VLJ repository. In 2023, intermediate-level waste amounting to 64 m³ and low-level waste amounting to 17 m³ was placed in the VLJ repository.

TVO uses an operating waste management manual that contains the procedures and instructions for the handling, storage and final disposal of radioactive waste. The employees working with operating waste management receive training on the subject on the basis of separate training requirements and induction programmes.





The total amount of high-level radioactive waste generated during the reporting year was 32.46 t. Once the spent fuel is removed from the reactor, it is cooled in the fuel pool inside the reactor hall for a few years, after which it is transferred to the spent fuel interim storage located in the plant area (KPA storage). In the KPA storage, the fuel is stored under water, which provides shielding against radiation as well as cooling. The fuel is kept in an interim storage at Olkiluoto until it can be placed in final disposal in the Olkiluoto bedrock. The final disposal will start in the mid-2020s. Posiva is the first company in the world to commission a safe final disposal solution for spent nuclear fuel.

In order to construct the disposal repositories, approximately 500,000 solid cubic metres of Olkiluoto bedrock have been excavated by 2023. The majority of blasted stone has been utilised for construction on the Olkiluoto island and in the local area. The objective in all the preparations for final disposal, such as method research and the construction of facilities, is to minimise the impacts on the surrounding nature.

Decommissioning waste is waste produced in connection with the disassembly of the power plants at the end of the operating life. The final disposal of decommissioning waste will also take place at Olkiluoto.

Municipal waste

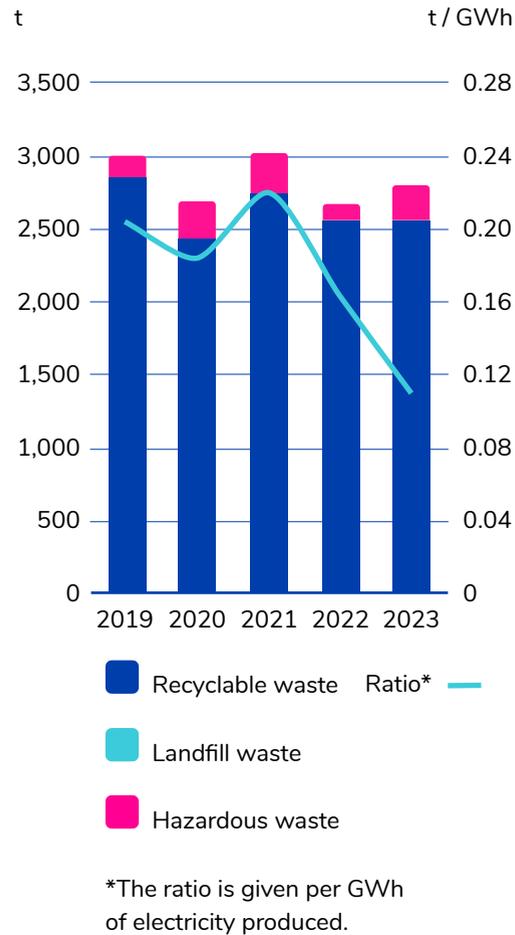
The operation of the power plant also generates municipal waste and hazardous waste. The TVO Group is committed to the reduction of the amount of waste and to the improvement of the reuse of waste. This is a requirement for everybody working at Olkiluoto. The goal is to route any usable products for reuse, and donations to charity are also made. The generation of waste is considered already at the procurement stage, with the aim of reducing the volume of waste generated. The TVO Group focuses on procuring products that are durable and have a long lifespan and takes into account opportunities for their recycling and potential reuse at the end of their service life.

All waste generated at Olkiluoto is sorted and processed. The sorted waste is recycled as materials whenever possible or reused as energy. Only waste that cannot be reused in any manner is taken to the landfill. In 2023, no such waste was generated. The optimal use of chemicals is one of the ways of aiming to reduce the amount of hazardous waste. All hazardous waste is collected in the hazardous waste storage to be sent to an appropriate waste treatment plant.

In 2022, the total volume of waste was 2,746 tonnes. Waste suitable for recycling as materials or reuse as energy amounted to 96 per cent of the total amount of waste, and the share of

Waste

Municipal waste



hazardous waste was 4 per cent. Most of the hazardous waste was batteries and WEEE (waste electrical and electronic equipment) as well as oil-water mixtures and glycol.

