

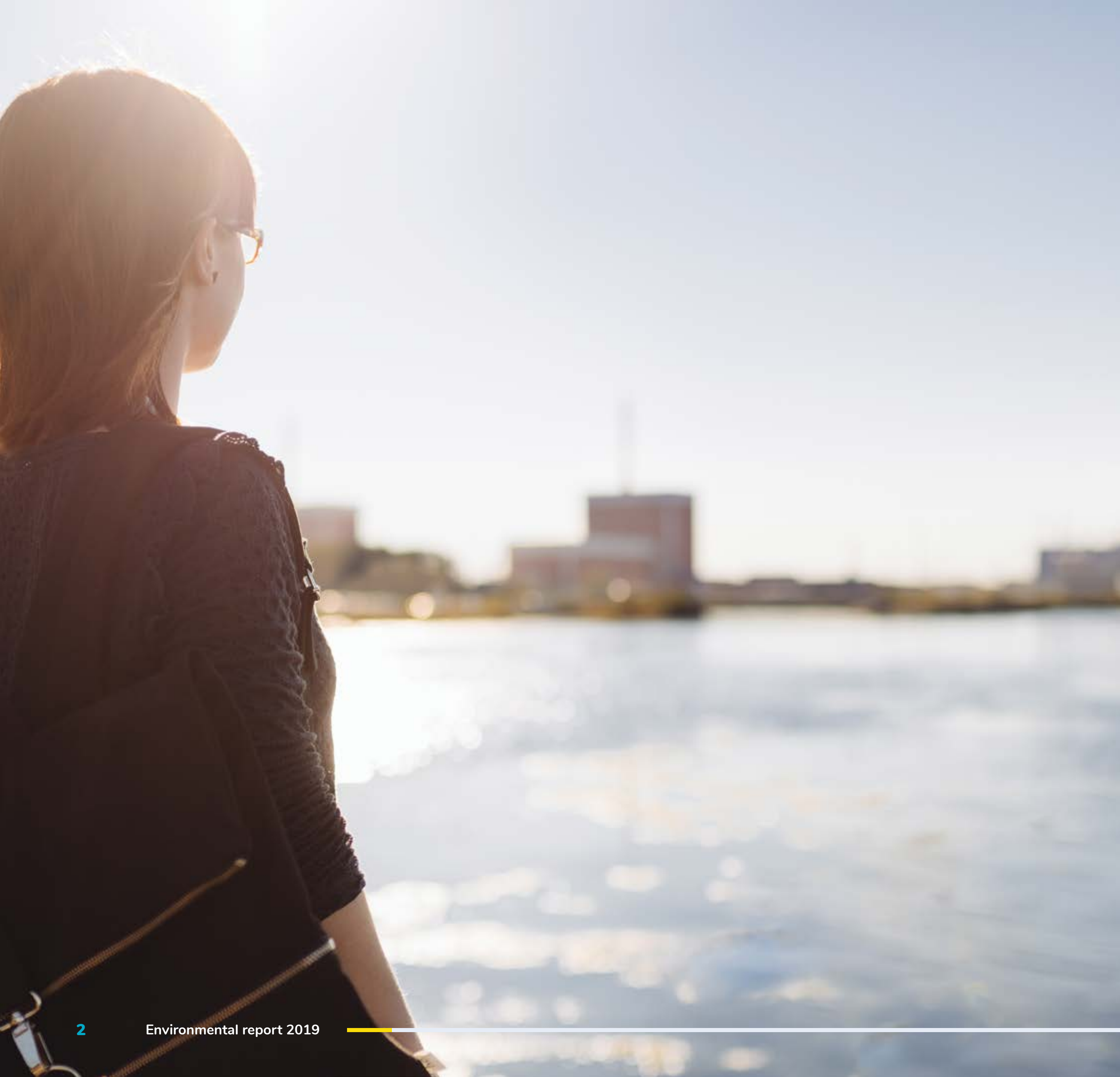
A central factor for our climate

ENVIRONMENTAL REPORT

2019



tvo



Contents

- 03 TVO as a company
- 05 Environment & climate
- 06 Environmental management
- 08 Environment and energy efficiency program 2019–2021
- 10 Climate-friendly electricity
- 11 Environmental impact – low-emission electricity production
- 13 Cooling water
- 14 Raw materials and material efficiency
- 16 Production and energy efficiency
- 19 Emissions to the air
- 20 Emissions to water and soil
- 21 Waste
- 23 Environmental research and biodiversity
- 24 Cooperation with authorities
- 26 Nuclear waste management
- 28 Responsibility contact persons
- 29 EMAS-statement
- 30 Verification report of the environmental report
- 31 Group-level policies

TVO as a company

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

TVO OPERATES according to the cost price principle. TVO's goal is not to make profit or pay dividends.

TVO is owned by six shareholders, some of which – like TVO – operate according to the cost price principle. Electricity generated by TVO serves the needs of Finnish industrial and energy companies, some of which were owned by a total of 132 Finnish municipalities in 2019. Olkiluoto nuclear power plant generates approximately 17 per cent of all the electricity consumed by people in Finland.

TVO's operations are based on a strong safety culture and securing the safety of

production. TVO's operational system covers production operations at the Olkiluoto nuclear power plant, maintenance and development of production capacity, construction of additional production capacity, as well as related steering and resourcing operations. The system meets the requirements of international quality management, environmental, and health and safety standards, and it has been certified by DNV GL Business Assurance Finland Oy Ab. The general part of

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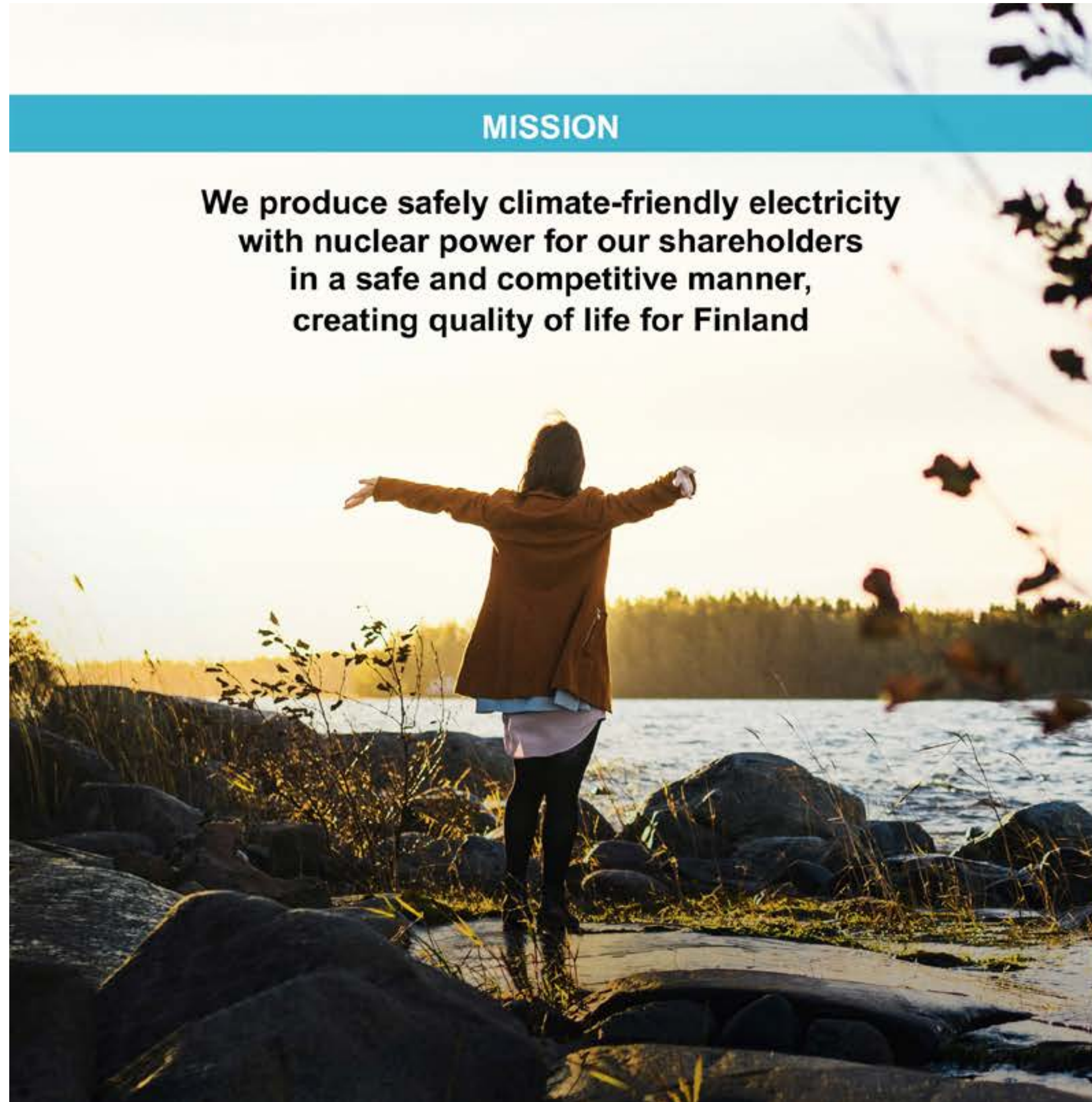


the operational system also acts as the licensee's quality management system approved by the Radiation and Nuclear Safety Authority (STUK).

The nuclear electricity produced in Olkiluoto plays a significant role in the economic development, electricity self-sufficiency, and general well-being of the whole of Finland. Nuclear electricity also plays an important role in the reduction of greenhouse gas emissions and the achievement of climate targets. The emissions generated by nuclear power are low: throughout the lifecycle, the greenhouse gas emissions remain at the same level as for hydropower and wind power. TVO is a major contributor to sustainable development and the mitigation of climate change.

The objectives of TVO's strategy include predictable and competitive price of electricity, solid safety brand, and satisfied customers. The goals are to maintain a competitive average electricity production cost and to ensure that the operability 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 at all stages of the nuclear power lifecycle. As the result of changes of the operating environment, nuclear power will remain a major part of the energy selection of Finland and the entire EU as we make our way towards a carbon neutral society.





MISSION

We produce safely climate-friendly electricity with nuclear power for our shareholders in a safe and competitive manner, creating quality of life for Finland

VISION

A recognised pioneer in the nuclear industry.
Approximately 30% of the electricity produced in Finland.

STRATEGIC CHOICES

 OL3 controlled by TVO	 Business-oriented management
 Usability of OL1/OL2 at a high level	 Posiva's cost-efficient and industrial final disposal solution

VALUES

- Responsibility
- Proactiveness
- Transparency
- Continuous improvement

Environment and climate

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

ELECTRICITY produced with nuclear power is climate friendly. TVO carries its responsibility for the environment by identifying the environmental and energy efficiency aspects of its operations and minimizing the related adverse impacts. TVO sets targets for its operations in accordance with the principle of continuous improvement. TVO has monitored the impact of its operations on the state of the environment since the 1970s, and initiates immediate corrective actions when necessary. TVO takes care of the environmental competence and expertise of its personnel and others working at the Olkiluoto nuclear power plant.

TVO believes that its overall responsibility of environment at all stages of the fuel cycle is important. TVO ensures that nuclear fuel is used in a safe manner from raw material acquisition to final disposal. TVO monitors and supervises the environmental management of fuel suppliers.



“
Soon, Olkiluoto will see the commissioning of what will be the greatest single contribution to climate in Finland: with the addition of the efficient OL3 nuclear power plant unit, some 30% of all the electricity consumed in Finland will come from Olkiluoto.”

TVO requires responsibility from suppliers in ensuring and developing the living conditions in the surroundings of uranium production and processing plants while taking local people into account. Fuel is taken care of in a responsible manner all the way from uranium mines to final disposal according to the “from bedrock to bedrock” principle.

TVO aims to prevent and reduce the already low emissions of radioactive substances. Potential exceptional events in the plant process are predicted and preparations for the prevention of potential environmental disadvantages are made.

Energy and material efficiency is taken into account in all of TVO's operations

TVO OBSERVES energy efficiency requirements and improves the energy efficiency of its operations throughout the organization. TVO monitors and continuously improves the efficiency of its own energy consumption by taking energy aspects into account in project planning, the procurement of components, and the

development of operating practices and procedures. Plant unit modernization projects improve the energy efficiency of the power plant process.

TVO improves the efficiency of the use of energy and raw materials, and improves the reuse of waste. The goals are to increase the relative share of waste delivered to reuse and to decrease the amount of radioactive waste. TVO also strives to reduce the amount of spent fuel by optimizing the use and properties of the fuel.

Sustainable utilization of the environment is 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-sixth of all the electricity used in Finland. After the commissioning of OL3, the production volume will increase to around one-third. The concentration of energy production in a small geographic area minimizes the environmental impact and allows the preservation of other areas in their natural state.

TVO requires not only from its own employees but also all the companies and partners working in the power plant area commitment to the group-level policies and the TVO Code of Conduct, and that they have a responsible attitude towards environmental matters.

Environmental management

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

THE SYSTEM is EMAS-registered, and the goal of the management system is increasing the level and continuous improvement of environmental protection. TVO has identified environmental and energy aspects related to its operations and assessed their significance. The significance of environmental and energy aspects are assessed on the basis of statutory and permit requirements as well as by observing the severity/utility of the impact, probability, and impacts to the stakeholder groups. Also TVO's opportunity to influence the issue are affecting the assessment process.

TVO has specified targets for the significant environmental and energy aspects. The targets have been confirmed by the management of the company. A team

of environmental experts from various organizational units monitors the status of the targets approximately every two months. Other subjects discussed at the team meetings include the current status of environmental non-conformities, environmental observations, current statutory matters, and other environmental issues. The team acts as an expert, advisor, and provider of information in environmental issues.

Feasibility of the environmental management system is assessed semi-annually in conjunction with the management review. If necessary, corrective actions are specified to ensure that the goals are reached. TVO 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 the management review. Furthermore, TVO's operations are regularly assessed both within the organization and by means of external audits.

STORAGE AND HANDLING OF HAZARDOUS OR HARMFUL SUBSTANCES

PRODUCTION OF CLIMATE-FRIENDLY ELECTRICITY

SUSTAINABLE LAND USE

TVO has identified the significant environmental and energy aspects of its operations

SPENT NUCLEAR FUEL GENERATED DURING OPERATIONS

EMISSIONS IN THE MANUFACTURE AND DELIVERY OF RAW MATERIALS, PRODUCTS, AND SERVICES

A RADIOACTIVE RELEASE INTO THE ENVIRONMENT DURING A SEVERE ACCIDENT

THERMAL LOAD ON THE SEA CAUSED BY COOLING WATER

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 also utilizes a proactive safety observation procedure to prevent environmental damage. A total of 93 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 involvement in TVO's environmental management. All of the safety observations and initiatives are monitored, and all deficiencies are corrected without delay.

