



WELL-BEING WITH  
NUCLEAR ELECTRICITY



# Corporate Social Responsibility Report 2013

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## Responsible Leadership

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TVO believes in voluntary corporate social responsibility that supports business operations and is based on TVO's values, targets, and corporate social responsibility policy as well as legislation and stakeholder expectations.

The Responsible leadership theme of the Corporate Social Responsibility 2013 report includes a review by the CEO, a description of the operating environment, strategic objectives, a description of good corporate governance, risk management, and the corporate management system, as well as an account of company-level policies and the company's code of conduct.

## Review by the CEO

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2013 was a busy year for TVO people. The annual production output of the Olkiluoto nuclear power plant reached a record high. Work progressed in the Olkiluoto 3 site, and the Olkiluoto 4 project proceeded to an analysis of received tenders and negotiations with potential plant suppliers. We also expanded our internal development project targeted at strategic management, leadership competencies and the efficiency of operations.

### A good production year

We can now enjoy the fruits of the determined work done to improve the technology, safety and lifecycle management of our nuclear power plant. Our success is proven by the fact that despite some unplanned outages, we reached the highest annual output of our history at 14.63 TWh of electricity, and an excellent availability, 95.1%. A good history does not, however, guarantee future success; the close monitoring of the condition of the plant units and their timely development are targets of continuous development.

Work at the Olkiluoto 3 construction site has progressed to an advanced state, but there is still plenty of work to do. Our challenges are increased by the inability of the plant supplier to provide us with a reliable schedule for the completion of the project. The plant unit will be technologically advanced, and its safety features in particular will set an example to all industrial production. We continue to do everything in our power and give our support to the supplier of the turnkey plant delivery to launch the production operation of OL3 as efficiently as possible, with no further delay.



### Winds of change in the energy industry

The position of nuclear power in the electricity market is challenging. The market situation favors renewable energy sources that receive government subsidies, as well as cheap fossil fuels such as coal.

The Intergovernmental Panel on Climate Change (IPCC) published new alarming research results on the progress of climate change. The energy sector causes nearly 80% of all greenhouse gas emissions, which means that decisions that have an impact on the field are very significant for the mitigation of climate change. The lifecycle emissions of nuclear power are at the same low level as those of hydropower, wind power or solar power. The steady production of nuclear power is the only plausible path to a low-carbon future.

Nuclear power meets the conditions of sustainable development; therefore, it has an important role in Finland's energy and climate strategy and clean energy program, and capacity increases are justified. Nuclear power investments are large and their repayment periods long. The planned service life of the new plant unit is 60 years. It is important that no short-sighted political decisions are made that would disturb the stability and predictability of the operating environment or the efficiency of the markets.

## Responsibility builds trust

Production of nuclear energy is always based on the people's trust and political decision-making. We build trust through open responsibility. The core of our operations consists of safe and economical production and nuclear waste management operations, energizing leadership and competent personnel, and transparent and proactive interaction and communications.

We listen to the worries of the general public through many channels, and regularly measure the development of the acceptability of nuclear power and the stakeholder groups' opinions of our operations. According to an attitude Energy survey carried out in 2013, 56% of the respondents felt that Finland's experiences of nuclear power are positive, and a clear majority of people believe that nuclear power has an important role in reducing climate emissions and improving Finland's competitive advantages.

## Competitive advantage through improved leadership and procedures

The two central principles of our operations, the uncompromising safety culture and continuous improvement, apply not only to the technical reliability of the plant but also to leadership and the way in which our working community functions. Our internal development project progressed in 2013, and an increasing number of TVO people participated in strategic planning and the development of operations.

According to our revised mission launched in 2013, our objective is to produce safe, economical and climate-friendly nuclear power to our shareholders. Through our shareholders, Finnish industrial companies and energy utilities, we create well-being all over Finland.

In 2013, we again produced approximately one-sixth of all the electricity consumed in Finland. We are an important operator in society, and we must ensure that we possess the resources and functions required by our mission also in the future, and that our work is always guided by a unified, efficiency-oriented leadership and operating culture. While carrying out the OL3 project and developing the existing plant units, we also continue the development of leadership, competencies, responsibility and efficiency in 2014. Our objective is to maintain the safety and top availability of the Olkiluoto nuclear power plant in a cost-efficient way that helps us satisfy our shareholders' needs.

Jarmo Tanhua  
President and CEO

## Operating environment

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At the end of 2013, a total of 438 nuclear power plant units were in operation in 30 different countries. These covered approximately 12% of the global electricity demand. A total of 71 new reactors are currently under construction. In the next few years, new nuclear power plant projects are expected<sup>1)</sup> to be launched in Europe and in China, India, South Korea, the United States and Russia, among others. The global nuclear power capacity is estimated to grow from the current 400 GW to 580 GW by 2035.

Nearly 28% of all electricity consumed within the European Union is generated at nuclear power plants; there are 131 reactors operational in 15<sup>2)</sup> member states, with a combined total capacity of 132 GW. Four<sup>3)</sup> reactors are currently under construction in the European Union: one in Finland, one in France and two in Slovakia. Many countries also plan extending the service life of existing nuclear power plants.

Based on the outcome of the nuclear safety assessments recently carried out in the EU, the Commission has proposed a review of the Nuclear Safety Directive. The proposal is currently being discussed by the Council and the European Parliament. At the same time, national action plans following the stress tests are being implemented by member states.

The European Commission organized a nuclear liability consultation in fall 2013 with the purpose of preparing for the harmonization of nuclear liability arrangements within the EU.

The revised regulatory guides on nuclear safety compiled by the Finnish Radiation and Nuclear Safety Authority (STUK) came into effect in December 2013. The new regulations will be applied to new nuclear facilities with no modifications. Separate decisions will be given on the necessary modification of the regulations for existing plant units as well as those under construction.

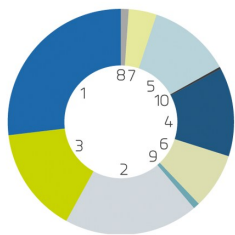
## Nuclear power – a key element in Finnish energy policy

In December, the Finnish Parliament approved the updated energy and climate strategy prepared by the Government headed by Prime Minister Jyrki Katainen. The strategy includes a clean energy program which aims to reduce greenhouse emissions, create jobs, decrease the volume of imported energy and accelerate the development and utilization of domestic clean energy technology. Investments in nuclear power play a key role in the work towards these objectives.

The new power plant tax act was ratified by the Finnish Parliament in December. The act will enter into force at the time prescribed by a government decree. The new law enables the annual collection of an approximate total of EUR 50 million in taxes from nuclear power, hydropower and wind power plants that have been commissioned before 2004. More than one fifth of this sum would be paid by nuclear power plants starting from 2014. The law is subject to the approval of the European Commission.

### ELECTRICITY SUPPLY BY ENERGY SOURCE 2013

TOTAL 83.9 TWH

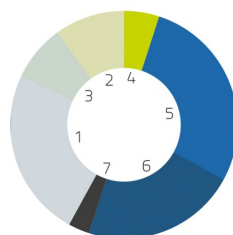


1 Nuclear energy 27.1%  
2 Net import 18.7%  
3 Hydropower 15.2%  
4 Biomass 12.8%  
5 Coal 11.8%  
6 Natural gas 8.1%  
7 Peat 4%  
8 Waste 11%  
9 Wind 0.9%  
10 Oil 0.3%

Source: Finnish Energy Industries

### TOTAL ELECTRICITY CONSUMPTION IN FINLAND 2013

TOTAL 83.9 TWH



Industries 47%  
1 Forest industry 24%  
2 Metal industry 10%  
3 Chemical industry 8%  
4 Other industries 5%  
Other consumption 50%  
5 Housing and agriculture 28%  
6 Services and construction 22%  
7 Losses 3%

Source: Finnish Energy Industries

## Minor decrease in total Finnish energy consumption

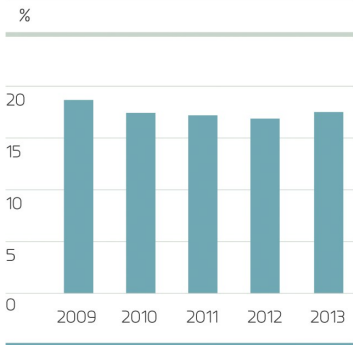
In 2013, the consumption of electricity in Finland totaled 83.9 TWh. Compared to the previous year, consumption decreased by 1.5%. The share of imported electricity remained high at one fifth of total consumption. The share of domestic hydropower decreased and that of coal increased. The production of nuclear energy amounted to 22.7 TWh, which accounted for 27% of consumption.

<sup>1)</sup> IEA World Energy Outlook 2013

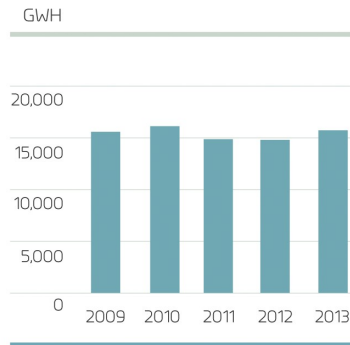
<sup>2)</sup> 15th is Croatia which owns half of the Krsko NPP located in Slovenia

<sup>3)</sup> Finland 1, France 1, and Slovakia

TVO'S DELIVERY SHARE OF THE ELECTRICITY USED IN FINLAND



ELECTRICITY DELIVERED TO SHAREHOLDERS



## Strategic objectives

TVO's strategy is based on its mission, vision and business model, and the key indicators that steer the company's operations. TVO's values and Code of Conduct, together with an uncompromising safety culture, create a solid basis for responsible day-to-day operations.

TVO is aware of its responsibility in creating social well-being through the generation of climate-friendly, safe, and reasonably priced electricity. TVO creates well-being, employment, and income by producing cost-price electricity for its shareholders, Finnish industry and energy companies with 135 municipalities behind them. The Olkiluoto power plant provides Finland with competitively priced and stable domestic nuclear power, produced in a responsible, efficient and environmentally friendly manner.

TVO believes in voluntary corporate social responsibility that supports the company's business operations and is based on its values and targets as well as legislation and stakeholder expectations. TVO's corporate social responsibility policy and its practical implementation form the core of the company's social responsibility effort. Corporate social responsibility is at the core of TVO's strategy and is an integral part of day-to-day operations. As a value behind the work of every TVO employee, it means uncompromising quality, adherence to strict safety requirements, and compliance with the rules and regulations that have been agreed and are in force. TVO's personnel are committed to an uncompromising safety culture, valued by us all.



The President and CEO, with the approval of the Management Group, is responsible for the strategic objectives and planning of TVO's corporate social responsibility. In the Management Group, the Senior Vice President responsible for corporate relations and the Corporate Social Responsibility Manager present issues related to the development, monitoring and reporting of corporate social responsibility. In the development and implementation of corporate social responsibility, the management of TVO is assisted by the Corporate Social Responsibility Group, which was reappointed in May 2013. The group acts as an expert, advisor, and information forwarder in matters concerning corporate social responsibility. The group monitors and develops the company's corporate social responsibility policy and other related matters and reports and communicates these to the management, personnel, and stakeholders.

The President and CEO appoints the members, chairperson, and secretary to the group. The members of the group hold various positions within the organization. The Corporate Social Responsibility Group, and the corporate social responsibility development group that acts within it, convened six times during the latter part of 2013.

During the year under review, the focus was on listening to the views of stakeholders through an extensive stakeholder survey. The survey was one of the prerequisites for updating TVO's responsibility materiality assessment. Social responsibility was discussed at the same time in accordance with the company's new strategy. It will still be based on stable, economic and safe production of electricity, safe nuclear waste management, and uncompromising safety culture with attention to energizing leadership, competent personnel, consideration of the climate and environment throughout the lifecycle, and transparent and proactive interaction and communications. In the final part of the year, focal themes of corporate social responsibility were derived from the company's new mission and strategic vision goals. These building blocks of responsibility were compiled into a responsibility program to comply with TVO's strategy. The program summarizes the responsible actions inherent to the planning and practical aspects of the operations of various units, and includes the goals, measures and indicators that concern TVO's impact on society and on the Group itself. The responsibility program was fine-tuned by the Corporate Social Responsibility Group during the fall, approved by the Management Group in December, and adopted at the beginning of 2014.

## Management, planning, and development projects continued

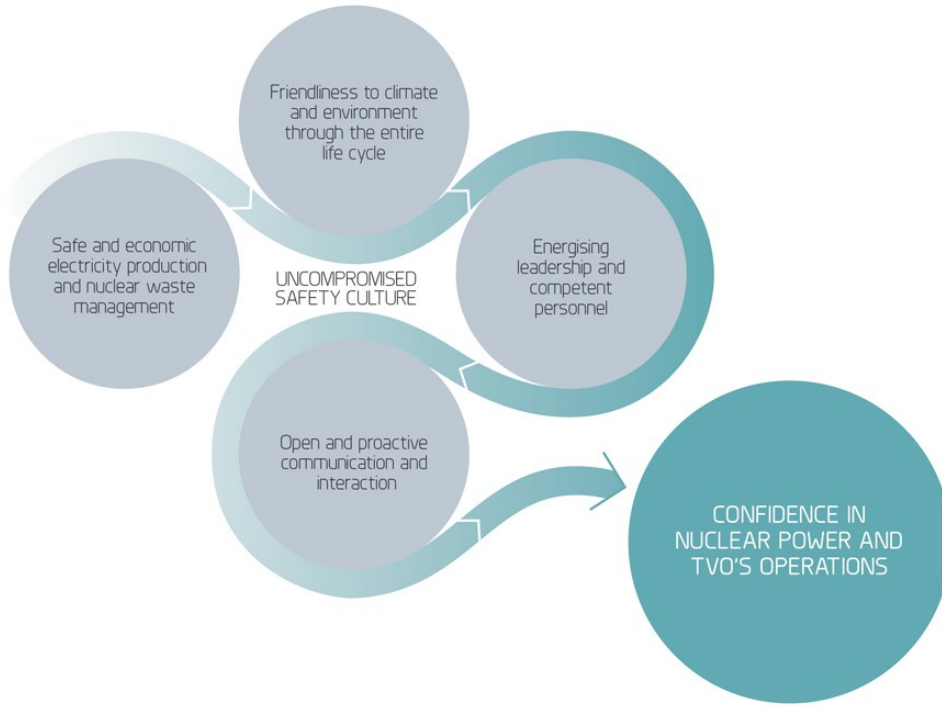
Projects focusing on the management, planning and development of operations continued in 2013. They aim at developing the company's strategy and business model as well as the definition, follow-up and measurement of human resource management objectives. 2013 was the year for preparing new vision objectives, business model and scorecards with indicators, all based on the new strategy. These will be followed up in accordance with the annual management schedule.

The resource planning project aims to create shared practices for the entire company and to increase efficiency and savings through unified procedures. Shared procedures are also expected to help build a clear and fair management system. TVO people from various branches of the organization have participated in the process.

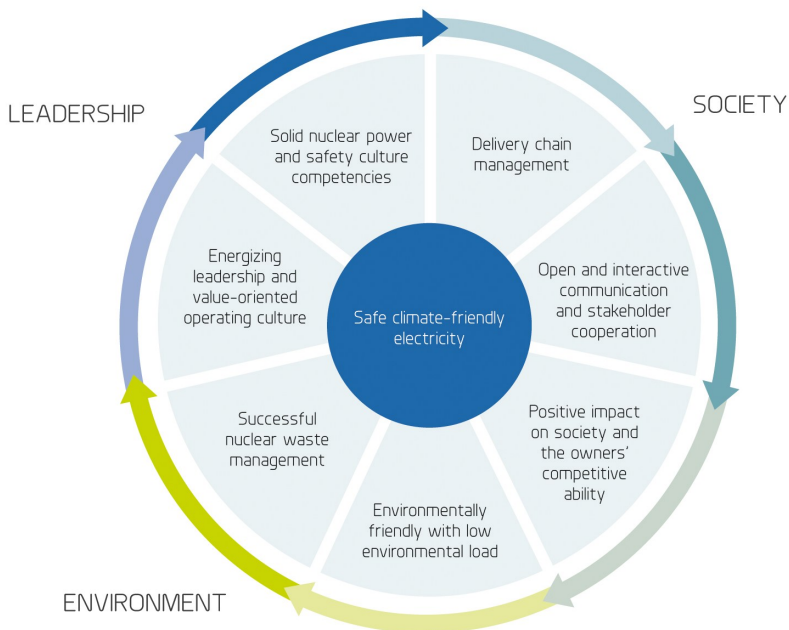
The many development measures implemented based on the company-wide personnel survey also supported the objectives of the resource planning development project. Various working groups consisting, in varying setups, of the whole personnel, supervisors, personnel representatives, new TVO employees, or the Management Group, participated in the development of improvements.

Further information: [Operating culture, corporate social responsibility, principles and management, responsibility management.](#)

## Corporate social responsibility at TVO



### RESPONSIBILITY PROGRAM





ANNUAL MANAGEMENT SCHEDULE



## Good corporate governance

TVO adheres to valid legislation, its own Articles of Association, and the principles of good corporate governance in all its operations. Situations where there is a conflict of interests are processed according to legal requirements. According to the TVO Code of Conduct, TVO employees must disqualify themselves in cases of conflict of interest. TVO's company-level policies define central aspects of social responsibility.

Further information: [Administration and management](#), [Board of Directors](#), [Management Group](#) and [Organization](#).

## Risk management

Risk management is an important part of the planning and operations of TVO Group. Risk management is carried out in accordance with the risk management principles, approved by the Board of Directors, which define the purpose and objectives of risk management.

TVO's risk management is developed in accordance with the principle of continuous improvement. The Risk Management Group, which operates under the Management Group, prepares an annual assessment of the risk management and identifies improvement targets. Practical risk management is carried out by the various units of the company.

Identification of risks is based on TVO's business objectives. Unified practices are applied to the assessment of risks. In addition to financial impacts, consequences are assessed based on their impact on safety, production operations and reputation.

In 2013, TVO adopted a risk management information system. The adoption of the information system, together with other development measures, aimed to unify risk assessments and risk reporting throughout the Group, and to allow a more efficient handling of risks. In connection with the information system launch, training was organized to introduce key personnel to risk management methods and procedures. In 2014, the emphasis of risk management development will be in building a more efficient follow-up system for the preparation and recovery measures required by identified risks.

## Management system

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TVO's mission, vision, strategic objectives, business model, values, Code of Conduct and company-level policies give direction to all of its operations. TVO uses an activity based management system that supports the adherence to plans. The system provides the procedures for ensuring safe, competitive, high-quality, and environmentally sound electricity production.

Operations are developed according to the principles of continuous improvement. The management process aims at practical strategic and operative steering that ensures the realization of both short and long-term goals as well as the energetic, motivated and efficient operation of the organization. A strategy that is sensitive to the customers' needs and changes in the company's operating environment guides the preparation of visions, strategies, plans and objectives of the business and support operations. The procedures described within the activity based management system direct the work of all TVO employees and partners working at Olkiluoto.

The system covers production operations at the Olkiluoto nuclear power plant, the maintenance and development of production capacity, the construction of additional production capacity, as well as the steering and resourcing operations of these. The system meets the requirements of international quality management, environmental and health and safety standards, and has been certified by DNV Certification OY/AB. The general part of the activity based management system also acts as the licensee's quality management system approved by STUK. The implementation, effectiveness and efficiency of the system are regularly monitored by internal audits and management reviews.