Radioactive waste	2023	2022	2021	2020	2019
Low-level (m ³) ¹⁾	17	22	0	92	150
Intermediate level (m ³) ¹⁾	64	114	0	18	7
Operating waste cleared after monitoring (t)	0	0	0	0	0

¹⁾ Operating waste placed in the VLJ repository during the year.

Amount of spent fuel in the OL1 and OL2 storage pools and interim storage, cumulative	2023	2022	2021	2020	2019
Number of assemblies (pcs)	10,118	9,914	9,724	9,524	9,328
Assemblies (t)	1,694.2	1,660.7	1,629.6	1,597.5	1,564.9

Municipal and hazardous waste OL1, OL2, and OL3 (t)	2023	2022	2021	2020	2019
Mixed waste to energy	108	135	209	176	126
Landfill waste to TVO's landfill	0	0	0	0	0
Paper and cardboard	78	69	73	111	69
Energy waste	130	193	203	205	194
Biowaste	95	110	98	86	66
Wood	212	153	180	220	407
Metal	158	194	172	119	955
Glass	0,4	3	4	5	4
Plastic	3	3	3	4	2
Cable refuse	13	4	9	20	11
Crushed brick and concrete	53	23	210	8	5
Screening	73	8	11	38	25
Hazardous waste	242 ¹⁾	147 ²⁾	298	243	151
Sludge ³⁾	1,581	1,632	1,627	1,425	990

¹⁾ Includes hazardous waste recycled as material 74 t

²⁾ Includes hazardous waste recycled as material 32 t

³⁾ Sludge from the wastewater treatment plant, sand water & shellfish water mixture (solid matter 8-10%)



Targets:

Sustainable land use and biodiversity

- » The concentration of energy production in a small area minimizes the environmental impact and makes it possible to preserve natural areas elsewhere.
- » The Infrastructure and Land Use Steering Group coordinates the natural environment and the infrastructure to be planned and located in the area, with special attention to natural sites and nature reserves.
- » During the year, a natural meadow and sunflower field were established in the Olkiluoto area.

Environmental research and biodiversity

The island of Olkiluoto is one the most researched areas in Finland, and its diverse nature is charted in detail. Environmental research has been conducted on the island since the 1970s, years before electricity production was launched. The early baseline studies created a basis for the environmental monitoring programmes aimed at facilitating environmental radiation monitoring and determination of the impact on waters.

Environmental radiation safety at the Olkiluoto nuclear power plant is continuously monitored with many different methods and through the cooperation of several parties. Around 300 samples are taken from the environment of Olkiluoto each year to be analysed in compliance with an environmental radiation monitoring programme approved by STUK. There are also several radioactivity monitors in the immediate vicinity of the plant. They continuously measure radiation and are connected to STUK's automatic network for monitoring external radiation.

Over 100 water samples are taken each year from the sea area surrounding Olkiluoto. These samples are subjected to approximately 1,500 different water

quality analyses. Furthermore, the condition of fish stocks in the sea area is monitored by, for instance, fishing for record-keeping purposes and surveys among professional and recreational fishers. Test fishing takes place every four years in the areas surrounding Olkiluoto in accordance with the environmental monitoring plan. The state of aquatic flora is monitored by means of transect line diving every six years.

All the Olkiluoto plant projects have undergone extensive environmental impact assessments (EIA). The final disposal of spent nuclear fuel has been studied since the 1980s, and it has also been evaluated through environmental impact assessments. TVO has started preparations for an environmental impact assessment (EIA) concerning the service life extension and possible power uprating of the Olkiluoto 1 and Olkiluoto 2 plant units.

Centralising production secures biodiversity

Climate change also has a major impact on biodiversity. As a producer of climate-friendly electricity, TVO safeguards and maintains the diversity of nature.



About 30 per cent of all electricity produced in Finland and about 31 per cent of all electricity consumed in Finland is generated on the small island of Olkiluoto, surrounded by four nature conservation areas. The concentration of energy production in a small geographic area minimises the environmental impact and allows for the preservation of other areas in their natural state.

The total surface area of Olkiluoto Island is 900 hectares, of which areas constructed for nuclear power and final disposal amount to approximately 170 hectares. The total quantity of non-water-permeable areas is 44 hectares. TVO does not own any nature-conservation-oriented areas.

