TVO

Environmental Report 2012

Teollisuuden Voima Oyj – Well-being with nuclear electricity

TVO Environmental Report 2012 complies with the EMAS regulation concerning environmental reporting.
The 2011 figures are presented in brackets.

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TVO – An experienced pioneer in the nuclear power sector

TVO contributes to maintaining sustainable development and Finnish well-being by providing Finns with electricity from the Olkiluoto nuclear power plant in Eurajoki in a safe, reliable, and environmentally friendly manner.

TVO is a respected Finnish nuclear power company and has become a leader in the nuclear power sector during the course of its more than 40 years of operation. On Olkiluoto Island, TVO has the competence, structures, functions, and waste management required for the safe production of nuclear electricity, and for the construction of new capacity. TVO's nuclear power know-how and experience attract global interest.

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 all electrical power required in Finland. The Olkiluoto nuclear power plant has been granted the right to use the Key Flag Symbol as recognition of its Finnish work and know-how. Every year, the nuclear power produced at Olkiluoto helps prevent carbon dioxide emissions of over 10 million tonnes in Finland compared to producing the same amount of electricity using coal. The saved amount corresponds to the total annual carbon dioxide emissions of all road traffic in Finland.

The second best production output in plant history

The Olkiluoto complex has two nuclear power plant units, OL1 and OL2. Both of these have been producing electricity for over 30 years. The plant units operated safely for the entire year 2012. The production output for 2012 was the second best in the history of the Olkiluoto nuclear power plant, reaching 14.45 TWh (billion kWh) of electricity.

OL2 achieved its best production output so far, 7.48 TWh. The load factor of OL2, 96.9%, was also the best in the plant unit's history. Production at OL1 was cut back by a generator breakdown in the spring. The annual outage was brought forward as a result. Despite these challenges, the load factor of OL1 reached 90.4% and the production output was 6,97 TWh. On April 20, 2012, the Olkiluoto nuclear power plant crossed the record limit of 400 TWh of electricity produced.

Upgrades implemented between 2010 and 2012 further improved the nuclear power plant's safety, and the improved efficiency of the turbine islands increased the net electrical output of both plant units by around 20 megawatts. Both plant units now have a rated net electrical output of 880 MW. TVO continues to plan and implement safety improvements within projects such as the stress tests carried out for nuclear power plants throughout the EU.

A third plant unit, Olkiluoto 3, is currently under construction at Olkiluoto. The OL3 site is a major international project that gives us an opportunity to contribute to the creation of international trends for the future of nuclear power construction. Most of the construction work has been completed, and the main components are in place.

The I&C design work for the reactor plant, installation of pipes and electrical systems, installation of electrical systems, and pressure testing continued. Commissioning of the nuclear island electricity distribution system began. Process system commissioning tests also continued at the turbine island.

On July 1, 2010, the Finnish Parliament ratified a favorable decision-in-principle by the Government concerning the construction of the new OL4 unit. In 2012, TVO continued to investigate the licensing potential and suitability of the power plant alternatives together with the potential plant suppliers. TVO launched the competitive bidding for the Olkiluoto 4 project in March 2012.

May 8, 2012 was the 20th anniversary of the first load of radioactive waste being transferred into the repository for operating waste, the VLJ repository. The VLJ repository also receives the small radioactive waste created by Finnish healthcare, industries and research institutions. On November 22, 2012 the Finnish Government granted TVO a license to dispose of the low and intermediate level waste from the OL3 plant unit, currently under construction, in the VLJ repository. It is estimated that the repository will need to be extended in the 2030s.

The new extension of the spent fuel interim storage facility (the KPA storage) reached its final height, which was

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.

duly celebrated on August 31, 2012. The extension doubles the available fuel pool capacity.

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. The excavation of the research tunnel has been completed. The excavation of two characterization tunnels at the final repository depth were completed and accepted in 2012. The purpose of the characterization tunnels is to prove Posiva's ability to build and excavate actual final repository tunnels, to drill disposal holes, and to determine the best location for the tunnels and holes to ensure safe disposal of nuclear materials. Posiva submitted a construction license application on the repository for spent nuclear fuel to the Finnish Government on December 28, 2012.

Electricity at cost price

We provide our owners with electricity at cost price. The owners cover all of TVO's operating costs, and in return they receive electricity produced by TVO proportional to their ownership. They consume the electricity themselves or sell it 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 with Pohjolan Voima Oy as the main owner. 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 40%. Posiva Oy takes care of the final disposal of the spent nuclear fuel produced in its shareholders' Olkiluoto and Loviisa nuclear power plants.

TVONS markets and sells TVO's nuclear power know-how services throughout the world. Olkiluodon Vesi manages the water supply required by the TVO and Posiva operations at Olkiluoto. TVONS and Olkiluodon Vesi Oy are wholly owned by TVO.

TVO has production plants at Olkiluoto in Eurajoki, and offices in Helsinki, Brussels, and Rauma. No changes took place in TVO's ownership during 2012. The Olkiluoto site also features a 1 MW wind power plant. Furthermore, there is a 100 MW gas turbine back-up power plant, built 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 power produced by OL1 and OL2, the B series entitles shareholders to power produced by OL3, and the C series entitles shareholders to a share of the electricity produced by the Meri-Pori coal-fired power plant.

TVO'S SHAREHOLDERS AND THEIR HOLDINGS, DECEMBER 31, 2012:

	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 recognize the environmental aspects of our operations. We strive to minimize the harmful impact 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 aim to be a pioneer in environmental management.

In 2012, our operations at the Olkiluoto nuclear power plant complied with our environmental policy, the conditions of our environmental permits, and our environmental management system.

We take care of the environmental management and environmental impact of our power plant units and the infrastructure around them. 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 recognize the environmental aspects of our operations and systematically strive to minimize any associated harmful effects. We inform and train our personnel on environmental matters in site entry training and at various theme events. Our operations are regularly assessed both within our organization and by external assessors.

The feasibility 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. When necessary, the review defines corrective measures to achieve the set objectives. We maintain a list of the statutory requirements applicable to our operations and systematically monitor them for changes.

Environmental research as the foundation of all operations

We have conducted environmental research on the island of Olkiluoto 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 determination of the impact on waters.

Around 300 samples are taken from the environment of Olkiluoto each year. The samples are 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. Forty to fifty water samples are taken from the sea surrounding Olkiluoto each year. These samples are subjected to more than a hundred different water quality analyses. Furthermore, the condition of fish stock is monitored by, for instance, a survey among professional fishermen. The status of aquatic plants is monitored by means of transect line diving every six years.