In 2019, there was an environmental event at the Olkiluoto nuclear power plant, involving a coolant leak of 104 kilograms (135.2 t CDE). The leak occurred in a subdistribution board cooling system at the OL3 construction site. Eight minor oil leaks from working machines (totaling

52 liters) and some smaller coolant leaks also took place at the power plant over the course of the year.

An oil spill took place at a Fingrid Oy gas turbine plant in Olkiluoto. Approximately 4,000 liters of fuel oil leaked into the plant's protective pools. The oil was successfully collected, and the leak did not cause any environmental damage. TVO reports all significant environmental non-conformances and events to the environmental authority.

Active cooperation with stakeholders

STAKEHOLDERS have a key role for a company that is engaged in environmentally responsible operations. The Olkiluoto Visitor Center receives some 12,000 visitors each year. The visitors are openly told about TVO's operations, and their questions are answered. Stakeholders also have the opportunity to submit feedback and questions to TVO via the TVO website. TVO replies to all contacts made with contact details appended. TVO did not receive any expressions of concern related to environmental issues from external sources in 2019.



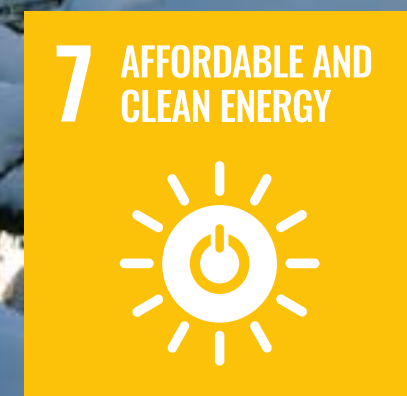
Environment and energy efficiency program 2019–2021

An environmental and energy efficiency program has been prepared for the years 2019–2021 to ensure the achievement of the environmental targets specified in group-level policies and to improve the efficiency of the management of significant environmental and energy aspects.

THE SET TARGETS are based on the production of stable and environmentally friendly electricity for society and minimization of adverse environmental impact of the operations at all stages of the electricity production chain. Procedures, responsibilities, and schedules are set to ensure that the targets are met. To ensure continuous improvement, achievement of the targets is regularly monitored.



TVO is committed to promoting the United Nation's Sustainable Development Goals in its operations.



In 2019, the focus of target setting was on the development of environmental risk management, the improvement of energy efficiency, and the commissioning of a chemical management system (TLTA) in OL3. Long-term efforts on the management of radioactive emissions and the thermal load of the cooling water were also continued.

In 2019, the operations at the Olkiluoto nuclear power plant complied with legislation, environmental permits, and the environmental management system.

Targets and results of the environment and energy efficiency program

DEVELOPMENT OF THE ENVIRONMENT AND ENERGY EFFICIENCY PROGRAM

- **Development of environmental risk management:** Adoption of a new HSE risk assessment program and performance of assessments in accordance with the plan.
Actual result: The new HSE risk management program was commissioned and risk assessments of the functions were supplemented. The oil spill prevention plan included in the nuclear power plant's preparedness plan on the management of environmental risks was updated.
- **Increasing awareness of environmental matters and energy efficiency:** Paying more attention to environmental matters and energy efficiency in projects and modifications, and renewing environmental training.
Actual result: All parts pertaining to environmental and energy efficiency in instructions and templates for projects and modifications were updated. The available environmental training was made more versatile, and all training materials were reviewed and updated over the course of the year. The practical mock-up training approach will also be utilized in orientation to environmental and energy efficiency matters.

MANAGEMENT OF ENVIRONMENTAL LOAD

- **Zero environmental accidents:** There are no serious or significant environmental accidents, there are at least 80 proactive environmental observations.
Actual result: The environmental accident target was not reached. A coolant leak took place at the OL3 plant unit in the Olkiluoto site area, and an oil leak took place at a Fingrid Oy gas turbine plant. Both incidents were classified as significant

environmental accidents. The oil was successfully collected, and the leak did not cause any environmental damage. The proactive environmental observation target was reached: 93 observations were made.

- **Production of climate-friendly electricity:** Production goal for 2019: 14,800 GWh.
Actual result: OL1 and OL2 produced a total of 14,751 GWh of electricity. Hence, the production target was narrowly missed despite the fact that OL1 had its best production year ever.
- **Management of cooling water heat load:** No excesses of the environmental permit target values.
Actual result: The cooling water temperature remained below the target values specified in the environmental permit. Extended voluntary monitoring of seawater temperature was continued in the sea areas near Olkiluoto, and measurements were carried out to obtain more information about the spreading of cooling water into the sea area.
- **Management of environmental issues at OL3:** Harmonizing and updating of the environmental systems of TVO and the plant supplier.
Actual result: A management system based on TVO's general operational system was specified for OL3 in cooperation with the plant supplier (CFS).
- **Optimal and controlled environmental load from the use of chemicals:** Adding new pools for preventing chemical contamination, as well as inspecting and maintaining the pools and their oil trap wells and other similar structures in accordance with the preventive maintenance program (100%).
Actual result: Condition surveys for all structures and components used in the storage, handling, and leak detection of chemicals were included in the scope of the preventive maintenance program, and all inspections and maintenance actions were carried out according to plan.

IMPROVEMENT OF MATERIAL AND ENERGY EFFICIENCY, AND SUSTAINABLE LAND USE

- **Total energy saving target for agreement period 2017–2025:** 150 GWh; the target for 2019 was 30 GWh.
Actual result: Energy efficiency measures carried out in 2019 included the installation of a high-pressure preheater drain pumping system and the commissioning of ejectors. Total energy savings achieved in the site area during the course of the year equaled to 30 GWh.
- **Development of circular economy:** Reduction of waste volume and recycling of waste as material (a minimum of 35% of the overall waste volume, excluding waste sludge).
Actual result: 53% of the site area waste was utilized. Cleaning campaigns were implemented in almost all of the office buildings on site. During the campaigns, employees were given instructions on how to sort waste.
- **Land use planning:** The concentration of energy production in a small geographic area minimizes the environmental impact and allows the preservation of other areas in their natural state.
Actual result: A steering group for infrastructure and land use adapts infrastructure designed and implemented in the area to the natural environment, paying particular attention to natural sites and nature conservation areas. The long-term plan guiding land use in the site area was updated.

SUPPLIERS' ENVIRONMENTAL RESPONSIBILITY

- **Environmental and energy efficiency in procurement:** Energy efficiency assessment questions will be added to the supplier evaluation procedure.

Actual result: Environmental and energy efficiency questions included in the supplier performance assessment were specified and TVO Group's procurement terms were updated. TVO procures products that are durable and have a long lifespan, and takes into account opportunities to recycle or potentially reuse the products at the end of their service lives.

- **Development of supplier monitoring at Olkiluoto:** Evaluating the partners' management of environmental issues and energy efficiency measures.
Actual result: Environmental audits were performed on three partners and three waste management service suppliers operating at Olkiluoto to verify that their operations comply with the environmental and energy efficiency requirements.

ISOLATION OF RADIOACTIVITY ORIGINATING AT THE POWER PLANT FROM THE ORGANIC ENVIRONMENT

- **Ensuring purity of the process:** Adopting and implementing the TLTA (safety-classified supplies) system at OL3.
Actual result: TLTA was introduced in OL3.
- **Keeping radioactive emissions into air and water clearly below the limits set by the authorities:** ALARA program targets.
Actual result: Radioactive emissions into the air and water remained clearly below the limits set by the authorities, despite a fault detected in the liquid waste processing system of OL1. The target of TVO's own ALARA program for emissions into water was reached, but the air emission target level was not reached.

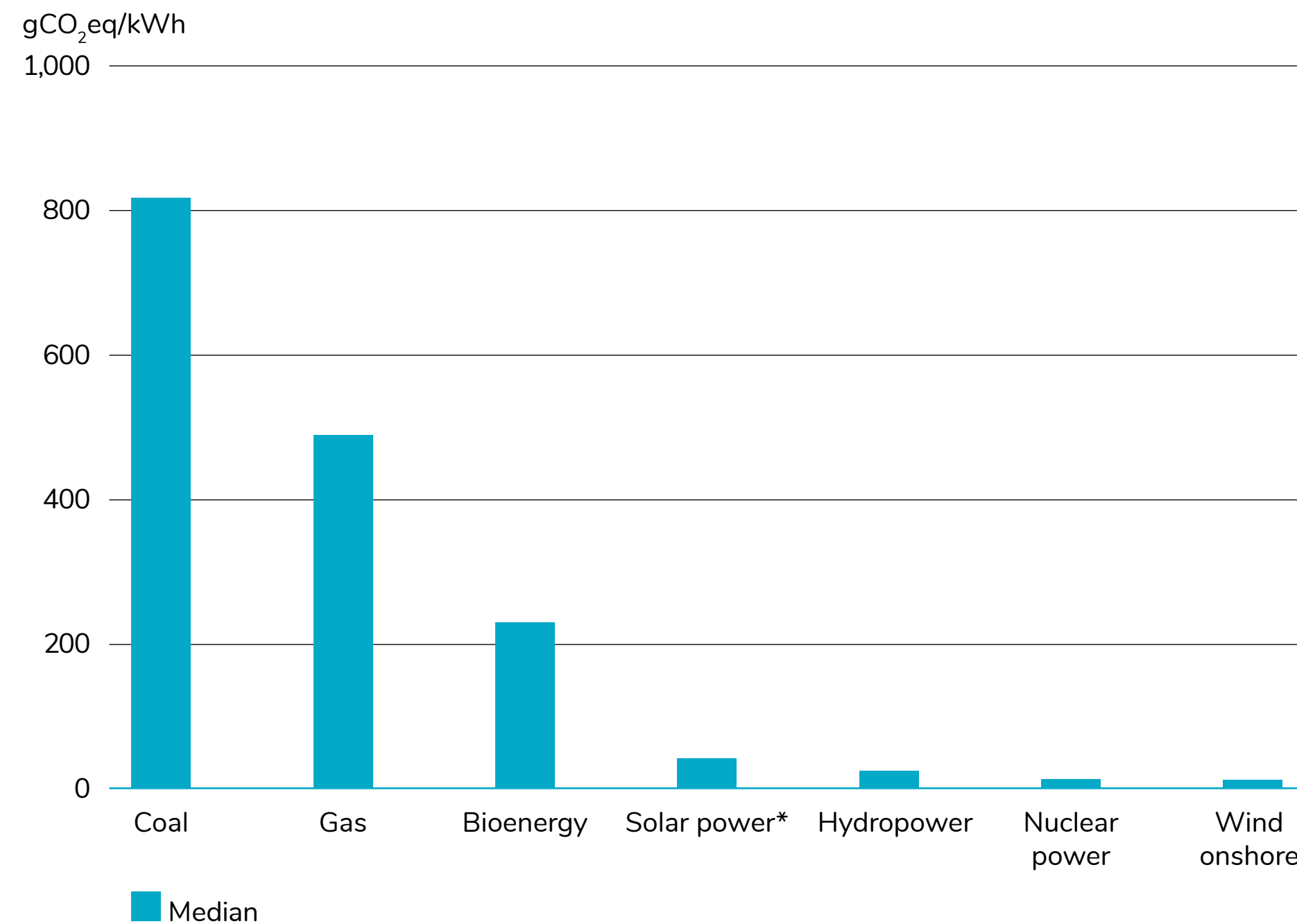
- **Management of nuclear safety risks**
Actual result: Risks are actively identified, and measured for their probability and consequences by means of up-to-date Probabilistic Risk Assessment (PRA). The identified risks are mitigated applying the Safety As High As Reasonably Achievable (SAHARA) principle. Following the Fukushima accident, TVO has further developed the capabilities of the plant units to withstand extreme natural phenomena and a simultaneous loss of power supply. Plant modifications related to these capabilities have been initiated, and most have also been implemented, which has already been reflected as a considerable reduction of the nuclear safety risk. The plan is to implement the rest of the improvements in 2020. The decrease in core damage risk and risk of radioactive emissions assessed using the PRA method in 2019 was due to plant modifications.

Climate-friendly electricity

The role of low-carbon energy, such as renewable energy and nuclear power, is crucial in the mitigation of climate change.

ACCORDING to a report published by the Intergovernmental Panel for Climate Change (IPCC) in 2019, nuclear energy has a pivotal role in the mitigation of climate change. IPCC has prepared four alternative scenarios to limit the increase of the global temperature to +1.5°C. The increase in the amount of nuclear power between 2010 and 2025 varies between 98 and 501 per cent in the different scenarios.

Average lifecycle greenhouse gas emissions of electricity production



*Solar panels

Source: IPCC Fifth assessment report (Working group III Report "Climate Change 2014: Mitigation of Climate Change")

Nuclear power will remain a major part of the energy selection of Finland and the entire EU as we make our way towards a carbon neutral society. In 2019, the share of nuclear power was about 35 per cent of all the electricity produced in Finland.

During its entire lifecycle, nuclear electricity is as environmentally friendly an electricity production method in terms of greenhouse gas emissions as wind power, hydropower, and solar power. The use of bioenergy will not add to the amount of carbon dioxide in the atmosphere either. The nuclear power annually produced in Finland helps prevent approximately 20 million metric tons of CO₂ emissions.



-20
million
metric tons CO₂

The nuclear power produced annually in Finland helps prevent approximately 20 million metric tons of CO₂ emissions.