Promoting biodiversity

A biodiversity study is completed on the island of Olkiluoto every ten years. The next comprehensive study will take place in 2024. During the reporting period, the Centre for Economic Development, Transport and the Environment carried out a survey of habitats suitable for the clouded Apollo butterfly in the Olkiluoto area and the winter bird population count carried out by the Finnish Environment Institute was started. Also, an eDNA study was performed on the seawater during the summer that surveyed the fish and clam species in the area. The benthic fauna, clams and aquatic vegetation were also studied in the immediate

vicinity of the cooling water intake and discharge areas.

The biotopes occurring at Olkiluoto are mostly barren with few species, but the four nature conservation areas surrounding the power plant area add to biodiversity. In places, the bird population on the island of Olkiluoto and in its surrounding areas is diverse and plentiful, and the constructed areas offer nesting opportunities for some notable bird species. Energy production and the construction of a spent nuclear fuel disposal facility have had no significant impact on the nature of Olkiluoto, which is barren and poor in species for the most part.

Biodiversity is promoted as part of the Environment and Energy Efficiency Programme, which includes, for instance, the principle of aligning the needs of the natural environment and any infrastructure being planned and to be placed in the area during land use planning, with special emphasis on locations relevant in terms of nature and nature conservation areas. The TVO Group's Sustainability Roadmap also includes goals concerning biodiversity, in relation to efficient land use and projects promoting biodiversity. In 2023, a new natural meadow and sunflower field were set up in the Olkiluoto area.

TVO and Posiva aim to improve biodiversity in connection with their operations and cooperate with stakeholders

within different projects. The impacts of the power plant's cooling water are mitigated with an annual fishery fee of EUR 13,200.

Biodiversity is also considered when planning decommissioning. The Centre for Economic Development, Transport and the Environment and the municipality of Eurajoki monitor the environmental permits, according to which detailed landscaping plans are required for the decommissioning of the power plant or a specific area. The plan for the landscaping takes into account restoring the area to its natural state and other goals regarding biodiversity, and they are approved by the authorities.



TVO and Posiva aim to improve biodiversity in connection with their operations and cooperate with stakeholders within different projects.





Targets:

Management of nuclear safety risks

- » Risks are actively identified and measured for their probability and consequences by means of up-to-date Probabilistic Risk Assessment (PRA). The identified risks are mitigated applying the Safety As High As Reasonably Achievable (SAHARA) principle.

Cooperation with authorities

The operation of a nuclear power plant is subject to licences and permits, and it is governed by the authorities. The authority supervising nuclear and radiation safety in Finland is the Radiation and Nuclear Safety Authority, STUK.