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 carried out the related environmental impact assessment procedures. The research has given us detailed insight into the Olkiluoto environment.

Annual targets for environmental and energy aspects

TVO's environmental management system is certified according to the international ISO 14001 standard and is compliant with the EMAS requirements. The purpose of the system is to continuously improve the company's operations and the level of environmental protection. Long-term objectives have been defined for seven major environmental aspects. Targets confirmed by the company's management are set annually for each objective.

We have identified 7 significant environmental aspects and to those we have set 4 long term goals. In order to achieve the goals, short term objectives are set and those are confirmed annually by the management review. A total of fifteen targets were set for the development of environmental issues in 2012. Thirteen of these targets were reached wholly or in part. 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. The targets set for the year 2013 are based on the previous year. According to the continuous improvement policy we have additional measures for achieving the goals. An environmental team of experts from various organizational units monitors the status of the targets approximately every two months. Other subjects discussed at the team's meetings include possible environmental non-conformity status and any issues concerning cooperation with the authorities or environmental aspects.

Cooling water – the most significant environmental aspect

We assess the significance of environmental and energy aspects on the basis of statutory and permit require-

MAJOR ENVIRONMENTAL AND ENERGY ASPECTS AND ASSOCIATED LONG-TERM OBJECTIVES AND TARGETS FOR 2013

SIGNIFICANT ENVIRONMENTAL ASPECTS:	OBJECTIVES:	TARGET
The thermal load on the sea caused by the cooling water	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
Land use Spent nuclear fuel produced during operations	Improvement of material and energy efficiency and sustainable land use	1. Development of energy efficiency activities and system 2. Long term 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 impact and costs resulting from the personnel's working methods 6. Reduction of the amount of process water to be less than 37 000m^3 per year. 7. Development of the recycling of wood waste
Selecting the product and service suppliers Storage and handling of hazardous or harmful substances	Suppliers' environmental responsibility	1. Acquisition of information from suppliers concerning their environmental management
Significant radioactive emissions into the environment during an accident situation Radioactive emissions into the atmosphere in an exceptional situation	Isolation of radioactivity originating from the power plant from the natural environment	1. Ensuring the purity of the process 2. Keeping radioactive emissions into the atmosphere clearly below the limits set by the authorities 3. Keeping radioactive emissions 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 2012

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

OBJECTIVE: MANAGEMENT OF ENVIRONMENTAL LOAD

Target 1. Management of the thermal load of cooling water and research into the utilization of the heat ▶

The target was met as planned. The temperature of cooling water remained within the limits required by the environmental permit. Research was carried out into the use of cooling water for the defrosting of outdoor areas.

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

The target was partially met. The waste water treatment plant has been improved through measures such as the replacement of the polymer system, but not all planned measures have yet been completed.

Target 3. Development of environmental risk management ▶

The target was met as planned. The environmental risk management procedures have been compiled into a unified system and complemented as necessary.

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

Target 1. Development of energy efficiency activities and system ▶

The target was met as planned. Energy efficiency has been taken into account in the preparation of modification plans. Two proposals for action were made in 2012 concerning improvements in energy efficiency. The company participated in Energy Saving Week by organizing an initiative contest on the theme for the personnel and publishing related informative presentations in the TVO intranet. TVO's training materials on energy efficiency were updated, and two briefings were held for various personnel groups on the subject in 2012.

Target 2. Land use planning ▶

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 safe final disposal of nuclear waste at Olkiluoto. The target was met; the land use team held meetings as planned, and operations were based on the strategic plan for land use in Olkiluoto.

Target 3. Recognition of biodiversity ▶

An observation trail was planned in the environment of the Olkiluoto Visitors' Center. A biodiversity survey of the Olkiluoto island was to be planned and launched. The observation trail to provide information on the environment of the island was opened in fall 2012. The biodiversity survey was planned, but not yet launched, which means that the target was partly met.

Target 4. Keeping the amount of landfill waste below 12% of the total amount of waste ▷

The target was not met. In 2012, the share of waste disposed of at the landfill was 15% of the total amount of waste.

Target 5. Reduction of the environmental impact and costs resulting from the personnel's working methods ▶

The target included development of meeting practices through an increase in the share of phone and web meetings, and the revision of the environmental manual meant for internal use and guidance. New IT systems have been adopted and better tools acquired for web meetings. The revision of the environmental manual was delayed, which means that the target was partly met.

Target 6. Reduction of the amount of process water (max. 37,000 m^3/year) ▶

The goal was to achieve the target set for OL1 and OL2 for 2005 (37,000 m^3/year) and to replace the air humidifiers in the OL2 control room to cut back on the consumption of water. The air humidifiers were replaced, but the consumption of process water totaled 38,100 m^3 in 2012, which means that the target was partly met.

Target 7. Development of the recycling of wood waste ▶

The aim was to test the use of construction waste wood as a material so that 15% of the wood waste would be used for other purposes, and the rest crushed and burned for energy. The experiment got off to a good start, and at least 15% of wood waste has been duly used.

▶ 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 not met as planned. The aim was, among other things, to improve the environmental supervision of contractors through quarterly field rounds. These were not carried out as planned, nor were all planned contractors evaluated for their environmental performance.

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. The loose part workgroup met three times during the year and kept a record of loose parts[1]. In 2012, a total of 10 loose parts were detected. The workgroup was established to discuss measures to reduce the number of loose parts. Loose part protection was improved by ordering cabinets that hold pipe plugs and caps for protection purposes. The turbine hall and the reactor building were agreed as the preliminary locations of the cabinets. Subcontractors were provided with induction on the matter.

1) loose part = a foreign object in the process

Target 2. Keeping radioactive emissions into the atmosphere clearly below the limits set by the authorities ▶

The target was met as planned. The total noble gas emissions of the plant amounted to 0.01% of the limit value set by the authorities (target value: < 0.04%).

Target 3. Keeping radioactive emissions into water clearly below the limits set by the authorities ▶

The target was met as planned. Radioactive emissions into water (fission and activation products) amounted to 0.07% of the maximum allowed value set by the authorities (target value: < 0.3%).

4. Prevention of the increase of 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 range of variation in 2012.

Following the Fukushima accident, TVO is involved in the further improvement of the plant units' ability to cope with extreme weather phenomena that occur concurrently with a power supply failure. The related changes to the units have partly progressed to the detailed planning stage, and will be implemented in connection with the annual outages of the next few years.

ments as well as by observing the magnitude, probability, and severity of the impact. Other factors affecting our assessment include our stakeholder groups and our own influence in the matter.

