TVO

Environmental Report 2011

Teollisuuden Voima Oyj – Well-being with nuclear electricity

TVO Environmental Report 2011 complies with the EMAS regulation concerning environmental reporting.
The 2010 figures are presented in brackets.

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Contents

TVO – An experienced pioneer in the nuclear power sector

Teollisuuden Voima Oyj (TVO) contributes to the maintenance of sustainable development and the well-being of Finnish people by providing Finns with electricity produced in a safe, reliable, and climate-friendly manner at the Olkiluoto nuclear power plant in Eurajoki.

A recognized Finnish nuclear power company, TVO has, during the course of its 40 plus years of operation, developed into a pioneer in the nuclear power sector. On the island of Olkiluoto, TVO has all the required competence, structures, functions, and waste management facilities required for the safe production of nuclear electricity and required construction work. TVO's nuclear power know-how and experience attract interest from around the world.

TVO is a limited liability company that was established in 1969, providing electricity for its owners at cost price. We produce approximately one-sixth of the total electricity consumed in Finland. The electricity produced at the Olkiluoto nuclear power plant has received the Key Flag, a symbol for Finnish work and know-how.

By the end of 2011, we had produced a total of over 395 billion kilowatt-hours of climate-friendly nuclear energy in Olkiluoto over a period of more than 33 years. The nuclear electricity produced at Olkiluoto enables Finland to prevent carbon dioxide emissions of over 10 million tons every year (in comparison to a scenario where the same amount of electricity would be produced using coal). The amount corresponds to the annual carbon dioxide emissions from traffic in Finland.

A period of major projects

The year 2011 saw the continuation of four major projects in Olkiluoto: the modernization of the Olkiluoto 1 and Olkiluoto 2 plant units (OL1 and OL2), the construction of the Olkiluoto 3 (OL3) plant unit, the progression of the Olkiluoto 4 (OL4) project to the bidding and engineering phase, and the construction of ONKALO.

Currently, we have two nuclear power plant units (OL1 and OL2) producing electricity in Olkiluoto. Both units have produced electricity for more than 30 years. During the year under review, the OL2 plant unit went through the most extensive annual outage in its history. Due to the improvement of the efficiency of the turbine plant, the net electrical output of OL2 increased by about 20 megawatts (MW). OL1 went through a corresponding extensive annual outage the previous year. Both plant units now have a nominal net electrical output of 880 MW. The total cost of the modernization project was approximately EUR 160 million. The modernization will continue in the spring 2012 with the replacement of the generator of OL1.

We are building a third plant unit, OL3, in Olkiluoto. The construction of OL3 is a large international project that gives us an opportunity to contribute to the creation of international trends for the future of nuclear power construction.

On July 1, 2010, the Finnish Parliament confirmed a favorable decision-in-principle by the Government concerning the construction of the new OL4 unit. During the year under review, we continued the preparation of the tender documents, planning work related to the construction of the plant unit, and soil surveys at the plant location. In December 2011, an additional meeting of TVO's shareholders decided to launch the bidding and engineering phase of the OL4 project. All the current owners of TVO (EPV Energia Oy, Fortum Oyj, Karhu Voima Oy, Kemira Oyj, Oy Mankala Ab, and Pohjolan Voima Oy) committed to the financing of the phase relative to their current ownership.

Posiva Oy, a company jointly owned by TVO and Fortum Power and Heat Oy, is currently constructing ONKALO, an underground facility for research into the final disposal of spent nuclear fuel, at Olkiluoto. In 2010, ONKALO reached the planned final disposal depth of 420 meters. The excavation has been extended to a depth of 437 meters for the purpose of constructing the required technical and auxiliary facilities. In the preparation of the final disposal, the focus is shifting from research to the training for implementation, or demonstration.

OUR VISION

AN ACKNOWLEDGED FINNISH NUCLEAR POWER COMPANY, A PIONEER IN ITS FIELD.

OUR MISSION

PRODUCING ELECTRICITY IN A SAFE, ECONOMICAL, AND ENVIRONMENTALLY SOUND MANNER.

OUR VALUES

RESPONSIBILITY, PROACTIVITY, TRANSPARENCY, CONTINUOUS IMPROVEMENT.

During the year under review, a demonstration tunnel corresponding to an actual deposition tunnel was excavated in ONKALO. The demonstration tunnel is used to examine the suitability of the bedrock for final disposal and to test methods relating to the construction of deposition tunnels and holes.

Electricity at cost price

We provide our owners with electricity at cost price according to the Mankala principle. Our owners cover the costs of our operations and in return they receive electricity produced by us relative to their ownership. They consume the power themselves or sell it on to third parties.

TVO Group

TVO Group consists of the subsidiaries TVO Nuclear Services Ltd (TVONS), Olkiluodon Vesi Oy and Perusvoima Oy. The parent company of the Group, TVO, is a joint venture of Pohjolan Voima Oy, the main owner of TVO. Established in 1995, Posiva Oy is a joint venture of TVO and Fortum Power and Heat Oy. The ownership of TVO is 60 % and that of Fortum Power and Heat Oy is 40 %.

TVONS markets and sells TVO's nuclear power know-how services throughout the world. Olkiluodon Vesi takes care of the raw water management of our plant units. TVONS and Olkiluodon Vesi Oy are wholly owned by TVO. Posiva Oy takes care of the final disposal of the spent nuclear fuel produced in its shareholders' Olkiluoto and Loviisa nuclear power plants.

TVO has production plants at Olkiluoto in Eurajoki and offices in Helsinki, Brussels, and Rauma. TVO's ownership did not change significantly during 2011. During the year under review, TVO's project activities were organized, and there was a change to the basic organization as TVO's OL4 division was established on July 1, 2011.

A one megawatt (MW) wind power plant also produces electricity in Olkiluoto. Furthermore, there is a 100 MW gas turbine reserve power plant, implemented as a joint project of Fingrid Oyj and TVO. TVO accounts for 45 % of the electricity produced by the Meri-Pori coal-fired power plant.

Shareholders and series of shares

The company has three series of shares. The A series entitles shareholders to electricity produced by OL1 and OL2, the B series entitles shareholders to electricity produced by OL3, and the C series entitles shareholders to a share of the power produced by the Meri-Pori coal-fired power plant.

TVO'S OWNERS AND SHAREHOLDINGS ON DECEMBER 31, 2011:

	A SERIES	B SERIES	C SERIES	TOTAL
EPV Energia Oy	6.5	6.6	6.5	6.5
Fortum Power and Heat Oy	26.6	25.0	26.6	25.8
Karhu Voima Oy	0.1	0.1	0.1	0.1
Kemira Oyj	1.9	-	1.9	1.0
Oy Mankala Ab	8.1	8.1	8.1	8.1
Pohjolan Voima Oy	56.8	60.2	56.8	58.5
	100.0	100.0	100.0	100.0

Continuous work for the benefit of the environment

TVO's corporate social responsibility is based on the principles of sustainable development. We identify the environmental aspects of our operations. We strive to minimize the harmful impacts of our operations at all stages of the electricity production chain and ensure that nuclear fuel is used in a safe manner from raw material acquisition to final disposal. We want to be a pioneer in environmental management.

In 2011, our operations at the Olkiluoto nuclear power plant complied with our environmental policy, our environmental permits, and our environmental management system.

We take care of the environmental management and environmental impacts of our power plant units and the infrastructure which supports our operations. We also require other companies and our partners operating in the power plant area to show a responsible attitude towards environmental matters consistent with our policies and operating principles.

We identify the environmental aspects of our operations and systematically strive to minimize any associated harmful impacts. We inform our personnel about environmental matters at induction training and in conjunction with various theme events. Our operations are regularly assessed both within our organization and by external assessors. The current situation of the environmental management system is discussed, and matters such as the realization of environmental targets monitored, semi-annually in conjunction with the management review. We maintain a list of the statutory requirements applicable to our operations and systematically monitor them for changes.

Our operations are built on environmental research

We have conducted environmental research on the Olkiluoto island since the 1970s, years before the production of electricity began. The early baseline studies created a basis for the environmental monitoring programs aimed at facilitating environmental radiation monitoring and determining of water impacts.