Environmental impact – low-emission electricity production

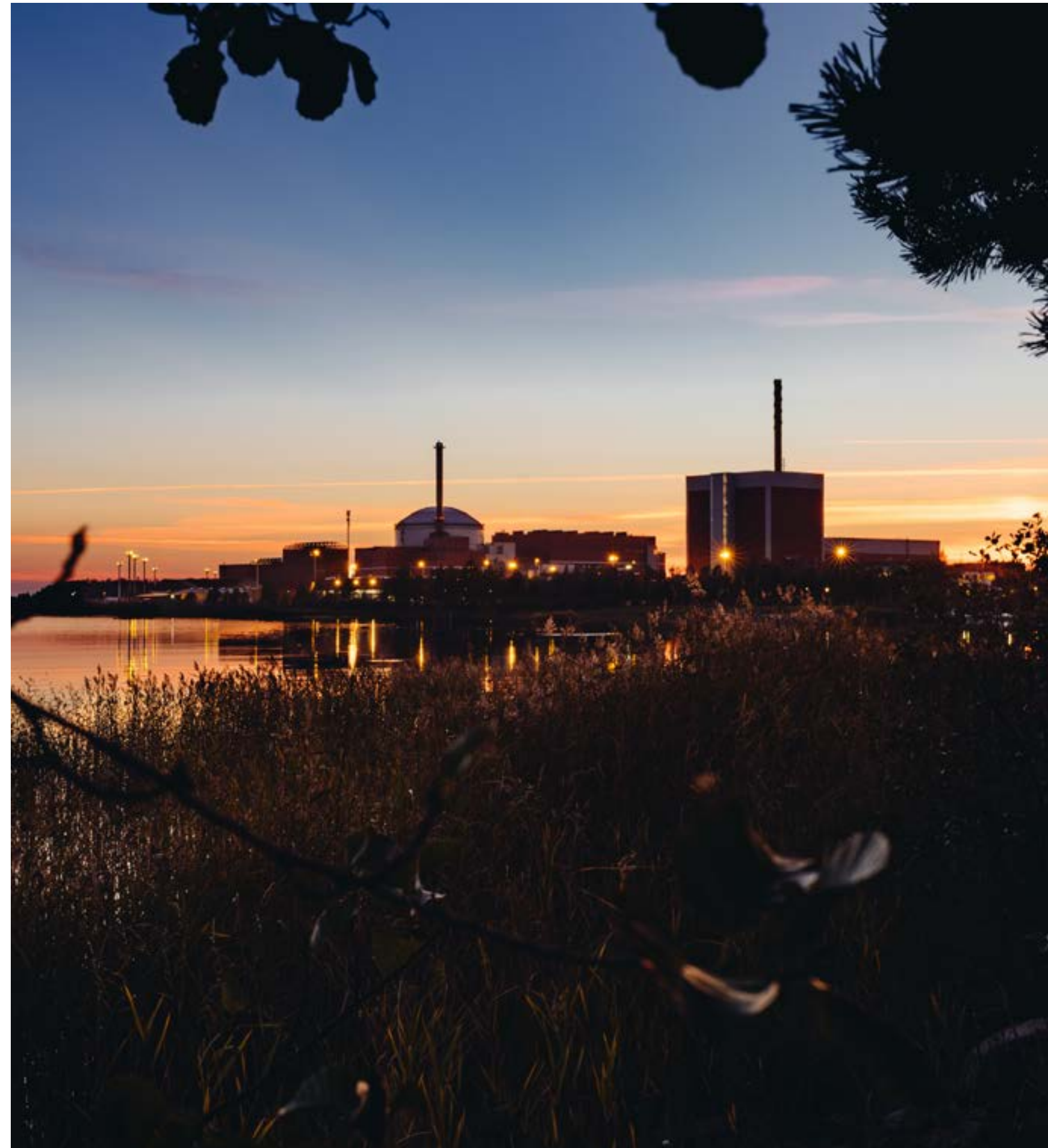
Under normal conditions, the environmental impact from nuclear electricity production does not pose any harm to people or the environment. The impact of Olkiluoto nuclear power plant's operations on land, sea, and air is being continuously monitored. Based on the monitoring results, the operations only cause minor environmental load.

THE MOST SIGNIFICANT environmental aspect of the Olkiluoto nuclear power plant is the production of climate-friendly electricity and the most significant impact is the warming up of the seawater near the plant. During the year, the plant produced 14.75 TWh of electricity, and the cooling water temperature remained within the limits required by the environmental permit. Radioactive emissions

into the air and water from the nuclear power plant were extremely low. Commissioning tests carried out at OL3 created temporary environmental effects, such as CO₂ emissions due to the commissioning of emergency diesel generators.

Nuclear electricity is climate-friendly, and thus TVO is a significant contributor to the mitigation of climate change and promotion of sustainable development. TVO participates in the Energy Efficiency Agreement Scheme, 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.

“ The low-emission nuclear electricity produced by TVO plays an important role in the reduction of greenhouse gas emissions and the achievement of the climate targets.”

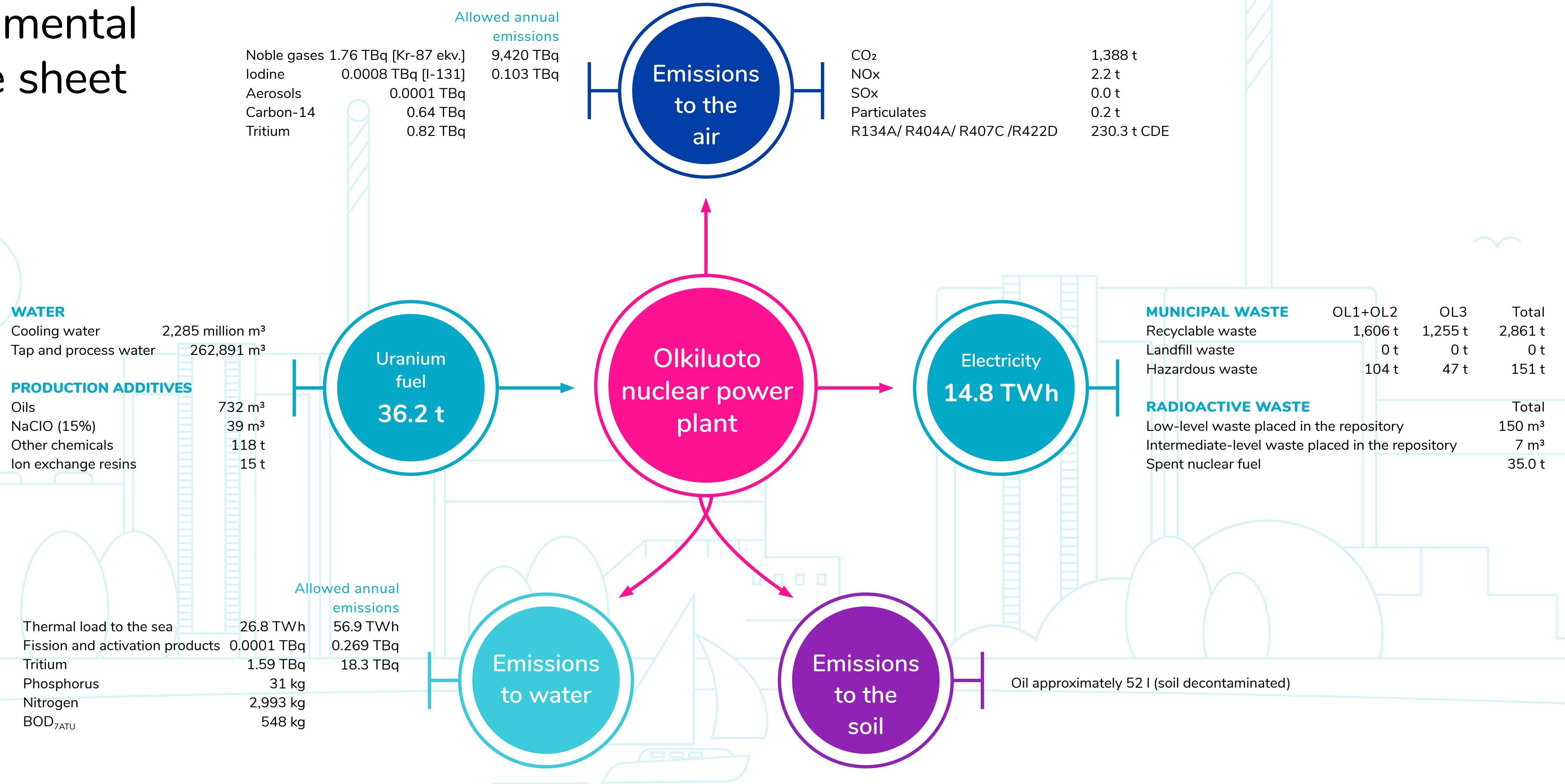


Diverse natural environment in Olkiluoto

The Olkiluoto island is a rich area in terms of flora and fauna. The fact that the island is located in a peaceful area, surrounded by nature conservation areas, gives rise to more animal observations, and many bird species – such as the white-tailed eagle and the gray heron – are common sights in the area nowadays. The number of hoofed animals and, for example, otters, has also clearly increased in the past few years.

The state of the environment in Olkiluoto and its immediate surroundings is continuously monitored by means of observations and by taking samples from flora, fauna, and the water systems. Up to 300 samples are taken annually in cooperation with the Radiation and Nuclear Safety Authority (STUK) to ensure that the power plant operations do not harm the environment.

Environmental balance sheet



Cooling water

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

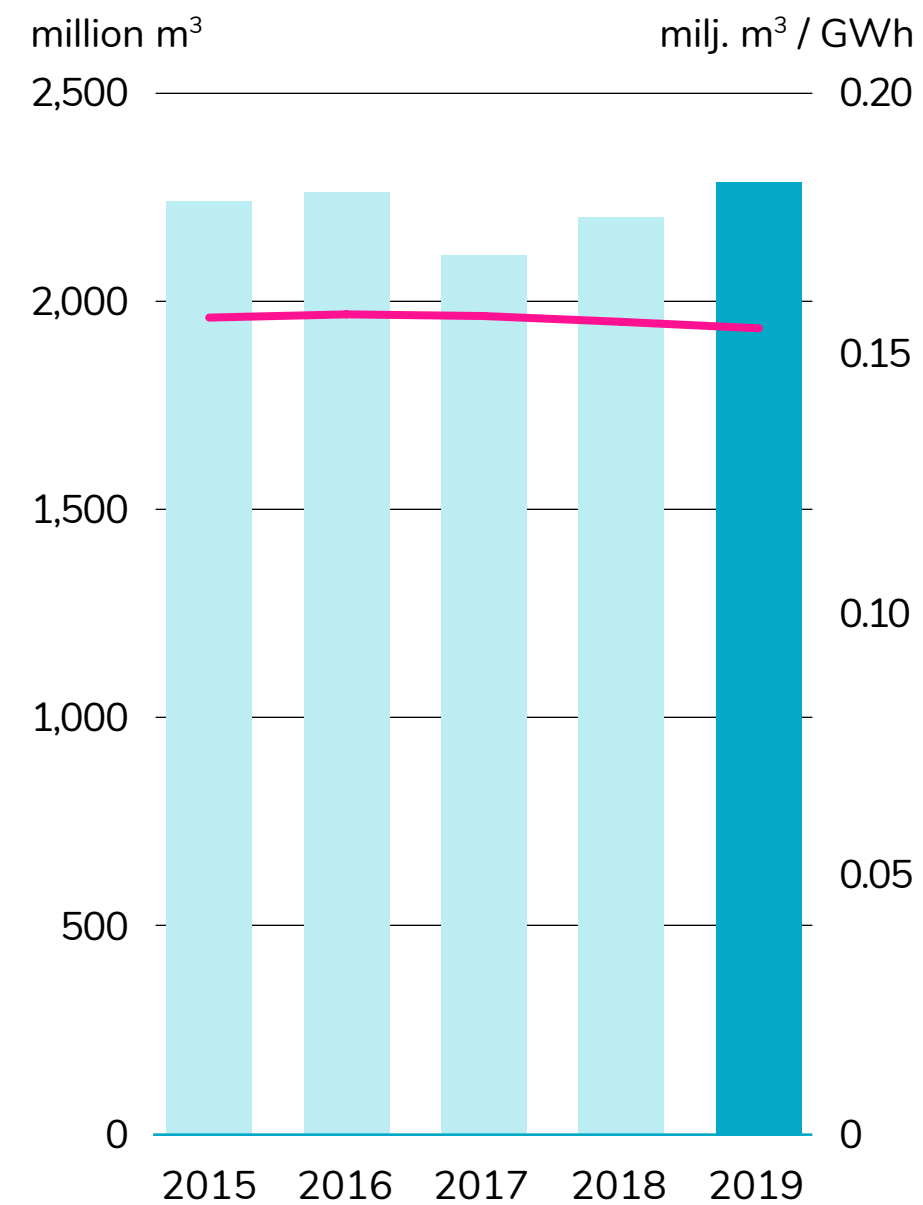
IN 2019, 2,285 million cubic meters of seawater was used for cooling, and the resulting thermal load on the sea was 26.8 TWh. Seawater temperature is monitored as required by the environmental permit. One of the environmental permit regulations is that the seawater temperature does not exceed the target value of 30°C when measured as a weekly average at a distance of 500 meters 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 2019.

As the cooling water passes through a plant unit, 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 circulating water. Throughout the operation of the power plant, TVO has monitored the impact from 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 kilometers 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, being at a maximum of around 7 km². TVO issues warnings about the unfrozen area 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.

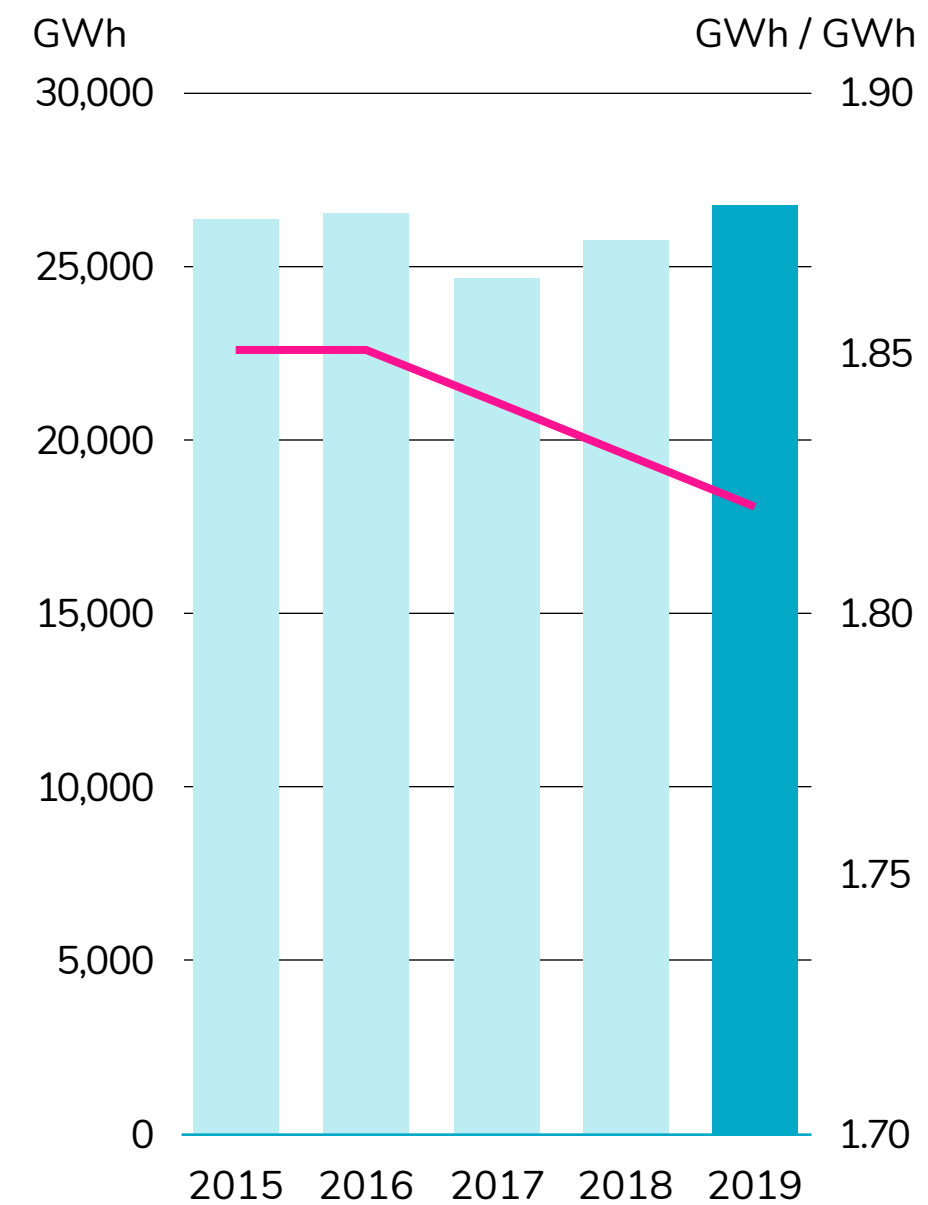
Water usage



* The ratio is given per GWh of electricity produced.

