



# Well-being with Nuclear Electricity TVO 2009



Teollisuuden Voima Oyj

# Building for the Future



# Contents

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Contents	1
<b>TVO in brief:</b>	
Experienced pioneer in nuclear power	2
<b>Review by the President and CEO</b>	4
<b>Operating Environment:</b>	
Climate change mitigation adds interest in nuclear power	6
<b>TVO's responsibility:</b>	
Safe and responsible production of electricity	10
<b>Focus areas in 2009 and 2010:</b>	
Stable and reliable production of electricity	14
Olkiluoto 3 reaches rooftop height	16
Nuclear power for Finland's need for electricity	18
<b>Research and development at TVO:</b>	
Final disposal and safety research: the core of TVO's R&D	20
<b>Final disposal:</b>	
Decades of research into final disposal	22
<b>Economic review:</b>	
Highest output in Olkiluoto's operating history	24
Teollisuuden Voima Oyj: Key figure graphs	25

# Experienced pioneer in nuclear power

Teollisuuden Voima Oyj (TVO) promotes the sustainable well-being of Finnish society by producing electricity in a safe, reliable and climate-friendly manner. Our objective is to be a valued Finnish nuclear power company and a leading pioneer in nuclear power industry. During the past thirty decades, our power plant units at Olkiluoto have generated 367 billion kilowatt hours of electricity without carbon dioxide emissions.

Together with renewable energy, nuclear power helps Finland to meet the targets set for reduction of greenhouse gas emissions. Other advantages of nuclear power are the stability and predictability of its price. At Olkiluoto, we have the expertise, infrastructures and operating activities required for the safe production of nuclear power as well as all the required systems for waste management, all on one island.

## Major electricity producer in Finland

TVO is a limited liability company established in 1969, and it produces electricity to its owners at cost price. We produce approximately one sixth of the electricity used in Finland.

Our electricity is generated by two units at Olkiluoto, Eurajoki, called Olkiluoto 1 and Olkiluoto 2 (OL1 and OL2), and we are current-

ly building a third unit, Olkiluoto 3 (OL3). We are also applying for a decision-in-principle to build a fourth plant unit (OL4) and have submitted our application to the Finnish Government in spring 2008.

We also have a one-megawatt wind power plant at Olkiluoto and a 100-megawatt reserve power plant built as a joint venture by Fingrid Oyj and TVO. TVO has a 45 per cent share in electricity generated by the Meri-Pori coal-fired power plant.

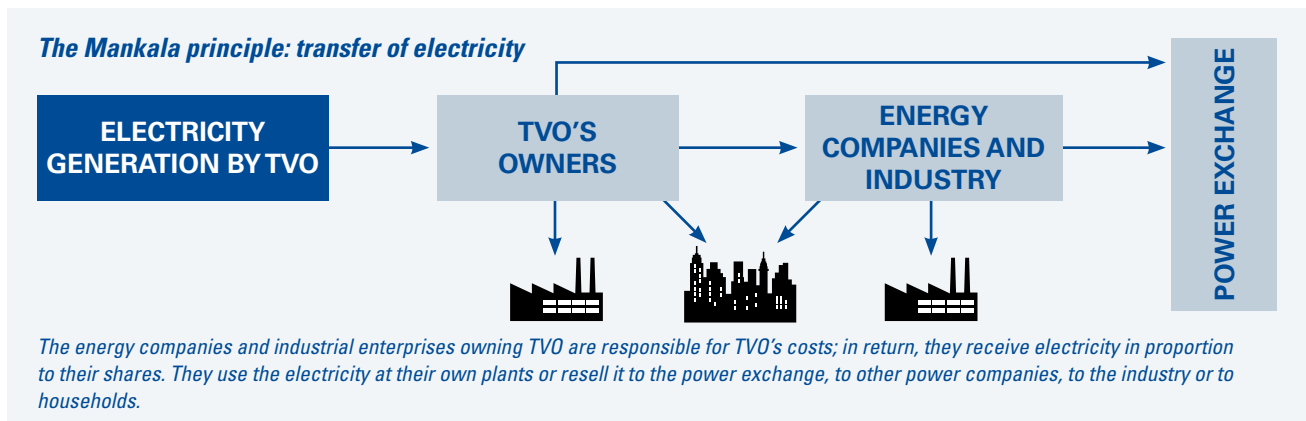
In May, the Association for Finnish Work awarded the Key Flag, a symbol of Finnish know-how, to electricity generated by TVO's Olkiluoto nuclear power plant. A symbol of Finnish manufacture, the Key Flag was a recognition of TVO's work and solid expertise.