We have carried out extensive environmental impact assessment procedures for the new OL3 and OL4 plant unit projects. We have studied the final disposal of spent nuclear fuel since the 1980s, and environmental impact assessment procedures have also been utilized in the evaluation process. Through this research, we have familiarized ourselves with the island of Olkiluoto and its environment.

Annual targets for environmental and energy aspects

Our environmental management system is certified to the international ISO 14001 standard and is compliant with the EMAS Regulation. The goal of the system is to improve continuously our operations and the level of environmental protection. During 2010 and 2011, we developed further the procedure for the assessment of the environmental and energy aspects relating to our operations and the setting of associated objectives and targets. We set four long-term objectives for the seven identified significant environmental aspects. Targets confirmed by the company's management are assigned annually for each objective.

During the year under review, we achieved 14 of the 17 targets set. For each target, we specify actions through which the target can be achieved. For each action, we specify a responsible organization and an implementation schedule. Established in 2010, the environmental team regularly monitors the realization of the targets. Other subjects discussed at the team's meetings include the current non-conformity status, topical authority matters, and other environmental issues.

SIGNIFICANT ENVIRONMENTAL AND ENERGY ASPECTS AND ASSOCIATED LONG-TERM OBJECTIVES AND TARGETS FOR 2012

ASPECTS:	OBJECTIVES AND TARGETS SET TO ACHIEVE THEM:
The thermal load on the sea caused by the cooling water Storage and handling of hazardous or harmful substances	**Management of environmental load** 1. Management of the thermal load of cooling water and research into the utilization of the heat 2. Development of the sanitary waste water treatment plant 3. Development of environmental risk management
Land use Spent nuclear fuel created in the operations	**Improvement of material and energy efficiency and sustainable land use** 1. Development of energy efficiency activities and system 2. Planning of land use 3. Recognition of biodiversity 4. Keeping the amount of landfill waste below 12 % of the total amount of waste 5. Reduction of the environmental impacts and costs resulting from the personnel's working methods 6. Reduction of the amount of process water (max. 37,000 m^3) 7. Development of the recycling of wood waste
Selecting the product and service suppliers	**Suppliers' environmental responsibility** 1. Acquisition of information from suppliers concerning their environmental management
A significant radioactive emission into the environment in an accident Radioactive emissions into the air in an exceptional situation	**Isolation of radioactivity originating from the power plant from the organic environment** 1. Ensuring the purity of the process 2. Keeping radioactive emissions into the air clearly below the limits set by the authorities 3. Keeping radioactive discharges into water clearly below the limits set by the authorities 4. Prevention of the increase of nuclear safety risk

REALIZATION OF TARGETS SET FOR ENVIRONMENTAL OBJECTIVES IN 2011

▶ Target met as planned ▶ Target met partially ▷ Target not met

OBJECTIVE: MANAGEMENT OF ENVIRONMENTAL LOAD

Target 1. Launching a cooling water research program ▶

The target was met as planned. A report was prepared on cooling water waste heat utilization methods. Furthermore, the matter was investigated in two engineering studies:

- Suitability of absorption heat pump technology to use waste heat in district heating
- Possibilities of ORC technology to utilize the condensing energy in a nuclear power plant

A summary of the measures implemented in conjunction with the program and suggested further measures was prepared and will be utilized in the planning of future research.

Target 2. Development of the sanitary waste water treatment plant ▶

The target was met. The BOD and phosphorus loads of the waste water discharged from the treatment plant remained below the limit values. Furthermore, a plan was prepared concerning the development of the treatment plant. The plan comprises several subprojects (one, for example, for the replacement of the polymer dosing equipment). The projects will be implemented during 2012 and 2013.

Target 3. Management of the thermal load of cooling water ▶

The target was met as planned. The temperature of cooling water remained within the limits required by the environmental permit.

OBJECTIVE: IMPROVEMENT OF MATERIAL AND ENERGY EFFICIENCY AND SUSTAINABLE LAND USE

Target 1. The development of the energy efficiency system ▶

The target was met as planned. Energy efficiency has been taken into account in the preparation of modification plans. In 2011, two proposals for action were made concerning the improvement of energy efficiency. The company participated in the Energy Saving Week by holding a lecture on the theme for its personnel and publishing related informative presentations in the TVO intranet. The information on energy efficiency matters on the TVO website was updated.

Target 2. Planning of land use ▶

The target is to continue the planning of land use. The purpose of the planning is to support effective and uninterrupted production of electricity and to ensure the safe final disposal of nuclear waste at Olkiluoto. The target was met. The land use team met regularly, and area and land use planning principles were prepared for the Olkiluoto area.

Target 3. Keeping the share of waste disposed of at the landfill below 15 % of the total amount of waste (measured as a rolling three-year average) ▶

The target was met as planned. In 2011, the share of waste disposed of at the landfill was 10 % of the total amount of waste, and the rolling three-year average is 13 %.

Target 4. The development of sorting in the accommodation villages, the contractor area, and the ONKALO worksite ▷

The target was not met. Despite the guidance and instructions provided, sorting activity did not realize the targeted level in all the above-mentioned locations. Furthermore, inspection rounds were discontinued after week 36 because most of the waste had been packed in plastic bags, which made the assessment of sorting accuracy impossible.

Target 5. Reduction of the environmental impacts and costs resulting from the personnel's working methods by implementing a minimum of four measures ▶

The target was met as planned. During 2010 and 2011, several measures with a potential to reduce the environmental impacts and costs resulting from the personnel's working methods were implemented. Examples:

- The personnel's awareness of the above-mentioned matters was heightened through several informative presentations in Olkinet, particularly during the Energy Saving Weeks
- The personnel were provided with an opportunity to work remotely from home insofar as their work tasks permit
- Information systems were developed to enable the organization of more energy-efficient telephone and Internet meetings
- The electronic distribution of documents was improved

Target 6. Maintaining the amount of powdery filtering masses used below the specified limit ▶

The target was met. The amount of the powdery filtering masses used was 30 % lower than the specified limit value.

Target 7. Reduction of the amount of process water ▷

The target was not met. The target was to achieve the consumption target set for 2005 (37,000 m^3/yr). In 2011, the air humidifiers of the control room of the OL1 plant unit were replaced, which reduced the consumption of process water. The amount of process water consumed in 2011 was 39,200 m^3.

Target 8. Crushing wood ▶

The target was met as planned. All wood waste produced as result of construction activities during the year was crushed and dispatched for further utilization in energy production.

Target 9. Utilization of excess concrete ▶

The target was partially met. Only 7 % of the excess concrete resulting from construction activities crushed in 2011 could be utilized in earth and base layer construction.

▶ Target met as planned ▶ Target met partially ▷ Target not met

OBJECTIVE: SUPPLIERS' ENVIRONMENTAL RESPONSIBILITY
Target 1. Acquisition of information from suppliers concerning their environmental management ▶ The target was met as planned. Information on the suppliers' environmental management systems was collected through questionnaire feedback.

OBJECTIVE: ISOLATION OF RADIOACTIVITY ORIGINATING FROM THE POWER PLANT FROM THE ORGANIC ENVIRONMENT
Target 1. Ensuring the purity of the process ▶ The target was met as planned. Having started operation at the beginning of the year, the loose part workgroup met three times during the year and kept a record of loose parts[1]. In 2011, a total of 15 loose parts were detected. The workgroup was established to discuss measures to reduce the number of loose parts. Subcontractors were provided with induction on the matter. 1) loose part = a foreign object in the process
Target 2. Keeping radioactive emissions into the air clearly below the limits set by the authorities ▶ The target was met as planned. The total noble gas emissions of the plant amounted to 0.007 % of the limit value set by the authorities (target value: < 0.04 %).
Target 3. Keeping radioactive discharges into water clearly below the limits set by the authorities ▶ The target was met as planned. Radioactive discharges into water (fission and activation products) amounted to 0.05 % of the maximum allowed value set by the authorities (target value: < 0.3 %).
Target 4. Prevention of the increase of the nuclear safety risk ▶ The target was met. The target is to prevent the level of nuclear safety risk from increasing. Risks are actively identified and their likelihood and consequences measured by means of up-to-date Probabilistic Risk Assessment (PRA). The identified risks are mitigated according to the Safety As High As Reasonably Achievable (SAHARA) principle. The risk of core damage and radioactive emissions into the environment is very small, and the variation of the risk remained within the normal variation range in 2011. Following the Fukushima accident, TVO submitted a 17-point report on the safety features of the Olkiluoto nuclear power plant and the planned safety improvements to the Radiation and Nuclear Safety Authority in mid-December. TVO plans to improve, among other things, the supply of cooling water to the reactor in extreme situations where normal safety systems are postulated to be unavailable due to exceptional natural phenomena or a complete loss of AC power.