Emissions

Thermal load on the sea



* The ratio is given per GWh of electricity produced.

Raw materials and material efficiency

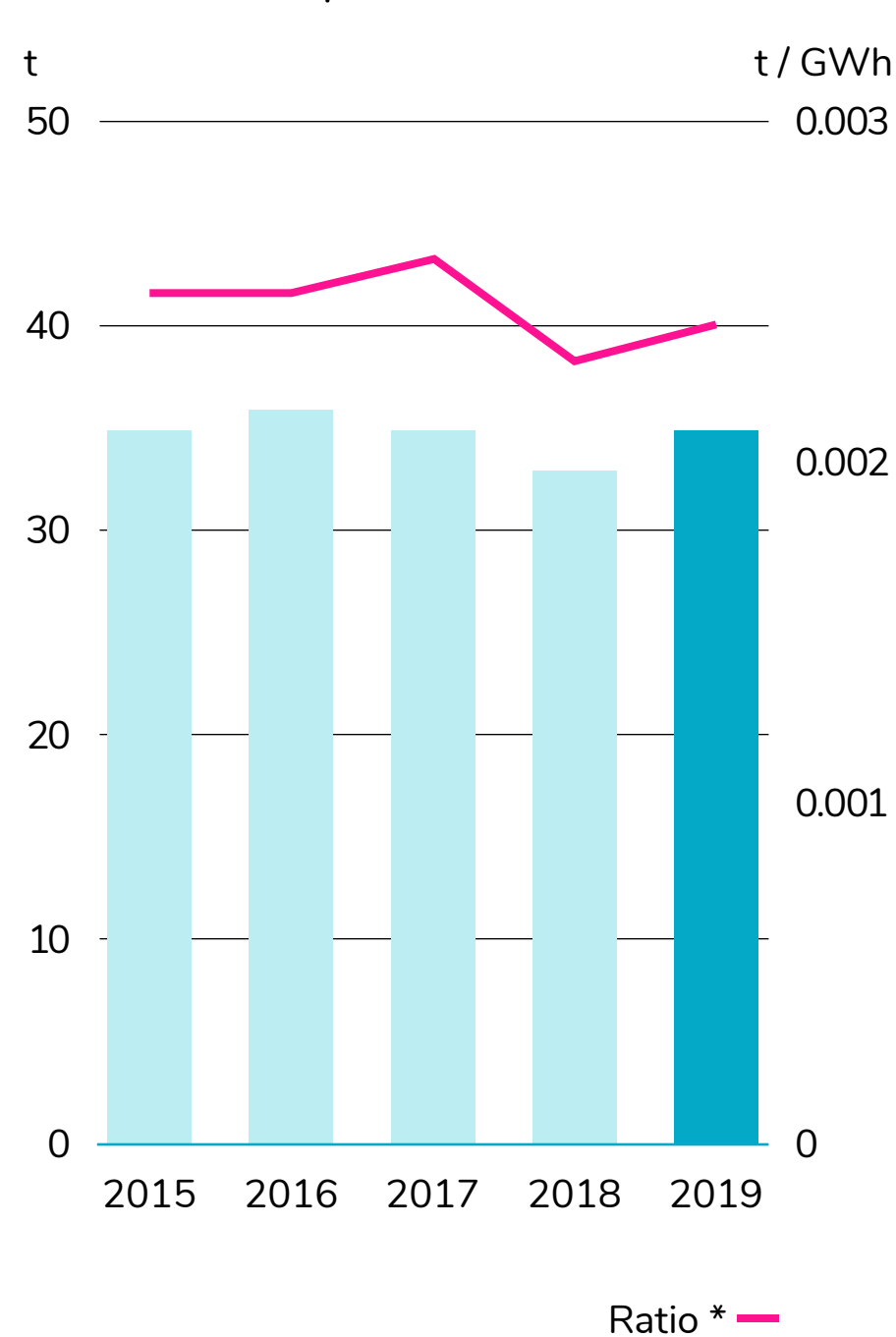
TVO ensures the safe use of the uranium used as nuclear fuel at all the electricity production chain stages from responsible procurement to safe final disposal. The OL1 and OL2 plant units require an annual total of approximately 40 metric tons of low-enriched uranium for fuel.

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

TVO 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 lives. The procurement operations ensure safe, competitive, and reliable production and long-term operation of the plant units.

Material efficiency



* The ratio is given per GWh of electricity produced.

All purchased products and services must meet TVO's quality, occupational health and safety, and environmental requirements. The availability of products and services necessary for the company's operations is ensured through long-term contracts based on mutual trust and partnership.

Intermediate agents in production

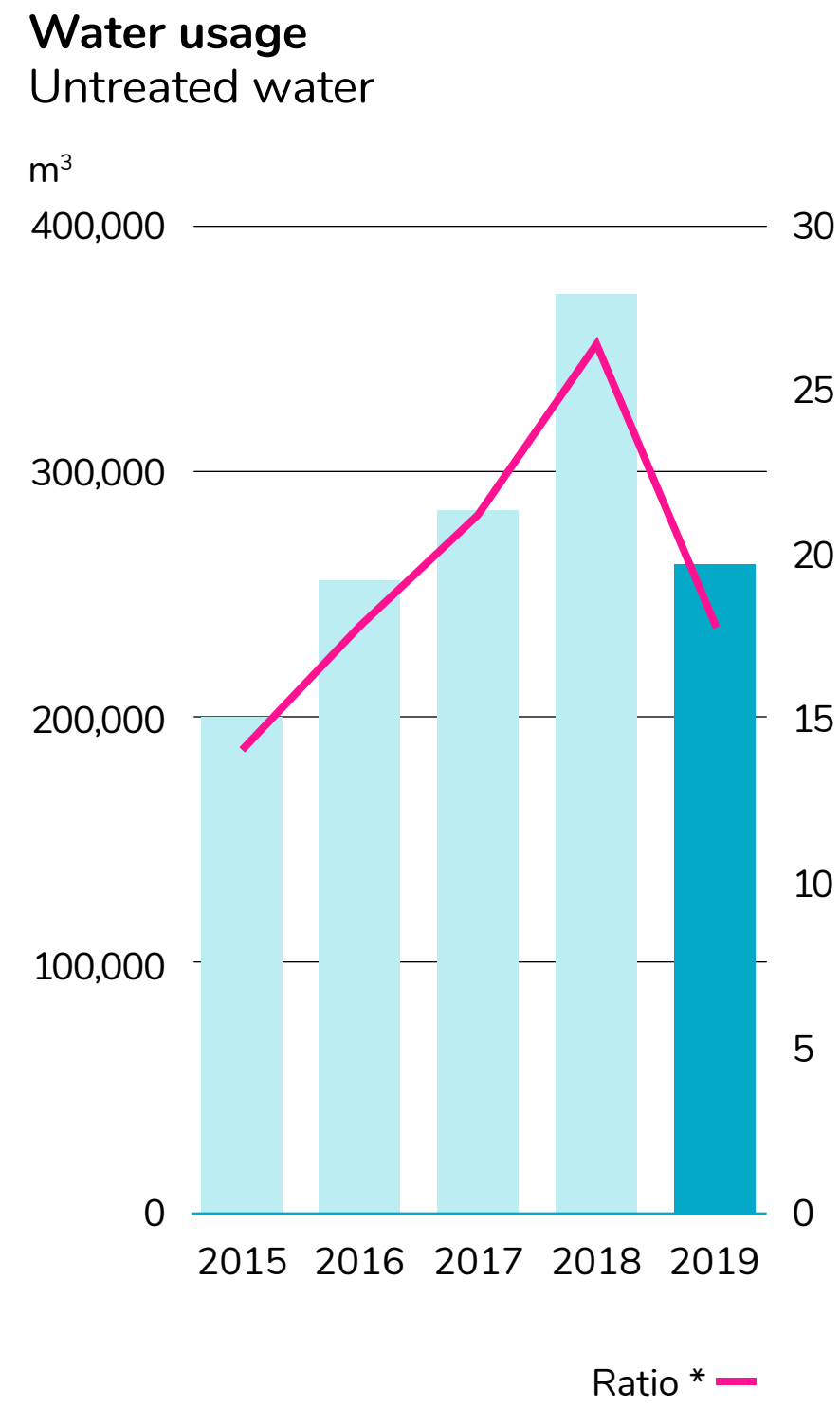
CHEMICALS are extensively stored and processed by TVO. The Olkiluoto nuclear power plant is a safety report establish-

ment. The intermediate agents include the fuel of the emergency diesel generators, the reserve power boiler plant, and vehicles (oils) and sodium hypochlorite (NaClO) used for hydroid control in the seawater systems. The ion-exchange resin used to clean the circulating water as well as solvents, bitumen, and nitrogen used at the plant (other chemicals) are among the reported additives. Consumption of oil increased due to the commissioning tests of the emergency diesel engines that help ensure the safety of OL3.

Intermediate agents	2019	2018	2017	2016	2015
Oils (m ³)	732	657	258	255	391
NaClO (15%) (m ³)	39	45	40	41	45
Other chemicals (t)	118	137	176	235	139
Ion exchange resins (t)	15	15	17	18	15

Reducing consumption of water

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 circulating water. The circulating 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 demineralization plant, a laboratory, and a wastewater treatment plant. The tap and circulating water are treated at TVO's own water treatment plant. Ion exchange and reverse osmosis methods are used to purify the water used in the power plant process. Circulating water is continuously recycled and purified. During annual outages, the fuel pool water is stored in storage pools to wait for reuse. The recycling of water reduces TVO's need for clean circulating water and the amount of circulating wastewater discharged from the plant by approximately 30,000 m³ each year. During the reporting year, 262,891 m³ of fresh water was taken from the Eurajoki river.

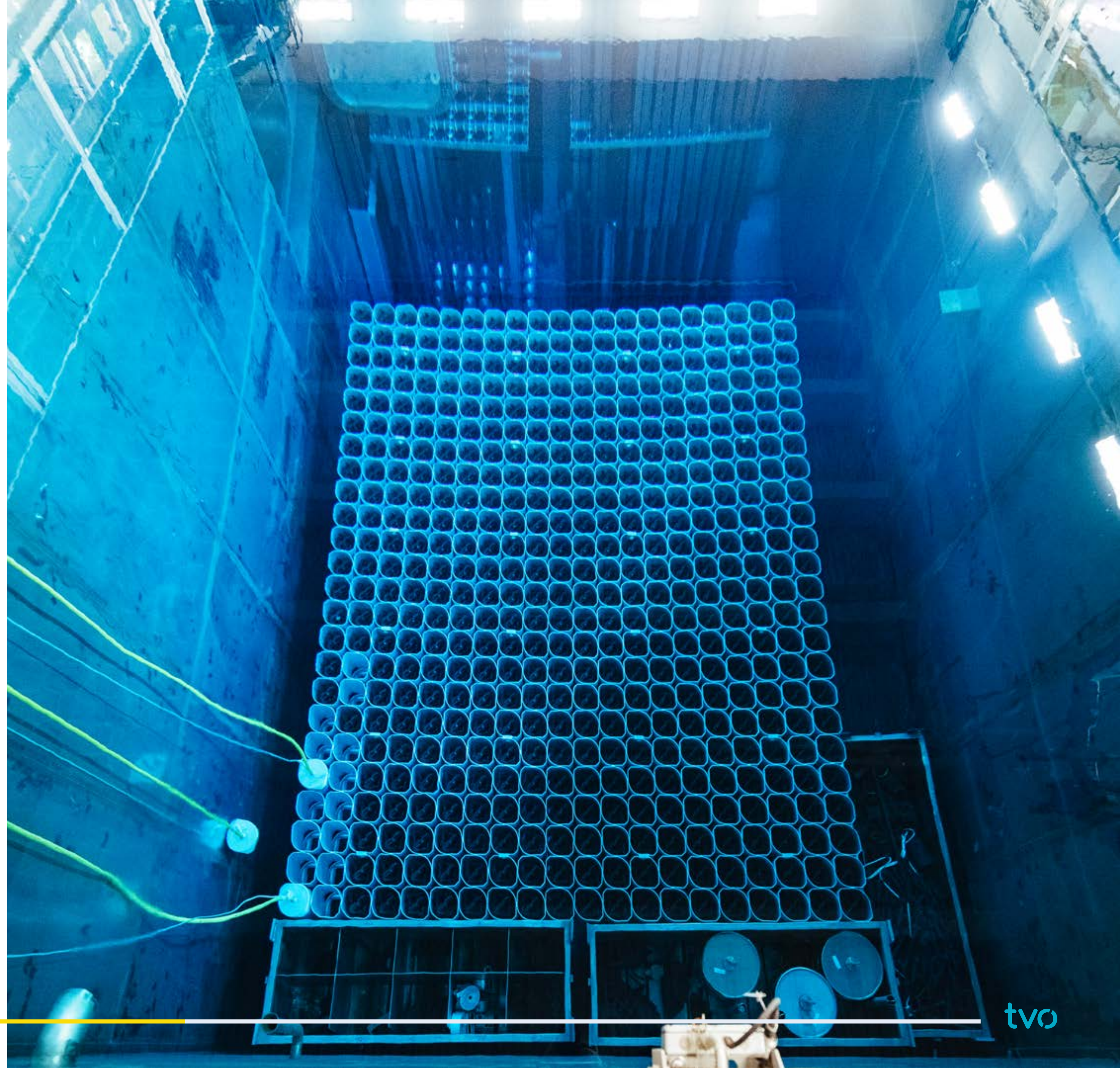


* The ratio is given per GWh of electricity produced.

	2019	2018	2017	2016	2015
Raw water treatment					
Amount of water (m ³) ¹⁾	262,891	372,295	284,874	256,237	201,229
Water treatment chemicals (t) ²⁾	73	117	83	70	43

¹⁾ Amount of water pumped from River Eurajoki to Korvensuo.

²⁾ Chemicals used in water processing (H₂SO₄, NaClO (10%), NaOH, sedimentation chemicals).



Production and energy efficiency

In 2019, the combined power output of the Olkiluoto units, OL1 and OL2, was 14,751 GWh. The combined load factor of the plant units was 94.8%. TVO produces approximately 17% of all the electricity consumed in Finland.