TVO's activity based management system meets the requirements of the following procedures and standards, among others:

- Quality management system ISO 9001:2008, YVL 1.4 Management systems for nuclear facilities
- Environmental management system ISO 14001:2004, EMAS Regulation 1221/2009
- Energy efficiency system
- Occupational health and safety management system OHSAS 18001:2007.

## Company-level policies

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TVO's company-level policies define all the central aspects of social responsibility. Company-level policies include: Nuclear safety and quality policy (nuclear safety, radiation protection, nuclear non-proliferation control, and quality) Corporate social responsibility policy (environment, procurement, personnel, occupational health and safety, and communication) Production policy (operation and maintenance of the plant and increasing its production capacity) Corporate safety policy (production and operating safety, personnel and facility security, rescue and emergency operations, and information security).

### Company-level policies

## Code of conduct

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TVO operates in a responsible, transparent, and proactive manner, and continuously improves its operations. TVO's Code of Conduct complies with the OECD Guidelines for Multinational Enterprises 2011, and is based on TVO's values. The Code of Conduct concerns the company's management and administration, personnel, subcontractors, and suppliers regardless of their position and location. The Code of Conduct defines TVO's general principles concerning practical operations and social responsibility. It also aims to ensure that all TVO employees see eye to eye on our basic ethical principles and proper business practices. The purpose is to create a unified way of working in accordance with a shared framework of responsibility and ethics.

The Code of Conduct was adopted on February 1, 2013, with the distribution of a brochure on the subject to the entire personnel. Approximately a dozen Code of Conduct training events were organized for the staff and subcontractors, and all new employees were introduced to the content of the Code and given a copy of the text during their induction training. The training will be repeated for all employees every three years. In the fall, an internal personnel survey was carried out concerning the Code of Conduct. The response rate for the survey was 40%. The overall outcome was that the creation of a unified Code of Conduct was considered a good thing. The survey revealed development targets related to the working atmosphere, such as equality and respect between fellow employees. These have been incorporated into the 2014 action plans.

TVO's subcontractors were informed of the Code of Conduct by adding the document to contracts signed with subcontractors and partners. Training of subcontractors and the personnel will continue in 2014. An online training course on the Code of Conduct is being prepared together with Posiva Oy, and will begin to be used by the personnel of TVO Group in early 2014.

### Code of conduct

## Safety

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The safe operation of the Olkiluoto nuclear power plant is based on high-quality power plant engineering, the principle of continuous improvement, highly capable and conscientious employees, and independent external supervision. TVO's personnel are committed to a high standard of safety culture.

The Safety theme of the Corporate Social Responsibility 2013 report includes a description of TVO's safety culture and its development, a report on special events, and an account of research and development operations.

## Safety culture

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### Safety at the core of operations

The Nuclear Energy Act requires that the use of nuclear energy must be safe; it shall not cause injury to people or damage to the environment or property. The safe operation of the Olkiluoto nuclear power plant is based on safe power plant engineering, highly capable and conscientious employees, and independent external supervision. Safety is a factor shared by the entire nuclear power industry.

Safety is a special area of focus for nuclear power plants because the uranium fuel becomes highly radioactive during the power production process, and continues to generate heat even after being removed from the reactor. Spent nuclear fuel is cooled in water-filled pools, as water also acts as an efficient radiation shield. The Olkiluoto power plant has abundant water reserves to ensure the cooling of both the fuel in the reactor and the spent fuel. The plant also has multiple power supply back-up systems for cooling water circulation systems.

### Nuclear safety and safe power plant engineering

Nuclear safety is developed by analyzing risks and by making provisions for them. Nuclear safety is always based on the valid and constant laws of physics.

Nuclear power plants observe defense-in-depth safety principles and deploy multiple release barriers. The diverse and redundant safety systems reduce the probability of accidents.

The Olkiluoto nuclear power plant has four-fold safety systems. If one system fails, the next one takes over. An operator error or even several equipment failures cannot cause a serious accident.

TVO has implemented modifications at Olkiluoto to improve the safety of the plant throughout its operating life. New improvements will also be designed and implemented in the future.

### Competent and responsible personnel

TVO's entire personnel are committed to an uncompromising safety culture. All factors that affect the nuclear power plant's safety receive attention in proportion with their significance and are given priority in decision making. The principle of continuous improvement is present in all day-to-day work.

TVO uses the STAR approach to everyday safety. The STAR approach means that employees should always first Stop and Think, and only then Act, and finally Review whether everything went as it should have. TVO encourages employees to report errors and observations, and aims to maintain a low threshold for such reporting.



## CASE

The largest individual plant modification ever in Olkiluoto

[Read more](#)

Safety culture-related instructions to TVO employees:

- make sure you are fit to work
- make no compromises with procedures and instructions
- make sure that you and others use safe working practices and work in safe conditions
- stop and think before you act, and review the consequences of your actions
- report all problems and deficiencies without delay
- maintain an atmosphere where reporting can be done freely and without blame
- question practices and develop operations in the spirit of continuous development.

Various atmosphere surveys and self-evaluations are carried out at TVO to examine the state of the safety culture. Based on these, the state of the TVO safety culture is good. It must, however, be continuously monitored and developed. In 2013, TVO carried out a safety culture self-assessment including a review of documentation and a survey filled in by the entire personnel. The assessment is repeated every three years. TVO's safety culture was found to be at a good level. TVO's strengths included the emphasis laid on the strategic importance of safety, highlighting safety as a primary concern in both internal and external communications, long-term planning, and the continuous development of the plant units and attention to any minor deficiencies. These ensure the good overall state of the plant. To maintain a high standard of safety culture in accordance with the continuous improvement principle, the self-assessment team has issued some recommendations mostly related to organizational learning and the development of operations.

## Development

### Safety – shared by the entire nuclear power industry

TVO's operations are subject to a license and supervision by the authorities. The Finnish Radiation and Nuclear Safety Authority (STUK) supervises nuclear and radiation safety.

TVO is not alone in thinking about safety issues. Other nuclear power companies, organizations, research institutes, and public authorities are looking for ways to develop the safety of nuclear power and safety culture at nuclear power plants. For example, the World Association of Nuclear Operators (WANO) issues proposals and recommendations related to safety.

In 2011, several surveys were conducted to analyze the power plant's preparedness for extreme natural phenomena and other external threats. The work included both national surveys and participation in EU "stress tests". In spring 2012, the ENSREG expert group that compiled the final report for the nuclear power plant safety reviews stated that no safety defects or previously unidentified development needs that would call for improvements were detected at Olkiluoto. The Olkiluoto nuclear power plant received praise for its multiple power supply back-ups and the severe accident management system that can prevent any major releases in the very unlikely case of a severe accident. Surveys have been continued based on further requirements set by STUK. The most important plant modifications currently being planned concern the cooling of the reactor without any of the normal electrical or sea water systems. In 2013, TVO has continued preliminary surveys, planning and implementation of plant modifications. TVO provides STUK with progress reports every six months. Plans are also regularly discussed within the TVO safety group.



## CASE

The largest individual plant modification ever in Olkiluoto

[Read more](#)

Update of official safety regulations was completed in 2013, and STUK published most of the regulations at the end of the year. TVO will now carry out a suitability analysis for its plant units to examine how well the units meet the new requirements.

Over the years, TVO has carried out continuous modernization and safety improvements at its plants. In 2013, the most important of these included the improvements made to electrical systems, better preparation for oil leaks, and the launch of the replacement of emergency diesel generators.

TVO will replace the emergency diesel generators ([linkki http://www.tvoy.fi/news/58](http://www.tvoy.fi/news/58)) as part of an ongoing major modernization project. The emergency diesel generators ensure the power supply of the plant in the possible but unlikely loss of power situation. The new emergency diesel generators have both seawater and air cooling systems. The preparation of the emergency diesel replacement project began in the early 2000s, and the project is the most extensive single plant modification project to ever have been carried out at Olkiluoto. TVO acquires the emergency diesel generators from Wärtsilä Finland Oy. The agreement on the delivery of emergency diesel generators and their auxiliary systems to the Olkiluoto nuclear power plant was signed in May 2013. The replacement project will begin in 2016 and has been estimated to continue to 2020.

## Special events

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### Reporting of special events

The events that take place at a 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 for safety.

TVO reported four events in 2013. All of these were rated at severity level 0 on the INES scale (a deviation with no safety significance). One event that occurred in 2012 and was rated at level 0 on the INES scale was reported in 2013.

TVO processes all operational events that take place at the Olkiluoto nuclear power plant, and carries out the necessary corrective measures. TVO also follows the events at other nuclear power plants around the world. Operations are developed based on the observations made of these events.

TVO has reported all INES events on its web site in the [News](#) section.

When investigating the causes behind the events that took place during the latest annual outages, TVO has identified various factors related to working methods and communications, among other things. Changes will be made to further develop the procedures based on the assessment of these factors. The matters will be discussed, implemented and followed up within the quality management information system. The Human Performance team develops, monitors and implements HU tools.

TVO submits separate case-specific reports to STUK for all special events and operating transients.

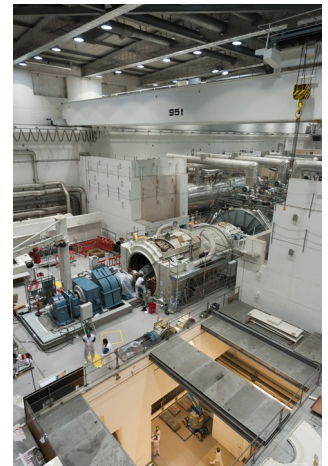
INES SCALE



## Research and development

TVO's R&D operations focus on supporting the acquisition and renewal of nuclear power plants' construction and operating licenses through the production of high-quality technical information, and on validating data and calculations for the needs and use of the plant units.

Modernization and changes at the plant units as well as following and using new technology also create research needs. In 2013, measures based on safety assessments have been carried out at the plant. These measures have also resulted in the creation of new research areas. Changes made to national regulations (YEL, VNA and YVL guides) have been taken into account in the definition of research projects. The storage, handling and final disposal of waste are another important research area. The development of safe disposal of spent nuclear fuel is by far the most important objective of TVO's research work until 2020. The work is carried out by Posiva Oy.



The total costs of TVO's research and development operations were EUR 37.7 (44.7) million. The figure includes nuclear waste management research and development costs, of which Posiva's share was EUR 31.5 (38.2) million. In addition to these, approximately 12 man-years were spent at TVO on various internal R&D projects.

TVO is the biggest payer of national public research programs on nuclear power plant safety (SAFIR2014) and nuclear waste management (KYT2014). In 2013, TVO paid a total of EUR 4.6 (4.6) in research fund-related contributions to the Finnish State Nuclear Waste Management Fund. TVO also participated in the steering and monitoring of the programs through the work of 26 experts.

Primary areas of focus for research in 2013 included the OL1 and OL2 lifecycle management and modernization projects. For lifecycle management, an extensive integrated information system has been adopted to combine strength calculation, process simulations and the operating history of plant structures. The development of the system began in TVO in the 1990s; currently, the development work focuses on the integration of the calculation systems. Research of the I&C technology focuses on the solutions required for the modernization of OL1 and OL2 and the construction of OL3. Primary research targets include the adoption and licensing of digital I&C technology.

Fuel research helps ensure continuing safety; the research aims at safe reactor operation, good fuel economy and safe final disposal of spent fuel. Fuel research is TVO's most important area of international research cooperation, which requires special competence, available testing reactors and fuel hot cell studies. The best option to obtain all of these is international

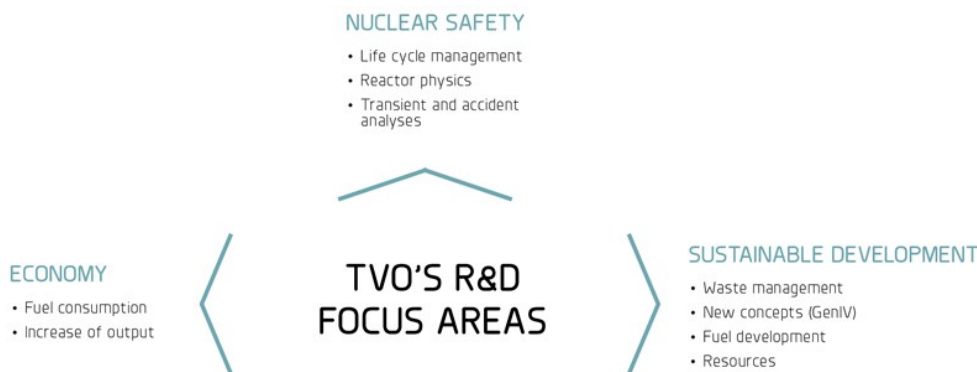
cooperation. Research further specifies and validates the safe use of the fuel and accident safety margins with a higher burnup. The behavior of fuel in storage and after final disposal is another important field of study. TVO also participates in Euratom's FIRST Nuclides project which focuses on the behavior of actual spent UO2 fuels in a groundwater environment. The project is carried out in cooperation with European research institutes, power companies and organizations responsible for the development of final disposal of spent nuclear fuel.

TVO also actively participates in the operations and research projects of more extensive international cooperation networks. TVO joined the new European NUGENIA association after it was established in fall 2012. The purpose of the association is to steer and carry out European research and development in the field of fission energy, focusing on existing reactors, that is, GenII and GenIII nuclear power plants. The association is based on the Nulife, Sarnet and Eniq networks that received funding from Euratom. TVO follows programs coordinated by OECD/NEA, primarily through the technological and safety research projects of universities and research facilities.

TVO also supports the research work to develop new research infrastructure. New experimental technology is being built into the Jules Horowitz material testing reactor which can be used for reactor materials and fuels research required by modern nuclear facilities, supporting the development of new reactor types within the next decades.

During the year, TVO has sent representatives to participate in the national nuclear energy strategy working group coordinated by the Ministry of Employment and the Economy. The work will be completed in 2014. The working group's objective is to prepare a strategy for nuclear power research until 2030. The strategy comprises of six fields from safety research to innovation and service business.

Further information: [Objectives of TVO's research and development](#), [Research and development](#) and [Research areas](#).





## Uranium from bedrock to bedrock

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The safe use of uranium fuel is ensured at all stages of the power production chain, from the responsible procurement of uranium to the safe final disposal of spent fuel.

The Uranium from bedrock to bedrock theme of the Corporate Social Responsibility 2013 report includes the following sections: procurement of uranium; production of electricity at Olkiluoto 1 and Olkiluoto 2; progress of the Olkiluoto 3 and Olkiluoto 4 projects; nuclear waste management, Finnish State Nuclear Waste Management Fund and final disposal of spent nuclear fuel.

## Procurement of uranium

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### From responsible partners only

Uranium is an element widely present in nature – approximately 40 times more common than silver. Nearly half of all uranium is produced using conventional mining techniques in underground mines and open pits, while roughly the same quantity is produced by in situ leaching. The rest, approximately 7%, is produced as a by-product of other mining operations. These operations cover approximately 85% of the uranium requirement of the world's nuclear power plants. The remaining 15% is obtained from various inventories and the reprocessing of spent fuel.

The largest producers of uranium (based on the statistics of 2012) are Kazakhstan, Canada, Australia, Niger, and Namibia. Together, these countries are responsible for approximately three quarters of the world's total production volume. Uranium is usually produced by large international companies with operations in several countries. The eight largest companies cover approximately 85% of all production, with ten mines producing more than half of all uranium.

Environmental protection and monitoring of mining operations, as well as occupational and radiation safety requirements, are defined on the basis of the legislation and regulations valid in the country where the operations take place. The requirements set for the operations are further specified by licenses concerning the construction, operation, and environmental practices of the facilities. Proper practices require that the original licensing process of a production facility also pays attention to decommissioning operations. Funds for waste management, the closure of the mine and the ore enrichment plant, and landscaping should be gathered during production operations.

Certification of quality, environmental, and occupational health and safety management systems is widely applied; large operators in particular have certified the management systems of their production facilities. Responsible companies follow the same standards and the principles of safety and social responsibility in all their locations, which in turn promotes the development of legislation and procedures of new mining countries.

### TVO's supplier evaluation method

TVO applies a diversified nuclear fuel procurement chain, which means that separate contracts are concluded for the different stages of procurement, usually with several suppliers for each stage. Procurement operations are based on long-term contracts with leading suppliers.



### CASE

Olympic Dam uranium mine in Australia

[Read more](#)

TVO employs a supplier evaluation method and only procures uranium and nuclear fuel refining services from suppliers who have passed the evaluation process. A systematic evaluation process precedes the closure of each supply contract. In addition to the requirements set for the products, the process also considers the reliability and responsibility of the supplier.

TVO's supplier evaluation also includes active monitoring and evaluations at fixed intervals. Remote monitoring from Finland and excursions to production sites both provide TVO with an opportunity to examine suppliers' practices and, when necessary, to demand that changes are made to them. The purpose of supplier evaluation is to ensure that suppliers pay appropriate attention to environmental issues, the well-being of personnel, and quality management. Special issues concerning mines are also considered, such as the impact of operations on local people.

**OLKILUOTO NUCLEAR POWER PLANT'S ENVIRONMENTAL BALANCE SHEET 2013 (2012)**

Emissions into the air		Allowed annual emissions
Noble gases (TBq)	0.22 (Kr-87 equivalent) (121)	(9.420)
Iodine (TBq)	0.0000907 (I-131 equivalent) (0.000017)	(0.103)
Aerosols (TBq)	0.000020 (0.000016)	
Carbon-14 (TBq)	0.80 (0.88)	
Tritium (TBq)	0.62 (0.36)	
CO <sub>2</sub> (t)	483 (384)	
NO <sub>x</sub> (t)	0.63 (0.52)	
SO <sub>x</sub> (t)	0.0017 (0.001)	
Particles (t)	0.44 (0.36)	

URANIUM FUEL (t)	36.8 (37.6)
Intermediate agents:	
- Oils (m <sup>3</sup> )	303 (238)
- NaClO (15 %) (m <sup>3</sup> )	62.6 (67)
- Other chemicals (t)	139.3 (115)
- Ion exchange resins (t)	10.1 (10.8)
- Water treatment chemicals (t)	108.3 (94)
Raw water (tap and process water) (m <sup>3</sup> )	274,549 (211,312)
Cooling water (million m <sup>3</sup> )	2,288 (2,267)

ELECTRICITY (TWh)				14.6 (14.5)
Municipal waste	OL1 and OL2	OL3*	Total	
- Recyclable waste (t)	586 (539)	1,231 (1 571)	1,817 (2,110)	
- Landfill waste (t)	101 (108)	210 (296)	311 (404)	
- Hazardous waste (t)	137 (109)	103 (73)	240 (182)	
*construction phase				
Radioactive waste				
- Low level waste (m <sup>3</sup> )		0 (172)		
- Intermediate level waste (m <sup>3</sup> )		4.2 (20)		
- Spent nuclear fuel (t)		35.7 (35.8)		

Emissions into the water		Allowed annual emissions
Cooling water (million m <sup>3</sup> )	2,288 (2,267)	
Thermal load to the sea (TWh)	27.1 (26.8)	
Fission and activation products (TBq)	0.00009 (0.002)	(0.296)
Tritium (TBq)	146 (131)	(18.3)
Phosphorus (kg)	10 (31)	
Nitrogen (kg)	4,380 (5,475)	
BOD <sub>7</sub> ATU (kg)	548 (985)	



## Nuclear power plant OL1 and OL2

TVO produces electricity at Olkiluoto, Eurajoki, with two plant units, Olkiluoto 1 and 2. Olkiluoto 1 was connected to the national grid on September 2, 1978. Since that date, for more than 35 years, safe, economical and environmentally benign base load energy has been produced in Olkiluoto for the needs of Finnish society. After their first few years of operation, Olkiluoto 1 and Olkiluoto 2, commissioned in 1980, have been continuously among the most reliable nuclear power plant units.