Cooling water – the most significant environmental aspect

We assess the significance of environmental and energy aspects on the basis of statutory and permit requirements and as well as by considering the magnitude, probability, and severity of the impacts. Other factors affecting our assessment include our stakeholder groups and our own influence in the matter.

The total amount of seawater used by us for the cooling of the OL1 and OL2 plant units is approximately 76 m^3/sec. In 2011, the total amount of seawater used for cooling was 2,154 (1,929) million m^3, and the corresponding thermal load on the sea was 26.6 (26.9) TWh. In fact, the cooling water's thermal load on the environment is the most significant environmental aspect of our operation.

While the cooling water passes through a plant unit, its temperature increases by approximately 10 °C. Then, it mixes with seawater. The cooling water does not come into direct contact with the power plant's process waters.

Throughout our operation, we have monitored the impacts of cooling water and conducted related surveys. The cooling water stratifies to the surface layer of the water over an extensive sea area. From the surface layer, 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 between 3 and 20 km^2 depending on the winter weather. We use newspaper announcements and weak ice warning boards to warn the residents of nearby areas of the unfrozen area.

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. We have investigated the impact of our operations on the Rauma archipelago Natura area located in the sea area off Olkiluoto, most recently in conjunction with the Natura assessment procedure concerning the OL4 project. Based on the assessment, the combined impact of warm cooling water discharged from the four plant units will not result in a significant harmful impact on the objects of protection in the Rauma archipelago Natura area.

We monitor seawater temperature as required by our environmental permit. One of the environmental permit regulations is the seawater temperature does not exceed the target value of 30 °C (measured as a weekly average) at a distance of 500 meters from the cooling water discharge channel. The target value was not exceeded in 2011.

Energy efficiency is improved in many different ways

We have a long history in systematically implementing various significant energy-saving measures and assessing their economic effects. TVO signed the energy conservation agreement drafted between the government and the energy sector as early as in 1998. The Olkiluoto power plant has been included in the business sector's energy efficiency agreement since 2008. Stipulated by the current energy efficiency agreement, an energy efficiency system has been included as part of our environmental system, and we implement energy efficiency measures as part of our normal operation (for example, as part of the modification process).

During the 2011 annual outage, we replaced the OL2 plant unit's low pressure turbines, main seawater pumps, isolation valves, and generator. As a result, the efficiency of the plant unit was improved by approximately 1 %; the same amount of fuel now yields an approximately 20 MW higher electrical output. The measure thus improved the energy efficiency of the plant and reduced the amount of heat discharged into the sea.

In 2010, we implemented an energy review at our facilities. On the basis of the review, we prepared an energy efficiency improvement plan for the years 2011–2016. One of the measures aimed at improving energy efficiency is the planned replacement of 4,500 lights at the plant units. The replacement of the lights will save approximately 286 MWh of electricity every year. 25 % of the planned replacements were implemented in 2011.

The external heat distribution circuit of the OL1 plant unit will be converted into a so-called secondary circuit. This means that the heat contained in the circuit can be utilized, for example, in the heating of the buildings located in the area. A corresponding operation was implemented at the OL2 plant unit in 2010, and heat from that unit has already been utilized for the above-mentioned purpose. In 2011, we completed the plans for the implementation of the operation and prepared a preliminary investigation on connecting the training centre and the repository for low-level and intermediate-level waste to the district heating system.

Expressions of concern, initiatives, and environmental deviations are taken seriously

In 2011, we received a great number of questions and inquiries through personal communications and various other channels. We entered 2 (3) of the contacts in the quality management information system as external expressions of concern. One of these concerned environmental impacts. We respond to all inquiries that include contact details.

Our initiative practice also supports personnel and stakeholder group involvement in TVO's environmental management. A total of 226 initiatives were submitted, of which 115 were rewarded. Some of the initiatives directly or indirectly reduce the environmental impacts of our operations or improve our energy efficiency.

No significant environmental deviations were observed in 2011. We observed 3 (7) minor environmental deviations. In 2011, the reporting of environment-related safety observations was extended from the OL3 construction site to the OL1 and OL2 areas. The number of such observations was 37, most of these concerned defective marking of materials and sorting of waste. Of the safety observations, 17 (30) of those reported concerned the OL3 construction site.

We take into account even small environmental events and follow up on all reported safety observations in order to prevent damage. We report all significant environmental deviations to the environmental authorities.

Small emissions, responsible waste management

We strive to reduce the amount of waste and to promote its utilization. We isolate radioactive waste from the organic environment until its radioactivity has decreased to a harmless level. With regard to the management of radioactive substances, we always strive to keep any emissions well below both the emission limits set by the authorities and our own target limits, which are more stringent than the official limits.

Our operation produces ordinary municipal waste, hazardous waste, and radioactive waste, as well as a small amount of ordinary and radioactive emissions into air and water. More detailed information about these can be found in the environmental key figures on pages 18–19. No events leading to the contamination of soil occurred in 2011.

As in previous years, the radioactive emissions from the Olkiluoto nuclear power plant into the air and water were extremely minor, and we managed to keep the emissions below both the limit values specified by the authorities and the stringent emission limits set by ourselves. Noble gas emissions into the air amounted to 0.007 % (0.003 %) and iodine emissions to 0.0015 % (0.08 %) of the allowed limit value specified by the authorities.

The emissions of radioactive fission and activation products into water amounted to 0.05 % (0.08 %) and the tritium emissions to 7.2 % (8.2 %) of the limit value specified by the authorities.

A minimum amount of landfill waste

We are committed to reducing the amount of waste and require everyone working at Olkiluoto to do the same. We constantly improve the sorting and processing efficiency of the waste created and dispatch sorted waste forward for utilization. We sort conventional waste into nine separate groups and only take waste that is unsuitable for utilization to the landfill. We gather hazardous waste to the hazardous waste storage facility. From there, it is taken to an appropriate processing facility for further processing.

The share of waste recycled or utilized in energy production was 86 % (87 %) of the total amount of waste produced by us. The share of landfill waste was 10 % (11 %), and the share of hazardous waste was 3 % (2 %). The total amount of waste was 5,800 (10,800) tons.

The significant reduction in the amount of waste is due to the construction work at the OL3 worksite progressing to the installation phase.

Nuclear plant waste is sorted according to its level of radioactivity

The waste produced at the power plant is classified as waste cleared after monitoring, low and intermediate level operating waste, high level waste (spent fuel), and decommissioning waste according to its level of radioactivity.

Waste cleared after monitoring contains such a small amount of radioactive substances that it can be recycled and utilized or disposed of at our landfill site. Waste is produced during the operation and maintenance of the power plant. The amount of operating waste cleared after monitoring was 61 (55) tons. In addition, we cleared approximately 59 (195) tons of metal for recycling and delivered 10 (16) tons of hazardous waste for further processing.

The protective gear used in operating and maintaining the power plant, the equipment removed from the process, and insulating materials are classified as low-level waste. We pack them tightly and place them in a repository for low-level and intermediate-level waste located at an approximate depth of 100 meters in the plant area. The total amount of low-level waste produced was 117 (167) m^3.

The ion exchange resins used for cleaning the power plant's process water are classified as intermediate level waste. We blend them with bitumen and place in the repository for low-level and intermediate-level waste. The total amount of intermediate-level waste produced was 56 (13) m^3. In 2011, the total amount of high level radioactive waste (spent fuel) produced was 39.1 tons (36.9 tons). It is placed in interim storage at Olkiluoto until it can be disposed of in the Olkiluoto bedrock. Final disposal will commence around 2020. Decommissioning waste is waste produced in conjunction with the dismantling of a power plant after its operation has ended. Decommissioning waste will also be disposed of in Olkiluoto.