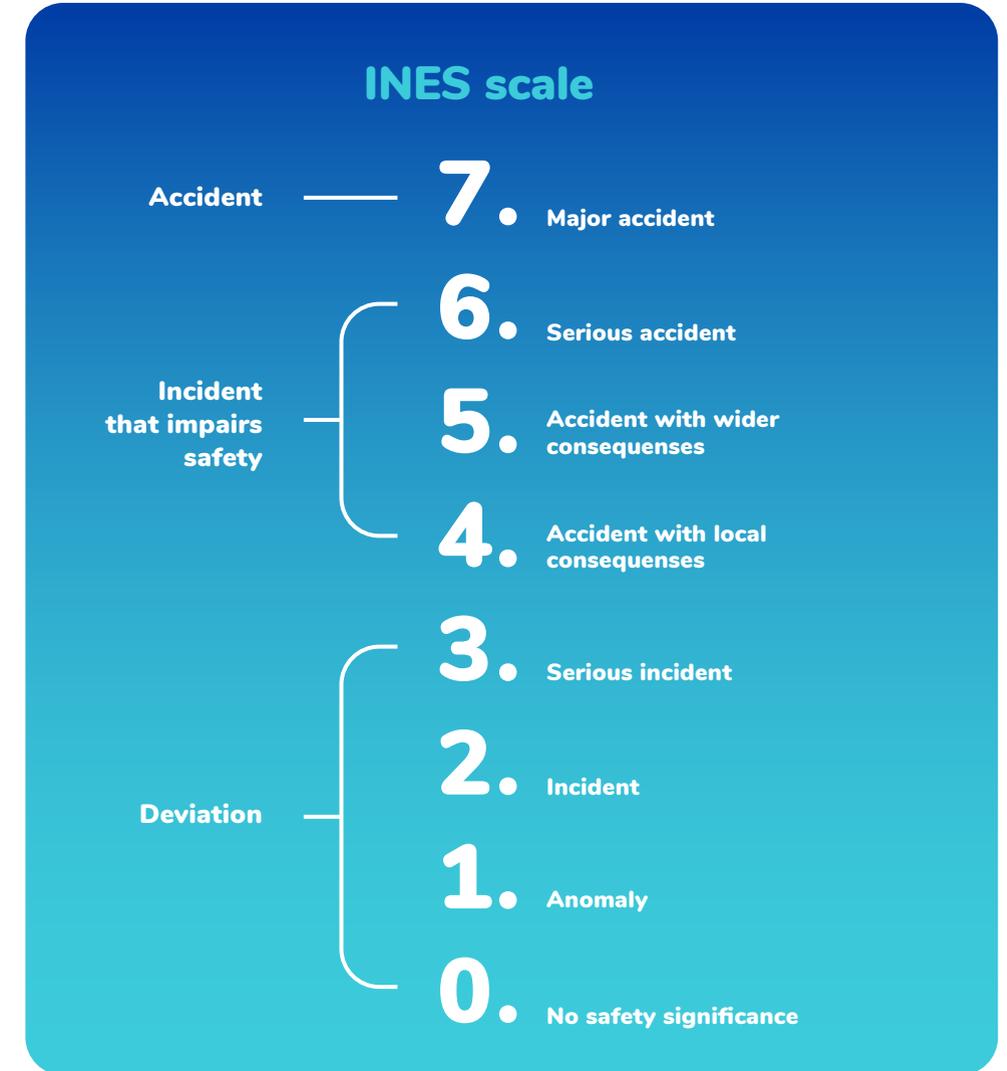
The competent environmental permit authority is the Southern Finland Regional State Administrative Agency and the supervising authority is the Southwest Finland Centre for Economic Development, Transport and the Environment. Other authorities involved in the management of environmental matters include the environmental department of the municipality of Eurajoki and the Ministry of Economic Affairs and Employment (MEAE), which acts as the coordinating authority in EIA procedures.