The competent expert staff of TVO is the number one success factor behind the stable long-term power production. TVO has a strong safety-oriented operating culture based on committed personnel who build their competencies in the spirit of continuous improvement.

On 1 November 2013, Olkiluoto 2 achieved the milestone of 200 TWh in commercial production. The 200 TWh produced by OL 2 would cover the entire Finnish consumption of electricity for more than two years.

### Plant units operated safely for the entire year

In 2013, the combined power output of OL1 and OL2 was 14,633 (14,450) GWh. The combined load factor of the plant units was 95.1% (93.7%). Olkiluoto accounted for approximately 17% of all the electricity produced in Finland.

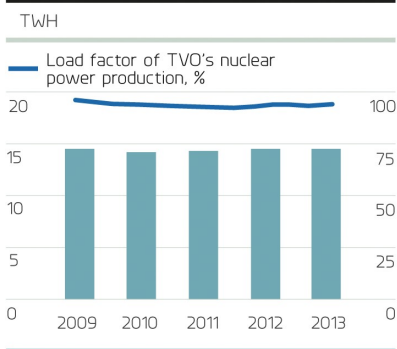


## CASE

Energy efficiency:  
More with less

[Read more](#)

### TVO'S ELECTRICITY PRODUCTION



The net output of OL1 was 7,470 (6,973) GWh and load factor 97.1% (90.4%). The net output of OL2 was 7,163 (7,477) GWh and load factor 93.1% (96.9%).

A generator cooling circuit transient caused a break in production operation from September 9 to 15 at OL2. Generation of electricity was interrupted when the generator protection system tripped the turbine. The plant unit's protection systems operated as designed, and steam generation of the reactor was brought to a controlled stop. The generator failure and the resulting turbine trip did not compromise nuclear safety. OL1 operated reliably throughout the year, excepting one short production break that occurred at the beginning of December.

## Safety and energy efficiency

Over the decades, the OL1 and OL2 plant units have been systematically developed. The basic idea is to maintain the plant units as good as new. Latest technological solutions that improve the availability, productivity and safety of the plant units are implemented continuously. Both plant units now have a rated net electrical output of 880 MW, while the original output was 660 MW.

In addition to the production output, the modernization has also improved the energy efficiency of the plant units, which means benefits for the environment. TVO is a party to the Energy Efficiency Agreement and complies with the related energy production action plan that aims at the implementation of energy efficiency improvement measures as well as improving the efficiency of primary energy usage and the overall efficiency of energy production. TVO's energy efficiency objective based on the Energy Efficiency Agreement is to save 340 GWh in 2008–2016. The efficiency plan will be valid until the end of the agreement period. TVO already achieved its objective, savings of 340 GWh of electricity, by the end of 2011. The saved amount corresponds to the annual consumption of approximately 18,000 houses with electrical heating systems.

## Annual outage with refueling and maintenance

The Olkiluoto nuclear power plant is constantly kept in an excellent condition by alternating refueling and maintenance outages. The annual outages that take place every spring at Olkiluoto usually begin with a refueling outage where part of the uranium fuel is replaced and the necessary repairs and maintenance operations are carried out, together with any preparatory work for the following year's maintenance outage. The refueling outage usually takes about one week.

The annual maintenance operations then continue with the maintenance outage of the other plant unit where major maintenance and modification work is carried out in addition to refueling. The maintenance outage usually takes two to three weeks. Extensive modernization and reconditioning operations have been carried out during the maintenance outages at approximately five-year intervals.

The 2013 annual outages of the Olkiluoto nuclear power plant took place from May 12 to June 14. OL1 underwent an eight-day refueling outage, and OL2 a maintenance outage of approximately 18 days.

The main focus of the OL2 outage was on replacement of low-voltage switchgear and work on the reactor. Two subsystems got new low-voltage switchgear and transformers that meet the requirements of the latest regulations, the relevant standards and future plant modifications. Replacement of switchgear is part of the systematic long-term development of the plant units. Other important work included the repair of a generator stator, refueling, containment testing and replacement of two main sea-water pumps.

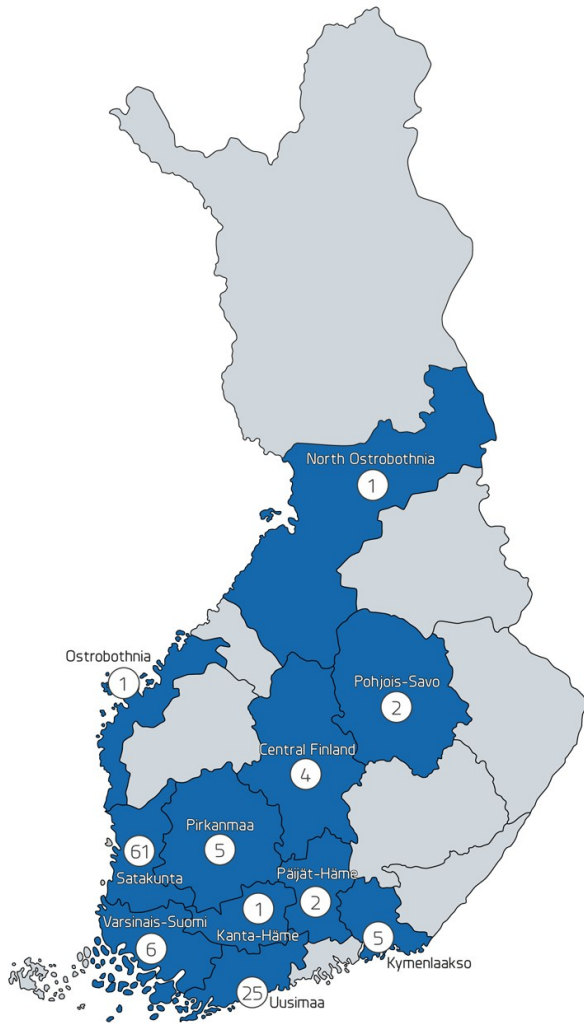
At OL1, refueling was followed by replacement of two main sea-water pumps and annual maintenance, testing and repair work.

Approximately 1,000 subcontractor employees, 900 of which were Finnish, participated in the annual outages in addition to TVO's own personnel.

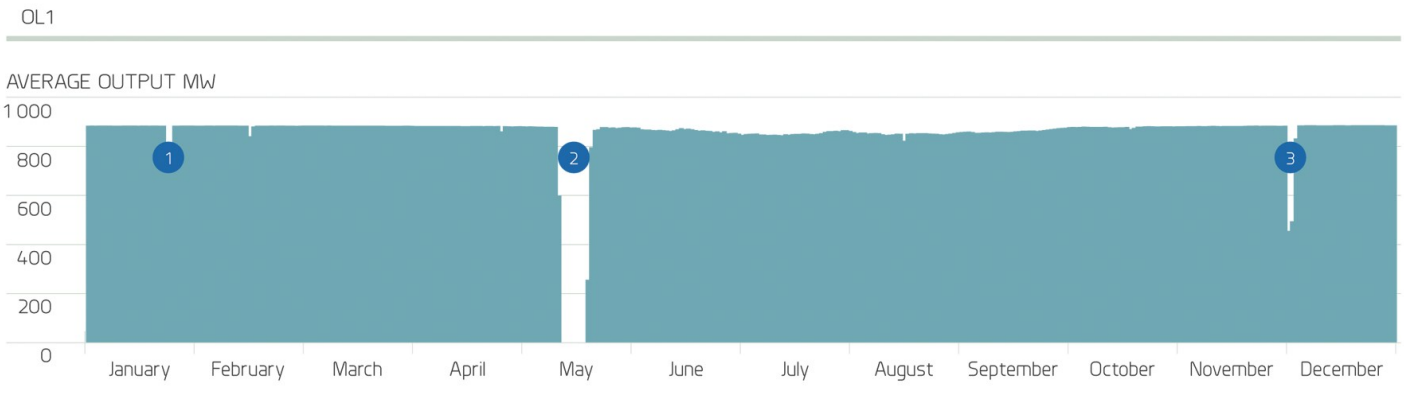
Further information: [Nuclear power plant, Olkiluoto 1 and Olkiluoto 2](#)

COMPANIES PARTICIPATING IN ANNUAL OUTAGES

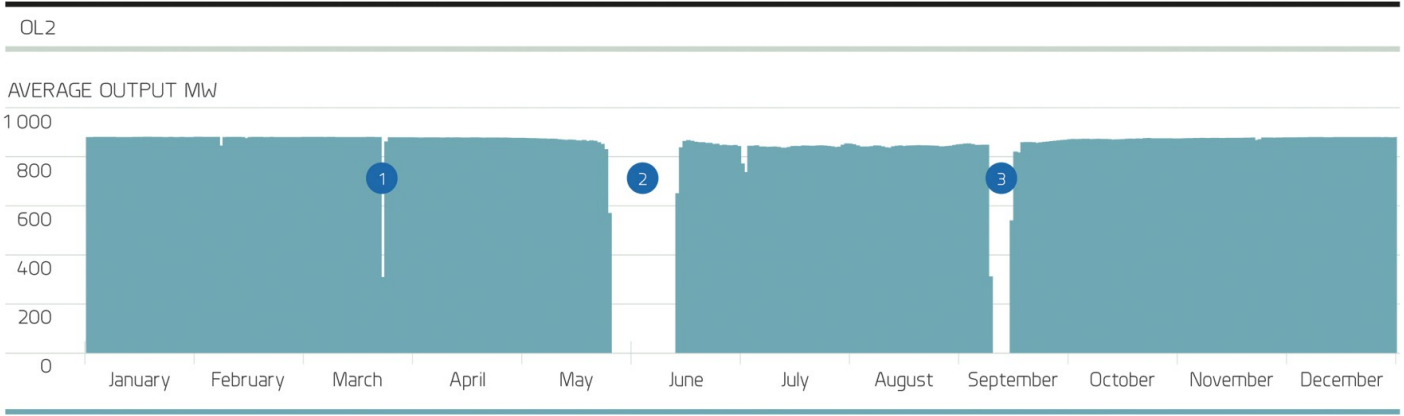
2013



**PRODUCTION IN 2013**

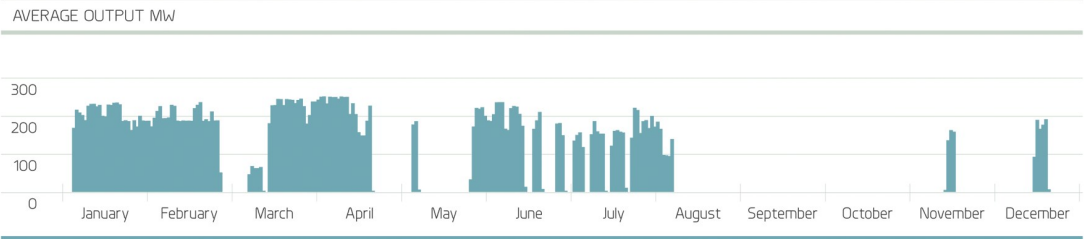


1. Shutdown of the reactor coolant pumps after the control valve of the high-pressure turbine closed spontaneously. Power limitation due to the replacement of the rubbing-face seals of the feedwater pumps.
2. Refueling outage
3. Load drop due to a failure of the over-voltage protection of the exciter rotor.



1. Reactor shutdown to the hot shutdown state due to the inspection and replacement of the flexible connectors between the generator and the exciter.
2. Maintenance outage
3. Turbine tripped by the earth fault protection of the generator stator.

**TVO'S SHARE OF MERI-PORI'S PRODUCTION**



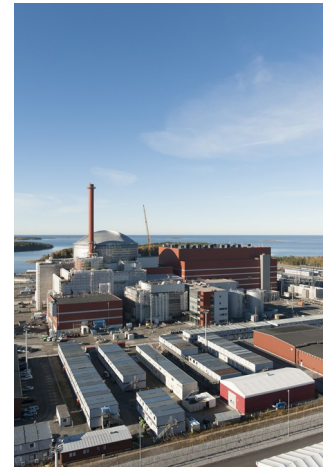
## Olkiluoto 3

TVO is currently building a third plant unit, OL3, at Olkiluoto. The OL3 construction site is a major international project. In 2013, the average number of staff for the OL3 site was 2,790. At the end of the year, approximately 2,000 people were working at the site. An uncompromising safety culture is a basic requirement at the site, and occupational safety indicators remained at a good level.

The construction of the plant unit has progressed to an advanced state. In December 2013, the plant supplier announced that it would focus its effort on the design tasks that are the most urgent and critical for the project. At the same time, the plant supplier told about its plans to reduce the number of subcontractors and workers at the OL3 site. TVO has required that the plant supplier provide an updated overall schedule and an account of the measures to be carried out to ensure the appropriate progress of the project. After the end of the period under review, in February 2014, TVO announced that it has not received from the plant supplier the requested update of the overall schedule for the OL3 project.

TVO allows no exceptions from legal obligations in its own operations, and requires the same from all companies with operations at Olkiluoto. TVO requires the plant supplier and subcontractors to observe, among other things, the laws and regulations governing taxation and working hours, as well as union contracts. TVO has worked systematically to eradicate the gray economy and to promote the related legislation.

Compliance is continuously monitored. There are several alternative channels available at the site for reporting any deficiencies or for expressing concerns to TVO. TVO will report any suspected failures to observe regulations to the plant supplier and require the plant supplier to investigate the situation and take the necessary action for improving it. TVO will also report suspected infringements to public authorities, when necessary. Authorities can be granted permanent access permits to the OL3 site to facilitate and streamline unannounced inspections.

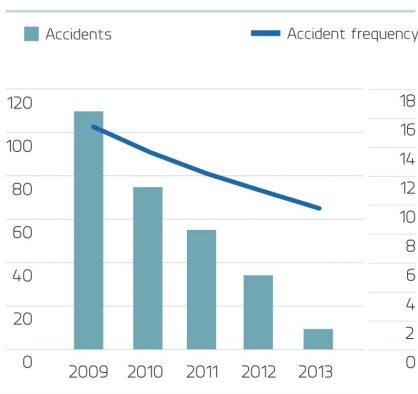


### CASE

Reactor pressure vessel closure head installed at OL3

[Read more](#)

ACCIDENTS AND ACCIDENT FREQUENCY AT THE OL3 SITE



TVO is involved in a cooperation team established at the initiative of the Employment and Economic Development Office of Rauma, with the representatives of various authorities processing current issues related to the OL3 project and discussing possible methods of advancing official procedures. The team includes representatives from the Ministry of Employment and the Economy, the Regional State Administrative Agency, the Finnish Centre for Pensions, tax administration, the police, the local parish, STUK, TVO, and the plant supplier AREVA-Siemens consortium. Representatives of trade unions are also regularly invited to participate.

Further information: [Olkiluoto 3](#)

## Olkiluoto 4

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### Olkiluoto 4 at the bidding and engineering phase

On July 1, 2010, the Finnish Parliament confirmed a favorable decision-in-principle by the Government concerning the construction of the new OL4 unit. Preparations for the OL4 project advanced in late 2011 to the bidding and engineering phase when TVO's general meeting of shareholders decided to initiate the phase.

All the current owners of TVO (EPV Energia Oy, Fortum Power and Heat Oy, Karhu Voima Oy, Kemira Oyj, Oy Mankala Ab, and Pohjolan Voima Oy) are committed to the financing of the bidding and engineering phase of the project pro-rata to their holdings. Dozens of industrial and energy companies are found behind the owner companies, meaning that the cost price electricity from the new plant unit will benefit Finnish families, the service sector, and industries on a wide scale. The objective of the bidding and engineering phase is to ensure that the OL4 plant alternatives are able to obtain the necessary licenses and be built in Finland. This phase also includes a competitive bidding process where a safe plant unit, fulfilling all the latest requirements, will be selected.

In 2013, TVO continued to investigate the licensing potential and suitability of the power plant alternatives together with the potential plant suppliers. As part of the procurement process aiming at the selection of the plant alternative, TVO received offers for the new plant unit in January 2013. Assessment of updated offers and preparation of the following phases of the project is currently in progress.

Further information: [Olkiluoto 4](#)





## Nuclear waste management

Low and intermediate level waste, also called operating waste, accumulates during the operation and maintenance of the nuclear power plant. Some of the nuclear power plant structures become radioactive during the operation of the plant and need to be finally disposed of when the plant has been decommissioned. Nuclear power plants use uranium fuel which becomes high level radioactive waste during operation and requires final disposal at a repository. Before final disposal, spent nuclear fuel is kept in the interim storage facility for spent nuclear fuel.

Responsibility for nuclear waste management lies with the nuclear power companies that must carry out the necessary nuclear waste management measures for their own waste at their own cost. According to the Finnish Nuclear Energy Act, nuclear waste generated in Finland must be treated, stored, and finally disposed of in Finland, and the import of nuclear waste into Finland is prohibited.

TVO also takes care of the operating waste and the power plant decommissioning waste. The waste is finally disposed of in the repository for operating and decommissioning waste, also called the VLJ repository, located at Olkiluoto. The VLJ repository also receives the small radioactive waste created by Finnish healthcare, industries, and research institutions.

TVO also manages the interim storage for spent nuclear fuel. Expansion of the Olkiluoto interim storage for spent nuclear fuel was launched in fall 2010, and construction work has proceeded as planned. The interim storage is expanded in accordance with TVO's plans for the interim storage of spent fuel elements from both the existing OL1 and OL2 plant units and the OL3 plant unit currently under construction. The plan is to officially commission the expansion in 2014. The extension doubles the available fuel pool capacity.

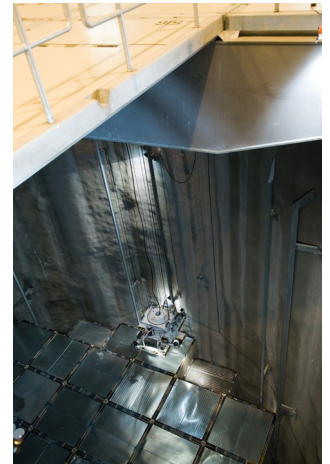
### Advance collection of waste management funds

Financial investments into final disposal are already being made. The cost of final disposal is collected from the owners of TVO in the price of nuclear electricity.

In Finland, nuclear power companies bear the costs of nuclear waste management, and the funds for that purpose are collected into the State Nuclear Waste Management Fund. Each year, the Ministry of Employment and the Economy determines the share of each nuclear power company in the State Nuclear Waste Management Fund as well as the waste management fee to be paid to the fund. Each nuclear power company's share of liabilities in the fund is decreased by the investments it has made in final disposal.

The annual fee payable to the fund is determined on the basis of the amount of disposable nuclear waste accumulated less the effect of actions taken for nuclear waste management. The fee is also increased or decreased on the basis of how well the fund succeeds in its investments: if the interest income is higher than expected, the fee is correspondingly reduced. The objective is to accumulate enough assets in the fund so that it allows for the final disposal of accumulated nuclear fuel to be carried out.