Recycling reduces fresh water consumption

In addition to seawater used as cooling water, the Olkiluoto power plant makes use of fresh water, used as tap and process water. The process water boiled 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 waste water treatment plant. We treat the tap and process water at our water treatment plant. We use the ion exchange and reverse osmosis methods for purifying the water used in the power plant process. We continuously recycle and purify the process water. During annual outages, we store the fuel pool water in storage pools to be redeployed later. In total, recycling of water reduces our need for clean process water and the amount of process waste water discharged from the plant by approximately 30,000 m^3. During the year under review, we took 357,659 (378,470) m^3 of fresh water from the River Eurajoki.

We process sanitary waste water at the Olkiluoto waste water treatment plant. The treated water is discharged into the sea. In 2011, the amount of treated sanitary waste water was 139,251 (154,503) m^3. The phosphorus load discharged into the sea was 19 (25) kg, the nitrogen load was 6,900 (8,800) kg and the biological oxygen demand (BOD_{7ATU}) was 1,000 (2,500) kg. We treat the sanitary waste water in accordance with the permit conditions concerning treatment efficiency and emissions into water as well as statutory requirements. The emissions from our sanitary waste water treatment plant were just a fraction of the nutrient load of the River Eurajoki, totaling 13,000 kg of phosphorus and 505,000 kg of nitrogen. The river flows into the sea north of Olkiluoto.

ENVIRONMENTAL BALANCE SHEET OF THE OLKILUOTO NUCLEAR POWER PLANT 2011 (2010)

Emissions into air			Allowed annual emissions
Noble gases (TBq)	1.24 (Kr-87 equivalent)	(0.581)	(17,700)
Iodine (TBq)	0.0000024 (I-131 equivalent)	(0.000094)	(0.114)
Aerosols (TBq)	0.000011	(0.000012)	
Carbon-14 (TBq)	0.81	(0.71)	
Tritium (TBq)	0.24	(0.27)	

URANIUM FUEL (t)	41.0	(39.1)
Intermediate agents		
Oils (m^3)	259	(271)
NaClO (15 %) (m^3)	86	(68)
Other chemicals (t)	204	(138)
Ion exchange resin (t)	19	(16)
Water treatment chemicals (t)	108	(119)
Raw water (tap and process water) (m^3)	357,659	(378,470)
Cooling water (million m^3)	2,154	(1,929)

ELECTRICITY (TWh)		14.2	(14.1)
Municipal waste	**OL1 and OL2**	**OL3***	**Total**
Recyclable waste (t)	839 (864)	4,133 (8,539)	4,972 (9,402)
Landfill waste (t)	183 (270)	405 (928)	588 (1,198)
Hazardous waste (t)	48 (86)	149 (79)	197 (166)

* construction phase

Radioactive waste		
Low-level waste (m^3)	117	(167)
Intermediate level waste (m^3)	56	(13)
Spent fuel (t)	39.1	(36.9)

Emissions into water			Allowed annual emissions
Cooling water (million m^3)	2,154	(1,929)	
Thermal load on the sea (TWh)	26.6	(26.9)	
Fission and activation products (TBq)	0.0001	(0.0002)	(0.296)
Tritium (TBq)	1.31	(1.50)	(18.3)
Phosphorus (kg)	19	(25)	
Nitrogen (kg)	6,900	(8,800)	
BOD_{7ATU} (kg)	1,000	(2,500)	

Electricity production under authority supervision

Our operations are subject to a license and they are supervised by the authorities. The Finnish Radiation and Nuclear Safety Authority (STUK) supervises nuclear and radiation safety.

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 our environmental issues include the environmental department of the municipality of Eurajoki (where we are located), and the Ministry of Employment and the Economy, which acts as our liaison authority in the EIA Procedure.

Radiation monitoring samples taken from the surroundings of Olkiluoto are submitted to STUK for analysis. We prepare annual reports on the amount of waste and emissions caused by our operations and submit them to several regional and national authorities. We annually report our environmental investments and environmental protection operation costs to Statistics Finland. After verification, we report the annual carbon dioxide emissions of backup diesels and backup heating boilers to the Energy Market Authority. Tukes acts as the supervising authority for the industrial processing and storage of hazardous chemicals.

No special situations resulting in environmental impacts

No nuclear or radiation safety-related special situations or operating disruptions resulting in environmental impacts took place at the Olkiluoto power plant in 2011. In case of special situations and operating disruptions, we submit separate case-specific reports to STUK.

The severity degree of events taking place at the nuclear power plant are classified according to the international INES classification. The INES scale has seven severity classes, of which 4–7 are classified as an accident, 1–3 as an incident or an anomaly decreasing the level of safety, and class 0 as a deviation with no significance to safety. The most severe incidents at Finnish nuclear plants have been of INES class 2. During the operating history of the Olkiluoto power plant, there have been three INES 2 incidents.

In 2011, the Olkiluoto nuclear power plant experienced one INES 1 category anomaly relating to the cracking of the guiding and main pistons of the blowdown system valves. As a repair measure, the relevant parts of the valves were replaced. The corrective actions include the review of the preventive maintenance and replacement programs of equipment important to safety.

In 2011, we also prepared two special reports concerning our operations. The events referred to in the reports were classified as INES 0 category events (no significance to nuclear or radiation safety).

We process all operational incidents taking place at the Olkiluoto nuclear power plant and continuously monitor the incidents taking place at other nuclear power plants around the world. We develop our operations on the basis of the observations.

Our operations are regulated by various permits

In addition to the nuclear energy and radiation laws, our operations are regulated by the requirements set out in environmental legislation. The operations of the Olkiluoto power plant are subject to a permit referred to in the Environmental Protection Act, and cooling water intake is subject to a permit referred to in the Water Act. The permit regulations control the amount of the power plant's cooling water and the amount of heat contained in it. The regulations also specify the target value for the temperature of the sea area, taking into account the heat load. The permit regulations also apply to matters such as waste water treatment efficiency, processing of waste, operations in case of disruptions and exceptional situations, and monitoring and reporting. The Olkiluoto nuclear power plant landfill has its own environmental permit.

In 2011, the Southwest Finland Centre for Economic Development, Transport and the Environment carried out a supervisory inspection to assess whether the conditions of

INES CLASSIFICATION

the environmental permit were met. No particular remarks were made during the inspection concerning the management of environmental matters. However, the environmental risk management plan must be complemented in accordance with the instructions provided by the Finnish Environment Institute.

Permits referred to in the Chemicals Act have been granted for the processing and storage of hazardous chemicals. The safety analysis for the industrial processing and storage of hazardous chemicals at the Olkiluoto nuclear power plant was updated in 2011.

The permitting of the embankment planned between the Olkiluoto and Kuusisenmaa islands is currently in progress. The processing of the case continues in the Supreme Administrative Court.

Fingrid power line EIA

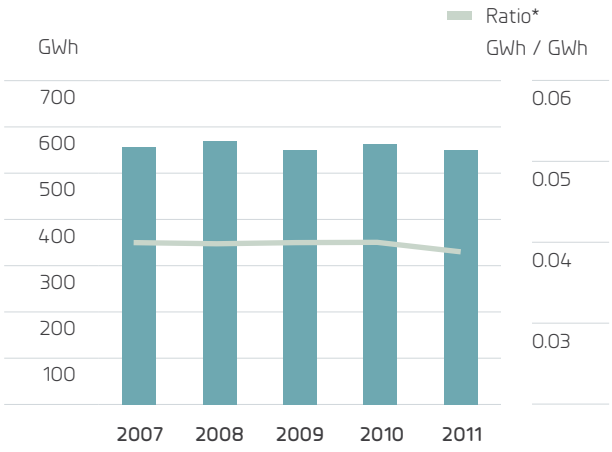
Fingrid Oyj, the company responsible for Finland's national grid, is planning the construction of the 400 kilovolt (kV) and 110 kV power lines required by the OL4 nuclear power plant unit from Olkiluoto to Rauma and from Rauma to Ulvila, Forssa, and Lieto. In 2011, Fingrid submitted, in compliance with the environmental impact assessment (EIA) procedure, an assessment program to the Southwest Finland Centre for Economic Development, Transport and the Environment acting as the coordinating authority.

The EIA procedure continues in 2012 with the investigation and assessment of the project's environmental impacts, carried out in accordance with the assessment program and the issued statements and opinions. These form the basis for the preparation of the EIA report. The assessment procedure ends when the coordinating authority issues its statement on the assessment report.