The total amount of seawater used for the cooling of the OL1 and OL2 plant units is approximately 76 m^3/s. In 2012, the total amount of seawater used for cooling was 2,297 (2,154) million m^3, and the corresponding thermal load on the sea was 26.8 (26.6) TWh. In fact, the cooling water's thermal load on the environment is the most significant environmental aspect of our operations.

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 process water.

Throughout our operation, we have monitored and surveyed the impact of cooling water. The cooling water spreads in the surface layer of an extensive sea area, where part of the heat transfers into the air. Depending on the weather conditions, an increase in temperature can be observed up to an approximate distance of three to five 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 from 3 to 20 square kilometers, depending on the winter weather. We use newspaper announcements and thin 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 protection sites in the Natura area of the Rauma archipelago.

We monitor seawater temperature as required by our environmental permit. One of the environmental permit regulations is that 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 2012.

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 in 1998. The Olkiluoto power plant has been included in the business sector's energy efficiency agreement since 2008. The agreement was first established in 2007. As 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).

We have carried out an energy review of our facilities that has been used as a basis for the energy efficiency improvement plan for 2011–2016. One of the energy-efficiency improvement measures involves replacing 4,500 lighting fixtures with new ones. This will save approximately 286 MWh of electricity every year. 50% of the planned replacements were completed by the end of 2012.

The external heat distribution circuit of the OL1 plant unit will be converted into a secondary circuit system. 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 similar measure was carried out for OL2 in 2010, and the heat has been utilized for the same purpose. Plans and preliminary surveys concerning the district heating potential in the Olkiluoto area have been prepared.

Active stakeholder communications and careful processing of environmental deviations

The Olkiluoto Visitors' Center receives about 15,000 visitors each year. Visitors are told about TVO's operations, and their questions are answered. Each year, we introduce our operations at various trade fairs or other such events. We also organize public meetings at the marketplaces of nearby towns, allowing citizens to talk to TVO's representatives. The public may also send us feedback and questions via the TVO website and all the feedbacks with contact information are replied.

Our initiative operations also support the involvement of stakeholder groups in TVO's environmental management. A total of 332 initiatives were made in 2012, and 113 of these received recognition from TVO. (Some of the recognized initiatives had been submitted in previous years.) Some of the initiatives directly or indirectly reduce the environmental impact of our operations or increase energy efficiency.

In the year 2012 there were no incidents that would have caused environmental damages or significant environmental deviations in Olkiluoto power plant area. A total of nine (20) minor environmental incidents or minor non-conformances pertaining for example to the marking of chemicals or waste containers were observed; the number of minor incidents and non-conformances at the OL3 construction site was 26 (17).

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 non-conformances and events to the environmental authority.

Small emissions, responsible waste management

We are committed to reducing the amount of waste and to promote its utilization. We isolate radioactive waste from the natural 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 operations produce ordinary municipal waste, hazardous waste, and radioactive waste, as well as a small amount of ordinary and radioactive emissions into air and water. They are discussed in more detail in the key figures of the environmental report on pages 18–19. No events leading to the contamination of the soil occurred in 2012.

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 that we set ourselves. Our noble gas emissions into the atmosphere amounted to 0.01% (0.007%) and iodine emissions to 0.02% (0.0015%) of the allowed limit value specified by the authorities.

The emissions of radioactive fission and activation products into water amounted to 0.07% (0.05%) and tritium emissions to 7.1% (7.2%) of the limit value specified by the authorities.

Minimum amount of landfill waste

We are committed to reducing the amount of waste and require everyone working at Olkiluoto to do the same. All the wastes produced from activities in Olkiluoto are separated and processed and the sorted wastes are forwarded for utilization. We sort ordinary waste into nine separate groups and only take waste that is unsuitable for utilization to the landfill. We gather all hazardous waste to the hazardous waste storage facility. From there, the waste is taken to an appropriate processing facility for further processing.

The share of waste utilized for recycling or energy in our total amount of waste was 78% (86%), the share of landfill waste was 15% (10%) and the share of hazardous waste was 7% (3%). The total amount of waste was 2,696 (5,800) metric tons. The significant reduction in the amount of waste is due to the construction work at the OL3 site progressing to the installation phase.

Operating waste is sorted according to its level of radioactivity

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

Waste exempted from control contains such a small amount of radioactive substances that the waste can be returned to utilization or disposed of at our landfill site. The waste is produced during the operation and maintenance of the power plant. The amount of maintenance waste exempted from control was 20 (61) metric tons. In addition, we cleared approximately 50 (59) metric tons of metal for recycling and delivered 7 (10) metric 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 low level waste. We pack them tightly and place them in the repository for operating waste (VLJ repository) located at an approximate depth of 100 meters in the plant area. The amount of low level waste disposed of in the VLJ repository totaled 172 m³ in 2012.

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 the mixture in the VLJ repository. The amount of intermediate level waste disposed of in the VLJ repository totaled 20 m³ (0 m³) in 2012. The total amount of high level radioactive waste (spent fuel) produced in 2012 was 35.8 tons (39.1 tons). It is placed in interim storage at Olkiluoto until it can be disposed of in the Olkiluoto bedrock. It is estimated that final disposal can begin in 2020. Decommissioning waste is waste created in conjunction with disassembly after power plant decommissioning. Decommissioning waste is also disposed of at Olkiluoto.

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 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 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 to purify 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 m³ each year. During the year under review, we took 211,312 m³ (357,659 m³) 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 2012, the amount of treated sanitary waste water was 111,565 m³ (139,251 m³). The phosphorus load discharged into the sea was 31 kg (19 kg), the nitrogen load was 5,475 kg (6,935 kg) and the biological oxygen demand (BOD7ATU) was 985 kg (1,022 kg). We treat the sanitary waste water in accordance with the permit regulations concerning treatment efficiency and emissions into water as well as statutory requirements. The emissions from our sanitary waste water treatment plant were only a fraction of the nutrient load of the River Eurajoki, totaling 25,000 kg of phosphorus and 829,000 kg of nitrogen. The river empties into the sea north of Olkiluoto. Results of the water quality are measured by external consulting company.