Further information: [Nuclear waste management](#), [Operating waste](#) and [Interim storage for spent nuclear fuel](#).

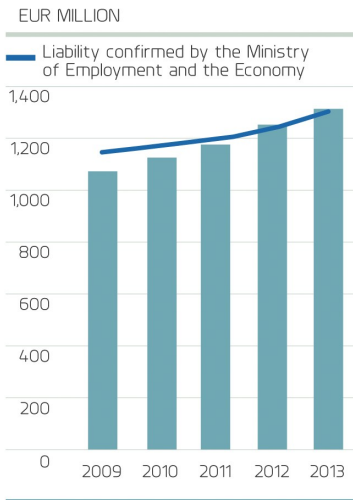


### CASE

Increase in capacity for interim storage of spent fuel

[Read more](#)

**TVO FUND SHARE IN THE  
FINNISH STATE NUCLEAR  
WASTE MANAGEMENT**



## Final disposal

### Final disposal of spent nuclear fuel

Spent nuclear fuel must be managed to avoid any risk to people or organic nature. A responsible producer of nuclear electricity will look after the fuel all the way, from bedrock to bedrock. TVO and Fortum have established a company, Posiva Oy, to handle the final disposal of the owner companies' spent nuclear fuel. The spent nuclear fuel from nuclear power plants will be packed in copper canisters and placed in the Olkiluoto bedrock at an approximate depth of 400 meters. Final disposal has been researched and tested for more than 30 years.

Final disposal of spent nuclear fuel is based on the multiple barriers principle. Barriers ensure that nuclear waste does not come into contact with people or organic nature. One deficient barrier, a predictable geological change, or other similar factor will not compromise effective isolation. Barriers include the solid state of the fuel, the final disposal canister, the bentonite clay buffer, the tunnel filling material, and the surrounding bedrock.

The spent fuel will be packed into canisters in the encapsulation plant. After encapsulation, the canisters are transported to the underground disposal facility by an elevator.

Before final disposal, the spent fuel is kept in an interim storage facility at TVO's Olkiluoto power plant. From the power plant, the fuel will be transported to the encapsulation plant of the final disposal facility in special containers. Spent fuel from TVO's and Fortum's power plants in Finland will be placed in the Olkiluoto repository.

Plenty of time has been reserved for the preparation and practical execution of final disposal. Thorough preparations and careful implementation ensure the safety of the final disposal. The disposal of spent fuel is scheduled to begin in the 2020s; it will continue for nearly 100 years.



## CASE

ONKALO exhibiton soon to open at Olkiluoto

[Read more](#)

The actual tunnel section of ONKALO was completed in 2012, and technical facilities and systems have been added to the facility in 2013. An international tunnel closure testing program coordinated by Posiva and partially financed by the EU has been launched at the depth of 420 meters. Eight countries are involved in the program.

In September, the Ministry of Employment and the Economy organized a public hearing and discussion event on the Posiva construction license application, which Posiva had submitted to the Ministry of Employment and the Economy at the end of 2012. The Ministry of Employment and the Economy has received all the stakeholder group statements it has requested concerning the construction license application.

In 2013, Posiva has made preparations to begin the construction of a final disposal and encapsulation facility at the beginning of 2015. The work has included the preparation of a detailed project and system plans and recruitment of project personnel. The final disposal concept has also been developed further, the license application complemented with additional materials required by STUK, and demonstration measures to confirm the ability to begin final disposal in the first half of the 2020s launched.

Further information: [Final disposal, Nuclear waste management, From the reactor to final disposal](#) and [Final disposal responsibilities](#) and [Posiva](#).

## Environment in brief

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Nuclear power is climate-friendly energy, which makes TVO an important contributor to the mitigation of climate change and advocate of sustainable development. The level of our environmental management is already high, and we aim for the continual improvement of operations and a high level of environmental protection. Nuclear power generates no greenhouse gas or particle emissions. The most significant environmental impact of the Olkiluoto nuclear power plant is the warming up of the sea water near the plant.

The Environment theme of the Corporate Social Responsibility 2013 report describes TVO's continuous work for the good of the environment.

## Continuous work for the benefit of the environment

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TVO's environmental management system is EMAS registered and certified according to the international ISO 14001 standard. The purpose of the system is to improve continuously the company's operations and the level of environmental protection. TVO's corporate social responsibility is based on the principles of sustainable development. TVO recognizes the environmental aspects of its operations, strives to minimize the adverse impact of its operations at all stages of the electricity production chain, and ensures that nuclear fuel is used in a safe manner from raw material acquisition to final disposal. TVO also requires other companies and our partners operating in the power plant area to take a responsible attitude towards environmental matters consistent with our policies and operating principles.

In 2013, the operations at the Olkiluoto nuclear power plant complied with TVO's corporate social responsibility policy, environmental permits and environmental management system, and remained at the good level of previous years. TVO's management confirms the targets for major environmental and energy aspects. An environmental team, compiled of experts from various fields, regularly monitors the achievement of objectives and defines corrective measures to improve the progress when necessary. In 2012, TVO set a total of fifteen targets for the development of environmental and energy issues. All of these targets were reached wholly or in part.

The most significant environmental impact of the Olkiluoto nuclear power plant is the warming up of the sea water near the plant. Continuous management and potential utilization of the thermal load contained in the cooling water is a long-term objective for TVO. During the year under review, the temperature of cooling water remained within the limits required by the environmental permit. The environmental impact of the construction of the Olkiluoto 3 plant unit has been minimized through measures such as the sorting and recycling of waste.

The lifecycle carbon emissions of the nuclear electricity produced at Olkiluoto correspond to those of hydropower and wind power. The radioactive emissions into the air and water from the nuclear power plant are very low, mainly below one percent of the maximum permissible limits. During the year under review, radioactive emissions into the water were the lowest of the entire operating life of the nuclear power plant. No accidents causing environmental damage occurred at the power plant.

TVO is committed to the Energy Efficiency Agreement of trades and industries. Energy efficiency measures are integrated into TVO's usual operations, such as the modification process and personnel development. During the year under review, TVO participated in the Energy Saving Week. During the week, personnel were provided with information on the potential of energy efficiency at home, energy certificates of houses, and energy efficiency at the plant units.



### CASE

Art from filters

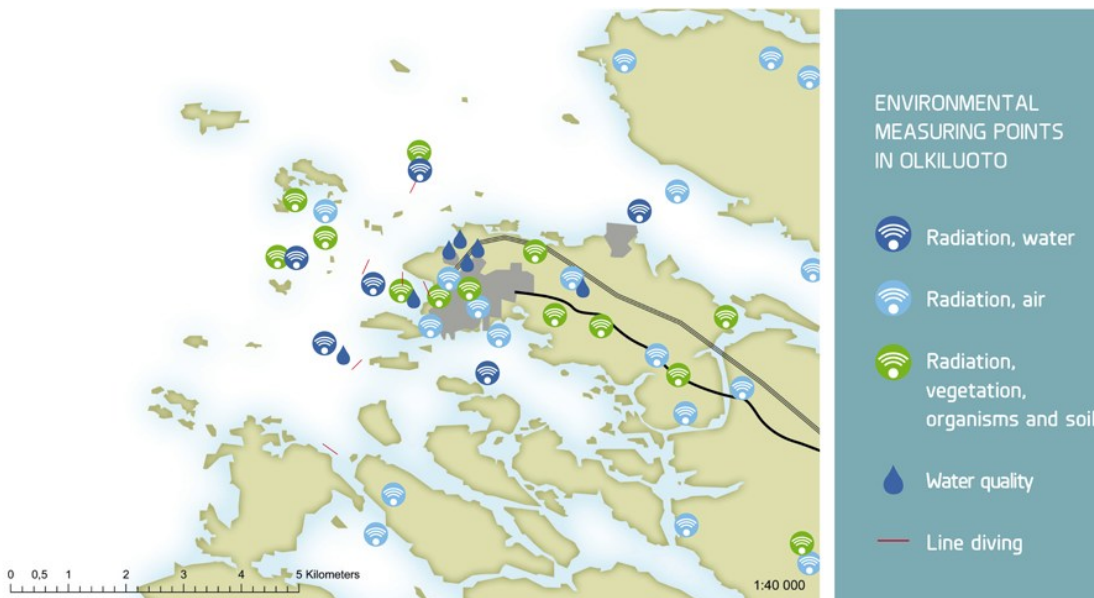
[Read more](#)

A waste sorting campaign day was also included in the Energy Saving Week, with information of correct sorting of waste provided to personnel. TVO also encouraged its personnel to participate in WWF's Earth Hour campaign.

Environmental surveys of the Olkiluoto island were launched as early as in the 1970s, and the state of the environment is continuously monitored. A biodiversity survey of the island was carried out in 2013 to define the state of the environment and the range of species present, and to allow a detailed analysis of the environmental impact of the operations. Important observations included the changes that occur in the environment of the island due to new infrastructure and the construction effort, the abundance and diversity of birds in places, and the increase of the nature conservation areas on the island. The habitat types found in the area are mostly low-nutrient with few species, which keeps the impact of forestry and construction work minor.

The personnel are informed of environmental matters in induction training, which all new employees at the Olkiluoto nuclear power plant participate in. TVO also provides training on waste sorting and energy efficiency, for example, and organizes campaign weeks on current environmental matters.

Please read more about [environmental impacts](#) and [environmental research](#) from TVO's Environmental Report.



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Carbon-14 (TBq)	0.80 (0,88)	
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URANIUM FUEL (t)		36.8 (37.6)
Intermediate agents:		
- Oils (m³)	303 (238)	
- NaClO (15 %) (m³)	62.6 (67)	
- Other chemicals (t)	139.3 (115)	
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Raw water (tap and process water) (m³)	274,549 (211,312)	
Cooling water (million m³)	2,288 (2,267)	

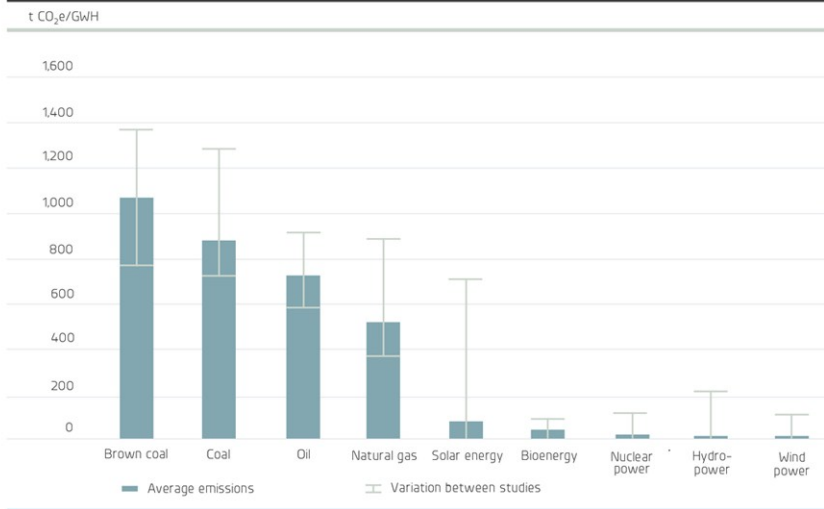
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		240 (182)
*construction phase		
Radioactive waste		
- Low level waste (m³)		0 (172)
- Intermediate level waste (m³)		4.2 (20)
- Spent nuclear fuel (t)		35.7 (35.8)

Emissions into the water		Allowed annual emissions
Cooling water (million m³)	2,288 (2,267)	
Thermal load to the sea (TWh)	27.1 (26.8)	
Fission and activation products (TBq)	0.00009 (0.002)	(0.296)
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Phosphorus (kg)	10 (31)	
Nitrogen (kg)	4,380 (5,475)	
BOD <sub>7</sub> ATU (kg)	548 (985)	



**LIFECYCLE GREENHOUSE GAS EMISSIONS**



Source: World Nuclear Association, compilation of various studies

## TVO and Society

TVO supports Finnish well-being through the safe and economical production of climate-friendly electricity. Competent and motivated personnel are a prerequisite for the safe operation of a nuclear power plant. TVO supports open interaction in the immediate region, Finnish society, and within the international nuclear energy sector.

The TVO and society theme of the Corporate Social Responsibility 2013 report includes an overview of TVO and information on the funding and financial basis of operations, personnel, occupational and radiation safety, communications, stakeholder cooperation, sponsorship operations, and the many aspects of TVO's social participation.

### TVO: an overview

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

Established in 1969, TVO is a limited liability company that provides electricity for its owners at cost price. TVO operates two nuclear power plant units in Olkiluoto, Eurajoki, since 35 years. Olkiluoto 1 and 2 were built to satisfy the increasing need for electricity of Finnish energy-intensive industries. During the past decades, TVO has developed from an industrial resource to a base load producer that benefits the entire society. The two Olkiluoto plant units currently produce approximately one sixth of Finland's total electricity output. Approximately half of the electricity produced by TVO is spent by the industry. The other half is used at homes, in service production and in agriculture via power utilities.

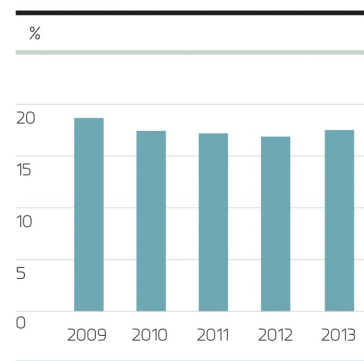
After their early years, OL1 and OL2, which were commissioned in 1978 and 1980 respectively, have remained among the most reliable nuclear power plant units in the world. On Olkiluoto Island, TVO has all the competence, structures, functions, and waste management required for the safe production and construction of nuclear electricity. TVO's nuclear power expertise and operating experience attract worldwide interest.

During their 35 years of operation, the Olkiluoto plant units have produced a total of 424 billion kWh of climate-friendly electricity. Every year, the nuclear power produced at Olkiluoto helps prevent approximately 12 million tonnes of carbon dioxide emissions in Finland compared to producing the same amount of electricity using coal. The saved amount corresponds to the total annual CO<sub>2</sub> emissions of all road traffic in Finland.

The Olkiluoto site also features a 1 MW wind power plant, as well as a 100 MW gas turbine reserve power plant built as a joint project of Fingrid Oyj and TVO. TVO's share of the power produced by the Meri-Pori coal-fired power plant is 45%. In addition to Olkiluoto, TVO has offices in Helsinki, Brussels, and Rauma and Pori.

Through its direct owners, TVO's nuclear electricity brings well-being to 135 municipalities. These municipalities are shareholders in more than 50 energy companies that serve as a route for distributing electricity from Olkiluoto throughout Finland.

TVO'S DELIVERY SHARE OF THE ELECTRICITY USED IN FINLAND



## The impact of global megatrends on the energy industry

### GLOBAL CHALLENGES FOR THE ENERGY INDUSTRY



Population increase and economic growth usually also increase the demand for energy. The energy sector plays an important role in ensuring that growth is sustainable. TVO aims to respond to global challenges with a strategy based on an uncompromising safety culture and solid nuclear energy expertise.

As the wealth of the population has increased and energy-efficiency improved, electricity's share of total energy consumption has kept climbing. Electricity can help advance the efficient utilization of natural resources and sustainable economic development. Scarce natural resources, increasing environmental problems and rising fuel prices strengthen electricity's share of total energy consumption. When other energy sources are replaced with electricity, the overall energy requirement decreases, as electricity can be used more efficiently.

Emissions can also be reduced when electricity is produced with no CO<sub>2</sub> emissions using nuclear power, for example. Climate change poses a challenge for which the energy industry must help find solutions. The available natural resources and energy sources must be utilized to maximum benefit, and new low-emission technology that saves energy must be developed and adopted. Nuclear power will help us achieve a low-carbon future, which requires the reduction of greenhouse gas emissions by 80–90% before 2050.

## Group structure

TVO's majority shareholder is Pohjolan Voima Oy with its share of 58.5% of the TVO stock. Teollisuuden Voima Oyj is a joint venture of Pohjolan Voima and several other companies.

TVO Nuclear Services Oy (TVONS) is a subsidiary fully owned by TVO. Integration of TVO's fully owned subsidiaries Olkiluodon Vesi Oy and Perusvoima Oy to the mother company was entered into the trade register on December 31, 2013. TVO and Fortum also have a joint venture, Posiva Oy, of which TVO owns 60%.

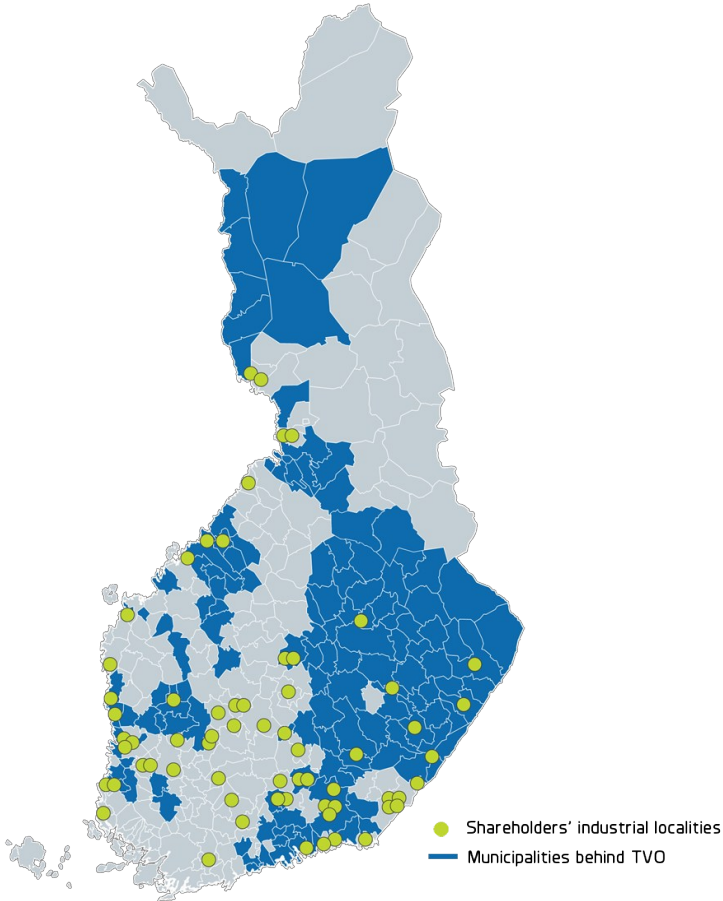
Further information: [TVO in brief](#), [TVO's history timeline](#), [Company information](#) and [TVO's location](#).