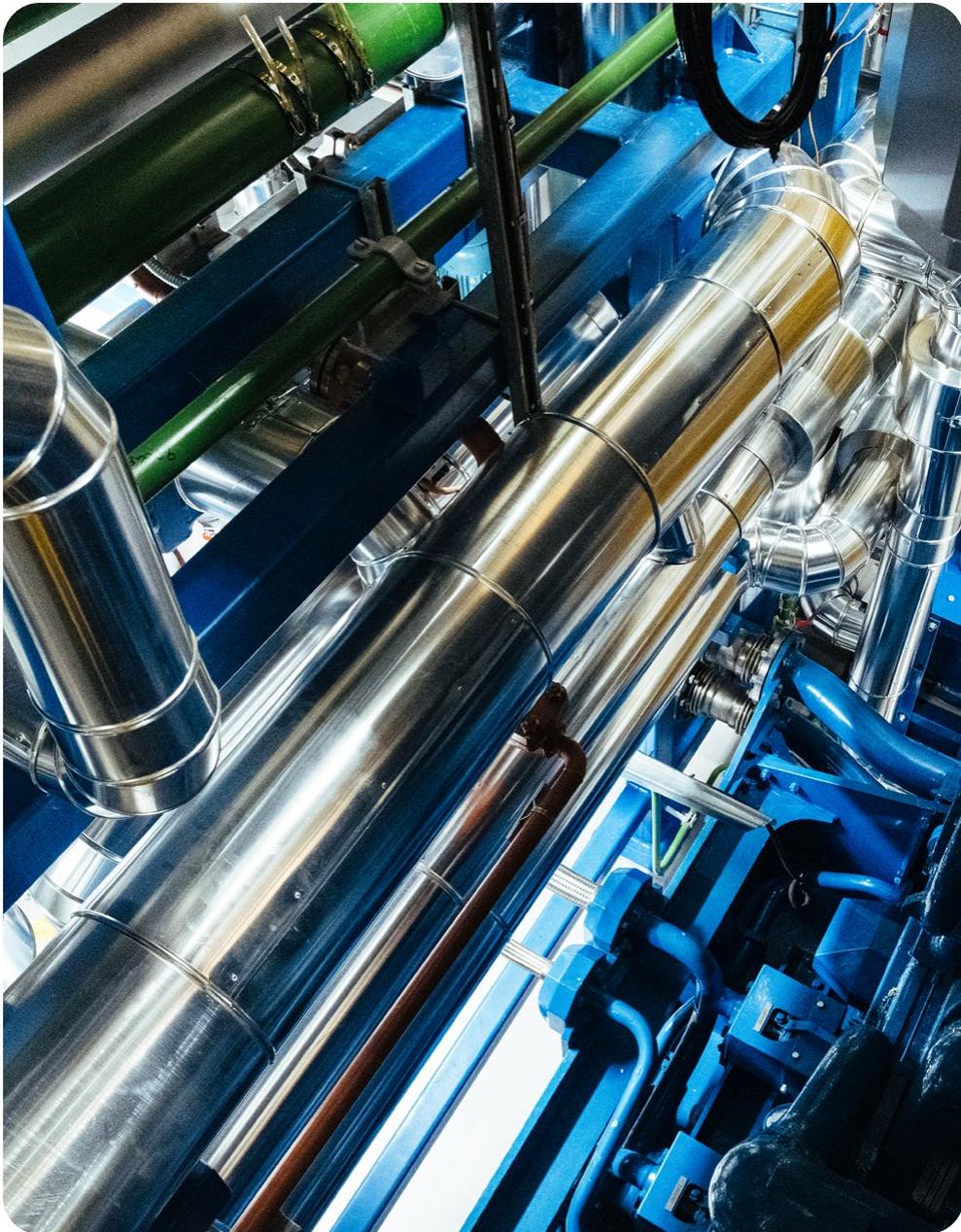
Radiation monitoring samples taken from the Olkiluoto environment are submitted to STUK for analysis. TVO annually prepares a report on the waste and emissions caused by its operations and submits the report to several regional and national authorities. TVO annually reports its environmental investments and environmental protection activity expenses to Statistics Finland. After verification,

the annual carbon dioxide emissions of the emergency diesel generators and reserve boilers are reported to the Energy Authority. Energy-saving measures are reported to Motiva. The Finnish Safety and Chemicals Agency (Tukes) acts as the supervising authority for the industrial processing and storage of hazardous chemicals.

Events affecting nuclear safety

The Olkiluoto nuclear power plant units operated safely throughout the year. TVO classifies events affecting nuclear safety in accordance with the international INES scale (0–7) and reports events to STUK. In 2023, 10 events rated as INES level 0 (no nuclear or radiation safety significance) and two events rated as INES level 1 (anomaly, exceptional incident with safety effects) took place at the Olkiluoto plant. TVO analyses and investigates all events that may have affected nuclear safety and defines the corrective actions for their causes. TVO publishes news on any significant events that may be of public interest on its website. TVO also follows events at other nuclear facilities around the world. Activities at the Olkiluoto nuclear power plant are constantly developed on the basis of any event observations made.





Permits govern the activities

In addition to legislation pertaining to nuclear energy and radiation safety, operations are also regulated by requirements laid down in environmental legislation. Operating the Olkiluoto nuclear power plant is subject to a permit according to the Environmental Protection Act, and cooling water intake is subject to a permit according to the Water Act. The permits are valid until further notice.

Decisions concerning environmental permits and water permits cover the power plant's operations and its emergency power generation systems. The permit conditions control the nuclear power plant's cooling water volume and the amount of heat contained in it, wastewater treatment efficiency, the processing of waste, operations in the event of operational occurrences and emergencies as well as monitoring and reporting. In addition, there are separate environmental permits for the supporting operations of the Olkiluoto nuclear power plant, such as the dumping area and the quarry material storage area. An environmental permit for the construction and operation of a near-surface disposal repository for very low-level waste was received in October 2023. The

supervisory authorities for the environmental permits, i.e. the Centre for Economic Development, Transport and the Environment and the municipal environmental authority examined the activities at Olkiluoto in September and Tukes carried out a periodic assessment of the chemical licence in November.