OLKILUOTO NUCLEAR POWER PLANT'S ENVIRONMENTAL BALANCE SHEET 2012 (2011)

Emissions into the air			Allowed annual emissions
Noble gases (TBq)	1.21 (Kr-87 equivalent)	(1.24)	(9.420)
Iodine (TBq)	0.000017 (I-131 equivalent)	(0.000002)	(0.103)
Aerosols (TBq)	0.000016	(0.000011)	
Carbon-14 (TBq)	0.88	(0.81)	
Tritium (TBq)	0.36	(0.24)	
CO_2 (t)	384	(456)	
NOx (t)	0.52	(0.59)	
SOx (t)	0.001	(0.002)	
Particles (t)	0.36	0.41	

URANIUM FUEL (t)	37.6	(41.0)
Intermediate agents		
Oils (m^3)	238	(259)
NaClO (15 %) (m^3)	67	(86)
Other chemicals (t)	115	(204)
Ion exchange resins (t)	11	(19)
Water treatment chemicals (t)	94	(108)
Raw water (tap and process water) (m^3)	211,659	(379,659)
Cooling water (million m^3)	2,297	(2,154)

ELECTRICITY (TWh)			14.5	(14.2)
Municipal waste	**OL1 and OL2**		**OL3***	**Total**
Recyclable waste (t)	539 (839)		1,571 (4,133)	2,110 (4,972)
Landfill waste (t)	108 (183)		296 (405)	404 (588)
Hazardous waste (t)	109 (48)		73 (149)	182 (197)

* construction phase

Radioactive waste		
Low level waste (m^3)	172	(117)
Intermediate level waste (m^3)	20	(56)
Spent nuclear fuel (t)	35.8	(39.1)

Emissions into the water			Allowed annual emissions
Cooling water (million m^3)	2,297	(2,154)	
Thermal load to the sea (TWh)	26.8	(26.6)	
Fission and activation products (TBq)	0.0002	(0.0001)	0.296
Tritium (TBq)	1.31	(1.31)	(18.3)
Phosphorus (kg)	31	(19)	
Nitrogen (kg)	5,475	(6,935)	
BOD_{7ATU} (kg)	985	(1,022)	

Electricity production under the supervision of authorities

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 concerns 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 Olkiluoto environment are submitted to STUK for analysis. We prepare an annual report on the amount of waste and emissions caused by our operations, and submit the report to several regional and national authorities. We annually report our environmental investments and environmental protection activity costs to Statistics Finland. After verification, we report the annual carbon dioxide emissions of back-up diesels and back-up heating boilers to the Energy Market Authority. Tukes acts as the supervising authority for the industrial processing and storage of hazardous chemicals.

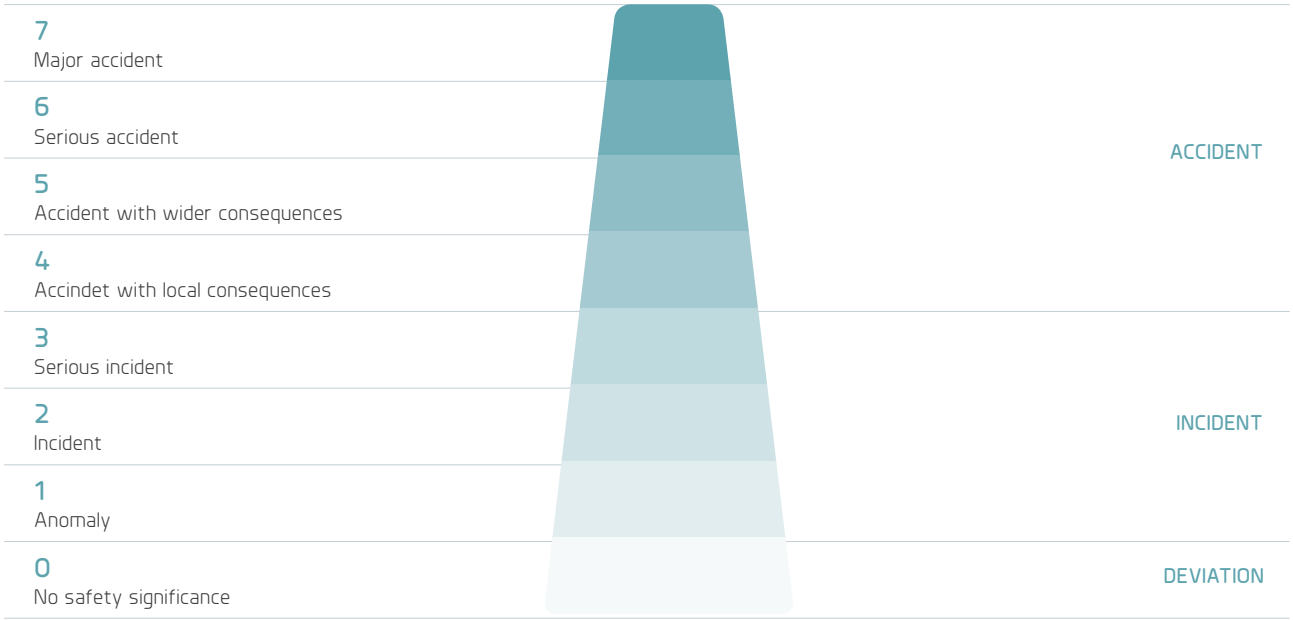
No special events resulting in an environmental impact

No nuclear or radiation safety-related special events or operating disruptions resulting in environmental impacts took place at the Olkiluoto power plant in 2012. In case of special events and operating disruptions, we submit separate case-specific reports to STUK.
The events taking place at the nuclear power plant are classified on the international INES scale according to their degree of severity. The INES scale has seven categories of severity. Category 4–7 events are classified as accidents, category 1–3 events as incidents or anomalies with a negative effect on safety, and category 0 events as deviations with no significance to safety. The most severe events ever to occur at Finnish nuclear power plants have been classified as INES category 2 events. During the operating history of the Olkiluoto nuclear power plant, there have been a total of three INES 2 events.
In 2012, two INES 1 events occurred at the Olkiluoto nuclear power plant. These concerned deviations in the control circuits of isolation valves detected in the tests carried out during the annual outage. As a corrective measure, the reactor protection system testing coverage survey will be extended to the containment isolation function.
In 2012, four other special reports were prepared on our operations in addition to the reports related to the event mentioned above. These reports concerned events classified as INES 0 (no significance for nuclear or radiation safety). Furthermore, a root cause report was prepared on system isolation during the annual outage.
We process all operational events taking place at the Olkiluoto nuclear power plant and continuously monitor events taking place at other nuclear power plants around the world. We develop our operations on the basis of the observations that we make.