### TVO'S SHAREHOLDERS AND THEIR HOLDINGS, DECEMBER 31, 2013

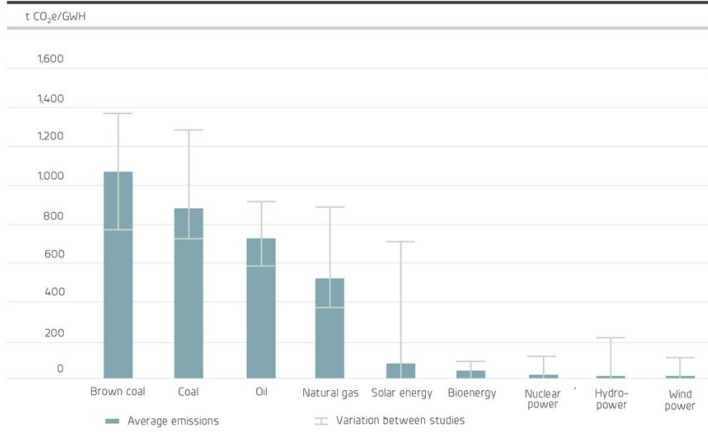
	A Series	B Series	C Series	Total
EPV Energia Oy	6.5	6.6	6.5	6.5
Fortum Power and Heat Oy	26.6	25.0	26.6	25.8
Karhu Voima Oy	0.1	0.1	0.1	0.1
Kemira Oyj	1.9	–	1.9	1.0
Oy Mankala Ab	8.1	8.1	8.1	8.1
Pohjolan Voima Oy	56.8	60.2	56.8	58.5
	100%	100%	100%	100%



TVO is owned by Finnish industrial operators, energy sector companies, and municipalities



**LIFECYCLE GREENHOUSE GAS EMISSIONS**



Source: World Nuclear Association, compilation of various studies

## Financing

TVO's financing situation has developed as planned, and an efficient mix of financing sources has been used. The role of the capital market as a source of financing has increased further. All the credit ratings agencies with importance for capital market financing estimate TVO's future as stable.

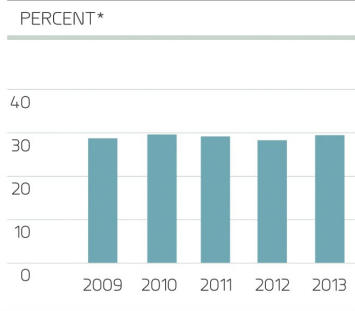
Proper financing ensures TVO's solvency in all circumstances. TVO's basic principle is to raise about three quarters of the funding required for investments from the financial markets, with about one quarter coming from the owners. TVO prefers long-term financing arrangements. Financing is always sought for the company, not for individual projects.

TVO is in the middle of major investments; their financing arrangements require strong trust. While major projects, OL3 and OL4, are in progress, it is important to maintain the trust of investors. From the point of view of investors, the good electricity production capacity of OL1 and OL2 is very valuable. These plant units have already been generating electricity for more than 35 years with high load factors, and the original investments have been amortized.

TVO's owners are very committed to the company and trust its operations. The solid trust was reflected in the approval of the shareholder loan commitment in 2013. In February 2013, TVO decided to propose its B series shareholders a new shareholder loan amounting to EUR 300 million to allow TVO to prepare better for potential additional delays and costs pertaining to the completion of the OL3 project. In June in the same year, all the owners of B series shares signed a shareholder loan agreement in accordance with the proposal of the Board.

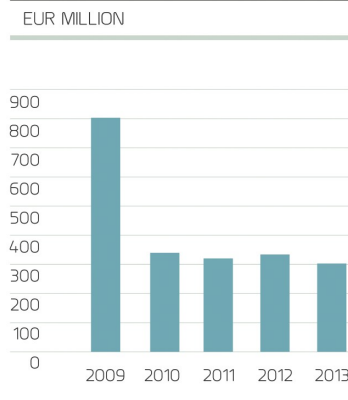
Further information: [Investor information](#).

### EQUITY RATIO



\*Equity ratio (%) = 100 x  $\frac{\text{equity} + \text{appropriations} + \text{loans from equity holders}}{\text{balance sheet total} - \text{loan from the Finnish State Nuclear Waste Management Fund}}$

### INVESTMENTS



## Economic aspects

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TVO creates well-being, employment and income by producing cost-price electricity for its shareholders. The company has a significant impact on the economy of the municipalities in the immediate region, and it directly or indirectly touches the everyday life of thousands of people all over Finland.

TVO's operations are based on the production of electricity to shareholders at cost price. Owners cover all of TVO's operating costs and, in return, receive electricity pro-rata to their ownership. TVO's owners consume the power themselves or sell it on to third parties. The cost price model allows electricity companies and electricity users of different sizes to participate in major investments, such as those required for nuclear power, and reap the benefits of large-scale production. TVO's owners include 135 municipalities, which means that stable costs and predictability, the benefits of cost-price electricity, are felt all over Finland.

The financial performance of companies is compared using various indicators. Due to the cost price operating principle, TVO cannot be analyzed using conventional financial indicators, as they were created for comparing companies that aim to make a profit. Important indicators to TVO and the owners include the amount of electricity produced and the load factors of the plant units.

In 2013, TVO's plant units operated safely and achieved their best production output, 14.6 TWh. The net output of OL1 was 7.5 (7.0) TWh and load factor 97.1% (90.4%). The net output of OL2 was 7.2 (7.5) GWh and load factor 93.1% (96.9%). The combined load factor of the plant units was 95.1%. OL1 underwent an eight-day refueling outage, and OL2 a maintenance outage of approximately 18 days.

TVO makes investments to improve the availability, productivity and safety of its nuclear power plant. Modernizations have brought the net electrical output of OL1 and OL2 from 660 MW to 880 MW, 1,760 MW combined, and significantly improved the safety and efficiency of production operations. TVO aims to maintain the plant units as good as new.

As a part of the major modernization project currently in progress, TVO will [replace the emergency diesel generators](#). The project is the most extensive single plant modification project to have been carried out in Olkiluoto. The total investment in the diesel generator replacement amounts to more than EUR 100 million. TVO acquires the emergency diesel generators from Wärtsilä Finland Oy. The agreement on the delivery of emergency diesel generators and their auxiliary systems to the Olkiluoto nuclear power plant was signed in May 2013. The replacement project will begin in 2016 and has been estimated to continue to 2020.

## Electricity at a stable price

The price of electricity charged from TVO's owners remains stable when operations follow plans and both costs and production figures are in line with the budget. TVO produces a steady supply of electricity and maintains its future production capacity.

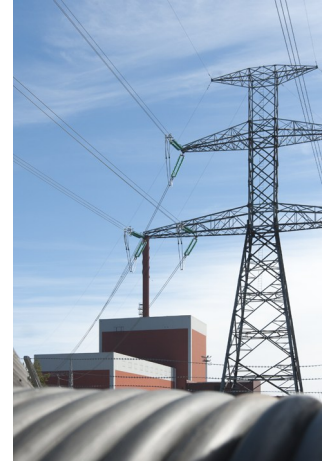
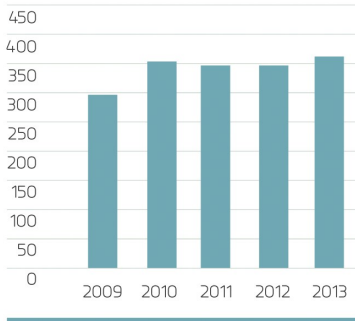
The operations were according to plan in 2013; the production of electricity, turnover, and the production cost of electricity were all in line with the targets set. A stable and predictable price for electricity is important to our owners.

In 2013, TVO's turnover was EUR 362.8 (347.1) million. Of the turnover, EUR 40.4 (29.8) million was accumulated from the electricity produced at the Meri-Pori coal-fired power plant. TVO's share of the Meri-Pori power plant's production capacity is 45%.

In fall 2013, 35 years had passed since TVO launched production operations in Olkiluoto. OL1 and OL2 produce electricity at a competitive price, and the plant units are continuously maintained and improved. In 2013, OL2 achieved the milestone of 200 TWh of electricity produced in commercial operation.

### TURNOVER

EUR MILLION



## CASE

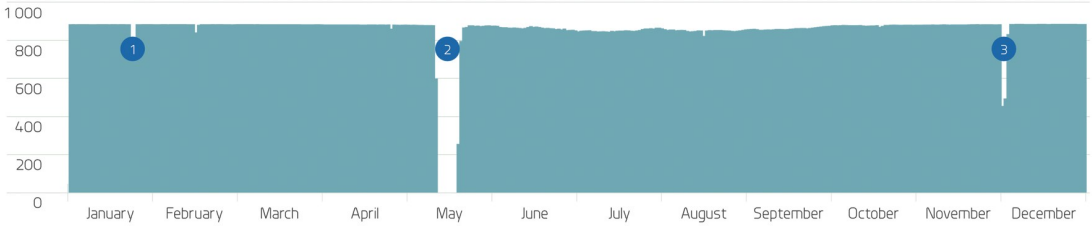
35 years of clean  
electricity production

[Read more](#)

**PRODUCTION IN 2013**

OL1

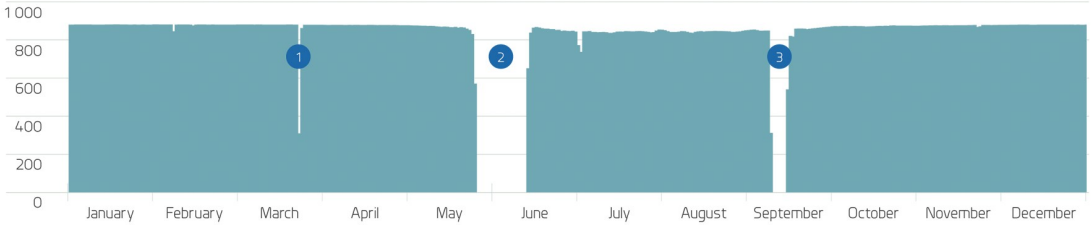
AVERAGE OUTPUT MW



1. Shutdown of the reactor coolant pumps after the control valve of the high-pressure turbine closed spontaneously. Power limitation due to the replacement of the rubbing-face seals of the feedwater pumps.
2. Refueling outage
3. Load drop due to a failure of the over-voltage protection of the exciter rotor.

OL2

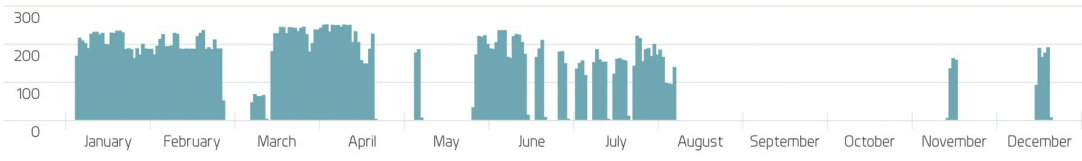
AVERAGE OUTPUT MW



1. Reactor shutdown to the hot shutdown state due to the inspection and replacement of the flexible connectors between the generator and the exciter.
2. Maintenance outage
3. Turbine tripped by the earth fault protection of the generator stator.

**TVO'S SHARE OF MERI-PORI'S PRODUCTION**

AVERAGE OUTPUT MW



## Well-being and employment

TVO procures products and services from both local and international operators.

TVO and the OL3 construction site are important sources of employment and economic prosperity in the region, both directly and indirectly. The purchases of products and services also provide employment and income to local people. In addition, TVO pays real estate tax to the Municipality of Eurajoki.

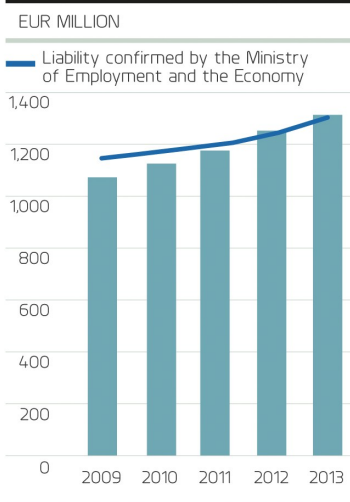
In 2013, TVO worked with approximately 1,000 Finnish material or service supplier, of which 300 were located in the Satakunta region. During the year under review, the OL3 site employed an average of 2,790 people who conveyed the positive financial impact on the entire region.

The value of nuclear fuel procurement amounted to EUR 56.5 (67.5) million in 2013. Nuclear fuel worth EUR 48.2 (46.1) million was consumed in the electricity production process. TVO only procures uranium and processing services related to the fuel supply chain from responsible suppliers it has specifically approved.

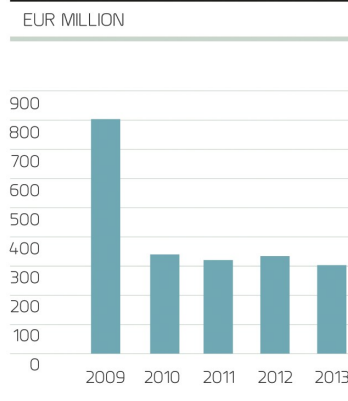
In compliance with the Nuclear Energy Act, TVO pays nuclear waste management fees to cover future costs of nuclear waste management. In 2013, the Finnish State Nuclear Waste Management Fund confirmed TVO's fees for 2012 to be EUR 43.1 (34.1) million. The fee for 2013 will be confirmed in 2014. During the past year, TVO's total costs for nuclear waste management amounted to EUR 89.3 (76.9) million.

TVO's investments in 2013 amounted to EUR 302.5 (336.9) million, of which the OL3 project accounted for EUR 260.8 (274.0) million.

### TVO FUND SHARE IN THE FINNISH STATE NUCLEAR WASTE MANAGEMENT

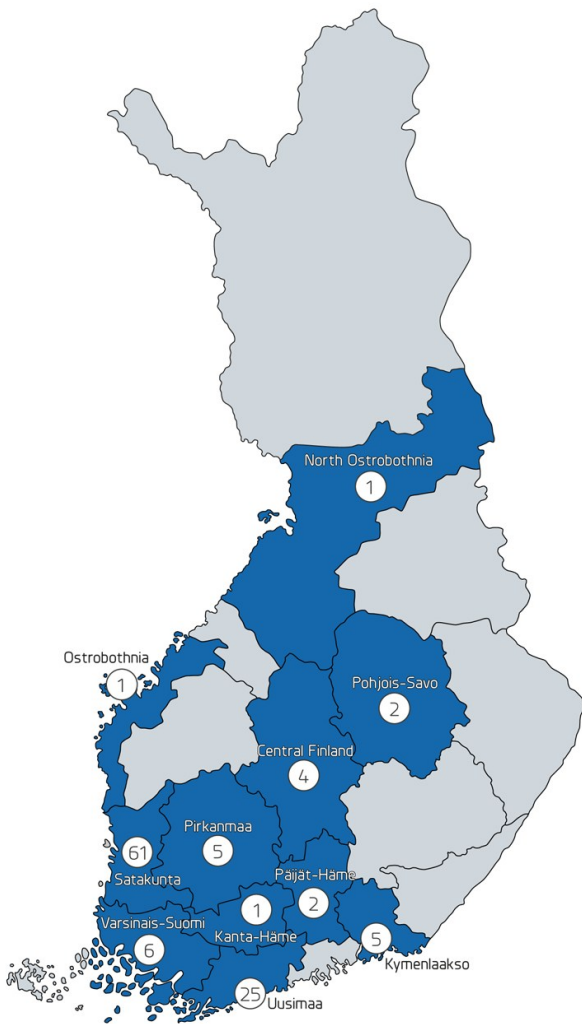


### INVESTMENTS



COMPANIES PARTICIPATING IN ANNUAL OUTAGES

2013



## Social responsibility indicators

	2013	2012	2011	2010	2009
Personnel, permanent, Dec 31	762	772	738	714	717
- Men	589	599	569	560	567
- Women	173	173	169	154	150
Personnel, fixed-term, Dec 31	90	91	75	84	80
- Men	49	48	38	36	32
- Women	41	43	37	48	48
Personnel living in (%) 1)					
- Eurajoki	18	18	18	19	20
- Rauma	55	55	56	57	57
- Pori	11	11	11	10	9
- other	16	16	15	14	14
New TVO employees 1)	25	71	73	29	31
- Men	18	62	47	21	21
- Women	7	9	26	8	10
Summer workers	175	166	173	168	186
- Men	112	115	117	106	116
- Women	63	51	56	62	70

1) Data reported only on the permanent personnel.

## Economic impact

In the reporting of its economic responsibility, TVO uses the applicable indicators of the Global Reporting Initiative (GRI). The social responsibility report includes some figures that are gathered as a part of the closing of accounts but that are not included in the actual annual report and accounts. The following figure is a description of TVO's economic impact (M€) on major stakeholders. The data was derived from TVO's income statement and balance sheet. The legend does not include all impacts.



## TVO's economic impact

A description of TVO's economic impact (M€) to major stakeholder groups.

### Production of added value

<b>Shareholders</b>	<b>363 (347) M€</b>
<p>TVO produces electricity to its shareholders at cost price. In 2013, TVO shareholders paid a total of EUR 363 (347) million for the electricity. TVO supplied 15,331 GWh of electricity, approximately one-sixth of the total amount of electricity consumed in Finland.</p> <p>The electricity is distributed all over Finland via a chain of ownership which consists of TVO's principal owner Pohjolan Voima as well as the Finnish companies and power utilities of 135 municipalities, which own Pohjolan Voima and receive the produced electricity.</p> <p>About half of the electricity produced by TVO is used in industry by industrial companies owned by TVO's shareholders in various localities. The other half is consumed by households, agriculture, and the service sector.</p>	

### Distribution of added value

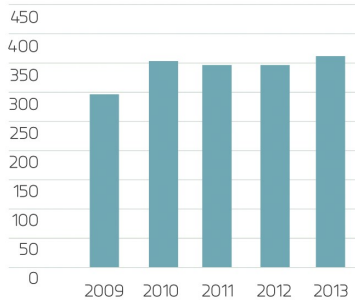
<b>Suppliers and subcontractors</b>	<b>199 (194) M€</b>	<b>Investments and financiers</b>	<b>312 (350) M€</b>
<p>About 1,000 external workers participated in the annual outages, 900 of them Finnish. Subcontractors from three other countries also participated in the effort.</p> <p>Long-term partners include: Securitas Oy, in charge of security; Sodexo Oy, in charge of the personnel canteen; and RTK-Palvelu Oy, responsible for cleaning and sanitation services. These companies employ over 300 people at Olkiluoto. In all, TVO regularly provided work for an approximate total of 700 subcontractors and consultants.</p>		<p><b>Financiers</b></p> <p>At the end of the year, TVO's current and non-current liabilities amounted to EUR 3427 (3197) million. The company raised a total of EUR 362 (775) million in non-current liabilities while repayments amounted to EUR 176 (241) million.</p> <p>At the end of the year, TVO had undrawn credit commitments as well as cash and cash equivalents totaling EUR 2,220 (2,164) million. Of this, subordinated shareholder loan commitments by the owners accounted for a total of EUR 720 million, of which EUR 220 million is intended for financing the bidding and engineering phase of the OL4 project and EUR 500 million for the financing needs of the OL3 project.</p> <p>All credit rating organizations consider TVO's outlook to be stable.</p> <p><b>Investments</b></p> <p>Modernization work, such as the replacement of low-voltage switchgear, was carried out during the OL1 annual outage, together with work on the reactor. TVO also signed an agreement on the purchase of new emergency diesel generators and their auxiliary systems for the Olkiluoto nuclear power plant.</p> <p>In 2013, investments in the OL3 project amounted to EUR 261 (274) million. Most of the construction work for the new plant unit has been completed, and the main components are in place. Design, documentation and licensing of the reactor island automation systems are still in progress.</p> <p>Preparation of the OL4 nuclear power plant project continued with an investigation of the licensing potential and suitability of the power plant alternatives together with the potential plant suppliers.</p> <p>R&amp;D costs totaled EUR 38 (45) million. R&amp;D on nuclear waste management accounted for most of this.</p>	
<b>Personnel</b>	<b>52 (50) M€</b>	<p><b>State and municipality</b></p> <p>TVO paid the municipality of Eurajoki EUR 13 (12) million in real estate tax.</p> <p>TVO paid EUR 43 million in nuclear waste management fees to the State Nuclear Waste Management Fund to cover future costs of nuclear waste management.</p>	
<p>At the end of the year, TVO employed 852 (863) people, 821 (837) in Olkiluoto and 31 (26) in Helsinki.</p> <p>Of the total personnel, 56% (55%) are from Rauma, 18% (18%) from Eurajoki, and 11% (11%) from Pori.</p> <p>The share of female employees was 23% (22%).</p> <p>In 2013, TVO hired 25 (71) new employees, and 24 (21) employees retired.</p> <p>An average of 2,790 people worked at the OL3 site during the year. In addition, the subcontract work for the project provides employment both in Finland and abroad.</p>			

The figures in the diagram were derived from TVO's income statement and balance sheet. The legend does not include all impacts.