Permanent personnel at TVO at the end of December numbered 717 (709).

## Power generation on a cost-price principle

We generate electricity to our shareholders at cost price by applying what is called the Mankala principle. The shareholders pay for the expenses arising from TVO's operations and receive electricity in return in proportion to their shares. They can either use the electricity themselves or sell it through the NordPool power exchange.

Through our owners, power companies and electricity-using industries all over Finland are provided with Olkiluoto electricity. About one half of the electricity we produce is used by industry and the other half by private households, the service sector and agriculture.



## Our vision

An acknowledged Finnish nuclear power company  
and a pioneer in its own field.

## Our mission

Safe, economical and environmentally benign generation of electricity.

## Our values

Responsibility  
Continuous improvement  
Proactivity  
Transparency

### A subsidiary of the Pohjolan Voima group

TVO is part of the Pohjolan Voima Group, whose parent company is Pohjolan Voima Oy.

Other subsidiaries in the TVO subgroup are TVO Nuclear Services Oy (TVONS), Olkiluodon Vesi Oy, Perusvoima Oy and the joint enterprise Posiva Oy.

TVONS markets and sells TVO's services in nuclear expertise to all parts of the world. Olkiluodon Vesi supplies raw water for our plant units. Perusvoima Oy had no operations in 2009. TVONS, Olkiluodon Vesi Oy and Perusvoima Oy are fully owned by TVO.

Posiva Oy's business concept is the disposal of spent nuclear fuel of its shareholders, the plants at Olkiluoto and Loviisa. TVO has a 60% shareholding in Posiva Oy.

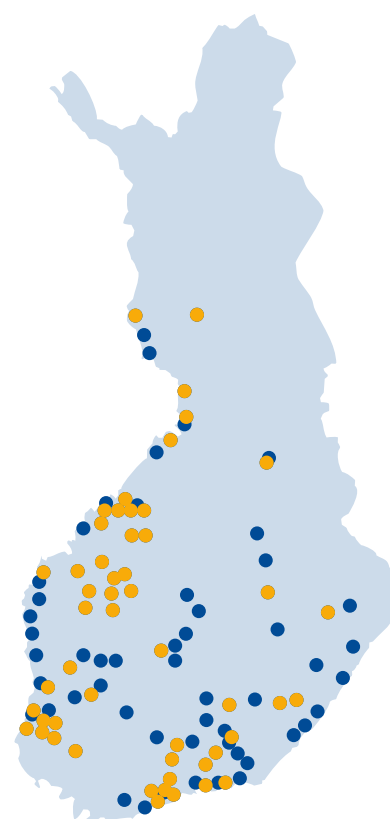
TVO has production plant units in Olkiluoto, Eurajoki, and offices in

Helsinki, Brussels and Rauma.

No significant changes in ownership or the corporate organisation took place during 2009.

### Shares and share series

The Company has three share series. The A series entitles shareholders to electricity generated at OL1 and OL2, the B series to electricity generated at OL3 and the C series to electricity generated by TVO's share in the Meri-Pori coal-fired power plant.



*We generate electricity for our owners, who use it themselves or resell it to their clients. The nuclear power we produce is used across Finland through municipalities and industrial companies owning TVO.*

● Locations of industrial plants run by OL3 shareholders  
● Sellers of electricity from OL3

### TVO shareholders and their holdings on 31 December 2009

	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	25.9
Karhu Voima Oy	0.1	0.1	0.1	0.1
Kemira Oyj	1.9	-	1.9	1.1
Oy Mankala Ab	8.1	8.1	8.1	8.1
Pohjolan Voima Oy	56.8	60.2	56.8	58.3
	100.0	100.0	100.0	100.0

# Review by the President and CEO



TVO's vision is to be an acknowledged Finnish nuclear power company, a pioneer in its own field. In addition to stable and safe electricity production, construction of a new plant unit and planning for additional production capacity, active participation in the lively debate on energy and climate issues were distinctive features in our operations in 2009.

Many were disappointed with the results of the UN's 2009 climate change conference held in Copenhagen last December; the meeting was meant to be the key forum of the year – or even the decade – for providing guidelines for future energy solutions as well. No unanimous, legally binding agreement on cutting carbon dioxide emissions was reached. Nevertheless, the summit set a target of keeping global warming at no more than two degrees.

Fortunately, we in Finland are in a position where we can quickly begin to reduce carbon dioxide emissions instead of waiting for binding international agreements. We know what needs to be done and we already have many of the means to do it. Placing greater emphasis on nuclear power and renewable energy will help us to achieve significant cuts in emissions in energy production. A good way for private households to cut emissions is to employ heating systems that are supported by air-source or ground-source heat pumps.