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. Operating the Olkiluoto power plant is subject to a license according to the Environmental Protection Act, and cooling water intake is subject to a license according to 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 thermal 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.
Permits referred to in the Chemicals Act have been granted for the processing and storage of hazardous chemicals. Tukes performed a periodic and commissioning

INES SCALE



inspection at the power plant in 2012 and no additional demands required.

On June 20, 2012, the Supreme Administrative Court granted an environmental permit for the construction of an embankment between the islands of Olkiluoto and Kuusisenmaa.

The 8 MW and 12 MW back-up heating boilers of the Olkiluoto nuclear power plant, as well as the 15 back-up diesel generators of OL1, OL2 and OL3, are included in the emissions trading system. In compliance with the Finnish Emissions Trading Act, TVO must submit an annual verified emissions report and a verifier's statement to the emissions trading authority.

TVO follows on regular basis the legal and other related requirements affecting the activities. The reponsible people from TVOs organisations are making sure that all necessary information of legal requirements are implemented into activities. The implementation of the requirements are followed in internal audits and management reviews.

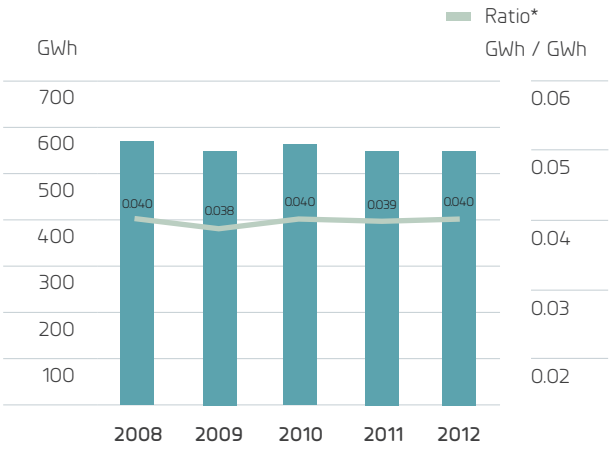
EIA of the power grid upgrade required by the OL4 project

Fingrid Oyj, the company responsible for Finland's national grid, is planning the construction of the 400 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 2012, Fingrid brought the related environmental impact assessment (EIA) procedure to a close by preparing an environmental impact assessment report, which the liaison authority (Southwest Finland Centre for Economic Development, Transport and the Environment) will comment on during spring 2013.

CORE ENVIRONMENTAL INDICATORS

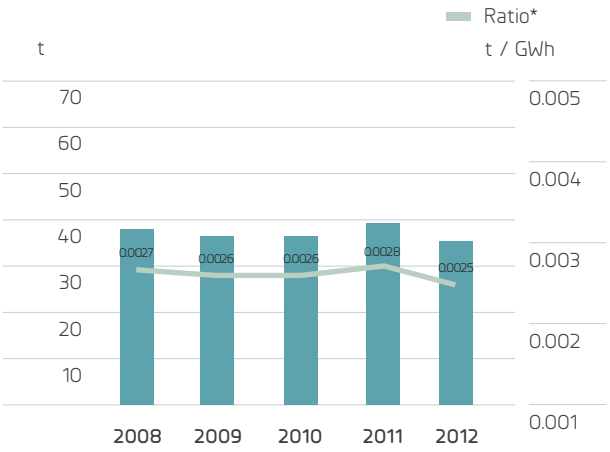
ENERGY EFFICIENCY

TVO'S ELECTRICITY CONSUMPTION



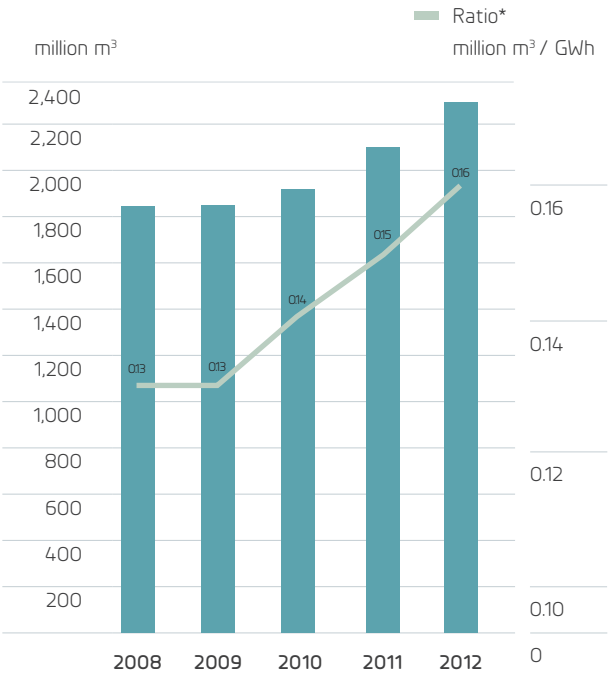
MATERIAL EFFICIENCY

NUCLEAR FUEL SPENT



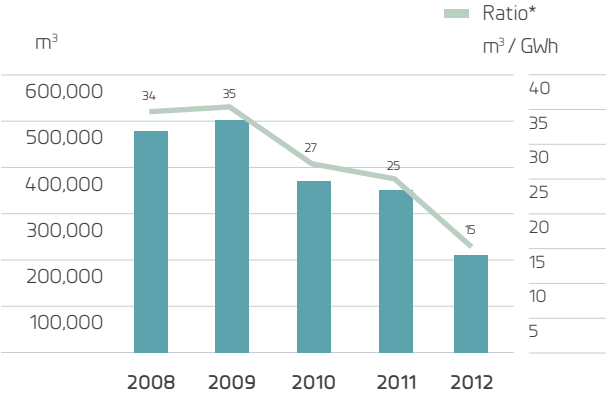
WATER USAGE

COOLING WATER



WATER USAGE

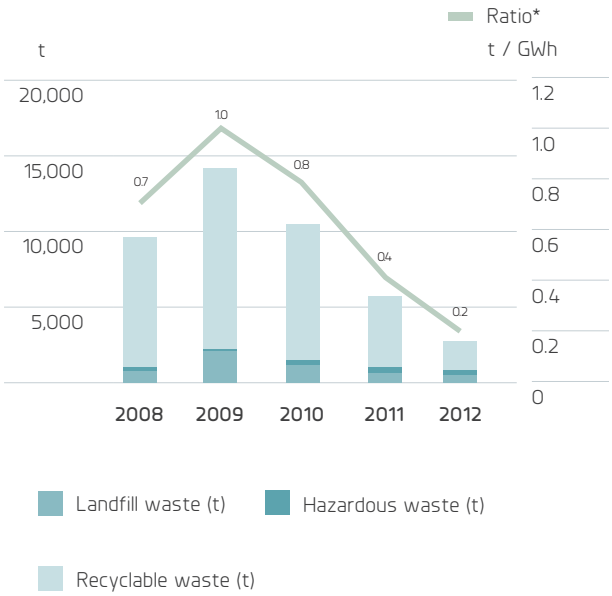
UNTREATED WATER



* The ratio is given per GWh of electricity produced.