*The figures in the diagram were derived from TVO's income statement and balance sheet. The legend does not include all impacts.*

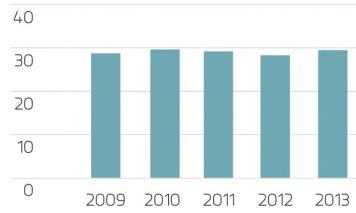
## TURNOVER

EUR MILLION



## EQUITY RATIO

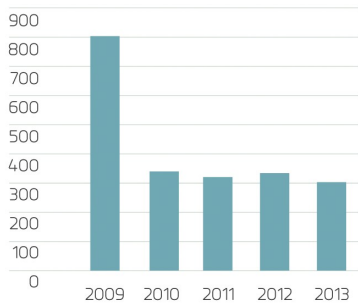
PERCENT\*



\*Equity ratio (%) =  $100 \times \frac{\text{equity} + \text{appropriations} + \text{loans from equity holders}}{\text{balance sheet total} - \text{loan from the Finnish State Nuclear Waste Management Fund}}$

## INVESTMENTS

EUR MILLION



## Personnel

TVO is a hub of Finnish nuclear power expertise with top-quality results produced by skilled, professional, experienced and motivated personnel. TVO possesses expertise on the entire lifecycle of a nuclear power plant from design and procurement of a plant unit to the final disposal of spent nuclear fuel. Olkiluoto is a competence center with all the resources and operations required by safe and economical production of nuclear power, and a shared operating culture to steer all operations.

The personnel are committed to the responsible performance of their duties in accordance with the agreed procedures that have been set out in the Code of Conduct approved by the Board of Directors. The Code of Conduct defines TVO's general principles concerning practical operations and social responsibility. The purpose of the Code is to create a unified way of working in accordance with a shared framework of responsibility and ethics.

### Personnel figures

At the end of the year, TVO employed 852 (863) people. Most of the personnel works at Olkiluoto, with approximately 30 employees based in Helsinki. The average age of the personnel in 2013 was 43.7 (43.6) years.

The average number of employees during the year was 890 (879). In 2013, 25 (71) new employees were hired. At the end of the year, 22.7% (22.4%) of the permanent workforce were female. The Board of Directors had 10 (10) members, one (1) of them a woman. The Management Group had 13 (13) members, two (2) of them women. The Management Group has 3 (3) personnel representatives.

During the year, 65 (53) people changed their jobs within the company. A total of 36 (36) permanent employees left the company, 24 (21) of them due to retirement. Nine per cent of the permanent staff spent time on parental leave during the year. Return to work after parental leave has been at a good level, and nearly 100 per cent were working one year after the end of parental leave. Low staff turnover and long employment relationships form the basis of TVO's competencies and professionalism. When the recruitment of new employees in recent years is taken into account, the average duration of employment relationships was 14 (14) years.

In 2013, TVO employed 175 (166) summer trainees. TVO participated for the first time in the responsible summer job campaign of the Finnish Children and Youth Foundation. The purpose of the campaign is to develop summer employment and the ability of 16–25-year-olds to find their path in the world of work. For TVO, participation in the campaign meant the incorporation of its principles into the work of summer trainees. The responsible summer job campaign has five principles, three of which brought changes to TVO's practices. Open communication was developed to improve the applicant experience, fairness and equal treatment. Success of the summer training period was followed up with feedback discussions, which particularly focused on the successful application process, appropriate induction training, and pleasant working community.

In 2013, TVO spent EUR 62.9 (61.2) million on personnel expenses, of which wages and salaries accounted for EUR 51.7 (50.3) million, pension costs EUR 8.3 (8.1) million and other statutory employer's contributions EUR 3.0 (2.8) million.

TVO observes the collective labor agreements for the energy sector, valid until January 31, 2017, in accordance with the employment and growth agreement between central labor organizations. The energy sector's agreed salary systems for technical and industrial officers and employees are based on the job requirement categories and support an equal salary policy. As a rule, TVO's employment benefits apply to the entire personnel, excluding very short employment contracts.



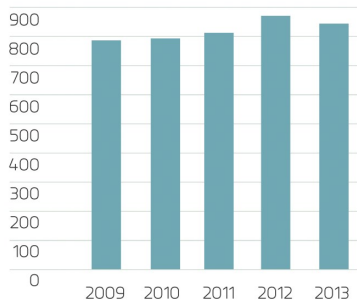
## CASE

Summer job season is over

[Read more](#)

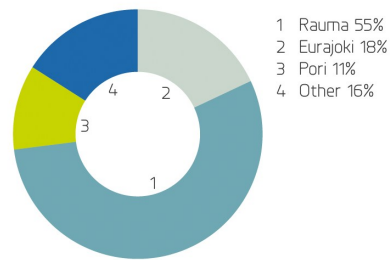
### TVO'S PERSONNEL

NUMBER OF EMPLOYEES



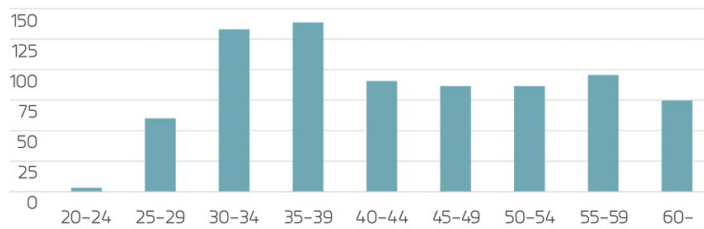
### PLACE OF DOMICILE, PERSONNEL

2013



### TVO'S PERSONNEL BY AGE GROUP

YEAR 2013



## Social responsibility indicators

Personnel structure	2013	2012	2011	2010	2009
Personnel, permanent, Dec 31	762	772	738	714	717
- Men	589	599	569	560	567
- Women	173	173	169	154	150
Personnel, fixed-term, Dec 31	90	91	75	84	80
- Men	49	48	38	36	32
- Women	41	43	37	48	48
Average age of personnel 1)	43,7	43,6	44,0	44,7	44,6
- Men	44,3	44,1	44,8	45,3	45,1
- Women	41,7	41,7	41,4	42,8	42,7
Personnel living in (%) 1)					
- Eurajoki	18	18	18	19	20
- Rauma	55	55	56	57	57
- Pori	11	11	11	10	9
- other	16	16	15	14	14
New TVO employees 1)	25	71	73	29	31
- Men	18	62	47	21	21
- Women	7	9	26	8	10
Average age of new TVO employees 1)	34,3	34	34	34	34
- Men 2)	34,9				
- Women 2)	27,7				
Incoming turnover (%) 1)	3,3	9,2	9,9	4,1	4,3
Outgoing turnover (%) 1)	4,7	4,6	6,6	4,5	3,2
Number of retirees 1)	24	21	29	18	13
Average age of retirees 1)	63,5	64	63	63	64
Summer workers	175	166	173	168	186
- Men	112	115	117	106	116
- Women	63	51	56	62	70

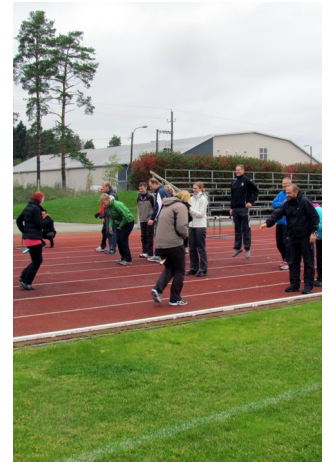
1) Data only reported for permanent employees.

2) Data reported from year 2013.

## Occupational well-being

TVO wishes to maintain its personnel's continuing ability to work through attention to occupational well-being. Extensive personnel and safety culture surveys are carried out every three years among the entire personnel.

Development measures that were found necessary in the 2012 personnel survey have been planned and carried out in 2013. Commitment to the company's values and objectives, cooperation between units and among supervisors and their teams, and the implementation of changes were considered to be at a good level. Targets for development included the high level of bureaucracy, efficiency of the decision-making processes, the personnel's ability to participate in decisions, equal treatment, and rewarding. During the year under review, these development measures have been implemented in the units where they have been found necessary but also on the corporate level by the Management Group, in supervisor workshops, with employee representatives and occupational safety representatives and with TVO employees who joined the company during the year.



The occupational well-being of TVO's employees receives attention in many ways. Well-being is promoted by an extensive occupational health care program and the supplementary insurance policy, among other things.

Flexible hours have been in use for more than 20 years, allowing employees to better balance their work with their free time. With flexible work arrangements, employees are able to arrange their daily and weekly working hours according to their needs. Other systems promoting occupational well-being at TVO include the internal sabbatical system applied since the early 1990s, job alternation leaves, and part-time working arrangements.

TVO promotes diverse club activities. The clubs provide an opportunity for recreation through exercise, culture, and other activities. The personnel also have access to vacation destinations for spending their free time.

Opportunities for maintaining skills and competencies also form an important part of occupational well-being. The personnel's training and development needs are reviewed every year in the result and development discussions.

## Competence development

Competent and motivated personnel form the basis of the safe operation of a nuclear power plant. TVO continuously organizes training in order to maintain the professional skills and competence of its personnel. Internal training is available in fields such as plant technology, nuclear power, and plant operation. A high level of competence is achieved through practices such as training programs for specific tasks, job rotation, on the job training and familiarization.

A task-specific or personal training plan is created for each TVO employee. In 2013 TVO's employees received a total of 8,592 (8,636) days of training, which means on average 9.7 (9.8) days per each employee. Annual training program is prepared with attention to task-specific training plan and other detected training needs. The implementation of the annual training program is monitored, and in 2013, it was found to follow the plan for the most part.



To improve supervisor skills, training and Topical Subject Days on various themes are arranged for supervisors. Basic supervisor training was organized for 11 new supervisors, and the third instance of the company's own supervisor training program, the TVO/Posiva Forerunner, continued with 15

supervisors participating in it. The Supervisor Forum was launched to support the work of supervisors'. The forum offers supervisors with current information, background information, examples of the application of instructions, links, and other helpful materials.

The operating personnel of the power plants receive extensive training throughout their career. In 2013, operators of OL1 and OL2 participated in operator training events and advanced simulator courses in the spring and in the fall as required by their refresher training program. The training of new operators who started in the position in 2011 and 2012 proceeded according to plan with basic simulator training and basic training period.

In 2013, operators of OL3 participated in operator training events in the spring and in the fall as required by their refresher training program. Additional simulator training was organized for operators between September 16 and November 22, 2013. The same opportunity was used to give TVO's trainers training and practice in the use and maintenance of the OL3 simulator. The rest of the time, OL3 operators have worked in commissioning duties and the trainers in the planning of training.

All employees working at the Olkiluoto nuclear power plant must complete induction training every three years. The general part of the training is intended for everyone working in the Olkiluoto area, while the radiation protection part is only intended for those working in the controlled area. In 2013, 2,918 people completed the general part of induction training, and 851 completed the radiation protection part (reported on January 16, 2014). Both parts of the training were organized in Finnish and in English.

TVO aims to develop competence development by also acknowledging its future needs as an employer of new nuclear energy experts. TVO has engaged in varied cooperation with schools and students. During the year, studies in nuclear technology were available at the Satakunta University of Applied Sciences, among others. In recent years, TVO has ordered an average of 15–20 thesis or diploma projects per year.

## Social responsibility indicators

Competence	2013	2012	2011	2010	2009
Average length of service (years) 1)	14	14	15	15	15
Training days per person	9,7	9,8	13,1	8,9	10,6 4)
Training days in total	8592	8636	11137	7482	8835 4)
Trainind days					
- senior salaried employees	4450	4549	6095	3952	4176 4)
- technical salaried employees	2766	2443	3596	2242	3103 4)
- industrial salaried employees	226	230	291	276	261 4)
- workers	732	1015	778	655	883 4)
- fixed-term employees + others	418	399	377	356	406 4)
Site entry training courses - common part 2)	158	152	174	275	261
- participants 2)	1479	1939	2471	1412	1337
Site entry training courses - common part 3)	101	100	104	117	149
- participants	1439	2170	2543	3020	2660
Site entry training courses - radiation part 2)	60	87	76	-	-
- participants	851	1088	1210	1343	1117
Occupation Safety Card training courses	14	9	21	28	54
- person given the Card	334	133	243	329	775

1) Data reported only on the permanent personnel.

2) In Finnish

3) In English

4) Mistake on year 2009 training numbers were discovered year 2011, when numbers have been corrected.

## Internal training days of TVO employees

	2013	2012	2011	2010	2009
Technical science	113	39	75	85	52
Nuclear technology	914	1571	1704	1064	1143
Plant technology	738	857	1937	1195	1879
Operation of NPP	2359	1962	2680	2009	1810
Maintenance of NPP	512	582	505	421	433
Protection / security	1283	1033	965	946	1338
Management and finance	145	248	123	172	204
Information technology	245	322	480	140	130
Co-operating and communication	504	151	456	306	215
Other issues	977	946	1353	628	854
<b>In Total</b>	<b>7790</b>	<b>7711</b>	<b>10278</b>	<b>6966</b>	<b>8058</b>

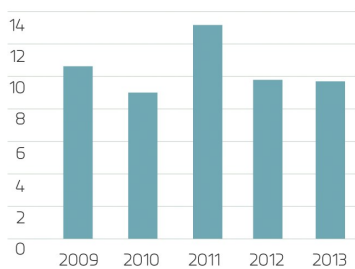


## Participation in training in relation to duration of employment

	under 2 years	2-5 years	5-10 years	10-15 years	15-20 years	over 20 years
Technical science	45	55	52	16	1	19
Nuclear technology	170	295	281	42	25	69
Plant technology	455	49	68	30	12	70
Operation of NPP	671	194	681	161	101	623
Maintenance of NPP	79	131	175	26	13	122
Protection / security	130	155	325	88	35	335
Management and finance	25	23	26	6	2	23
Information technology	36	38	96	25	7	51
Co-operating and communication	46	83	178	119	25	100
Other issues	78	97	153	50	16	101
<b>In Total</b>	<b>1735</b>	<b>1120</b>	<b>2035</b>	<b>563</b>	<b>237</b>	<b>1513</b>

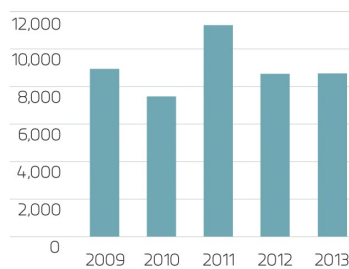
### TRAINING DAYS

PER EMPLOYEE (PERSONNEL)



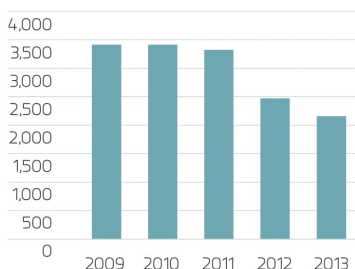
### TRAINING DAYS

TOTAL (PERSONNEL)



### TRAINING DAYS

TOTAL (SUBCONTRACTORS)



## Occupational safety

Occupational health and safety operations are guided by an occupational health and safety system compliant with the requirements of the OHSAS 18001 certificate.

Systematic occupational safety operations are a basic prerequisite of the zero accidents approach. The operations include periodic risk assessments and analyses, implementation of corrective measures to reduce risks, performance of safety rounds of various degrees, and the continuous monitoring and development of operations. Safety observations, in which everyone working in Olkiluoto participates, are an important indicator of proactive occupational safety work. In 2013, 589 (546) safety observations were made. Based on the observations, 642 corrective measures were recorded into the observation and corrective measure tracking system.



Focus areas of occupational safety in 2013 included the maintenance of occupational safety indicators that serve the organization, attention to safety during design, development of work guidance and induction training, improvement of cooperation between the various occupational safety organizations active in Olkiluoto, and certification of a shared occupational health and safety system for the existing plant units and the OL3 site.

Since 2008, TVO has been in the process of implementing a Human performance (HU) program that aims to manage human errors and strongly supports occupational safety. The HU tools in use include kick-off and closing meetings, confirmation of other team members' work independently or through pair work, and clear communication. Training on the HU tools has been developed, and three training videos have been produced on the subject. Practical use of the tools has been monitoring with internal audits and field observation. Human error-based events during annual maintenance have been reported in a memorandum which examined the role that human factors had in the event.

Occupational safety operations are coordinated by an occupational safety organization that includes an occupational health and safety manager, two occupational health and safety engineers, and one protection specialist. In addition, the OL3 site has a dedicated occupational safety team with four members. The occupational safety teams of the existing plant units and the OL3 project work closely together. The personnel have elected occupational safety representatives from among themselves as follows: an occupational health and safety representative and two deputies, seven occupational health and safety delegates, and the occupational health and safety representative of the officials, also with two deputies. Meetings with the occupational health and safety representatives are regular, and during annual outages, safety rounds are conducted together with them at the plant units every other day.

During the course of the year, 4 (5) accidents leading to a TVO employee being absent from work occurred. The accident frequency was 2.9 (3.6) accidents per one million working hours. The accidents led to 12 (56) days of absence. Three commuting accidents resulting in absence took place during the year. All accidents that led to absences have been investigated and corrective measures have been defined for them to prevent similar situations from occurring.

A total of 5 (9) accidents resulting in absence occurred to TVO's contractors in Olkiluoto, the accident frequency being 5.2 (8.2) accidents per one million working hours. The number of absence days of TVO's contractors resulting from these accidents was 137 (96). The figures for the Areva-Siemens consortium are not included in this number.

The combined accident frequency in Olkiluoto was 4.1. This figure includes TVO personnel, Posiva personnel and all contractors active in Olkiluoto, excepting the OL3 site which is reported by the Areva-Siemens consortium.

At the OL3 site, contractors had 15 (33) accidents resulting in absence during the year, the accident frequency being 3.2 (4.0) accidents. The total number of absence days accumulated of all accidents that occurred at the OL3 site was 71 (250). The total accident frequency for 2008–2013 was 9.4.

## Social responsibility indicators

Well-being at work	2013	2012	2011	2010	2009
Absences due to illness (%)	3,3	3,4	3,4	3,4	3,5
- Men 3)	3,3				
- Women 3)	3,4				
Absences due to illness, hours per person	64	64	63	65	60
Employees who had no sick days during the year 1)	189	224	232	214	185
- Men 3)	150				
- Women 3)	39				
Accidents of TVO personnel					
Absences, more than one day	4	5	4	2	2
- Men 3)	4				
- Women 3)	0				
Absences due to occupational accidents (days)	12	56	63	16	23
- Men 3)	12				
- Women 3)	0				
Occupational accidents per one million working hours	2,9	3,6	3,0	1,5	1,5
- Men 3)	2,9				
- Women 3)	0				
Zero accidents, no absence	8	5	11	5	4
- Men 3)	6				
- Women 3)	2				
Accidents on the way home or to work	3	2	5	3	1
- Men 3)	1				
- Women 3)	2				
Near misses 2)	589	546	557	384	359
Accidents of TVO sub-contractors					
- Absences, more than one day	5	9	12	11	11
Accidents at OL3					
-Absences, more than one day	15	33	56	75	105
Personnel maximum radiation dose (mSv)	8,07	9,04	9,25	9,1	9,9
Collective radiation dose (manmSv)	649	717	964	900	1186
Annual outage radiation dose (manmSv)	556	568	796	768	990

1) Data only reported for permanent employees.