THE PLANT UNITS operated safely and reliably. The net output of OL1 was 7,542 GWh, and the plant unit reached

the best annual production volume ever. OL1's load factor was 96.9%. The net output of OL2 was 7,209 GWh and the load factor was 92.7%. Each year, the nuclear power produced at Olkiluoto helps prevent carbon dioxide emissions of over 12 million metric tons in Finland when compared to producing the same amount of electricity using fossil fuels.

OL1	2019	2018	2017	2016	2015
Net production (GWh)	7,542	6,755	7,158	7,048	7,397
The plant units' own electricity consumption (GWh)	268	246	264	258	270
Capacity factor (%)	96.9	87.8	93.1	91.4	96.2
Efficiency (net) (%)	35.5	35.3	35.1	35.0	35.0

OL2	2019	2018	2017	2016	2015
Net production (GWh)	7,209	7,334	6,256	7,301	6,864
The plant units' own electricity consumption (GWh)	258	264	226	265	248
Capacity factor (%)	92.7	94.3	81.3	94.6	89.2
Efficiency (net) (%)	35.5	35.4	35.4	35.1	35.1

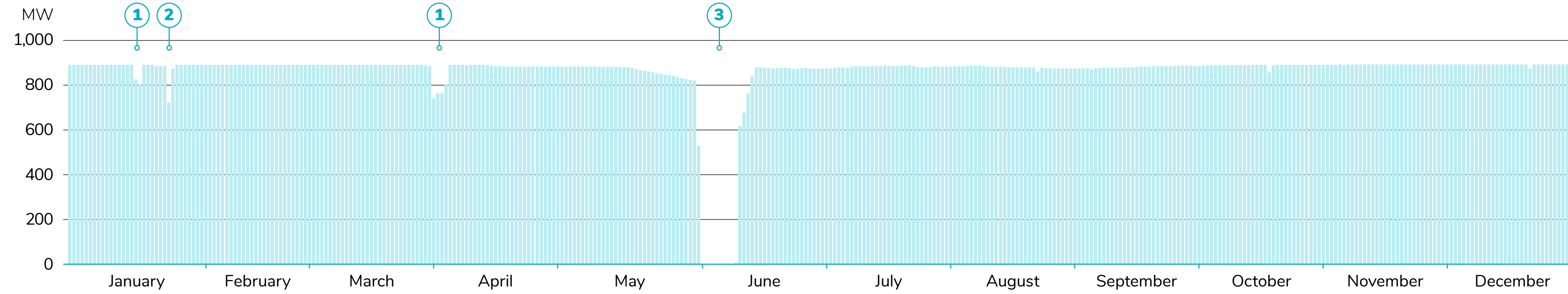


With the annual energy produced by OL1 and OL2 (14.75 TWh) an electric car could be driven for approximately

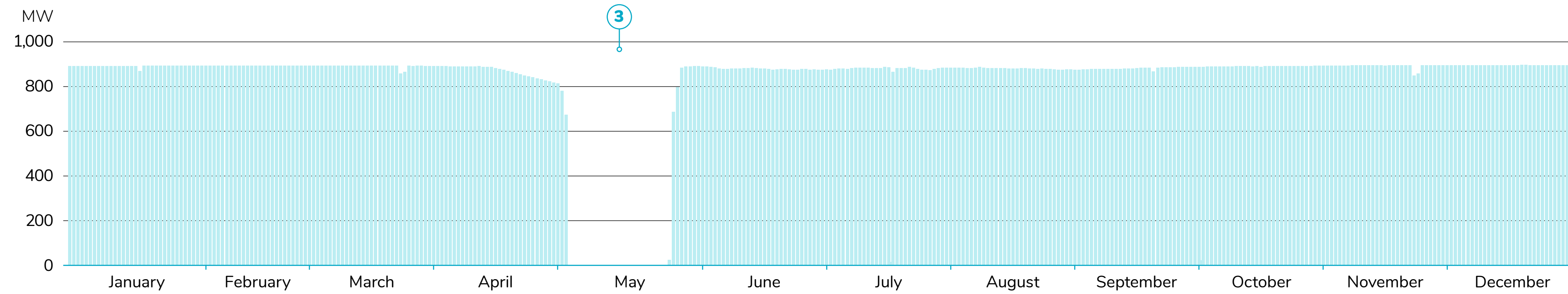
99,000

million kilometers. This would take the vehicle 2.47 million times around the globe.

OL1 Production
Average output MW



OL2 Production
Average output MW



- 1. Repair of a valve in the feedwater system
- 2. Repair of a valve leak in the reheater system
- 3. Annual outage



30 GWh

The energy saving target of 30 GWh was reached in 2019. It equals to the average annual consumption of some 1,500 single family homes heated with electricity.

Improving energy efficiency

FOR several years, TVO 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, continuous 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 total energy savings target for 2017–2025 is 150 GWh, which equals to the average annual consumption of some 7,500 single family homes heated with electricity.

Energy efficiency measures carried out in 2019 included installation of a high-pressure preheater drain pumping system and the commissioning of ejectors. Furthermore, more energy meters were installed in the buildings of the area. Measurements and energy analyses were performed in both of the existing plant units after the annual outages.

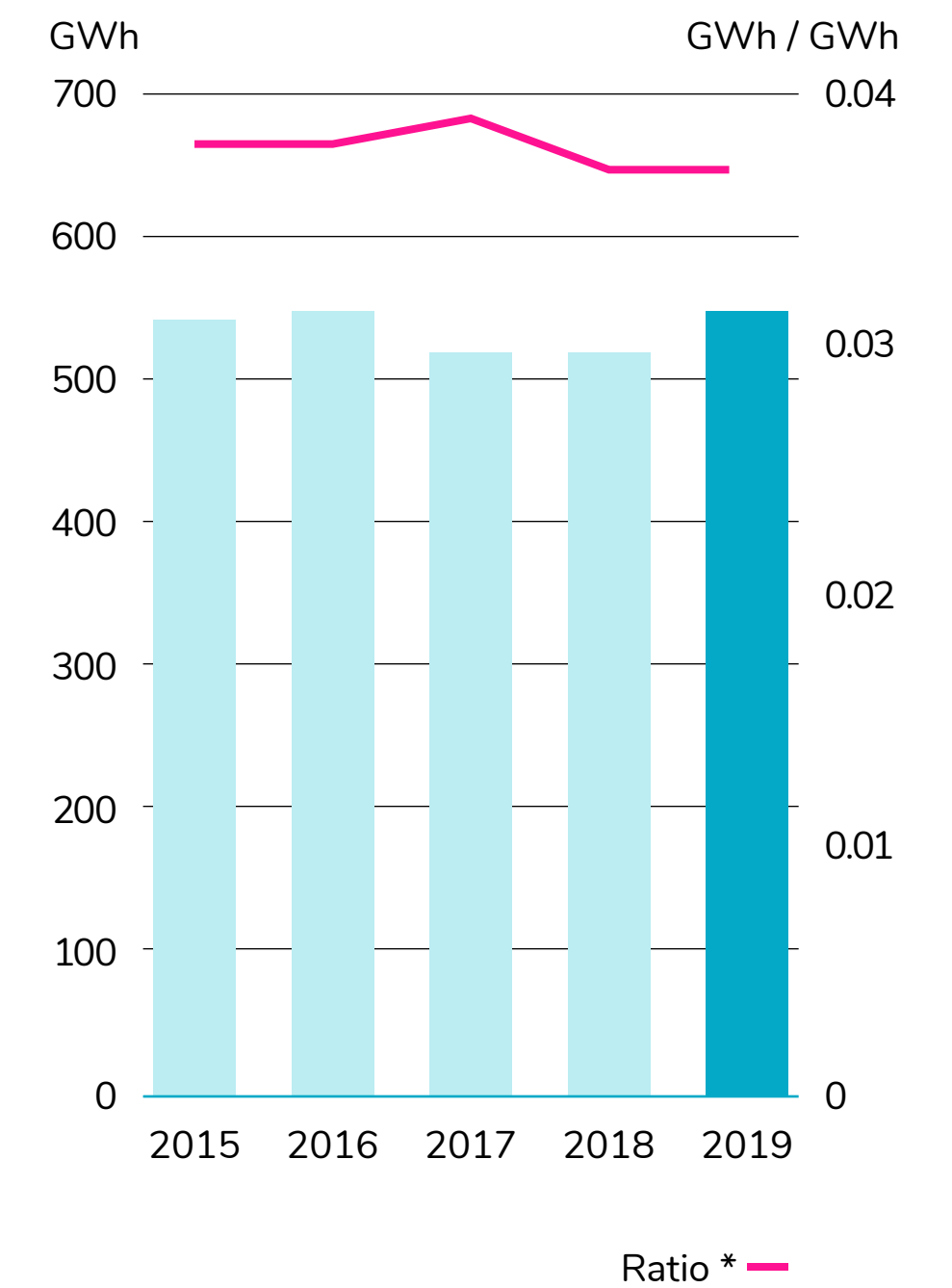
TVO carries out activities related to energy efficiency as part of its normal op-



erations. For TVO, the highest potential for savings involves improvement of the efficiency of the electricity production process; this has been implemented in the long term by means of plant mod-

ernization projects throughout the operational history of the company. Another area for improvement of efficiency is the reduction of own energy consumption at the company's site in Olkiluoto.

Energy efficiency TVO's electricity consumption



* The ratio is given per GWh of electricity produced.

Energy efficiency system EES+ has been integrated into TVO's environmental management system. It is used to improve energy efficiency in compliance with the principle of continuous improvement in all of the company's functions.

Emissions to the air

With regard to the management of radioactive substances, TVO always strives to keep any emissions well below both the emission limits set by the authorities and TVO's own target limits, which are more stringent than the official limits.

Radioactive releases into the air

NOBLE GAS emissions into the air amounted to 0.02% and iodine emissions into the air amounted to 0.74% of the allowed limit value specified by the authorities.

In 2019, TVO observed that the aerosol sampling efficiency of the vent stack's sampling system had not been taken into account in the OL1 and OL2 emission reports during the operating history of the plant units. Measurements will be taken in 2020, based on which the reported aerosol emissions will be corrected.

The theoretical radiation dose caused to neighboring residents in Olkiluoto is esti-

mated to remain clearly below the threshold value. In 2018, the radiation dose was 0.33 µSv (threshold value: 100 µSv).

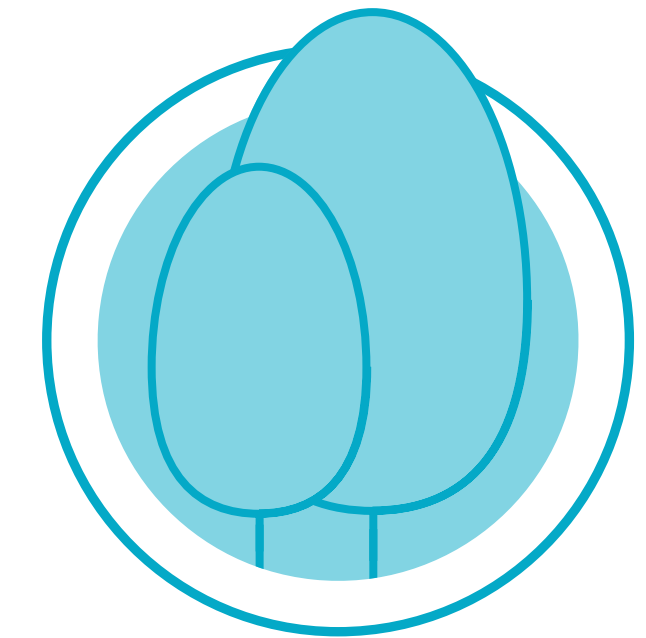
Carbon dioxide emission

TVO TAKES part in the global battle against climate change by producing low-emission electricity. The Olkiluoto nuclear power plant is included in the European Union emissions trading scheme that aims at monitoring greenhouse gas emissions and achieving the CO₂ reduction goals. The power plant's actual CO₂ emissions are generated by the releases of the reserve boilers and the emergency diesel generators. The emergency diesel generators would ensure 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 in OL1 and OL2 during the next few years will reduce particulate emissions to the air.

Radioactive emissions to the air	2019	2018	2017	2016	2015
Noble gas TBq (Kr-87 equivalent)	1.76	0.91	3.43	9.69	0
% of allowed amount	0.02	0.01	0.04	0.1	0
Iodine TBq (I-131 ekv)	0.0008	0.0005	0.0009	0.0016	0.00000008
% of allowed amount	0.74	0.48	0.84	1.50	0
Aerosols TBq ¹⁾	0.0001	0.0006	0.025	0.24	0.000017
Tritium TBq	0.82	1.32	1.07	2.65	1.04
Carbon-14 TBq	0.64	0.93	1.02	1.23 ¹⁾	1.07

¹⁾ The information has been corrected.

Verified CO ₂ emissions of the Olkiluoto power plant	2019	2018	2017	2016	2015
CO ₂ emissions total (t)	1,388	1,505	717	737	832
OL1/OL2 back-up heating boilers (8 MW + 12 MW)	17	1	22	95	496
OL1/OL2 emergency diesels (8 x 1,8 MW)	446	380	355	491	329
OL3 emergency diesels (4 x 6,4 MW, 2 x 2,5 MW, 1 x 1,3 MW)	925	1,124	340	152	7



TVO's radioactive emissions to the air are less than one per cent of the limits specified by the authorities.

Emissions to water and soil

The emissions of radioactive fission and activation products into water amounted to 0.04% and tritium emissions into 8.7% of the annual limit value specified by the authorities.

IN FALL 2019, a fault that prevented the decontamination of water with evaporators was detected in the liquid waste processing system of OL1. The decontamination was instead performed by means of filtering. Decontamination by means of filtering is not as efficient as decontamination with an evaporator, which is why the emissions into the water slightly increased during the fault. Minor concentrations of radioactive substances were also detected in the sea area as the result of the fault, but the concentrations were insignificant for humans and the environment. Repairs of the waste processing system were completed in December.

Sanitary wastewater is treated at the Olkiluoto wastewater treatment plant before it is discharged into the sea. In 2019, the amount of treated sanitary wastewater was 83,545 m³. The phosphorus load discharged into the sea was 31 kg, the nitrogen load was 2,993 kg, and the biological oxygen demand (BOD_{7ATU}) was 548 kg. 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 regulatory requirements. 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.

Emissions to the soil

OVER THE COURSE of the year, a total of approximately 52 litres of oil ended up in the soil due to failures of working machines. All oil was recovered, and the used spill control materials were delivered to appropriate further processing.