CORE ENVIRONMENTAL INDICATORS

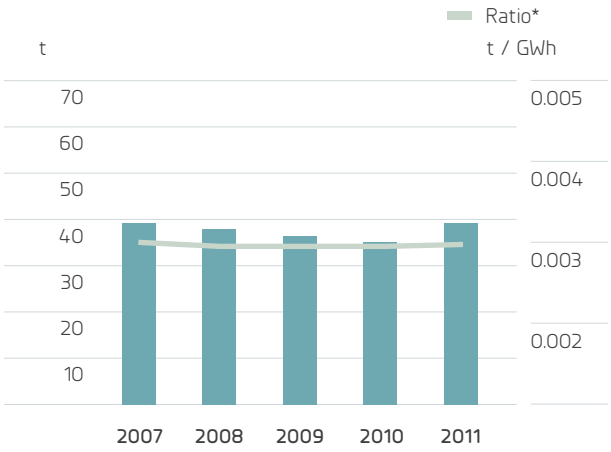
ENERGY EFFICIENCY

TVO'S ELECTRICITY CONSUMPTION



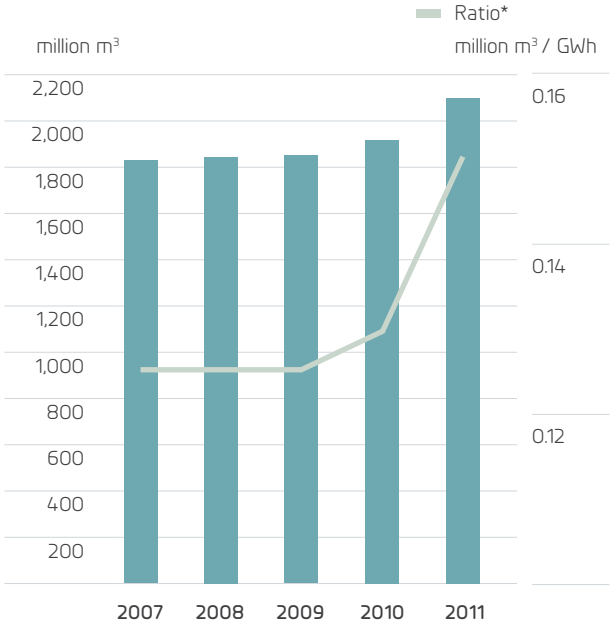
MATERIAL EFFICIENCY

SPENT NUCLEAR FUEL



WATER CONSUMPTION

COOLING WATER



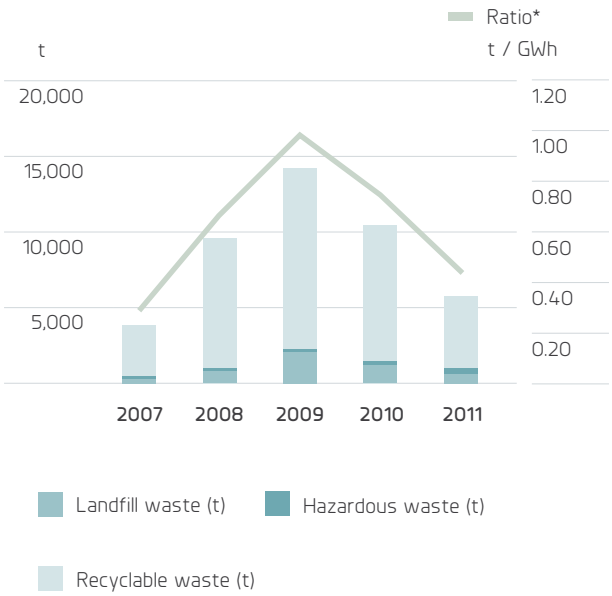
WATER CONSUMPTION

RAW WATER

*The ratio given in the graph is calculated against electricity produced (per gigawatt hour).

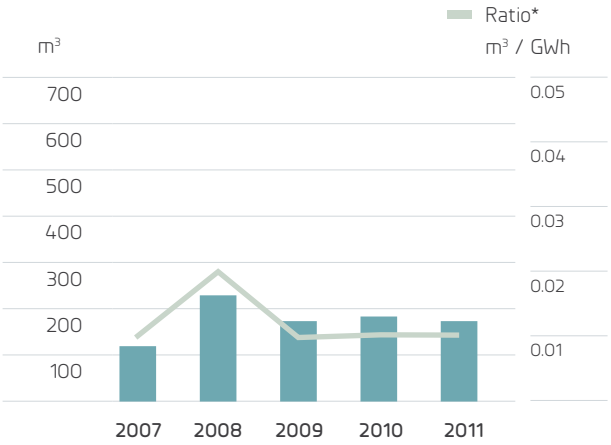
WASTE

MUNICIPAL WASTE



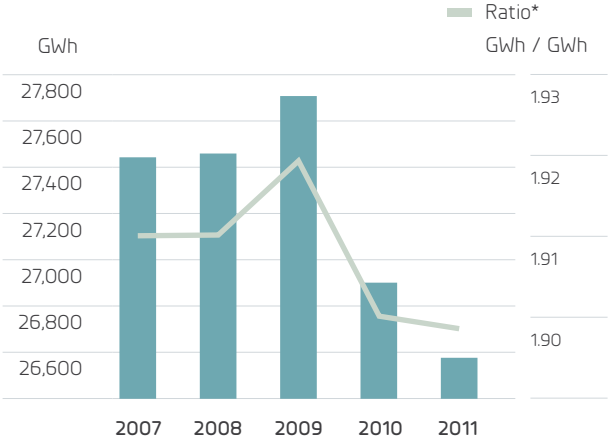
WASTE

LOW AND INTERMEDIATE LEVEL WASTE



EMISSIONS

THERMAL LOAD ON THE SEA



BIODIVERSITY

The land use indicator is not significant due to the nature of the operations and the area.

* The ratio given in the graph is calculated against electricity produced (per gigawatt hour).

ENVIRONMENTAL KEY FIGURES

	2011	2010	2009	2008	2007
OL1					
Net production (GWh)	7,290	6,977	7,296	7,066	7,335
The plant unit's own electricity consumption (GWh)	268	258	266	258	268
Capacity factor (%)	94.8	91.8	97.0	93.7	97.5
Cooling water (million m³) [1]	1,150	1,023	923	895	924
Thermal load on the sea (GWh) [2]	13,635	13,183	14,006	13,516	13,985
Efficiency (net) (%)	34.8	34.6	34.2	34.3	34.4
1) The permit regulation for the amount of cooling water is 3,800 million m³/yr (total aggregate amount for the OL1, OL2, and OL3 units).					
2) The permit regulation for the thermal load: 205,000 TJ/yr (~56,900 GWh/yr) (total value for the OL1, OL2, and OL3 units).					
OL2					
Net production (GWh)	6,914	7,167	7,156	7,314	7,051
The plant unit's own electricity consumption (GWh)	250	258	256	262	251
Capacity factor (%)	90.9	95.2	95.1	96.9	93.7
Cooling water (million m³) [1]	1,000	906	903	927	892
Thermal load on the sea (GWh) [2]	12,954	13,716	13,694	13,965	13,475
Efficiency (net) (%)	34.8	34.3	34.3	34.4	34.4
1) The permit regulation for the amount of cooling water is 3,800 million m³/yr (total aggregate).					
2) The permit regulation for the thermal load: 205,000 TJ/yr (~56,900 GWh/yr) (total value for the OL1, OL2, and OL3 units).					
Wind power plant					
Net production (GWh)	1.9	1.1	1.5	1.6	1.8
Capacity factor (%)	22	13	17	18	20
Electricity production capacity (MW)	1	1	1	1	1
Nuclear fuel					
Amount of spent fuel in the OL1 and OL2 storage pools and interim storage					
Number of assemblies	7,668	7,434	7,210	6,982	6,748
Assemblies (t)	1,291.8	1,253.4	1,216.9	1,179.8	1,141.9
Radioactive waste					
Low-level (m³)	117	167	117	113	76
Intermediate level (m³)	56	13	50	115	36
Operating waste cleared after monitoring (t)	61	55	16	16	22
Radioactive emissions					
Emissions into the air					
Noble gases [1] TBq (Kr-87 equivalent)	1.24	0.58	0	0	0.113
% of allowed amount	0.007	0.0033	0	0	0.0006
Iodine [1] TBq (I-131 equivalent)	0.000002	0.000094	0.0000001	0.000002	0.000015
% of allowed amount	0.0015	0.082	0.00009	0.001	0.013
Aerosols TBq	0.000011	0.000012	0.000059	0.00002	0.00003
Tritium TBq	0.24	0.27	0.32	0.43	0.38
Carbon-14 TBq	0.81	0.71	0.78	0.88	1.08
1) Permit regulation for radioactive emissions into the air: Noble gases 17,700 TBq Kr-87 equivalent, Iodine 0.114 TBq I-131 equivalent.					
Emissions into water					
Fission and activation products [1] TBq	0.0001	0.0002	0.0002	0.0003	0.0006
% of allowed amount	0.05	0.08	0.07	0.12	0.19
Tritium [1] TBq	1.31	1.5	1.85	2.39	2.41
% of allowed amount	7.2	8.2	10.1	13.1	13.2
1) Permit regulation for radioactive emissions into water: Tritium 18.3 TBq. Other beta-active nuclides 0.296 TBq.					