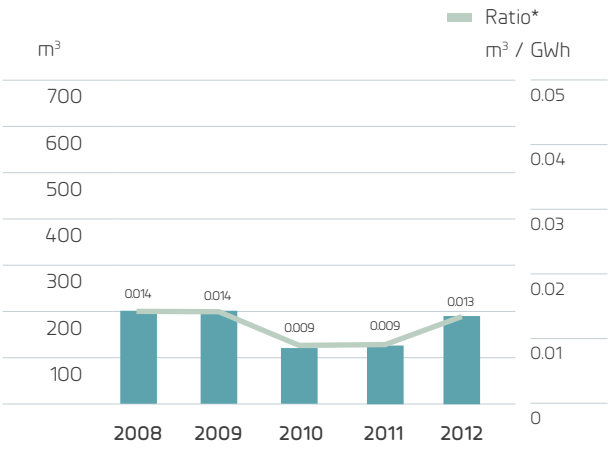
WASTE

MUNICIPAL WASTE



WASTE

LOW AND INTERMEDIATE LEVEL WASTE

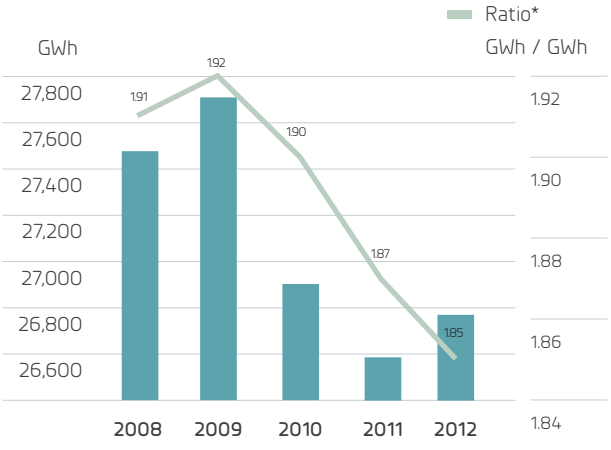


BIODIVERSITY

Due to the nature of operations and the area, the land usage indicator is not significant.

EMISSIONS

THERMAL LOAD ON THE SEA



* The ratio is given per GWh of electricity produced.

ENVIRONMENTAL FIGURES

	2012	2011	2010	2009	2008
OL1					
Net output (GWh)	6,973	7,290	6,977	7,296	7,066
The plant unit's own consumption (GWh)	256	268	258	266	258
Load factor (%)	90.4	94.8	91.8	97.0	93.7
Cooling water (million m³) [1]	1,110	1,150	1,023	923	895
Thermal load to sea (GWh) [2]	12,993	13,635	13,183	14,006	13,516
Efficiency (net) (%)	34.9	34.8	34.6	34.2	34.3
1) Permit regulation of a cooling water volume of 3,800 million m3 per year (combined for OL1, OL2, and OL3). 2) Permit regulation for thermal load: 205,000 TJ/year (~56,900 GWh/year) (combined for OL1, OL2, and OL3).					
OL2					
Net output (GWh)	7,477	6,914	7,167	7,156	7,314
The plant unit's own consumption (GWh)	271	250	258	256	262
Load factor (%)	96.9	90.9	95.2	95.1	96.9
Cooling water (million m³) [1]	1,190	1,000	906	903	927
Thermal load to sea (GWh) [2]	13,778	12,954	13,716	13,694	13,965
Efficiency (net) (%)	35.2	34.8	34.3	34.3	34.4
1) Permit regulation of a cooling water volume of 3,800 million m3 per year (combined for OL1, OL2, and OL3). 2) Permit regulation for thermal load: 205,000 TJ/year (~56,900 GWh/year) (combined for OL1, OL2, and OL3).					
Wind power plant					
Net output (GWh)	1.5	1.9	1.1	1.5	1.6
Load factor (%)	17	22	13	17	18
Electricity production capacity (MW)	1	1	1	1	1
Nuclear fuel					
Spent nuclear fuel in the storage pools of OL1 and OL2 and in the interim storage (KPA)					
Bundles (number of)	7,884	7,668	7,434	7,210	6,982
Bundles (metric ton)	1,327.3	1,291.8	1,253.4	1,216.9	1,179.8
Radioactive waste [1]					
Low level waste (m³)	172	132	117	163	95
Intermediate level waste (m³)	20	0	10	36	104
Operating waste exempted from control (t)	78	130	266	66	25
1) Reporting of radioactive waste has been changed to reflect the amount of waste placed in the VLJ repository. The amounts reported earlier have indicated changes in the MAJ and KAJ storages.					
Radioactive emissions					
Emissions into the air					
Noble gases [1] TBq (Kr-87 equivalent)	1.21	1.24	0.58	0	0
% of allowed	0.01	0.007	0.0033	0	0
Iodine [1] TBq (I-131 equivalent)	0.000017	0.000002	0.000094	0.0000001	0.000002
% of allowed	0.02	0.0015	0.082	0.00009	0.001
Aerosols TBq	0.000016	0.000011	0.000012	0.000059	0.00002
Tritium TBq	0.36	0.24	0.27	0.32	0.43
Carbon-14 TBq	0.88	0.81	0.71	0.78	0.88
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	0.0002	0.0001	0.0002	0.0002	0.0003
% of allowed	0.07	0.05	0.08	0.07	0.12
Tritium [1] TBq	1.31	1.31	1.50	1.85	2.39
% of allowed	7.1	7.2	8.2	10.1	13.1
1) Permit regulation for radioactive emissions into the water: Tritium 18.3 TBq. Other beta-active nuclides 0.296 TBq.					