2) Includes reported near misses.

3) Data reported from year 2013.

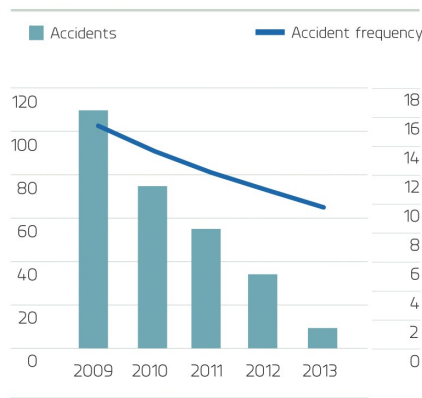
4) The maximum allowed annual dose for radiation workers is 50 mSv/year, or 100 mSv during five consecutive years.

Accidents occurring before January 1, 2014 have been included.

**ACCIDENTS AND SAFETY OBSERVATIONS**



**ACCIDENTS AND ACCIDENT FREQUENCY AT THE OL3 SITE**



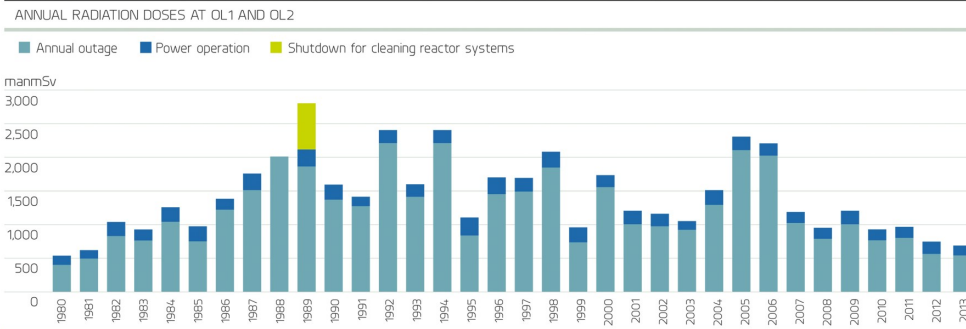
**Radiation safety**

The radiation exposure of employees at Olkiluoto has been low, remaining clearly below the dose limits specified by the authorities. In 2013, the total dose of employees working in conditions where radiation is present was 649 man-mSv, which is the lowest annual dose since the plant units' first years of operation. A total dose of 556 man-mSv accumulated during the power plant's annual outage, which was also a new record low. The annual dose was approximately 9.5% lower than that of the previous year.

The combined radiation dose of TVO's own personnel was 170 man-mSv, and that of external personnel was 479 man-mSv. The highest individual annual dose incurred at Olkiluoto nuclear power plant was 8.1 mSv. The number of personnel under dose monitoring was 2,645, with recorded doses accumulated for 819 employees. The maximum allowed annual dose for radiation workers is 50 mSv, or a total of 100 mSv during five consecutive years.



**RADIATION DOSE AT THE OLKILUOTO NUCLEAR POWER PLANT**



## Interaction with society

### Communications build a sense of togetherness

TVO communicates its operations in an open and neutral manner, without delay and based on facts. TVO aims for open and active interaction with all levels of society, including decision-makers, opinion leaders and the general public. The objective is to build mutual trust among stakeholders and to support open and constructive interaction in the immediate region, in Finnish society, and within the international nuclear energy sector.

TVO listens to and observes the issues raised by stakeholder groups, and wishes to be an active participant in public discussion, bringing out various themes. According to surveys carried out in 2013, the most important matter of concern is the safety of nuclear power production and the final disposal of nuclear fuel.

From the point of view of communications, the general public is the most important stakeholder group. Extension of interaction to new stakeholder groups continued in 2013.

Participation in various events all over Finland was also more frequent. It is considered particularly important that TVO meets people and provides everyone an opportunity to discuss nuclear power and the production of electricity. In 2013, TVO participated in six fairs and public events, such as the Farmari agricultural exhibition in Seinäjoki, the Kotka Maritime Festival, and seven student events at various educational institutes in Helsinki, Rauma, Turku, Tampere, Vaasa, Oulu and Lappeenranta.



### Acceptability of nuclear power

TVO monitors the general acceptability of nuclear power with annual opinion polls and surveys.

The general acceptability of nuclear power has been falling for several years now. Women in particular have negative or skeptical views towards nuclear power. At the same time, acceptance of nuclear power has increased among groups that are particularly worried about climate change. The number of those without an opinion has decreased, which is a sign of improving nuclear power knowledge among the public. (Finnish Energy Industries, TNS Gallup 5/2013)

The results of a survey concerning the energy attitudes of Finns were reported during 2013. Similar surveys have been carried out for 30 years already to chart the opinions and attitudes of the public. In the latest survey, performed late in 2013, 33% of the respondents supported the increase of nuclear power capacity, while 29% were against it. The current nuclear power capacity was considered appropriate by 29%, and 8% expressed no opinion. The portion of those wishing to reduce nuclear power capacity had decreased since the previous year. The survey was conducted by IRO Research Oy at the request of Finnish Energy Industries.

A total of 1,078 respondents were interviewed. The margin of error for the survey was +3.2%. TVO is a member of Finnish Energy Industries. Matters with particular importance to TVO's stakeholders were established in a survey conducted by Pohjoisranta Burson-Marsteller Oy. The survey was directed at decision-makers, people with influence, public officials, experts, the media, non-governmental organizations, and TVO personnel and owners. The data was collected with a web questionnaire in September 2013, and it was complemented by telephone interviews. The owner survey was carried out in October. The response rate was 36%, which is typical for surveys of this type. According to the responses, TVO is generally seen as a responsible company. Attention to safety is the most important aspect of responsibility. Other important areas include securing production operations and the continuous development of operations. Awareness of TVO's operations has also increased, and the company's reputation remains excellent. Non-governmental organizations are the stakeholder group that is most critical towards TVO's operations.

## Transparency

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### Transparency of communications

TVO supports an interactive and transparent corporate culture. The company communicates its operations and their impact on its stakeholders openly, honestly, and without delay, in compliance with legislation and the obligation to provide information. TVO engages in open, objective, and interactive cooperation with its stakeholder groups.

The company participates in the public energy production discourse in which many different values are expressed. TVO also respects the views and values of those who have a negative attitude towards nuclear power and TVO's operations.

TVO cooperates with political decision-makers and the government to develop and execute energy legislation and guidelines. TVO's interaction with stakeholder groups is always guided by a high code of conduct, thus strengthening trust in the operations of TVO and the stakeholder group, and does not jeopardize the reputation or objectivity of either party. TVO does not provide any support for political activity.



### Cooperation with stakeholder groups

Discourse with stakeholder groups helps TVO to develop. The most important stakeholder groups are the personnel, owners, authorities, neighbors and neighboring municipalities, decision-makers, financiers, subcontractors and suppliers, the media, and the general public. TVO uses regular interaction and surveys to gather information on the expectations that stakeholders set for TVO, and to respond to those expectations with all available methods. TVO puts great emphasis on an equal interaction with all stakeholder groups.

TVO considers the views of its stakeholders in all its plans and decisions that may have an important impact on the local community or Finnish society.

In 2013, the following methods and channels were used in stakeholder communications, among others:

- 11 bulletins
- 61 pieces of web site news
- 4 press conferences
- 3 stakeholder events
- 3 Ytimekäs stakeholder publications
- 3 Uutisia Olkiluodosta magazines targeted at the population of the region
- 3 What's On magazines targeted at the OL3 site personnel
- 6 electronic newsletters
- participation in six fairs and public events and seven student events.

In 2013, matters such as nuclear safety, competitiveness, the OL3 project, final disposal of spent nuclear fuel, and the competitive bidding for OL4 were discussed with stakeholder groups.

## Cooperation

### Cooperation in the neighboring region

The population and local communities in the vicinity of Olkiluoto belong to the immediate region of the nuclear power plant as defined by TVO. The immediate region covers Eurajoki, Rauma, Nakkila, Eura, Luvia and Pori. The economic, social, and environmental impacts of the operations primarily concern the municipalities and population of the immediate region.

On the other hand, the entire country can be considered to be within the immediate region of TVO, as the cost price electricity of TVO benefits the whole country through the municipally owned power utilities included in TVO's shareholders. TVO produces approximately 17% of all electricity consumed in Finland. Through its minor and major shareholders, electricity from Olkiluoto keeps machines, services and domestic appliances going all over Finland.

TVO aims to be a good and active neighbor. This means open dialog and listening to its neighbors. The company organizes various events and meetings to maintain interaction with the residents of neighboring areas.

TVO publishes the *Uutisia Olkiluodosta* (News from Olkiluoto) magazine for the people living in the immediate region, and organizes regular interaction in various forums. These forums include the municipal cooperation committee and the regional Olkiluoto committee. TVO maintains close interaction with Eurajoki in the municipality's own cooperation team. TVO also participates in the operations of the Vuojoki Foundation and the Vuojoki cooperation group.

The Olkiluoto regional cooperation committee was established in 2010 to promote regional interests during the processing of the decision-in-principle for OL4. The committee now aims to promote cooperation between Olkiluoto and the immediate region. The committee consists of key representatives of TVO and Posiva, the municipalities and towns of Eurajoki, Pori, and Rauma, the Satakunta and Rauma Chambers of Commerce, local entrepreneur associations, Prizztech Oy, the Regional Council of Satakunta, the Centre for Economic Development, Transport and the Environment, and the educational institutions in the region. In 2013, the committee convened once, and one of the three subcommittees convened a couple of times.

The municipal cooperation committee was established in the 1970s upon the initiative of TVO. The committee is a forum for interaction and the exchange of information, providing local municipal decision-makers with first-hand information. In addition to representatives of TVO and Posiva, the committee includes representatives appointed by the municipalities and towns of Eurajoki, Rauma, Nakkila, Eura, and Luvia. In 2013, the committee convened three times.

In addition to these groups, TVO carried out informal discussions with the residents of the region at market place events organized in Eurajoki in June and in Rauma in July. Lively discussion on matters concerning TVO and nuclear power took place at these events. The Eurajoki event was attended by about 250 people, while the event in Rauma attracted about 600 people.

In addition to these events, TVO conducts cooperation with the Eurajoki comprehensive school, organizing thematic events and the Energy in Western Finland theme weeks together with other west-coast power plants. TVO supports the schools in the immediate region when they visit other power plants on the west coast. Similarly, Olkiluoto receives visits from other schools in the west coast region.

TVO's strongest positive impact on the immediate community is related to economic well-being and activity in the area, achieved through employment. TVO creates significant economic well-being through the payment of real estate tax to the municipality of Eurajoki, but also through the indirect effect of taxes paid by TVO's employees to the municipalities in the



area. TVO's most significant negative measurable effect on the region is the increase in the temperature of the sea in the vicinity of the power plant. The increase in the temperature of seawater is regularly monitored and measured, together with the impact of the increased temperature on the sea bed.

## Visits

### Visits to Olkiluoto

The views of stakeholder groups regarding TVO's corporate social responsibility issues are best obtained from the continuous flow of visitors to Olkiluoto. A visit to the Visitor Center and the Olkiluoto nuclear power plant is the best and most effective way for stakeholders to learn about nuclear power.

The Olkiluoto Visitor Center is open from October to April from Monday to Friday between 10 a.m. and 6 p.m. and on Saturday and Sunday between 12 noon and 6 p.m. From May to September, the Visitor Center is open daily from 10 a.m. to 8 p.m. The Visitor Center is open to all visitors with no advance booking needed. The Electricity from Uranium science exhibition at the Visitor Center provides information about the production of nuclear electricity and covers the entire life cycle of the uranium fuel from responsible mining to safe final disposal.

Groups with advance reservations may receive a guided tour of TVO's operations, complete with a bus tour of the Olkiluoto power plant area and a visit to the operating waste repository. A new ONKALO exhibition was completed in the VLJ repository in December. The exhibition provides visitors with information about the final disposal of spent nuclear fuel.

In 2013, a total of 13,631 people visited the Visitor Center for a guided tour; 5,737 of these viewed the exhibition independently. The number of visitor groups was 523. The most frequent visitor groups were from schools, but many associations, companies, and student groups also visited Olkiluoto. May and June as well as September and October were the busiest periods, while January was the quietest. In July 2013, the summer Wednesday campaign attracted up to two busloads of visitors per day.

During the year, nearly 450 foreign experts and 197 reporters, 117 of them from Finland and 80 from other countries, visited TVO and the Visitor Center.

The kilometer-long observation path located in the environs of the Olkiluoto Visitor Center was opened in June. The route has information boards on the special characteristics of nature in Olkiluoto and the environmental research and surveys conducted in the area. The observation path is open in the summer only; at other times, it can be accessed as a virtual representation on the TVO web site.

### Science and technology camps

In 2013, TVO continued its science and technology camp tradition by organizing four camps for elementary school children with a focus on experiments. These camps have been organized since 2003. Each camp lasted from Monday to Friday and was attended by 22 children, a total of 88 during the summer. At the camp, the children get to learn about natural sciences and technology on their own terms.



## CASE

Science journalists find  
Olkiluoto interesting

[Read more](#)



## Sponsorship activities

TVO supports sports, cultural endeavors, and activities for the public good. TVO's sponsorship principles are built on the company's values, and the supported activities must be in line with the company's strategy and operating principles.

When selecting partners and sponsorships, the emphasis is on offering opportunities for recreational activities to the local people, children and young people in particular.

TVO does not support political activities, because even small financial support for political parties or their representatives might compromise the notion of neutrality in decision-making.

The most important sponsorship targets in 2013 were the following:

- The Finnish national men's ice hockey team and young ice hockey players (until June 30, 2013)
- The Rauman Lukko ice hockey team (the hockey league team and junior operations)
- Pallo-lirot (football team, junior operations and children's clubs)
- Rauma Golf
- Fera ry (Fera, ladies' Finnish baseball team – Lukko, girls' baseball team)
- The operations of the Vuojoki Mansion and cultural events in Eurajoki
- The Rauma Festivo chamber music festival
- Pori Jazz festival
- The ladies' Finnish baseball series (until September 30, 2013)
- The CO<sub>2</sub>-report website focusing on climate change and energy
- Selected sports, cultural endeavors and associations in the immediate region of the power plant.

In addition to sponsorship, TVO makes annual donations to organizations, communities and student groups who work for the public good. In 2013, support was also given to the support organization of the new children's hospital to be built in Finland.

Decisions concerning the sponsorships and donations are made by TVO's Corporate Relations together with the company's management.

## Memberships

### An active operator in various organizations and communities

TVO is an active participant in both the national and international nuclear power community and in various organizations and communities of the nuclear energy sector.

TVO's most significant international memberships are those in FORATOM, the trade association for the nuclear energy industry in Europe, and in WANO, World Association of Nuclear Operators, which is a nuclear power producers' association that focuses on nuclear safety. TVO has been a signatory to the ICC Business Charter for Sustainable Development since the 1990s.



## CASE

On a mission to gain  
WANO experience

[Read more](#)

TVO is a member of the following organizations: Eurelectric, Foratom, European Atomic Forum, Nordiska Sällskapet för Strålskydd, World Association of Nuclear Operators, World Nuclear Association, Finnish Energy Industries, Finnish Business & Society ry (FiBS) , Finnish Air Pollution Prevention Society, The Finnish branch of the International Chamber of Commerce, Lounais-Suomen Vesiensuojeluyhdistys ry, Finnish Nuclear Society, and the Finnish Quality Association.

TVO's branch office in Brussels manages connections with interest groups within the EU. The various institutions of the European Union form the core of these interest groups: the European Commission, the European Parliament, and the Council of Europe, as well as the organizations and partners within TVO's field of operations.

## Contents of the report

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TVO's Corporate Social Responsibility Report 2013 describes TVO's responsible leadership and how social responsibility is incorporated in the company's responsible everyday operations. The 2013 report is the company's thirteenth corporate social responsibility report, and it will only be published online.

The Contents of the report section of the Corporate Social Responsibility 2013 report describes the extent and basis of reporting, materiality assessment and GRI comparisons. The section also includes a glossary, the certification report, and a list of the corporate social responsibility contact persons.

## Reporting

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The objective of TVO's corporate social responsibility effort is to promote Finnish well-being by providing climate-friendly and reasonably priced electricity in a safe and reliable manner. TVO has been generating electricity at Olkiluoto for more than 35 years. TVO has reported its responsible management of the environment starting from 1996, and corporate social responsibility issues since 2001.

The 2013 report is the company's thirteenth corporate social responsibility report, and it will only be published online. The report describes TVO's major success factors and how social responsibility is incorporated in the company's responsible everyday operations.

The content of the report has been designed to reflect the social responsibility themes and issues considered interesting by TVO's stakeholder groups and important by TVO's employees. These aspects are described in TVO's social responsibility materiality matrix that is still current and valid in 2013.

The content of the corporate social responsibility report has been organized under five themes. The themes are the following: responsible leadership, safety, uranium from bedrock to bedrock, environment, and TVO and society. We use the themes to present issues that interest our stakeholder groups and to report the determined social responsibility effort carried out at Olkiluoto in 2013. Further information on responsibility and TVO's operations in 2013 is available in other annual reports published by the company and available on the website.

TVO publishes its Corporate Social Responsibility Report in Finnish and in English. DNV Certification Oy/Ab, an independent and impartial accredited certification body, has certified and verified that our Corporate Social Responsibility Report meets the requirements set out in the Global Reporting Initiative (GRI) G3.1 guidelines. For the certification report, see below. Financial reports have been audited by PricewaterhouseCoopers Oy, a firm of Authorized Public Accountants, while our environmental report was audited by DNV Certification Oy/Ab.

The reports for 2014 will be published on the website in spring 2015.

## Materiality assessment

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Materiality assessment is a tool for identifying and defining the matters that have an impact on the actualization of the company's corporate social responsibility and the communication of social responsibility issues. TVO's materiality assessment includes discussions and studies by the company's management, personnel, and external stakeholder groups.