Radioactive emissions to water	2019	2018	2017	2016	2015
Fission and activation products TBq	0.0001	0.0001	0.0003	0.0002	0.0001
% of allowed amount	0.04	0.04	0.09	0.05	0.04
Tritium TBq	1.59	1.62	2.46	2.32	2.05
% of allowed amount	8.7	8.9	13.5	12.7	11.2

Wastewater treatment	2019	2018	2017	2016	2015
Amount of water (m³)	83,545	89,558	97,207	88,606	77,093
Concentration (mg/l)¹⁾					
BOD _{7ATU}	6.6	10	8.0	13	4.7
Phosphorus	0.37	0.12	0.12	0.24	0.10
Treatment efficiency average (%)¹⁾					
BOD _{7ATU}	97	96	96	94	97
Phosphorus	96	99	98	98	99
Load on sea area (kg)					
Phosphorus	31	11	12	21	7.7
Nitrogen	2,993	4,380	5,840	4,380	3,541
BOD _{7ATU}	548	913	767	1,132	361
Water treatment chemicals (t)²⁾	32	35	39	34	22

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.

²⁾ Chemicals used for the treatment of sanitary wastewater.

Waste

TVO is committed to reduce the amount of waste and to promote its utilization. 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 radioactivity, into waste exempted from control, low- and intermediate-level operational waste, high-level waste (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. Waste is produced during the operation and maintenance of the power plant. In 2019, the amount of maintenance waste exempted from control was 0 tons. Approximately 26 tons of metal was also cleared for recycling.



Radioactive waste	2019	2018	2017	2016	2015
Low-level (m ³) ¹⁾	150	92	47	86	171
Intermediate level (m ³) ¹⁾	7	53	51	9	6
Operating waste cleared after monitoring (t)	0	44	40	96	50

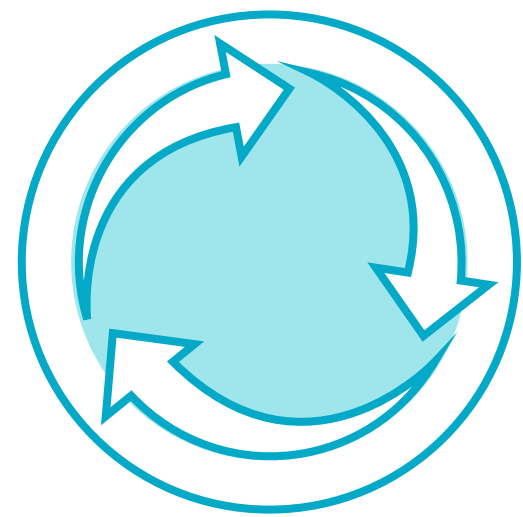
¹⁾ Waste disposed in the VLJ repository.

Amount of spent fuel in the OL1 and OL2 storage polls and interim storage, cumulative	2019	2018	2017	2016	2015
Number of assemblies (pcs)	9,328	9,122	8,922	8,720	8,518
Assemblies (t)	1,564.9	1,531.2	1,498.5	1,465.2	1,432.0

Protective gear used in operating and maintaining the power plant, components removed from the process, and insulating materials are low-level waste. Such waste is tightly packaged and placed in the repository for operational waste (VLJ repository) located at an approximate depth of 100 meters in the plant area.

The ion exchange resins used for the treatment of the process water at the power plant are classified as intermediate level waste that is incorporated in

bitumen and embedded in the operating waste repository. The total amount of high-level radioactive waste (spent fuel) generated during the year under review was 35.0 t. It is kept in an interim storage in Olkiluoto until it can be embedded in the bedrock of Olkiluoto for final disposal. The final disposal will start in the 2020s. Decommissioning waste is waste produced in connection with the demolition of the power plants at the end of the operating life. The final disposal of decommissioning waste will also take place in Olkiluoto.



53%

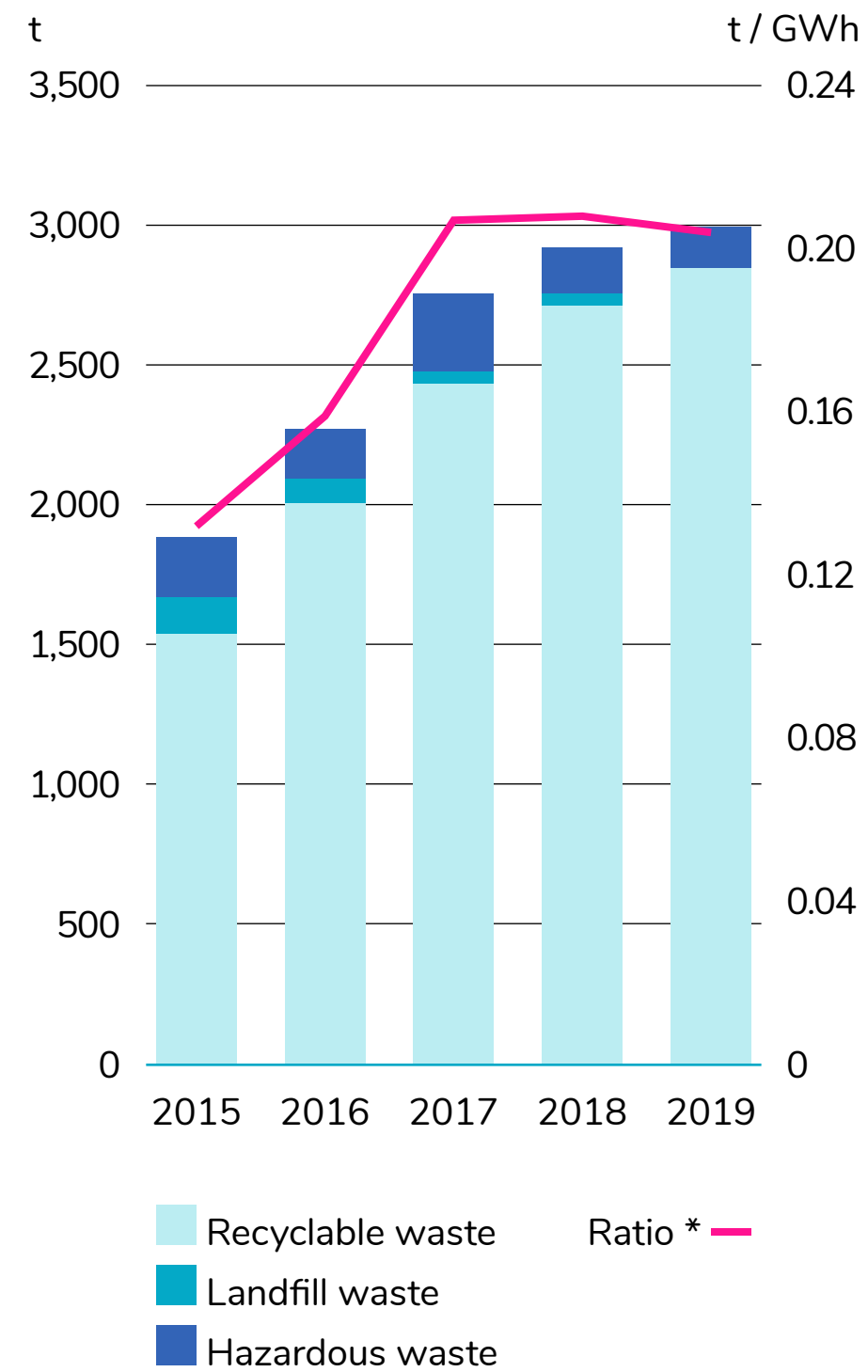
Share of waste recycled as material or utilized in energy production of the total waste volume, excluding waste sludge.

Municipal waste

THE OPERATION of the power plant also generates municipal waste. TVO is committed to the reduction of the amount of waste and to the improvement of the reuse of waste. This is requirement for everybody working at Olkiluoto. All waste generated at Olkiluoto is sorted and processed. The sorted wastes are recycled as materials whenever possible, or reused as energy. Only waste that cannot be reused in any manner is taken to the landfill. In 2019, there was no such waste. All hazardous wastes are collected in the hazardous waste storage to be sent to an appropriate waste treatment plant.

In 2019, the total amount of waste was 3,011 metric tons. Waste suitable for recycling or reuse as energy amounted to 95% of the total amount of waste and the shares of hazardous waste was 5%. Most of the hazardous waste was batteries and WEEE (waste electrical and electronic equipment) waste.

Waste Municipal waste



* The ratio is given per GWh of electricity produced.

Municipal and hazardous waste OL1 and OL2 (metric tons)	2019	2018	2017	2016	2015
Mixed waste to energy ¹⁾	64	59	65	103	61
Landfill waste to TVO's landfill	0	44	41	45	54
Paper and cardboard	48	49	50	74	90
Energywaste	113	102	132	114	94
Biowaste	35	57	50	64	65
Wood	111	108	99	67	59
Metal	201	208	107	77	99
Glass	4	5	5	5	2
Plastic	2	-	-	-	-
Cable refuse	8	23	8	7	11
Crushed brick and concrete	5	3	0	0	0
Screening	25	36	79	61	72
Hazardous waste	104	53	62	64	72
Sludge ²⁾	990	1,038	933	807	555

¹⁾ Since 2017, mixed waste has been taken to a waste-to-energy plant where it is used to produce district heating and electricity. ²⁾ Sludge from the wastewater treatment plant, sand water & shellfish water mixture (solid matter 8-10%).

Municipal and hazardous waste OL3 (metric tons)	2019	2018	2017	2016	2015
Mixed waste to energy ¹⁾	62	173	168	118	70
Landfill waste to TVO's landfill	0	0	0	44	54
Paper and cardboard	21	26	31	43	33
Energywaste	81	128	140	138	98
Biowaste	31	43	53	35	37
Wood	296	168	214	188	183
Metal	754	43	275	138	58
Cable refuse	3	22	32	65	51
Crushed brick and concrete	0	436	0	20	10
Cable reels	6	0	5	2	10
Hazardous waste	47	112	221	114	146

¹⁾ Since 2017, mixed waste has been taken to a waste-to-energy plant where it is used to produce district heating and electricity.

Environmental research and biodiversity

Environmental research has been conducted on the Olkiluoto island since the 1970s, years before electricity production was launched. The early baseline studies created a basis for the environmental monitoring programs 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 analyzed in compliance with an environmental radiation monitoring program approved by the Radiation and Nuclear Safety Authority (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 from the sea surrounding Olkiluoto each year. These samples are subjected to about

1,500 different water quality analyses. Furthermore, the condition of fish stocks is monitored by, for instance, fishing for record-keeping purposes and surveys among professional and recreational fishermen. Test fishing takes place every four years in the areas surrounding Olkiluoto in accordance with the environmental monitoring plan. The state of aquatic plants is monitored by means of transect line diving every six years.

All the Olkiluoto power plant projects have undergone extensive environmental impact assessments. The final disposal of spent nuclear fuel has been studied since the 1980s, and it has also been evaluated through environmental impact assessments.

Centralized production protects biodiversity

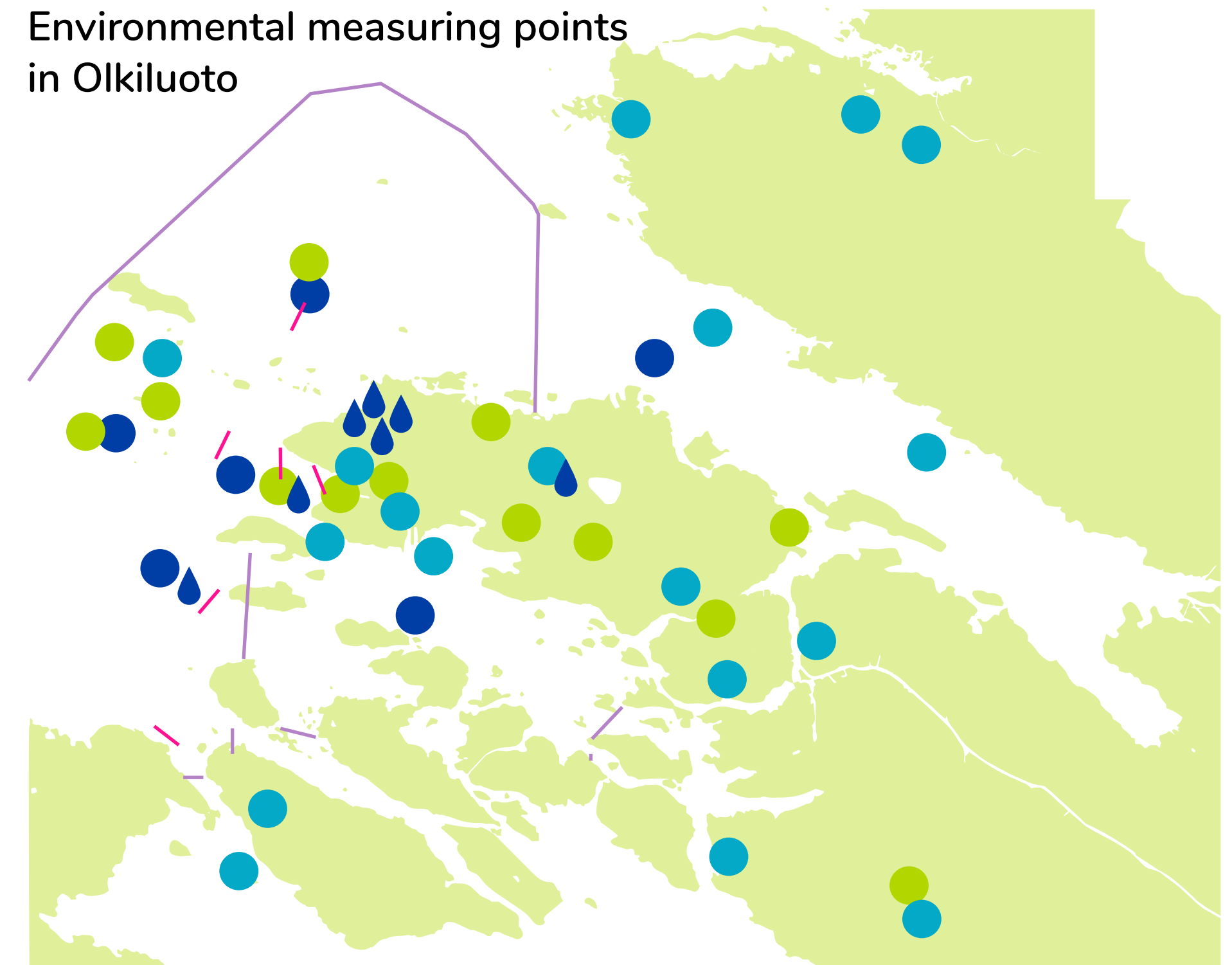
SURROUNDED by four nature conservation areas, the small island of Olkiluoto produces around one-sixth of all the electricity used in Finland. After the commissioning of OL3, the production

volume will increase to around one-third. The concentration of energy production in a small geographic area minimizes the environmental impact and allows the preservation of other areas in their natural state. Climate change also has a major impact on biodiversity. By producing clean and climate-friendly nuclear power-generated electricity, TVO makes a significant contribution to the mitigation of climate change and promotion of sustainable development.