	2011	2010	2009	2008	2007
Raw water treatment					
Amount of water (m^3) [1]	357,659	378,470	500,669	485,158	344,509
Water treatment chemicals (t) [2]	63.3	65.0	69.2	66.1	64.0
1) Surface water pumped from the River Eurajoki to the Korvensuo storage pool.					
2) Chemicals used for the treatment of raw water (H_2SO_4, NaClO (10 %), NaOH, chemical precipitation agents).					
Sanitary waste water treatment					
Amount of water (m^3)	139,251	154,503	157,383	150,069	101,104
Concentration (mg/l) [1]					
BOD_{7ATU}	7.4	16	9.3	7.1	12.0
Phosphorus	0.14	0.16	0.095	0.27	0.15
Treatment efficiency [1] average (%)					
BOD_{7ATU}	96	96	97	98	96
Phosphorus	98	99	99	97	99
Load on sea area (kg)					
Phosphorus	19	25	15	40	15
Nitrogen	6,935	8,800	8,400	6,200	4,400
BOD_{7ATU}	1,022	2,500	1,500	1,100	1,200
Water treatment chemicals (t) [2]	44.7	54.5	56.1	42.6	36.1
1) The permit regulation for sanitary waste water: The maximum BOD_{7ATU} value of waste water discharged into the sea is 15 mg O_2/l and the maximum phosphorus concentration is 0.7 mg P/l. The minimum treating efficiency for the BOD_{7ATU} value and phosphorus is 90 %. All values are calculated as annual averages.					
2) Chemicals used for the treatment of sanitary waste water.					
Ordinary municipal and hazardous waste					
OL1 and OL2 (OL3)					
Landfill, total amount (t)	183 (405)	270 (928)	531 (1,601)	396 (387)	130 (122)
TVO's own landfill [1]	138 (284)	176 (777)	335 (560)	237 (106)	
Crushed brick and concrete (t)	37 (107)	22 (1,913)	182 (376)	519 (40)	
Paper and cardboard (t)	117 (73)	121 (67)	107 (74)	70 (78)	60 (60)
Wood and sawdust (t)	177 (1,629)	146 (3,115)	206 (5,310)	399 (4,412)	368 (1,521)
Metal (t)	212 (1,815)	176 (2,959)	220 (3,645)	228 (2,046)	155 (819)
Cable refuse (t)	34 (31)	20 (8.0)	40 (7.5)	29 (2.5)	26 (1.2)
Waste suitable for energy production (t)	144 (431)	206 (451)	326 (1,459)	336 (567)	189 (291)
Biowaste (t)	83 (48)	95 (26)	99 (24)	69 (44)	62 (37)
Glass (t)	9 (0)	19 (0)	14 (0)	13 (0)	2 (1)
Hazardous waste (t)	48 (149)	86 (79)	60 (71)	102 (39)	89 (5)
Screenings [2]	26	59			
1) The maximum value allowed by the permit regulation is 1,000 t/yr (total aggregate amount for the OL1, OL2, and OL3 units).					
2) The collection of screenings from the sea began in 2010 in accordance with the environmental permit.					
Intermediate agents					
Oils (m^3) [1]	258.8	270.8	267.4	254.3	303.6
NaClO (15 %) (m^3) [2]	86.2	67.6	37.0	40.4	30.8
Other chemicals (t) [3]	204.1	137.6	133.0	136.1	132.7
Ion exchange resins (t)	19.1	16.2	14.3	21.4	16.5
1) Backup diesels and heating boilers (amount consumed) and the amount of gasoline and diesel fuel consumed by TVO vehicles through their own tanks.					
2) Used for hydroid control in seawater channels.					
3) Solvents, bitumen, and nitrogen.					
Coal fuel					
The amount of coal used in Meri-Pori to produce TVO's share of electricity (t)	274,041	561,450	299,323	286,839	458,408
Verified CO_2 emissions of the Olkiluoto power plant					
Backup heating boilers (8 MW + 12 MW = 20 MW) (t)	1	32	2	5	1
Backup diesels (8 x 1,5 MW = 12 MW) (t)	455	424	483	433	470
Total (t)	456	456	485	438	471

EMAS TABLE

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.	4–5
The environmental policy and a brief description of the environmental management system of the organization.	6–10, 13, 22–24
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.	7–10
A description of the environmental objectives and targets in relation to the significant environmental aspects and impacts.	7–9
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.	6–21
Other factors regarding environmental performance including performance against legal provisions with respect to their significant environmental impacts.	6, 11–15
A reference to the applicable legal requirements related to the environment.	14–15
The name and accreditation number of the environmental verifier and the date of validation.	21

Our power plant at Olkiluoto has been EMAS (Eco-Management and Audit Scheme) registered with code FI-000039 (NACE code D35.1.1). The registration is valid until June 30, 2012.

Verification of conformity

DNV Certification OY/AB has, as an accredited certifier (FIN-V-0002), reviewed the internal procedures observed at Teollisuuden Voima Oyj's Olkiluoto power plant and the resulting data and documentation. Based on this review, DNV Certification OY/AB states that the environmental policy, the management program, the environmental system, audit procedures, and the environmental statement including the indicators fulfill the requirements of decree (EC) No. 1221/2009.

Scope and methodology of certification

The certification of the EMAS report was carried out at TVO's Olkiluoto facilities between February 28 and March 1, 2012. The certification was carried out in conjunction with the ISO 14001 audit. The requirements of both systems and the fulfillment thereof were discussed. The scope of the report and the accuracy of the information contained therein were verified at this time 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.

Environmental Report 2011 is a separate, independent report which provides a clear and accurate image of Teollisuuden Voima Oyj's operations and their impacts on the environment. The environmental system is a logical whole with relevant goals and targets, the realization of which is monitored by the environmental team and, additionally, in conjunction with management reviews. The system and the environmental report describing its effectiveness, including the environmental statement and the environmental indicators used, fulfill the requirements of the EMAS decree 1221/2009.

Environmental Report 2011 reflects well Teollisuuden Voima Oyj's strong commitment to the maintenance and continuous development of high level safety, quality, and an environmental protection culture in its operations.

Espoo, March 8, 2012
DNV Certification OY/AB
EMAS-accredited certifier
FIN-V-0002

Seija Meriluoto
Lead Auditor

Company-level policies

Safety culture

TVO 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.

Company-level policies

TVO and its personnel follow the policies determined by the company. Applicable laws, decrees, and official regulations as well as international agreements are strictly followed. TVO sets objectives for its operations, which are stricter than those set out in the applicable laws. TVO 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's environmental, nuclear safety and quality policy, and information security principles.

Nuclear safety and quality policy

The nuclear safety and quality policy includes nuclear safety, radiation protection, nuclear material supervision and quality.