	2012	2011	2010	2009	2008
Treatment of raw water					
Water volume (m^3) [1]	211,312	357,659	378,470	500,669	485,158
Water treatment chemicals (t) [2]	52.3	63.3	65.0	69.2	66.1
1) Surface water pumped from Eurajoki river to the Korvensuo storage pool.					
2) Chemicals used for the treatment or raw water (H_2SO_4, NaClO (10%), NaOH, chemical precipitation agents).					
Sanitary waste water treatment					
Water volume (m^3)	111,565	139,251	154,503	157,383	150,069
Concentration (mg/l) [1]					
BOD_{7ATU}	8.9	7.4	16	9.3	7.1
Phosphorus	0.28	0.14	0.16	0.10	0.27
Average treatment efficiency [1] (%)					
BOD_{7ATU}	96	96	96	97	98
Phosphorus	97	98	99	99	97
Load to the sea (kg)					
Phosphorus	31	19	25	15	40
Nitrogen	5,475	6,935	8,800	8,400	6,200
BOD_{7ATU}	985	1,022	2,500	1,500	1,100
Water treatment chemicals (t) [2]	41.6	44.7	54.5	56.1	42.6
1) Permit regulation for sanitary waste water: for waste water discharged into the sea, maximum allowable BOD7ATU value is 15 mg O2/l and phosphorus content 0.7 mg P/l. Minimum treatment efficiency for BOD7ATU 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 volume (t)	108 (296)	183 (405)	270 (928)	531 (1,601)	396 (387)
TVO's own landfill site [1]	78 (225)	138 (284)	176 (777)	335 (560)	237 (106)
Crushed brick and concrete (t)	21 (114)	37 (107)	22 (1,913)	182 (376)	519 (40)
Paper and cardboard (t)	81 (61)	117 (73)	121 (67)	107 (74)	70 (78)
Wood and wood chip (t)	88 (613)	177 (1,629)	146 (3,115)	206 (5,310)	399 (4,412)
Metal (t)	102 (335)	212 (1,815)	176 (2,959)	220 (3,645)	228 (2,046)
Cable (t)	17 (37)	34 (31)	20 (8.0)	40 (7.5)	29 (2.5)
Energy waste (t)	96 (376)	144 (431)	206 (451)	326 (1,459)	336 (567)
Compostable waste (t)	62 (34)	83 (48)	95 (26)	99 (24)	69 (44)
Glass (t)	8 (0)	9 (0)	19 (0)	14 (0)	13 (0)
Hazardous waste (t)	109 (73)	48 (149)	56 (79)	60 (71)	102 (39)
Screenings (t) [2]	42	26	59		
1) Permit regulation max 1,000 t/year (combined for OL1, OL2 and OL3).					
2) The collection of screenings from the sea began in 2010 in accordance with the environmental permit.					
Intermediate agents					
Oils (m^3) [1]	238.0	269.7	268.6	267.4	254.3
NaClO (15%) (m^3) [2]	67.1	86.2	67.6	37.0	40.4
Other chemicals (t) [3]	114.6	204.1	137.6	133.0	136.1
Ion exchange resins (t)	10.8	19.1	16.2	14.3	21.4
1) Backup diesel generators 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.					
4) Since year 2010 the used oil amount is changed to represent also the fuel used by TVO subcontractors.					
Coal fuel					
Volume of coal used at Meri-Pori to produce TVO's share of the electricity (t)	168,704	274,041	561,450	299,323	286,839
Verified CO_2 emissions of the Olkiluoto power plant					
Backup heating boilers (8MW + 12MW = 20MW) (t)	1	1	32	2	5
Backup diesel generators (8 x 1,5 MW = 12 MW) (t)	383	455	424	483	433
Total (t)	384	456	456	485	438

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, 2015.

Confirmation of compliance

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 management system, audit procedures, and the environmental statement including the indicators fulfill the requirements of regulation (EC) No. 1221/2009.

Scope and methodology

The verification of the EMAS report was carried out at TVO's Olkiluoto facility on March 20–22, 2013. The verification was carried out in conjunction with the ISO 14001 audit. The requirements of both management systems and the fulfillment thereof were investigated.

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.

The 2012 report has the same structure as the 2011 report and continues along the same lines as previous reports, which means that the content can be easily compared to previous years. The 2012 Report is a separate, independent report which provides a clear and accurate image of Teollisuuden Voima Oyj's operations and their impact on the environment. The environmental management system is implemented by taking the goals into account, and the implementation of the system is monitored by the environment team and management reviews. The system, and the environmental report (and related environmental review and environmental indicators) which describe the impact of the system, meet the EMAS 1221/2009 requirements.

The 2012 Environmental Report still reflects well Teollisuuden Voima Oyj's strong commitment to the maintenance and continuous development of high-level safety, quality, and a culture of environmental protection in its operations.

Espoo, April 15, 2013
DNV Certification OY/AB
EMAS-accredited certifier
FIN-V-0002

Seija Meriluoto
Lead Auditor

TVO's company-level policies

Safety culture

TVO and its personnel are committed to a high standard of safety culture. Safety culture is comprised of organizational practices and individuals' attitudes. The safety culture ensures that all factors that affect the nuclear power plant's safety will receive attention in proportion to 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 targets more stringent than those set out in the applicable laws for its own operations. 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 with TVO act responsibly in accordance with 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 which enable the implementation of efficient procedures while simultaneously taking into account safety, quality, and costs. This ensures our capability to produce competitive electricity in a safe and reliable manner, also over the long term. TVO's operations must not cause any damage to people, the environment, or property.