The total surface area of the Olkiluoto island is 900 hectares, of which constructed areas amount to 170 hectares (170 ha in 2018). The total volume of non-water-permeable areas is 41 hectares. TVO does not own any nature-oriented areas.

Nuclear power is approximately 70 times more efficient in terms of its use of land areas than wind power.

Environmental measuring points in Olkiluoto



- Radiation, water
- Radiation, air
- Radiation, vegetation, organisms and soil
- Water quality
- Water plants
- Exploratory fishing

Cooperation with authorities

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

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 issues include the environmental department of the municipality of Eurajoki and the Ministry of Economic Affairs and Employment, which acts as TVO's liaison 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. The Finnish Safety and Chemicals Agency (Tukes) acts as the supervising authority for the industrial processing and storage of hazardous chemicals.



Six special events in 2019

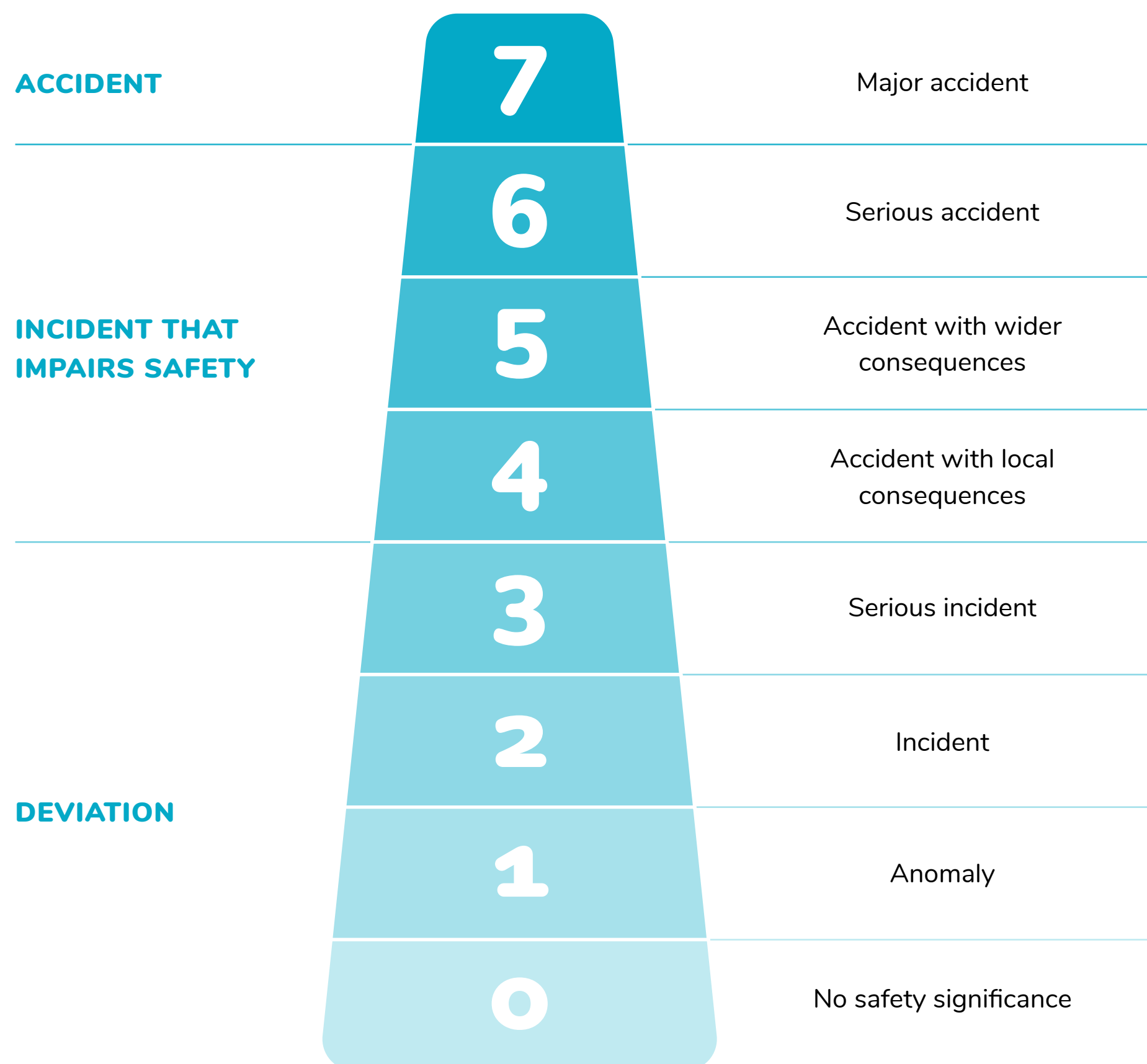
THE OLKILUOTO nuclear power plant units, OL1 and OL2, operated safely throughout the year. TVO classifies events affecting nuclear safety in accordance with the international INES scale (0–7). In 2019, six events rated as INES category 0 events (no nuclear or radiation safety significance) took place at the Olkiluoto plant. TVO investigates all events that could have an impact on nuclear safety and determines corrective actions. TVO publishes information on every event with public interest in the News section of its website.

TVO also follows events at other nuclear power plants around the world. Operations are continuously developed based on the observations made.

Permits govern the activities

IN ADDITION to legislation pertaining to nuclear energy and radiation safety, the operation is also regulated by requirements laid down in environmental laws. Operating the Olkiluoto power plant is subject to a permit according to the Environmental Protection Act, and cooling water intake is subject to a permit

INES-scale



according to the Water Act. The permits decisions are valid until further notice.

Environmental and water permit decisions cover power plant 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 transient and abnormal conditions, as well as monitoring and reporting. In addition, there are separate environmental permits for supporting operations of the Olkiluoto nuclear power plant, such as the landfill and the crushed stone storage area.

Licenses 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 OL1, OL2, and OL3 (a total of 15 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

TVO CONTINUOUSLY monitors statutory regulations and other requirements pertaining to its operations. People in charge of different parts of the operations are in charge of ensuring that the organizations receive sufficient up-to-date information about statutory regulations and their impact on TVO's operations. Compliance with the regulations and requirements is regularly assessed in internal and external audits as well as management reviews. In 2019, the operations complied with environmental legislation, licenses, and permits.

Nuclear waste management

The types of nuclear waste generated at a nuclear power plant include waste exempt from control, low and intermediate level operating waste, and high-level spent fuel.

COMPARED to the volume of produced energy, however, the amount 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.

Spent nuclear fuel from the nuclear power plants of Teollisuuden Voima and Fortum will be packed in copper canisters and embedded in Olkiluoto bedrock at a depth of 430 meters. The final disposal of spent nuclear fuel is based on the use of multiple release barriers, which 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 endanger the performance of the insulation. The release barriers include the physical state

of the fuel, the disposal canister, the bentonite buffer, the backfilling of the tunnels and the surrounding rock.

Plenty of time has been reserved for the preparation and practical execution of final disposal. Thorough preparations and careful implementation ensure the safety of the final disposal. The disposal of spent fuel is scheduled to begin in the 2020s, and it will continue for approximately hundred years.

Responsibility for nuclear waste management lies with the nuclear power companies that must carry out the necessary nuclear waste management measures for their own waste at their own cost. According to the Finnish Nuclear Energy Act, nuclear waste generated in Finland must be treated, stored, and finally disposed of in Finland and the import of nuclear waste into Finland is prohibited. Posiva Oy will manage research into the final disposal of spent nuclear fuel, construction and operation of final disposal facilities, and eventual closing up of the facilities on behalf



“Olkiluoto will make history in nuclear waste management – currently under construction, ONKALO® will be the world’s first disposal facility for spent nuclear fuel.”

of its owner companies. Posiva and ONKALO® are internationally renowned in the nuclear industry for their final disposal solution, and Posiva Solutions Oy offers this expertise in a dozen countries.

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 the shareholders of TVO into 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 State Nuclear Waste Management Fund. Each year, the Ministry of Economic Affairs and Employment determines the share of each nuclear power company in the State Nuclear Waste Management 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

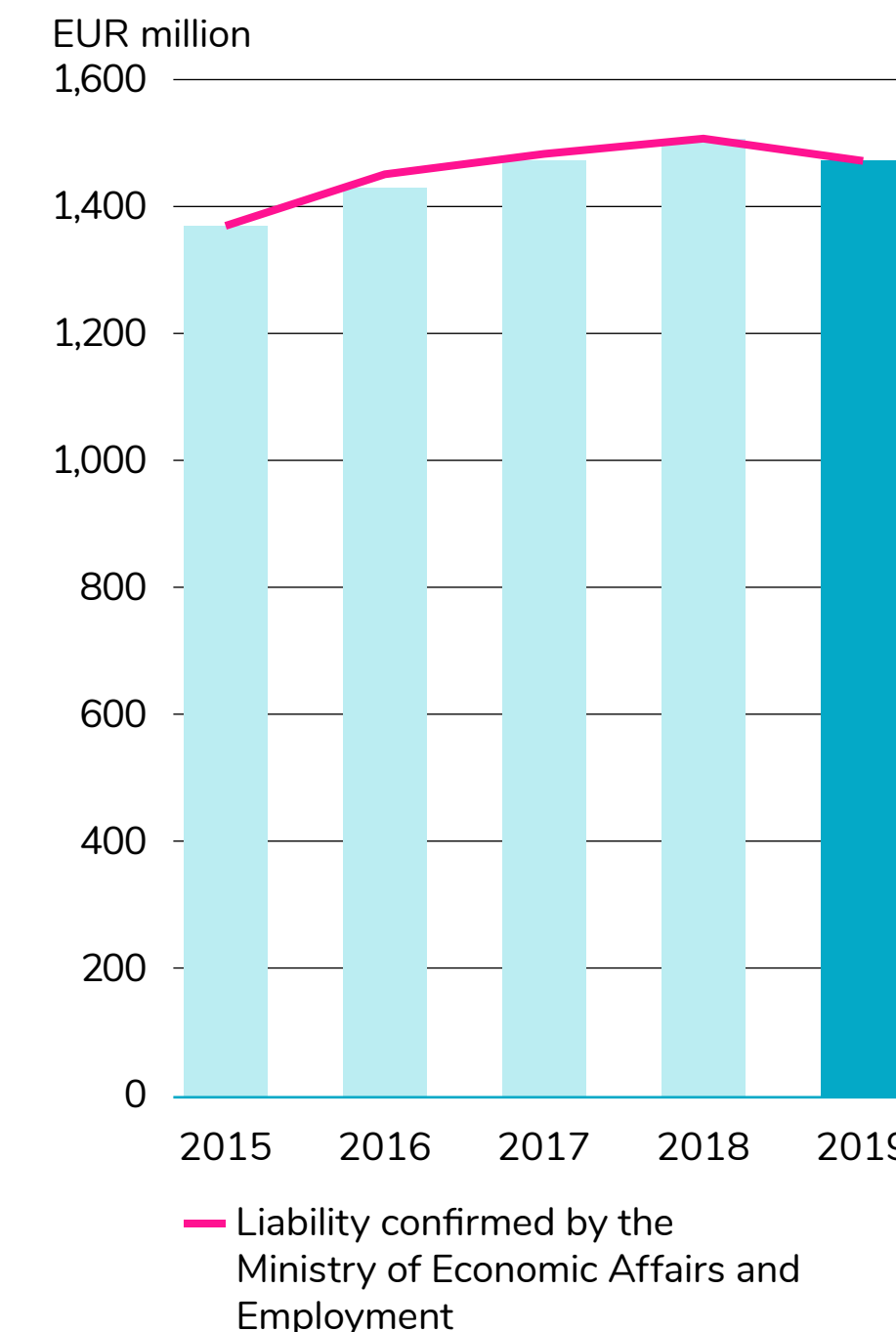


430m

The spent nuclear fuel will be packed in copper canisters and placed in the Olkiluoto bedrock at an approximate depth of 430 meters.



TVO's fund target share in the Finnish state nuclear waste management



or decreased on the basis of how well the Fund succeeds in its investments: if the interest income is higher than expected, the liability share in the Fund is correspondingly reduced. The objective is to accumulate enough assets in the Fund for the final disposal of accumulated nuclear waste.

Responsibility contact persons

PERSONNEL

Leena Wartainen

HR Manager
Tel. +358 2 8381 5819

ENVIRONMENT

Merja Levy

Environmental specialist
Tel. +358 2 8381 5155

OCCUPATIONAL HEALTH AND SAFETY

Heta Rohila

Corporate security expert,
occupational health and safety manager
Tel. +358 2 8381 5920

FINANCES

Sanna Niemensivu

Competence Center manager,
Group Controller
Tel. +358 2 8381 6400

RESPONSIBILITY REPORTING

Johanna Aho

Competence Center manager,
Communications Manager
Tel. +358 40 729 0822

Our email addresses are of the format
firstname.lastname@tvo.fi



TEOLLISUUDEN VOIMA OYJ

Olkiluoto

FI-27160 Eurajoki, Finland
Tel. +358 (0)2 83 811
Fax +358 (0)2 8381 2109

Töölönkatu 4

FI-00100 Helsinki, Finland
Tel. +358 (0)9 61 801
Fax +358 (0)9 6180 2570

Business ID: 0196656-0
Registered office: Helsinki
Head office: Olkiluoto

EMAS-statement

TVO's environmental report is based on the requirements laid down in the EMAS Regulation and serves as a verified environmental statement of the operation of the Company.



Olkiluoto power plant has been EMAS (Eco-Management and Audit Scheme) registered with code FI-000039 (NACE code 35)

THE ENVIRONMENTAL REPORT for 2019 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 GL Business Assurance Finland Oy Ab has in the capacity of an accredited, independent and objective party verified the information presented in the environmental report at the 14th of February 2020.

TVO publishes the environmental report in Finnish and English.

The information to be reported for 2020 will be published in the spring of 2021.

REQUIREMENT	REPORT PAGE
A clear and unambiguous description of the organization registering under EMAS and a summary of its activities, products, and services, and its relationship to any parent organizations as appropriate.	TVO as a company
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.	Environment and climate Environmental impacts – low-emission electricity production Environmental balance sheet Environmental management
A description of the environmental objectives and targets in relation to the significant environmental aspects and impacts.	Environmental management Environmental program 2019-2021
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 Environmental program 2019-2021 Climate friendly electricity Environmental impacts – low-emission electricity production Cooling water Raw materials and material efficiency Production and energy efficiency Emissions to air Emissions to water and soil Waste Environmental research and biodiversity Nuclear waste management
Other factors regarding environmental performance including performance against legal provisions with respect to their significant environmental impacts.	Environmental management Cooperation with authorities Cooling water Emissions to air Emissions to water and soil Waste Environmental research and biodiversity Nuclear waste management
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.	Verification report of the environmental report

Verification report of the environmental report

Confirmation of compliance

DNV GL 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 GL 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 fulfill 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 2019 (called Environmental Report 2019) was verified at the Olkiluoto location of Teollisuuden Voima at the 4th of February 2020. The verification was performed with the ISO 14001:2015 periodical audit by processing the requirements for both systems, and compliance with them.