Nuclear safety

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

Radiation protection

In all their radiation protection activities, TVO 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 material supervision

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

Quality

TVO ensures that high-quality working methods are used in the company. They lay the foundation for safe and economical operations. The personnel of TVO is aware of the safety significance of their work. Matters are discussed in an open manner. Know-how and operations are developed according to the principle of continuous development. The sharing of development themes, identified deficiencies, deviations, and errors is encouraged. We consider our internal and external customers equally important. We perform all work tasks appropriately, according to schedule, and with high quality. TVO 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 includes the environment, procurement, personnel, occupational health and safety, and communication.

Environment

TVO complies with the principles of sustainable development. TVO takes responsibility for the environment by identifying the environmental aspects of its operations and minimizing the harmful impacts they cause. TVO specifies objectives and targets for its operations according to the principle of continuous development. TVO monitors

the impact of its operations on the state of the environment and launches immediate corrective measures when necessary. TVO takes care of the environmental competence and expertise of its personnel and others working at the Olkiluoto power plant. TVO aims to be a forerunner in the management of environmental matters.

The objective of TVO is to prevent and reduce the already low emissions of radioactive substances. Potential exceptional events in the plant process are predicted and preventing potential environmental damage is prepared for. TVO believes its overall responsibility for all stages of the fuel cycle is important. The company monitors and supervises the environmental management of fuel suppliers. 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 all the way from uranium mines to final disposal according to the "from bedrock to bedrock" principle.

TVO observes energy efficiency requirements and improves the energy efficiency of its operations. TVO monitors its own energy consumption and aims to improve its efficiency by taking energy into account in equipment procurement and the development of operating methods. Plant unit modernization improves the energy efficiency of the power plant process.

TVO minimizes the amount of waste by improving the use of energy, supplies, and raw materials, and by developing the utilization of waste. The goal is to increase the relative share of waste delivered to utilization and to decrease the amount of radioactive waste. TVO also aims to decrease fuel consumption by optimizing the use and features of the fuel. The development of the Olkiluoto area and expanding the operations observe the sustainable use of the environment. The design and construction of new nuclear power plant units aim to minimize harm and disruption to the environment.

Procurement

High-quality procurement operations ensure safe, competitive, and reliable production and long-term operation of the plant units. The products procured must meet TVO's safety, quality, 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.

Supplier selection pays particular attention to the supplier operations' continuity, delivery reliability, quality, and environmental management and competitiveness while appreciating domestic and local suppliers. Suppliers are assessed, delivery quality is monitored, and immediate corrective measures are taken when necessary. TVO operates responsibly and ethically in relation to the supply chain and business partners. TVO requires its partners to follow a high safety culture and responsible operating methods in their activities.

Personnel

The objective of TVO is to ensure that personnel are motivated and competent, they carry out their tasks in a responsible manner and are committed to observing the agreed operating methods. TVO ensures that the company has sufficient, competent HR resources to meet the objectives specified for the company. TVO provides its personnel with opportunities to develop in their work and occupation. TVO provides competitive rewards and encourages employees to work profitably, to meet objectives and to carry out good operations on a daily basis. TVO creates the preconditions for its personnel to take care of their working capacity. The principles of the HR policy are implemented through good co-operation with the personnel. The objective of TVO is to have an equal, healthy working environment which does not approve of any discrimination and which promotes the implementation of equality.

Occupational health and safety

The objective of the company's occupational health and safety operations is to promote occupational health and safety according to "zero accidents" thinking. TVO maintains a good work atmosphere and good working conditions. TVO and its employees do not approve of any workplace harassment or bullying. The occupational health and safety objective of everyone working in the plant area is to ensure their personal safety and that of others. Occupational health and safety is observed in all functions.

Communications

TVO increases mutual trust by promoting open, responsible interaction with all its stakeholder groups in the neighborhood, Finnish society, and the international co-operation network of its sector. TVO promotes general nuclear power awareness and general acceptance by participating

in social debate and by openly communicating the operations and events of the company and the Olkiluoto nuclear power plant.

The Olkiluoto Visitor Center serves those interested in the company's operations, and an exhibition is open to visitors. Through internal communication, TVO supports an interactive corporate culture and ensures that the personnel understands the company's objectives and policies and is aware of the company's financial and production status.

TVO's interaction with stakeholder groups is guided by a high ethical principles, thus strengthening trust in the operations of TVO and the stakeholder group and does not jeopardize their reputation or objectivity. Promoting culture, sports, research, and non-profit activities is part of TVO's corporate responsibility. When selecting partners and sponsorships, their reputation, values, and suitability for TVO's strategic objectives and principles are taken into account. Being Finnish, reliable, interactive, and a forerunner are key selection criteria.

Production policy

The production policy includes the operation and maintenance of the plant and increasing its production capacity.

Operation and maintenance

Disruption-free, predictable and competitive electricity production is the objective of TVO's operation and maintenance activities. Nuclear and operating safety always comes first. Plant safety and reliability is developed in a well-planned way. Modifications or renovations carried out at the plant are implemented according to plans approved in advance so that the plant can be used for as long as possible. Well-planned, correctly sized testing and inspection measures ensure 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.

Increasing production capacity

TVO monitors nuclear power technology development and participates in international co-operation with power plant suppliers and nuclear power companies. The output of the existing plant units at Olkiluoto is increased by utilizing the most recent available technology whenever possible. The design and implementation of Olkiluoto 3 applies the best, financially feasible technology which minimizes environmental harm, while taking into account the full life cycle of the plant unit.

Corporate safety policy

The corporate safety policy includes production and operating safety, personnel and facility safety, rescue and preparedness operations, and information security.

Production and operating safety, personnel, and facility security

The procedures related to safety are implemented in a well-planned, proactive, and comprehensive way. The procedures ensure the safe operation of the plant and the integrity of the personnel and others working at the plant.

Rescue and emergency

TVO maintains and develops action preparedness for special situations. Rescue and emergency are rehearsed on a well-planned and regular basis. The company continuously maintains its awareness of risks related to the company, personnel, and the operating environment.

Information security

The information security procedures are dimensioned according to the importance and risks of TVO's functions. The objective is to protect nuclear safety, the financial interest and privacy of personnel, to ensure the availability of correct, reliable information, and to prevent damage caused by information processing. TVO's information security procedures cover the availability, authenticity, and confidentiality of information and information systems as well as access right management procedures.

TVO's employees are assigned access rights to the company's information and information systems according to their work tasks. Handing over information to outsiders is only allowed for the benefit of TVO. Processing information submitted by other parties to TVO is at least subject to the information security procedures used or required by the party submitting the information.

Terms used in TVO's environmental report

A

Activity
The number of spontaneous nuclear disintegrations occurring in a given quantity of radioactive material within a certain time. The unit of radioactivity, becquerel (Bq), equals one disintegration per second.

Absorption
Dissolution of a gas into a liquid. As a gas dissolves into a liquid, energy is released. This phenomenon is utilized in, for example, absorption heat pump technology.

Aerosols
A gaseous medium containing solid or liquid particles. In the case of emissions or releases from a nuclear power plant, these particles may be radioactive.

ALARA (As Low As Reasonably Achievable)
A nuclear power plant must be operated so that the radiation exposure can be kept as low as possible by practical measures.

AVI
Regional State Administrative Agency.

B

Background radiation
Radiation from natural radiation sources. These sources include the radioactive substances of the Earth and radiation from space.

Becquerel, Bq
Expresses the number of decays of the nuclei of a radioactive material per time unit. 1 Bq corresponds to one decay per second.

BOD
The biological oxygen demand of wastewater.
(Measure: BOD_{7ATU} mg O_2/l)

C

Capacity factor
A number describing the output of a power plant during one year or other suitable period. Capacity factor is the share of energy produced by a power plant in a year as a percentage of the energy that the plant would have produced if it had operated without interruption at full capacity for the entire year.

Carbon-14
Carbon-14 is a long-lived, beta-active radioisotope created by cosmic radiation in the atmosphere. Carbon-14 also forms in the reactor when the oxygen contained in the coolant is activated. From there, carbon-14 transfers into the atmosphere, bonded with carbon dioxide.

CO_2
Carbon dioxide.

Consortium
A temporary merger of companies, formed for a particular business venture.

D

DNV
An abbreviation of Det Norske Veritas. Det Norske Veritas acts as an independent third party in various inspection/assessment tasks. DNV's central fields of operation include services relating to the classification of ships and the certification of management systems.