Licences according to the Chemicals Act have been granted for the handling and storage of hazardous chemicals. The reserve boilers of the Olkiluoto nuclear power plant, as well as the emergency diesel generators of the OL1, OL2 and OL3 plant units (a total of 16 generators), are included within the scope of the emissions trading system. In compliance with the Finnish Emissions Trading Act, TVO submits an annual verified emissions report and a verifier's statement to the emissions trading authority.

Compliance with environmental legislation

The TVO Group continuously monitors statutory regulations and other requirements pertaining to its operations. People in charge of different areas are responsible for ensuring that the organisations receive sufficient up-to-date information about statutory requirements and their impact

on the TVO Group's operations. Compliance with the requirements is regularly assessed in internal and external audits as well as in management reviews.

The environmental authorities are informed of all significant environmental non-conformances and events. In 2023, these included the following:

- » a report on the malfunction at the debris handling building of OL1 and OL2 and the completion of the modifications;
- » the exceptional situations that occurred in the operation of the wastewater treatment plant in spring 2023 and
- » the larger than planned hydrazine consumption of the OL3 plant unit and the single release into the sea in December 2023.



Final disposal of spent nuclear fuel

Targets:

Responsible nuclear waste management

- » The application for an operating licence for the disposal facility was submitted to the Finnish Government in 2021 and the operating licence will be obtained in the mid-2020s.
- » Posiva has the best knowledge and expertise in the final disposal of spent nuclear fuel, and it is the most desired international reference and valued partner.

The types of nuclear waste generated at a nuclear power plant include waste exempted from control, low and intermediate-level operating waste and high-level spent nuclear fuel. Posiva is responsible for the final disposal of spent nuclear fuel generated at the power plants of its owners: TVO (Olkiluoto NPP) and Fortum (Loviisa NPP).

Compared to the amount of produced energy, the volume of waste and its space requirements are low. The principle of nuclear waste management is to isolate the waste from organic nature until the radioactivity of the waste has decreased to an insignificant level.

The responsibility for nuclear waste management lies with the nuclear power companies. They must carry out the necessary nuclear waste management measures for their own waste and cover their costs. According to the Finnish Nuclear Energy Act, the nuclear waste generated in Finland must be treated, stored and placed in final disposal in Finland, and the import of other countries' nuclear waste into Finland is prohibited.



Responsibly from bedrock to bedrock

Spent nuclear fuel from the nuclear power plants of TVO and Fortum will be packed in copper canisters and placed in final disposal in the Olkiluoto bedrock at a depth of approximately 430 metres. Posiva manages the research into the final disposal of its owner companies' spent nuclear fuel, the construction and operation of a disposal facility and the eventual closure of the facility.

In 2019, Posiva started the EKA project, which aims to initiate final disposal operations in the mid-2020s. The project involves constructing an above-ground encapsulation plant and installing the systems necessary for starting final disposal in the underground ONKALO facility, obtaining the requisite operating licence for the final disposal concept, the facility complex and its systems and preparing the supply chains needed for production before starting the actual final disposal of spent nuclear fuel. The EKA project has a

strong impact on vitality – the cost estimate of the large-scale construction project is approximately EUR 500 million, and its employment impact is approximately 2,500 person-work-years. At its highest, the project will employ approximately 500 people.

An operating licence application for the disposal facility was submitted to the Government in December 2021, and its processing has progressed according to plan. The installation and commissioning phase continues in the construction of the nuclear facilities. The most significant event in 2023 was the commissioning of a personnel lift between the lifting equipment building and the underground facilities. The installation of the canister lift also progressed. The underground construction and building services work proceeded well and on schedule.

The manufacture of the key encapsulation plant systems is underway. In 2023, a machining station was installed next to the canister welding station, among other things. Underground, at a depth of 430 metres, the AGV platform that operates by remote control under demanding conditions was tested and the first in-house test deposition holes were drilled. Due to delays in the delivery of certain systems, the

start of the joint functional test (practising final disposal using non-irradiated dummy fuel elements) will be postponed until late summer 2024. The joint functional test was previously scheduled for late 2023.

Finland is the only country to proceed to the implementation of final disposal, which makes the EKA project unique on a worldwide scale. Therefore, Posiva also plays an important role in the mitigation of climate change as part of the life cycle of nuclear power. Several countries employing nuclear energy have disposal facilities for low and intermediate-level waste, but the final disposal of high-level spent nuclear fuel has not been started anywhere else in the world.