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.

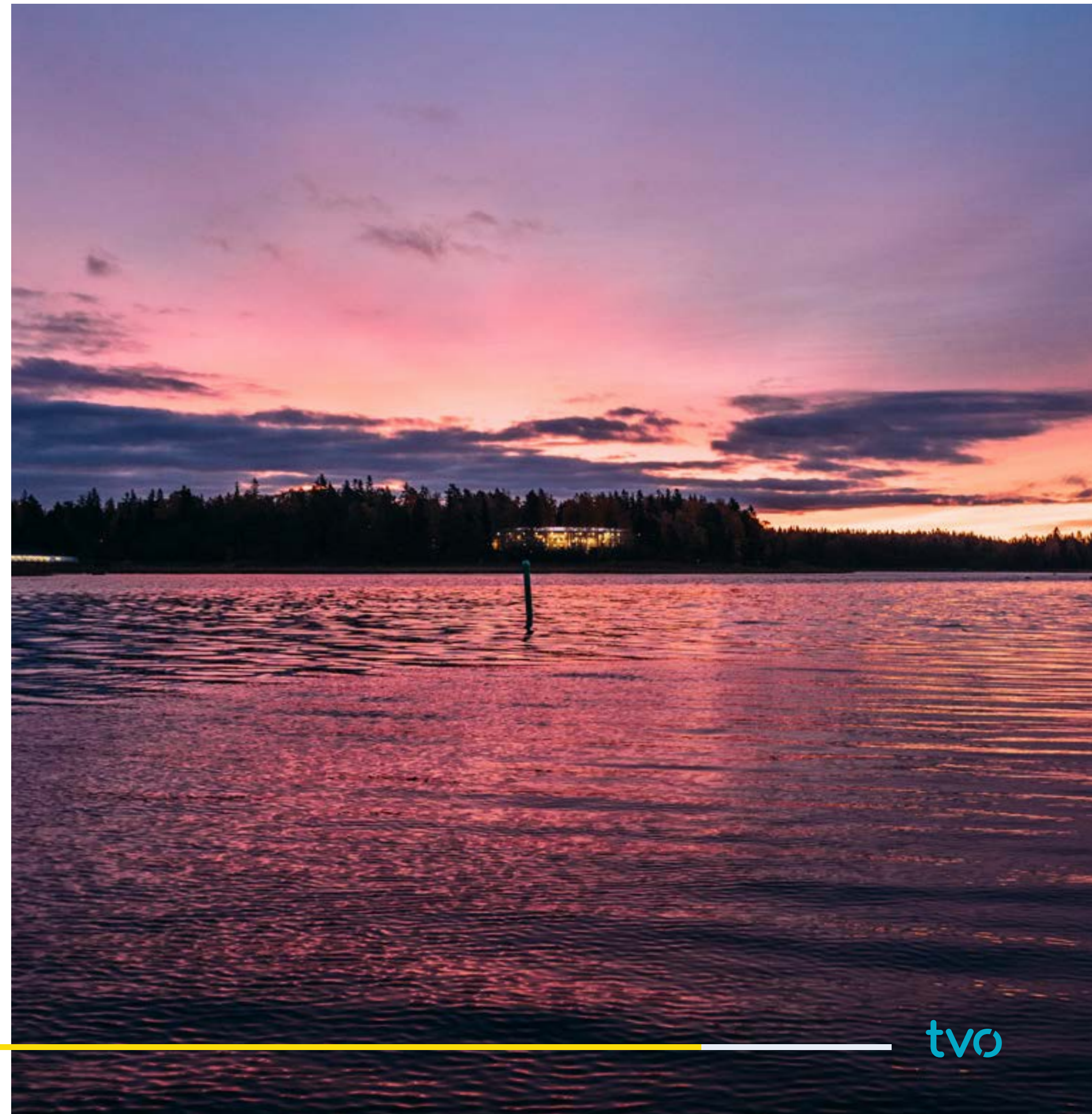
The Updated Environmental Statement 2019 has the same structure as the Environmental Report 2018 however considering the requirements of EU 2018/2026 to the annex IV. The content and environmental indicators can easily be compared year by year. The statement provides a clear and accurate image of Teollisuuden Voima Oyj's operations and their impact on the environment. The environmental system is implemented by setting the goals. The implementation and effectiveness of the system is monitored by the environment team and management reviews. The Environmental Report 2019 with environmental indicators, which describe the impact of the system, meet the EMAS 1221/2009 requirements for up-

dated 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 commitment to a high standard of safety, quality and environmental protection, and continuous improvement is shown in the Updated Environmental Report 2019.

Espoo, the 14th of February 2020
DNV GL Business Assurance Finland Oy Ab EMAS-accredited verifier
FI-V-0002

Esa Notkonen
Lead Auditor, Verifier



Group-level policies

THE GROUP-LEVEL policies have been approved in the meeting of TVO Group's Management Board on October 14th 2019.

Safety culture

TVO GROUP and its entire personnel are committed to a high standard of safety culture.

Safety culture is comprised of organisational practices and individuals' attitudes. Thanks to the safety culture, all factors that affect the nuclear power plant's safety will receive attention in proportion with their significance and are given priority in decision making.

Group-level policies

TVO GROUP and its personnel comply in their actions with the policies defined by the Group.

Applicable laws, decrees, and official regulations as well as international

agreements are strictly followed. TVO Group sets objectives for its operations, which are stricter than those set out in the applicable laws.

Issues are dealt with transparently within the Group. Reporting of development needs, detected shortcomings, nonconformances and errors is encouraged.

TVO Group requires its partners and their personnel working at Olkiluoto to be committed to the high safety culture and high-quality operating methods. This means that the companies and personnel in a direct or indirect contractual relationship engage in responsible operations according to TVO Group environmental, nuclear safety and quality policy, and information security principles.

Policy on nuclear safety and quality

Ydinturvallisuus- ja laatupolitiikkaan The nuclear safety and quality policy includes nuclear safety, radiation protection, nuclear material supervision and quality.

NUCLEAR SAFETY

TVO Group is committed to maintaining operating conditions where efficient procedures can be implemented by taking safety, quality, and costs into account. This ensures the capacity to also produce competitive electricity in a safe and reliable manner over the long term.

TVO Group's operations shall not cause any damage to people, the environment or property.

RADIATION PROTECTION

In all their radiation protection activities, TVO Group and its personnel are committed to following the ALARA (As Low As Reasonably Achievable) principle. According to the principle, individual and collective radiation doses are kept as low as possible by practical measures.

Restricting the amount of doses and keeping the amount of radioactive emissions as low as possible are already accounted for when designing the structures and functions. All employees shall observe matters affecting radiation protection in their work.

In addition to authority guidelines, the development of radiation protection operations also takes international recommendations into account.

NUCLEAR SAFEGUARDS

TVO Group takes good care of nuclear material and ensures that it does not get into the hands of unauthorized persons.

QUALITY

Work practices of a high standard are followed within TVO Group, which creates a basis for safe and economically efficient operation.

The professionals in nuclear industry who work at TVO Group are expected to show unfaltering compliance with procedures and verified execution of their own work. On the level of individual employees, this refers to a prudent approach to work, i.e., compliance with the STAR principle (Stop, Think, Act, Review) The personnel shall be aware of the safety significance of their work and utilise methods developed for the management of human errors which are employed in the Group.

Risk management is implemented on a regular and consistent manner. Any risks affecting operation, and in particular safety, are identified already at the operational planning phase.

We consider our internal and external customers equally important. We perform all work tasks appropriately, according to schedule, and with high quality.

TVO Group develops co-operation with its suppliers so that the safety, availability, and environmental friendliness of the plant units remain at a high international level.

Corporate social responsibility policy

The corporate social responsibility policy covers the environment, energy efficiency, procurement, personnel, occupational health and safety, and communication.

ENVIRONMENT AND ENERGY EFFICIENCY

TVO Group operates in accordance with the principle of sustainable development and produces environmentally friendly nuclear electricity. The Group recognises the environmental and energy aspects of its operation and minimises the related adverse impacts at all phases of electricity production. Operational objectives are specified in compliance with the principle of continual improvement. TVO Group monitors the impact that its operations have on the state of the environment, and when necessary, launches immediate corrective actions. TVO Group ensures that the personnel and other persons working at the Olkiluoto nuclear facilities have competence and expertise in matters related to the environment and energy efficiency.

The objective of TVO Group is to prevent and further reduce the already low emissions 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.

TVO Group acknowledges the importance of its overall responsibility for all the phases of the fuel cycle. The Group

monitors and supervises the management of environmental issues implemented by the fuel suppliers. TVO Group requires the suppliers to 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 management extends from the uranium mines all the way to final disposal according to the “from bedrock to bedrock” principle.

TVO Group is committed to improving the efficiency of energy production. The Group monitors its own energy consumption and improves its efficiency by taking energy aspects into account in the operations. Plant unit modernisation projects are implemented to improve the energy efficiency of the power plant process. Opportunities for improvement of energy efficiency are considered in investments, modifications and procurement. The level and performance of energy efficiency are also reported on in the annual environmental report.

TVO Group minimises the amount of waste through the improvement of the use of raw materials and the reuse of waste. The goal is to increase the relative share of waste delivered for reuse and

to decrease the amount of radioactive waste. TVO Group also takes efforts to reduce the amount of spent fuel through optimisation of the use and properties of fuel.

Sustainable utilisation of the environment is taken into account in the development of the Olkiluoto area and expansion of operations. The design and construction of any new nuclear power plant units aims to minimise harm and disruption to the environment.

PROCUREMENT

TVO Group employs procurement activities of a high standard to ensure safe, competitive and reliable production as well as the long service life of the plant units.

The products and services purchased by the Group are required to meet the requirements for safety, quality and the environment which the Group has specified. The availability of requisite products and services is ensured by means of long-term agreements based on mutual trust and partnership.

Factors particularly emphasised by TVO Group in the selection of suppliers include the continuity of the supplier's op-

eration, security of supply, management of quality and environmental aspects, as well as competitiveness, with domestic and local suppliers given priority. Supplier assessments are based on the safety significance of the products and services to be ordered. The quality of deliveries is monitored and when necessary, corrective actions are taken without delay.

TVO Group conducts its relations with the supplier chain and business partners in a responsible and ethical manner. TVO Group expects its partners to uphold a high level of safety culture and responsible practices in their own operations.

PERSONNEL

The objective of TVO Group is to ensure that the whole personnel is motivated, carry out their tasks in a responsible manner and commit to observing the agreed practices and procedures.

TVO Group makes sure that the human resources of the Group are competent and adequate to guarantee the achievement of the objectives specified for the Group.

TVO Group offers the employees opportunities for self-development in their work and profession and for the im-

provement of their competence by taking advantage, according to their own individual needs, of the training programmes provided by the Group. TVO Group offers competitive rewards and encourages employees to work profitably, to meet their goals, and to work to a high standard every day.

TVO Group provides its personnel with opportunities for the maintenance of their work ability. The principles of the HR policy are implemented through good cooperation with the personnel. The objective of TVO Group is to ensure the equality and well-being of the work community where no discrimination is approved and which promotes the implementation of equality.

HEALTH AND SAFETY

The goal of health and safety activities in TVO Group is to promote health and occupational safety by a proactive approach.

A good atmosphere is maintained in the work community within the Group, ensuring good working conditions as well as equality of treatment. We do not approve of any form of harassment or bullying in the workplace.

The goal of every employee in terms of occupational safety is to look after the safety of oneself and others. When making decisions related to occupational safety, TVO Group is committed to consultation and participation of workers, and their possible representatives.

COMMUNICATION

TVO Group increases mutual trust by supporting open and responsible interaction with all of its stakeholders in the local region, the Finnish society and the international cooperation network of the nuclear industry.

The Group promotes public knowledge about and acceptance of nuclear power by participating in social debate and communicating transparently about operations and events at the Olkiluoto nuclear facilities.

TVO Group uses internal communication to support an interactive work community culture and ensures that the personnel understand the goals and policies of the Group and are aware of the Group's financial and production situation.

TVO Group's contact with stakeholders is based on high ethical principles and thus reinforces confidence in the oper-

ation of both the Group and the stakeholders, posing no threat to the reputation or objectivity of either.

Sponsorship of culture, sports, research and non-profit activities is part of the corporate social responsibility of TVO Group. Factors considered in the selection of cooperation partners and sponsorship recipients include reputation, values and compatibility with the strategic objectives and principles of the Group. Finnish origin, a ground-breaking role, reliability, and interaction are some of the key selection criteria.

Production policy

The production policy covers the operation and maintenance of the plant, and the expansion of the production capacity.

OPERATION AND MAINTENANCE

The objective of the operation and maintenance activities implemented by TVO Group is to ensure uninterrupted, predictable and competitive electricity production. Nuclear and operating safety are always given priority.

Plant safety and reliability are developed systematically. Modification and reno-

vation projects are implemented at the plant in accordance with pre-approved plans to ensure an as long service life as possible for the plant.

Systematic test and inspection activities of an appropriate scope are carried out to verify the safe and reliable operation of the plant.

Plant maintenance operations are implemented in a well-planned manner, predicting potential disruption situations, and preparing for the measures the situations require.

EXPANSION OF PRODUCTION CAPACITY

TVO Group follows development in nuclear power technology and participates in international cooperation both with power plant suppliers and with nuclear power companies.

The electrical output of the existing plant units in Olkiluoto will be increased where possible by taking advantage of the latest available technology.

The best economically feasible technology that minimises environmental impacts over the entire life cycle of the plant unit is applied in the design and implementation of Olkiluoto 3.

Corporate security policy

The corporate security policy covers the safety of production and operation, personnel safety and facility security, rescue and emergency preparedness, and information security.

SAFETY OF PRODUCTION AND OPERATION, PERSONNEL SAFETY, AND FACILITY SECURITY

Procedures related to safety and security are implemented in a systematic, proactive and comprehensive manner. The procedures are designed to guarantee the safe operation of the plant, as well as the physical integrity of the personnel and others working at the plant.

RESCUE AND EMERGENCY PREPAREDNESS

TVO Group maintains and develops preparedness for special conditions. Exercises in rescue and emergency operations are arranged systematically and regularly.

TVO Group maintains at all times its awareness of risks related to the company, the personnel and the operating environment.

INFORMATION SECURITY

Information security procedures are in TVO Group designed according to the significance and risk of each function. The objective is to secure nuclear safety, financial interests and the privacy protection of the personnel, to verify the availability of correct and reliable information, and to avoid any damage resulting from information processing.

TVO Group's information security procedures cover the availability, authenticity, and confidentiality of information, as well as procedures for the management of access rights.

Group employees are granted access rights to the Group's information and information systems as required for the performance of their work tasks. Disclosure of information to third parties is only allowed when this is in the interest of the Group. Information disclosed by other parties is in TVO Group processed using at least the information security procedures used or required by the disclosing party.