E

EIA procedure
The Environmental Impact Assessment (EIA) procedure is a procedure related to the granting of an environmental permit. It must be performed in the planning phase of a project if the project causes, or may cause, significant environmental impacts.

ELY centre
Centre for Economic Development, Transport and the Environment.

Emission right
EU-wide carbon dioxide emission rights trading began in 2005. For the entire EU area, annual carbon dioxide quotas were specified for industry and energy plants emitting carbon dioxide. The target is to allocate cost-efficiently emission reduction measures to where their implementation is the most inexpensive. Plants that successfully and cost-efficiently reduce their emissions to a lower level than their quota allows may sell their spare emission rights in emissions trading. The plants for which the reduction of emissions is costly can purchase emission rights from the market.

EMAS
Eco-Management and Audit Scheme is an environmental management system of the EU. TVO's environmental management system complies with EMAS.

F

Fission
The splitting of one heavy atomic nucleus into two or more intermediate-mass nuclei, releasing neutrons and a considerable amount of energy in the process.

Fission products
Usually radioactive intermediate-mass atomic nuclei created in fission.

G

Gigawatt, GW
Unit of power. One gigawatt equals one million kilowatts.

Gigawatt hour, GWh
A unit of electrical energy. One gigawatt hour equals one million kilowatt hours.

I

Iodine
With respect to radiation protection, iodine-131, with a half-life of eight days, is the most important iodine isotope created as a fission product.

INES Scale
The International Nuclear Event Scale uses seven categories to describe the severity of nuclear power plant accidents and incidents. The lowest categories (1–3) describe incidents weakening plant safety, and the highest categories (4–7) describe accidents which may lead to emissions into the environment requiring radiation protection measures.

Ion exchange resins
Material used for removing impurities from water.

ISO 9001 standard
An international standard that specifies requirements for quality management systems.

ISO 14001 standard
A standard related to environmental management, used extensively throughout the world.

K

KAJ Store
Storage facility for intermediate-level waste.

KPA Store
Interim storage facility for spent fuel.

M

Megawatt, MW
Unit of power. One megawatt equals 1,000 kilowatts or 1,000,000 watts.

N

Natura area
Protected areas selected on the basis of EU-wide nature conservation goals. In Natura areas, nature conservation is implemented so that the normal use of the area is limited as little as possible.

Noble gas
A designation for some gaseous elements that rarely occur in nature (air). The noble gases are helium (He), neon (Ne) argon (Ar), krypton (Kr), xenon (Xe), and radon (Rn).

O

ONKALO
ONKALO is the name of the underground bedrock research facility for the final disposal facility for spent nuclear fuel.

ORC (Organic Rankine Cycle)
Rankine cycle process using a suitable organic fluid as circulation medium.

P

PRA
Probabilistic Risk Assessment.

R

Radiation
Electromagnetic waves or particle radiation consisting of the smallest particles of matter.

Radioactive operating waste
Waste created in a power plant's maintenance work. The volume of the waste can be decreased by compression. Examples of such waste are plastic materials, papers, and fabrics.

S

SAHARA (Safety As High As Reasonably Achievable)
The plant must be made as safe as possible within reasonable measures.

Screenings
The organic matter which accumulates on the screening plant's fine screen and traveling basket filters in cooling water intake. The screenings mainly consist of debris, algae, mussels, and fish carried with cooling water.

STUK
The Radiation and Nuclear Safety Authority, or STUK, is the authority that supervises the operations of nuclear power plants in Finland.

T

TEM
The Finnish Ministry of Employment and the Economy.

Terawatt, TW
Unit of power. One terawatt equals one billion kilowatts.

Terawatt hour TWh
A unit of energy. One terawatt hour equals one billion kilowatt hours.

Tritium
An isotope of hydrogen, the nucleus of which consists of a proton and two neutrons.

Tukes
The Finnish Safety and Chemicals Agency.

U

Uranium
An element (U): 0.0004 % of all materials contained in the Earth's crust (four grams in a ton) is uranium. All isotopes of uranium are radioactive. Natural uranium is mostly in the form of isotope U-238, with a half-life of 4.5 billion years. Only 0.72 % of natural uranium is in the form of isotope U-235, which can be used as a nuclear fuel.

V

VLJ Repository
The repository for low-level and intermediate-level waste.

Y

YVL guide
Nuclear power plant guide.

Further information

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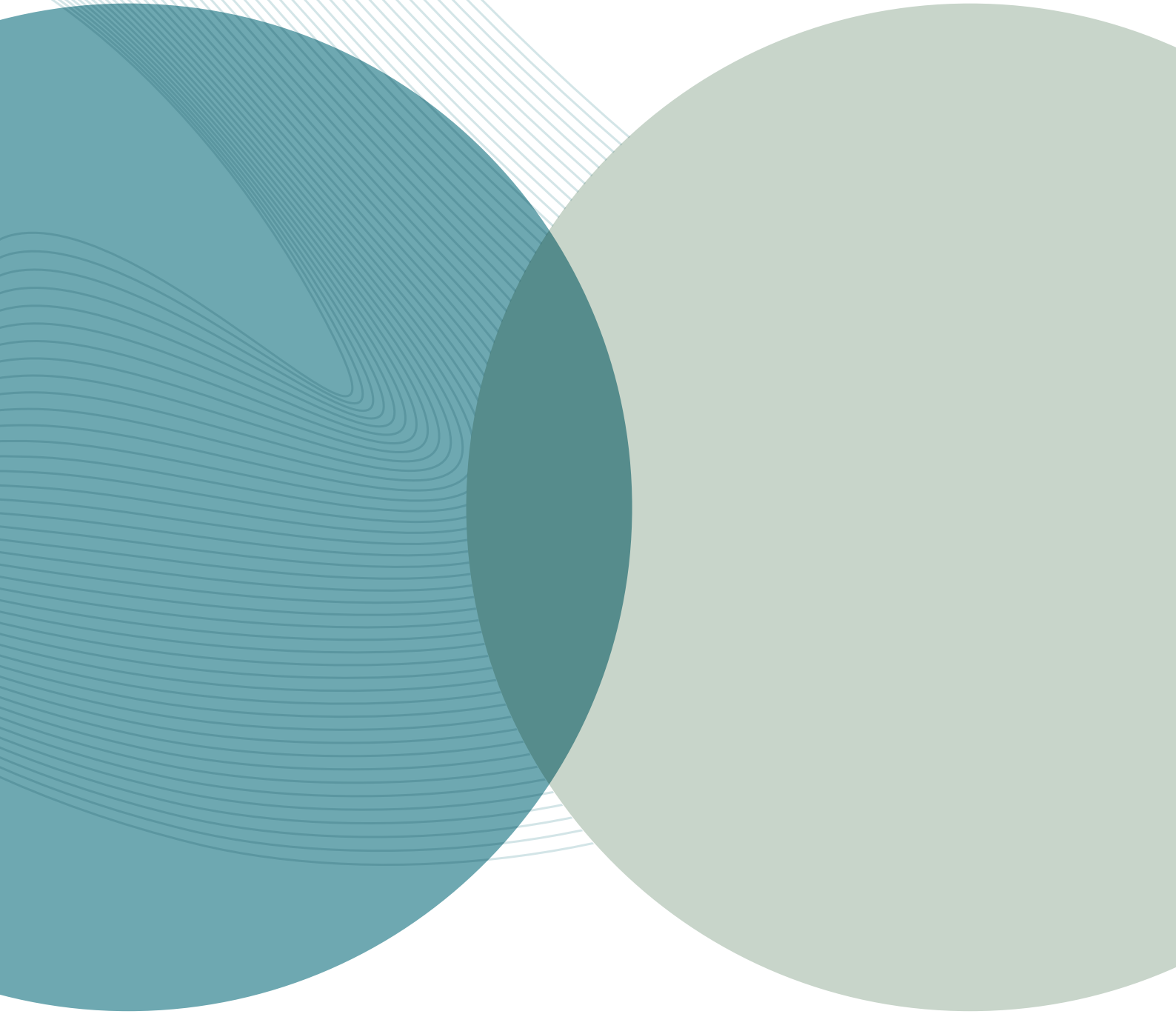
Please visit the TVO website for a lot more additional information about TVO, environmental matters, and nuclear power.
www.tvo.fi



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