Radiation protection

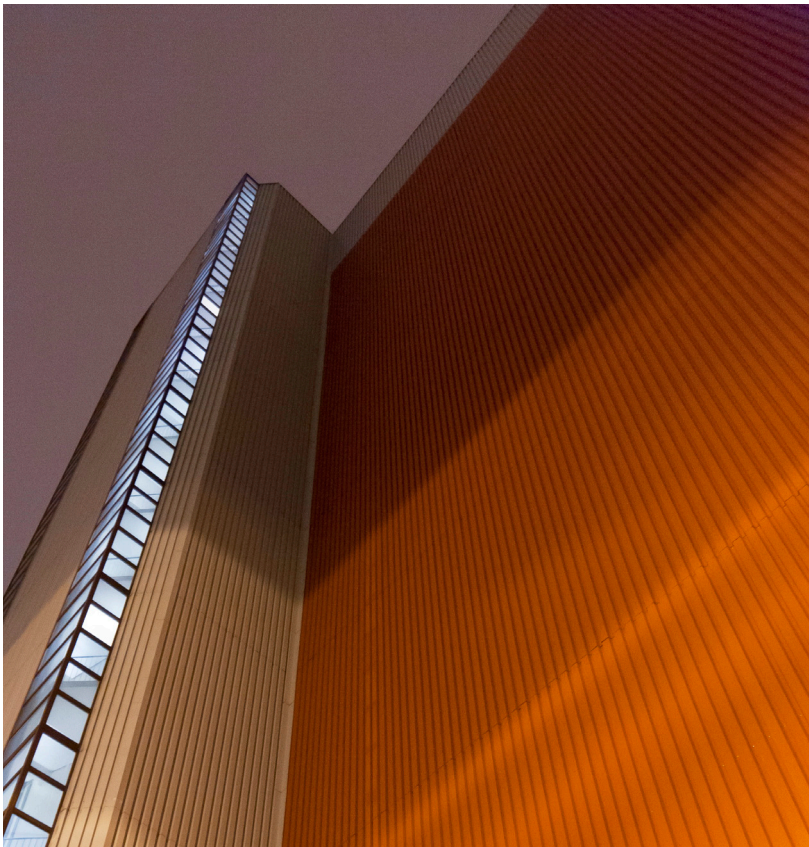
In all their radiation protection activities, TVO and its personnel are committed to following the ALARA (as low as reasonably achievable) principle. According to the principle, individual and collective radiation doses are kept as low as possible by practical measures. Restricting the doses and keeping the radioactive emissions as low as possible are already considered when designing the structures and functions. All employees shall observe matters affecting radiation protection in their work. In addition to instructions from the authorities, international recommendations are considered in the development of radiation protection.

Nuclear material supervision

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

Quality

TVO ensures that high-quality working methods are used in the company. They lay the foundation for safe and economical operations. TVO's personnel are aware of the importance of safety in their work. Matters are discussed in an open manner. Competencies and operating methods are developed according to the principle of continuous improvement. The sharing of objects of development, observed deficiencies, deviations, and errors is encouraged. We consider our internal and external customers to be equally important. We perform all work tasks with high quality and in a timely manner. TVO develops cooperation 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 impact they cause. TVO specifies goals and objectives for its operations according to the principle of continuous improvement. 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 strives to be a pioneer 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 preparations are made to prevent potential environmental damage. TVO assumes overall responsibility for all stages of the fuel cycle. The company monitors and supervises the environmental management of fuel suppliers. TVO requires responsibility from suppliers in ensuring and developing good living conditions in the surroundings of uranium production and processing plants, 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 takes into account 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. The modernization of the plant units improves the energy efficiency of the power plant process.

TVO minimizes the amount of waste by efficient 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 strives to reduce the amount of spent fuel by optimizing the use and properties of the fuel. Sustainable use of the environment is taken into account in the development of the Olkiluoto area and expansion of operations. The design and construction of new nuclear power plant units aim to minimize damage and disturbance 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. In supplier selection, particular attention is paid to the continuity of the supplier's operations, delivery reliability, management of quality and environmental matters, and competitiveness, while simultaneously 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 that its partners observe a high standard of safety culture and responsible operating methods in their own operations.

Personnel

TVO aims to ensure that its personnel are motivated and competent, carry out their tasks in a responsible manner, and are committed to observing the operating methods agreed upon. TVO ensures that the company has sufficient and competent human resources to meet the goals set. TVO provides its personnel with opportunities to develop in their work and careers. TVO provides competitive rewards and encourages employees to work profitably, to meet their goals, and to operate at a high level every day. TVO creates the preconditions for its personnel to take care of their working capacity. The principles of the HR policy are implemented through good cooperation with the personnel. The objective of TVO is to have an equal, healthy working environment where discrimination is not accepted and which promotes equality.

Occupational health and safety

The objective of the company's occupational health and safety operations is to promote occupational health and safety in line with "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 first and foremost occupational health and safety objective of every employee is to ensure their own personal safety and that of their fellow employees. Occupational health and safety is taken into account in all operations.

Communications

TVO increases mutual trust by promoting open, responsible interaction with all its stakeholder groups in the neighborhood, Finnish society, and the sector's international cooperation network. 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 Visitors' 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 code of conduct, 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 comprises the operation and maintenance of the plant and the increasing of 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 are developed systematically. Modifications or renovations carried out at the plant are implemented according to pre-approved plans so that the plant can be used for as long as possible. Well-planned testing and inspection measures of the correct scale ensure the safe and reliable operation of the plant. Plant maintenance operations are carried out in a well-planned manner, predicting potential faults or disturbances, and preparing for the measures that the situations require.

Increasing production capacity

TVO monitors the development of nuclear power technology and participates in international cooperation 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 execution 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 and security policy

The corporate safety and security policy comprises production and operational safety, personnel safety and facility security, rescue and emergency preparedness activities, and information security. The procedures related to safety and security are implemented in a systematic, proactive, and comprehensive manner. The procedures ensure the safe operation of the plant and the physical safety of the personnel and others working at the plant.

Rescue and emergency preparedness activities

TVO maintains and develops preparedness for special situations. Rescue and emergency preparedness activities are rehearsed systematically and regularly. 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 facing TVO's operations. The objective is to ensure nuclear safety, protect the financial interests 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 rights 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. When processing information submitted to TVO by other parties, the information security procedures used or required by the party submitting the information shall be complied with at the minimum.

Terminology

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.

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
DNV Certification OY/AB is an independent foundation that aims to protect people, property and environment. DNV does third party management program certifications.

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
International standard for environmental management.

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.

OHSAS 18001
is an international occupational health and safety management system specification.

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

Safety observation
Safety observation is an issue detected before it becomes an incident or non-conformance. Observation can be related to a process, functions of an organization, health, safety or environmental issues or loose parts in the system.

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

Anna Lehtiranta
Senior Vice Precident,
Corporate Relations
anna.lehtiranta@tvo.fi
Tel. +358 2 8381 5200

Sini Gahmberg
Communications Officer,
Corporate Social Responsibility
sini.gahmberg@tvo.fi
Tel. +358 2 8381 5204

Johanna Koskenranta
Environmental Engineer
johanna.koskenranta@tvo.fi
Tel. +358 2 8381 5157

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

Olkiluoto
FI-27160 Eurajoki
Tel. +358 2 83 811
Fax +358 2 8381 2109
www.tvo.fi

Helsinki
Töölönkatu 4
FI-00100 Helsinki
Tel. +358 9 61 801
Fax +358 9 6180 2570

Brussels
4 rue de la Presse
BE-1000 Brussels, Belgium
Tel. +32 2 227 1122
Fax +32 2 218 3141

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