Posiva's subsidiary Posiva Solutions Oy (PSOY) sells this expertise, which has been generated through 40 years of multidisciplinary research. PSOY provides tailored expert services for final disposal and ready-made solution and service models for nuclear waste management companies together with a broad network of partners.

Long-term safety is based on the multi-barrier principle

Final disposal is based on employing multiple release barriers. Release barriers ensure that the nuclear waste cannot be released into organic nature or become accessible to humans. A deficiency of a single barrier or a predictable geological or other change will not jeopardise the

performance of the isolation. The release barriers include the physical state of the fuel, the final disposal canister, the bentonite buffer, the backfilling of the tunnels and the surrounding rock.

The long-term safety of the solution is paramount in the final disposal of spent nuclear fuel. It is evaluated and demonstrated with a safety case. According to the international definition, a safety case refers to all of the technoscientific documentation, analyses, observations, examinations, tests and other evidence for justifying the reliability of the assessments made on the long-term safety of final disposal. Plenty of time has been reserved for the preparation and practical execution of final disposal, and safety is evaluated at many stages. The final disposal of spent nuclear fuel will continue for approximately one hundred years.

According to legislation, a party with a nuclear waste management obligation must present to the Ministry of Economic Affairs and Employment at regular intervals a plan on how they intend to carry out the measures pertaining to nuclear waste management and their preparation.

Posiva's owners submitted the annual report for nuclear waste management in 2022 to the Ministry of Economic Affairs and Employment at the end of March 2023.

**FOR MORE INFORMATION ON POSIVA,
PLEASE VISIT:
www.posiva.fi**





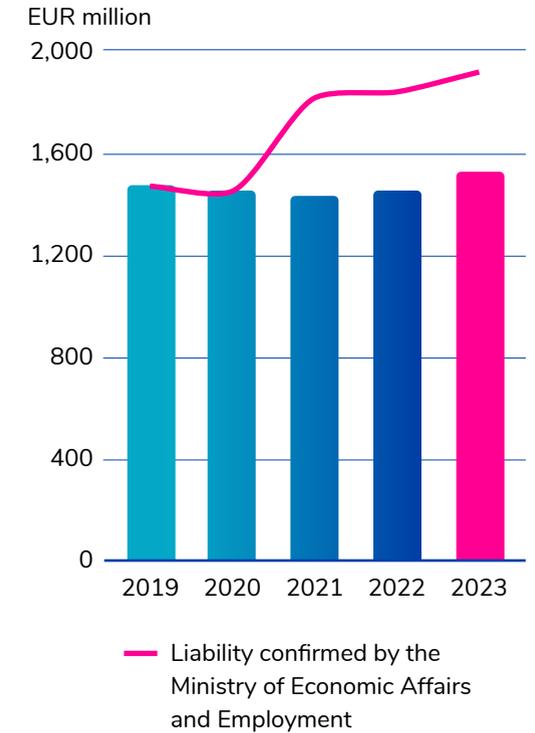
Advance collection of waste management funds

The costs of nuclear waste management and final disposal of spent fuel are collected in the price of nuclear electricity from shareholders and placed in a fund for future use.

In Finland, nuclear power companies bear the costs of nuclear waste management, and the funds for that purpose are collected into the Finnish State Nuclear Waste Management Fund. Each year, the Ministry of Economic Affairs and Employment determines the share of each nuclear power company in the Fund as well as the waste management fee to be paid to the Fund. The liability share of the nuclear power companies in the Fund is decreased by the investments they make in final disposal.

The annual fee payable to the Fund is determined on the basis of the difference between the amount of accumulated nuclear waste for final disposal and the measures implemented for nuclear waste management. The fee is also increased or decreased on the basis of how well the Fund succeeds in its investments: if the investment returns are higher than expected, the waste management fee is correspondingly reduced. The objective is to collect enough assets in the Fund for the final disposal of accumulated nuclear waste.

TVO's fund target in the Finnish State Nuclear Waste Management Fund confirmed by the Ministry of Economic Affairs and Employment



“
In Finland, nuclear power companies bear the costs of nuclear waste management.”



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Environmental Report

The environmental report for 2023 provides a comprehensive presentation of the environmental impact of TVO's operation, the Company's objectives with respect to environmental protection, and their achievement, as well as the key environmental indicators.