### TVO's stakeholder groups

TVO's most important stakeholder groups are the following:

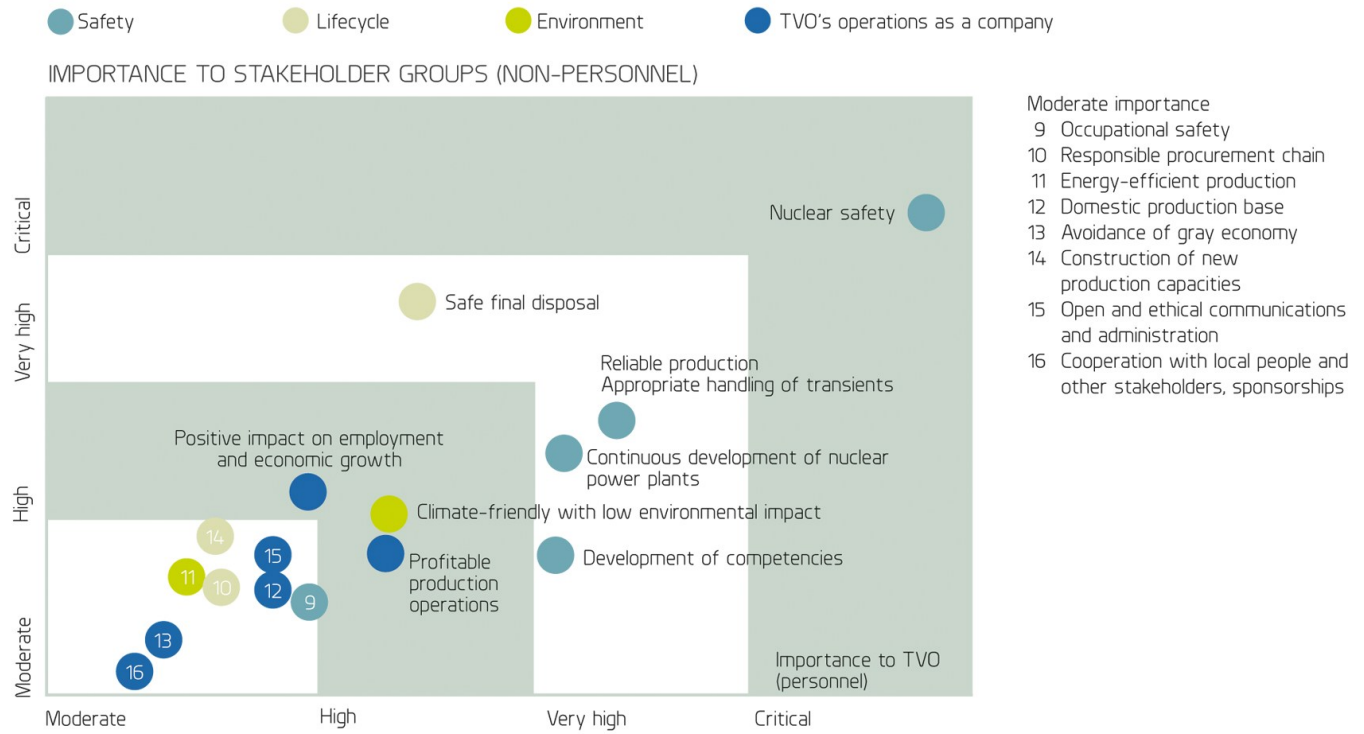
- personnel
- owners
- public authorities
- local community
- decision-makers
- investors
- subcontractors and suppliers
- the media
- various organizations
- general public

TVO's materiality assessment was updated and completed during the year under review with two surveys to reveal the themes that stakeholder groups regard as important.

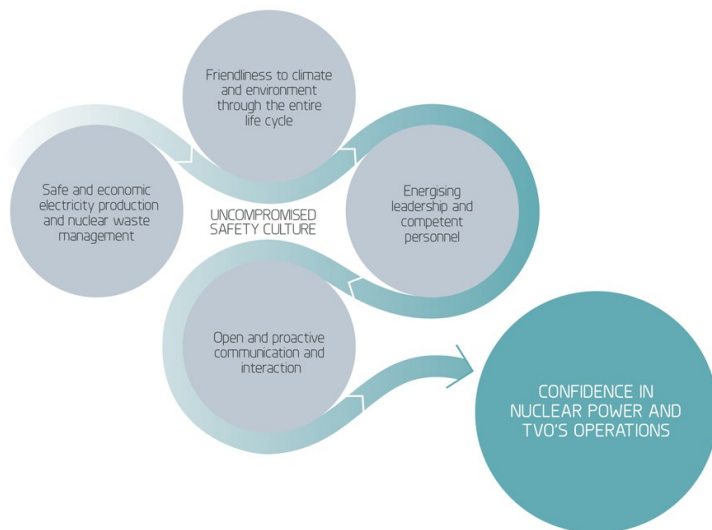
Data for the materiality assessment was received from an energy attitude survey and a web survey targeted at owners, decision-makers, public officials, the media, opinion leaders, experts, NGOs, and the personnel, as well as complementary thematic interviews. In addition to these, comments and queries received from visitors to Olkiluoto were taken into account in the assessment. The assessment resulted in the creation of a materiality matrix that indicates the company's stakeholder groups' views of important corporate social responsibility issues, actualization of social responsibility, and targets for development in the area of social responsibility.

TVO's concept of corporate social responsibility was also updated together with the materiality assessment. TVO's view of the concept is based on clean and stable electricity produced for the shareholders, with attention to all the stages of the life cycle from responsible mining to safe final disposal of spent fuel. TVO's personnel are committed to an uncompromising safety culture, valued by us all. TVO supports open and constructive interaction in the immediate region, Finnish society, and within the international nuclear energy sector. Operations in Olkiluoto benefit both the local community and the whole country. TVO creates Finnish well-being.

## MATERIALITY MATRIX



## Corporate social responsibility at TVO



## Scope and basis

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TVO's corporate social responsibility reporting is based on TVO's values – responsibility, continuous improvement, proactiveness and transparency – mission, vision objectives, and the responsibility issues raised by stakeholder groups and TVO's employees.

Open interaction is an essential part of responsible business operations. Environmental responsibility is a central theme in TVO's corporate social responsibility reporting. In addition to assuming responsibility for the environment, TVO wishes to discuss actively matters with stakeholder groups, raising various themes for discussion. According to surveys, stakeholders place great emphasis on themes such as nuclear safety and the final disposal of spent nuclear fuel.

The Corporate Social Responsibility 2013 report forms a close-knit entity with TVO's other annually published reports and the company's website. The report is complemented by the Report of the Board of Directors and Financial Statement 2013, prepared in accordance with the IFRS standard. Most conventional financial indicators fail to display a true picture of TVO's operations, because TVO is a non-profit company that aims to produce electricity steadily and securely for its owners at cost price. TVO's Corporate Governance Statement describes its management systems and the duties of its administrative bodies. The environmental responsibility information is based on a certified environmental management system and TVO's Environmental Report 2013, prepared in compliance with the EMAS regulation. Most of this information is based on the content of reports to the authorities. The occupational safety information concerning the personnel has been obtained from the occupational health and safety management system. Other information has been obtained from personnel information accumulated during company operations.

## Principles and guidelines

TVO's corporate social responsibility report has been prepared according to the Global Reporting Initiative (GRI) G3 guideline. This report applies version 3.1 of the GRI G3 guideline. In other respects, the report's coverage, scope, and measurement methods are the same as last year. In case of changes to previously reported information, they are indicated separately in conjunction with the tables in question.

The report contains a comparison to the GRI 3.1 recommendations, as well as TVO's own assessment of the reporting level. In the opinion of TVO, the Corporate Social Responsibility 2013 report meets the requirements of the GRI G3 guideline, and the company is of the opinion that it applies level B+ of the guideline. According to a verified assessment of report content relative to GRI's G3 guideline by an independent third party, the report applies level B+.

The report covers the operations of the parent company, Teollisuuden Voima Oyj. TVO also reports some accident and training information on TVO's subcontractors. The report also discusses the production output of the Meri-Pori coal-fired power plant and the research into the final disposal of spent nuclear fuel, conducted by the joint venture company Posiva Oy.

In the reporting of its economic responsibility, TVO uses the applicable indicators of the Global Reporting Initiative (GRI). The corporate social responsibility report includes some figures that are gathered as a part of the closing of accounts but that are not included in the actual annual report and accounts. An independent greenhouse gas verifier has verified the amount of carbon dioxide emissions.

## Verified corporate social responsibility report

DNV Certification Oy/Ab, an independent and impartial accredited certification body, has certified and verified in February 2014 that the corporate social responsibility report meets the requirements set out in the Global Reporting Initiative (GRI) G3.1 guidelines. For the certification report, see below.

Our financial reports were audited by PricewaterhouseCoopers Oy, a firm of Authorized Public Accountants, while our environmental report prepared in accordance with the EMAS regulation was audited by DNV Certification Oy/Ab. The Report of the Board of Directors and Financial Statement 2013, Corporate Governance Statement 2013, and Environmental Report 2013 are available on the TVO website in Finnish and in English.

The report is published on the company's website in Finnish and in English. The texts and diagrams of the report will not be updated after certification. The links to further information found at the end of some texts, pointing to other sections of the TVO website, may be updated during the year.

The report for 2012 was published at the beginning of May 2013, and the report for 2013 will be published in March 2014.

The corporate social responsibility report for 2014 will be published in spring 2015.

## Comparison to the GRI

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GRI provides companies with a procedure for reporting corporate social responsibility to the extent best suited for the company. Reporting levels range from C to A+. TVO assesses its corporate social responsibility reporting to apply level B+. This assessment has been verified by an independent third party, DNV Certification Oy/Ab, in accordance with level B+. TVO reports all key indicators or explains why a certain indicator has not been reported. GRI's calculation principles have not been thoroughly applied for all indicators.

[See the GRI Index table](#)

## Glossary

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### A

**Activation product:** A radioactive nuclide created by neutron radiation in the reactor.

**Activity:** The number of spontaneous nuclear disintegrations occurring in a given quantity of radioactive material within a certain time. The unit of radioactivity, the 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):** An internationally used principle regulating the amount of radiation doses at nuclear power plants.

**Alpha-active element:** A radioactive element that emits an alpha particle upon decomposing. An alpha particle consists of two protons and two neutrons.

**AVI:** Regional State Administrative Agency

### B

**Background radiation:** Radiation emanating from natural sources, such as radon from the soil, radiation from space, and radioactive materials in the human body.

**Becquerel (Bq):** The unit expressing the activity of a radioactive substance. 1 Bq is equal to one spontaneous nuclear

disintegration in the substance per second.

**Beta-emitting substance:** Radioactive material that emits negatively charged particles (electrons).

**BOD<sub>7ATU</sub>:** The biological oxygen demand in wastewater.

**BWR, Boiling water reactor:** A light-water reactor in which water used as the coolant boils as it passes through the reactor core. The steam generated rotates the turbines.

## C

**Capacity factor:** The figure depicting the production at a power plant; for example, for one year. The capacity factor is the energy produced in a year by a power plant as a percentage of the energy it would have produced had it been operating at full capacity for the entire year.

**Carbon-14:** Carbon-14 is a long-lived, naturally occurring, beta-emitting radioisotope created by cosmic rays in the Earth's atmosphere. It is also formed in a nuclear reactor when the oxygen in the coolant is activated. Carbon-14 then enters the atmosphere bound to carbon dioxide.

**CO<sub>2</sub>:** Carbon dioxide

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

**Controlled area:** The area that contains or may contain radioactive materials; separated from other plant facilities. The doors to the controlled area are locked.

**Control rod:** A rod holding material that absorbs neutrons. It regulates the number of neutrons in the reactor core and thus the power of the reactor. A power plant reactor has a large number of control rods.

**Conversion:** The chemical transformation of one substance into another substance. In nuclear technology, conversion usually refers to the conversion of uranium oxide (U<sub>3</sub>O<sub>8</sub>) into uranium hexafluoride (UF<sub>6</sub>) for enrichment purposes, and the conversion of uranium hexafluoride into uranium dioxide (UO<sub>2</sub>) for the fuel manufacturing process.

## D

**Decibel, dB:** Noise is measured by a decibel scale expressing sound intensity.

**Dose rate:** A dose of radiation per time unit (e.g. mSv/h) expressing the amount of radiation a person is exposed to within a certain period of time.

**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, Environmental Impact Assessment 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 center:** Center for Economic Development, Transport and the Environment.

**EMAS:** Eco-Management and Audit Scheme.

**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.

**Environmental policy:** The overall intentions and direction of an organisation relating to its environmental performance as formally expressed by top management including compliance with all applicable legal requirements relating to the environment and also a commitment to continuous improvement of environmental performance. It provides a framework for action and for the setting of environmental objectives and targets.

**Environmental performance:** The measurable results of an organisation's management of its environmental aspects.

**Environmental aspect:** An element of an organisation's activities, products or services that has or can have an impact on the environment. Significant environmental aspect' means an environmental aspect that has or can have a significant environmental impact.

**Environmental impact:** Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

**Environmental programme:** A description of the measures, responsibilities and means taken or envisaged to achieve environmental objectives and targets and the deadlines for achieving the environmental objectives and targets.

**Environmental objective:** An overall environmental goal, arising from the environmental policy, that an organisation sets itself to achieve, and which is quantified where practicable.

**Environmental target:** A detailed performance requirement, arising from the environmental objectives, applicable to an organisation or parts thereof, and that needs to be set and met in order to achieve those objectives.

**Euratom:** A unit of the EU Commission that supervises nuclear material.

## 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:** The medium-heavy nuclei produced in nuclear fission. They are usually radioactive.

**Fuel assembly:** An element formed by fuel rods.

**Fuel rod:** A slender metal tube holding fuel pellets. The fuel inside the tube is generally uranium oxide compressed into pellets.

## G

**Gamma radiation:** Electromagnetic radiation emitted during alpha and beta decay.

**Gigawatt, GW:** A unit of power. One gigawatt is one million kilowatts.

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

**GRI (Global Reporting Initiative):** Reporting guidelines for social responsibility that were approved by a meeting of the UN in Johannesburg in 2002. The reporting covers a company's financial, human, and environmental responsibility.

## H

**Half-life:** The time it takes for the activity of a radioactive isotope to be reduced by half.

## I

**IAEA:** International Atomic Energy Agency.

**INES (International Nuclear Event Scale):** A seven-level scale used internationally to depict the seriousness of accidents and incidents at nuclear power plants. The lower levels (1-3) depict incidents that have weakened plant safety and the upper levels (4-7) accidents that could cause emissions into the environment that require protective measures against radiation.

**Iodine:** From the point of view of radiation safety, the most important isotope of iodine among fission products is iodine-131, which has a half-life of eight days.

**Ion exchange resins:** Substances used to remove impurities from water.

**ISO 9001 standard:** International standard for quality management systems.

**ISO 14001 standard:** A standard for the management of environmental matters that is widely used in various parts of the world.

**Isotope:** Atoms of the same element differing from each other in the number of neutrons in their nucleus. Almost all natural elements occur as more than one isotope.

## K

**KAJ Store:** Storage facility for intermediate-level waste.

**KPA:** Interim storage for spent fuel.

## M

**ManSievert, manSv:** The unit used to indicate the collective radiation dose received by a certain number of people.

**MTT:** MTT Agrifood Research Finland.

**Megawatt, MW:** A unit of power. One megawatt equals 1,000 kilowatts, or one million watts.

**MWth:** Thermal power produced in a nuclear power plant.

## 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:** The name for certain gases rarely found in the atmosphere. The noble gases are helium (He), neon (Ne) argon (Ar), krypton (Kr), xenon (Xe), and radon (Rn).

**Nuclide:** A type of atom or nucleus with a specific number of protons and neutrons.

## 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.

**Occupational accident:** An accident that occurs at work or on the way home from work or vice versa and which causes an absence of at least one day.

## P

**Power delivered to the owners (GWh):** Electricity produced - (internal consumption at the plant + consumption in the plant area).

**PRA:** Probabilistic Risk Assessment.

**PWR, Pressurized water reactor:** A light-water reactor with such a high reactor pressure that water used as the coolant does not boil in the reactor. The hot water is conducted from the reactor to a steam generator in which the water in the secondary circuit evaporates and the steam is led to rotate the turbine.

## R

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

**Radioactive operating waste:** Waste such as plastic, paper, and cloth generated during maintenance work at the power plant. The volume can be reduced by baling.

## S

**SAHARA (Safety As High As Reasonably Achievable):** An internationally used principle emphasizing safety at a nuclear power plant.

**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.

**Sievert (Sv):** A radiation dose unit indicating the biological effects of radiation. As it is a very large unit, millisieverts (1 mSv = 0.001 Sv) and microsieverts (1  $\mu$ Sv = 0.001 mSv) are more commonly used.

**STUK:** Finnish Radiation and Nuclear Safety Authority. STUK is the authority that regulates the Finnish nuclear energy sector.

## T

**TEM:** The Finnish Ministry of Employment and the Economy.

**Transuranium element:** An element with an atomic number greater than that of uranium (92). Transuranium elements are not found in nature, but are created from uranium for example in nuclear reactors under the influence of neutron radiation.

**Tritium:** Tritium is a hydrogen isotope with a nucleus consisting of one proton and two neutrons. The nucleus is called tritium.

**Tukes:** The Finnish Safety and Chemicals Agency.

**TW, terawatt:** A unit of power. One terawatt equals one billion kilowatts.

**TWh, terawatt-hour:** A unit of energy. One terawatt-hour equals one billion kilowatt hours.

## U

**Uranium:** An element with the chemical symbol U. Uranium comprises 0.0004% of the Earth's crust. All uranium isotopes are radioactive. Natural uranium is mostly in the form of isotope U-238, which has 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:** A repository for low and intermediate-level radioactive waste.

**VTT:** Technical Research Centre of Finland.

## W

**WANO:** The World Association of Nuclear Operators.

## Y

**YVL guide:** Nuclear power plant guide.

## Verification statement

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DNV Certification OY/AB has verified the 2013 Social Responsibility Report of Teollisuuden Voima (TVO).



### SCOPE

The verification concerns TVO's 2013 Social Responsibility Report, which describes TVO's social, financial and environmental protection responsibilities and measures. The verification also covers, in a separate statement, TVO's EU EMAS report, which describes TVO's environmental system. Simultaneously, DNV Certification OY/AB again performed a certification assessment based on ISO 14001 and OHSAS 18001 and regular assessment's ISO 9001 standards. The results of the audit also provide reliable information for verifying the Social Responsibility Report.

PricewaterhouseCoopers has audited the financial responsibility key figures included in TVO's 2013 Annual Report. The correspondence of the key figures has been spot-checked, however they have not been verified separately in the present project.

### METHODOLOGY

The verification is based on the requirements set out in the GRI reporting instructions and DNV Verification Protocol for Sustainability Reporting.

The verification was performed at TVO's Olkiluoto office through interviews with people in charge, auditing of operating methods and location, and by spot-checking the information (and the origin of the information) included in the report from relevant TVO documentation and sources. TVO's Social Responsibility Report 2013 is available in electronic format on the company's annual reporting website in the Responsibility section ([www.tvo.fi/annualreport2013](http://www.tvo.fi/annualreport2013)). Verified material is not updated without express permission from the verifier. Other material on the website was not included in the verification.

### OBSERVATIONS, SUMMARY

- The verification ensures that the content of the report and quality requirements of the previously mentioned instructions are met. Examples include the information's relevance, clarity, comparability, accuracy, topicality, reliability and sustainable development.
- Based on the observations made during the verification, it can be stated that the aforementioned requirements have been met.
- The 2013 Social Responsibility Report includes an extensive correlation table that indicates how well the GRI requirements were met.
- Based on the verification, the scope of TVO's 2013 Social Responsibility Report meets the requirements for such a report and, taking into account the nature of the verification, the information presented in the report is reliable and meets level B+ of the GRI G3 instruction requirements.
- The Report is a clear example of TVO's highly responsible attitude towards nuclear safety and TVO's willingness to continuously improve its operations.

Mustasaari, 10 March 2013  
DNV Certification OY/AB  
EMAS-accredited certifier FIN-V-002

Seija Meriluoto  
Leading Certifier, Corporate Social Responsibility

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