The best solution in energy production for the overall good of our society is nuclear power generation accompanied by the development of renewable energy. This is exactly the kind of strategy we apply at TVO together with our shareholders. While we have been producing nuclear electricity at Olkiluoto, our owners have been investing considerably in bioenergy and wind power.

Procrastination will prove unwise when investments in power production are decided on. It takes a decade to plan and build a nuclear plant unit and an entire generation to develop new forms of production. Curbing climate change by replacing fossil fuels with low-carbon technology calls for prompt decisions and actions.

Nuclear power companies and their stakeholders are serious about this. Amid the current recession, the fact that no fewer than three companies are willing to build new nuclear power capacity in Finland without any financial support from the state is excellent news, while something of a surprise as well. Sufficient and timely construction of new production capacity will not only protect the climate but secure the competitiveness of Finnish businesses and the employment opportunities they provide for Finland. At the time of writing this, we already have everything required except the necessary political decisions. Once we have been granted a favourable decision, we can start taking practical steps to construct environmentally friendly, reasonably priced electricity production capacity.

The key factors in TVO's success are reliable power plants, safety and environmental responsibility, constructing new capacity, skilled personnel, cost efficiency and the trust placed on us by our stakeholders.

The two TVO plant units in operation continued to generate electric-

ity reliably for Finns. Still as good as new, they produced a record amount of electricity in TVO's history. The annual outages to be carried out in the next two years will be the most extensive in TVO's history both in terms of labour and cost. Modernisation of systems and equipment will extend the life time of the plant units and improve their operating efficiency, thus adding considerably to the plant's energy efficiency.

We also want to be a pioneer in managing safety and environmental matters. We accept our responsibility for the environment by identifying any adverse effects caused by our operations and seeking to minimise such effects at all stages of the production chain. The most significant environmental effect of our production is the rise in the temperature of the seawater by a few degrees in the vicinity of the plant units. As in previous years, any amounts of radioactivity emitted into air or released into water were extremely low, mere fractions of the limits set for the emissions by the authorities.

The construction of our third plant unit advanced and we held the topping-out ceremony in November. Olkiluoto 3 represents a new generation of power plants, containing leading-edge systems based on tried and tested technology and cutting-edge safety features. Once completed, the operation, safety and reliability of the unit will be equal to those of the other two units - which are



among the best in the world.

To increase the production of stable, reasonably priced base load power in Finland, we wish to expand our family of plant units even further. Even though electricity consumption has recently decreased, estimates show that consumption will grow in the decades to come. We at TVO feel that the Olkiluoto 4 project is the best of the three applicants to serve the overall good of Finnish society. After all, it will conserve the environment as the new unit can be built on an existing site with many of the required infrastructures and activities already in place; furthermore, we will be able to apply the unique experience gained from the construction of Olkiluoto 3 and benefit from the expertise of the current personnel.

The cornerstones of our corporate culture are the values adopted by our personnel – responsibility, transparency, proactivity and continuous improvement. Our objective for a high-quality, equal working life for our personnel is to ensure their well-being and safety, and to continuously develop their skills and expertise. In autumn 2009, we conducted a survey on the workplace atmosphere and used the results of the survey as the basis for agreeing on the best ways and measures to enable our employees to participate in improving the workplace community and their own work.

We also focused on cost efficiency

during the year in order to keep our production costs competitive, our financial arrangements favourable and our risk management systematic as well as to improve and exercise our energy and material efficiency.

TVO's finances remained stable and the Company's status as a producer of cost-effective electricity generated at cost price was sound. Our financing policy is based on diversified funding sources. The bond issue launched last summer was significantly oversubscribed, which clearly reflects the investors' confidence in our work. Our credit ratings remained the same, and our prospects regarding funding were deemed stable by the credit rating companies.

All our operations, including our relations with our stakeholders, are guided by a set of high ethical principles. We support mutual trust by engaging in open, responsible dialogue with our stakeholders. In addition to learning new facts about nuclear power through debates in the media, 20,000 visitors were able to experience our operations at Olkiluoto during the year. These visitors had mainly come to see our science and technology exhibition either on their own or as members of visiting groups, but we also received a number of experts, decision-makers and representatives of the media from Finland and abroad. We have also had close cooperation with the

neighbouring areas for several decades.

In all, TVO's fortieth year in business was filled with hard work and good results. For this, I would like to thank the Company's shareholders, personnel and financiers as well as the authorities and other stakeholders. Our personnel, in particular, deserves special credit – without their skills and commitment, we could never have achieved last year's good result.