DNV Business Assurance Finland Oy Ab (FI-V-0002) has in the capacity of an accredited, independent and objective party verified the information presented in the Environmental Report on the 23th of March 2024.

TVO publishes the Environmental Report in Finnish and English.

Requirement	Report page
A clear and unambiguous description of the organization and a summary of its activities, products, and services, and its relationship to any parent organizations as appropriate.	Review by the President and CEO TVO in brief
The environmental policy and a brief description of the environmental management system of the organization.	Group-level policies Environmental management
A description of all the significant direct and indirect environmental aspects which result in significant environmental impacts of the organization and an explanation of the nature of the impacts as related to these aspects.	Responsibility for the environment and climate The environmental impacts of nuclear power Environmental balance sheet Environmental management
A description of the environmental objectives and targets in relation to the significant environmental aspects and impacts.	Environmental management
A summary of the data available on the performance of the organization against its environmental objectives and targets with respect to its significant environmental impacts. Reporting shall be on the core indicators and on other relevant existing environmental performance indicators.	Environmental management Supply of electricity in Finland and its climate impact The environmental impacts of nuclear power Cooling water Raw materials and material efficiency Production and energy efficiency Releases into the air Releases into water and soil Waste Environmental research and biodiversity Final disposal of spent nuclear fuel
Other factors regarding environmental performance including performance against legal provisions with respect to their significant environmental impacts.	Environmental management Cooperation with authorities Cooling water Releases into the air Releases into water and soil Waste Final disposal of spent nuclear fuel
A reference to the applicable legal requirements related to the environment.	Cooperation with authorities
The name and accreditation number of the environmental verifier and the date of validation.	Confirmation of compliance



Confirmation of compliance

DNV Business Assurance Finland Oy Ab has, as an accredited certifier (FI-V-0002), reviewed the environmental management system at Teollisuuden Voima Oyj's Olkiluoto power plant. Based on this review, DNV Business Assurance Finland Oy Ab states that the environmental system with the programs and audit procedures as well the updated environmental statement including the indicators are in accordance with the requirements of Regulation (EC) No. 1221/2009 as well as Commission regulation (EC) 2017/1505.

Scope and methodology of verification

The updated Environmental Statement 2023 (called Environmental Report 2023) was verified at the Olkiluoto location of Teollisuuden Voima Oyj remotely the 13th of February 2024. The audit of the environmental management system according to ISO 14001:2015 that was continued on-site at Olkiluoto at the 13th-16th of February 2024 is acknowledged to be a part of the verification process.

The scope of the report and the accuracy of the information contained therein were

verified by means of a written report and practical inspections. Key personnel at the plant were interviewed, and the information contained in the report was compared with information found in reviewed source material.

The updated Environmental Statement 2023 has the same structure as the Environmental Report 2022. The content and environmental indicators can easily be compared year by year. The statement provides a clear and accurate image of Teollisuuden Voima Oyj's operations and their impact on the environment. The environmental system is implemented by setting goals. Achievement of the goals and implementation of the system is monitored by the environmental team and management reviews. The updated Environmental Report 2023 with environmental indicators, which describe the impact of the system, is in accordance with the EMAS 1221/2009 requirements for updated environmental statement as well as the requirements of EU 2017/1505 for annexes I-III and requirements of EU 2018/2026 for the annex IV.

The dedicated level of Teollisuuden Voima Oyj's commitment to a high standard of safety, quality and environmental

protection, and continuous improvement is shown in the updated Environmental Report 2023.

At Vaasa, the 23th of March 2024 DNV Business Assurance Finland Oy Ab EMAS-accredited verifier.

Heikki Lahtinen
Lead Auditor, Verifier



Group-level policies

TVO's Group-level policies are based on the values of the Company: responsibility, transparency, proactivity, and continuous improvement. The values are the cornerstones of TVO's operation as a whole.

The Group-level policies have been approved by the TVO Group Management Board in November 2020 and updated sustainability policy (before: corporate social responsibility policy) in January 2024. The Group-level policies are:

- » Nuclear safety and quality policy
- » Sustainability policy
- » Production policy
- » Corporate safety and security policy.

The Group-level policies can be found in TVO's website:

[TVO - Group-level policies](#)