This year and the new decade will be crucial for the climate and for society. The Government's energy policy will have a pivotal role in it. I look forward to favourable, far-reaching decisions.

*Jarmo Tanhua*  
*President and CEO*

# Climate change mitigation adds interest in nuclear power

According to decisions made by the European Union, carbon dioxide emissions from the future generation of electricity must be as low as possible. This has resulted in added interest in constructing and increasing nuclear power in Europe. In Finland, the prognoses for electricity demand were discussed. In 2009, the economic recession reduced electricity consumption in Finland.

The European Union has decided to reduce emissions and increase the share of renewable energy and energy efficiency. In addition to the various European countries which have long used nuclear power, nuclear power is now being considered in countries where there has been none before.

One third of the electricity generated within the European Union is nuclear power produced by about 150 reactors in fifteen member states. Most of these plants were built in the 1970s and 1980s. There is now a great renewed interest in both building new nuclear power plants and exploring ways to extend the life of existing plants.

## Plans for additional nuclear power capacity

There are several reasons for this renewed interest. While consumption of energy has stabilised, electricity consumption will grow in Europe. Curbing climate change requires low carbon power technologies. Apart from carbon dioxide emissions, the use of fossil fuels and the price of electricity generated by fossil fuels will be affected by uncertainties related to long-term price trends. Other aspects favouring new nuclear power plants are the security of energy supply and economic competitiveness.

In France, nearly 80 per cent of all electricity is generated by nuclear power plants and even more capacity is under construction. In Britain,

new nuclear power plants are being planned to replace the aging ones. Italy and the Netherlands, too, are reconsidering nuclear power. The plants built in Italy were closed in the 1980s. Having first decided to shut down the only Dutch nuclear power plant in Borssele, the Dutch Government cancelled the decision and allowed the plant to operate until 2033. Both countries are now preparing for new nuclear power plant projects.

Sweden produces nearly a half of its electricity with nuclear power. Although Sweden decided to phase out nuclear power on the basis of a referendum, only two reactors have been closed down. The remaining ten plant units have been modernised and their output has been increased. Under the Government's new policy, building permissions will be granted to new plant units replacing the existing reactors. The new plant units will be built on existing sites.

Most of the amount of electricity required by Lithuania has been produced by nuclear power. One of the conditions set for Lithuania's membership in the European Union was that the Ignalina nuclear power plant be shut down. Unit 1 was closed at the end of 2004 and 2 at the end of 2009. The construction of a new nuclear power plant has been planned as a joint project with the other Baltic countries and Poland.

Poland has decided on building at least one nuclear power plant of its own. Unfinished reactors are being

rebuilt in Romania, Slovakia and Bulgaria. Expansion of the Temel plant in the Czech Republic is also being planned, as is expansion of the Paks nuclear power plant in Hungary.

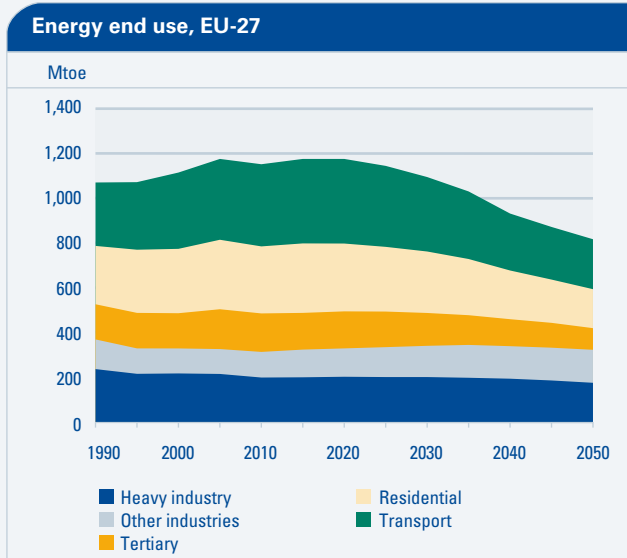
Outside the European Union, both Russia and Ukraine will rely heavily on nuclear power and build new plants. Switzerland, too, is considering new nuclear power plants to replace aging ones.

At the end of 2009, there were 436 nuclear power plant units in the world in 30 different countries, producing 16 per cent of the world's electricity demand. More than 50 new reactors are currently under construction. In addition to Europe, new nuclear power plant projects will be launched in Asia in particular (China, India, Japan, South Korea) and in the United States over the next few years. Global nuclear power plant capacity is expected to increase from today's slightly less than 400 GW to about 500 GW by 2030.

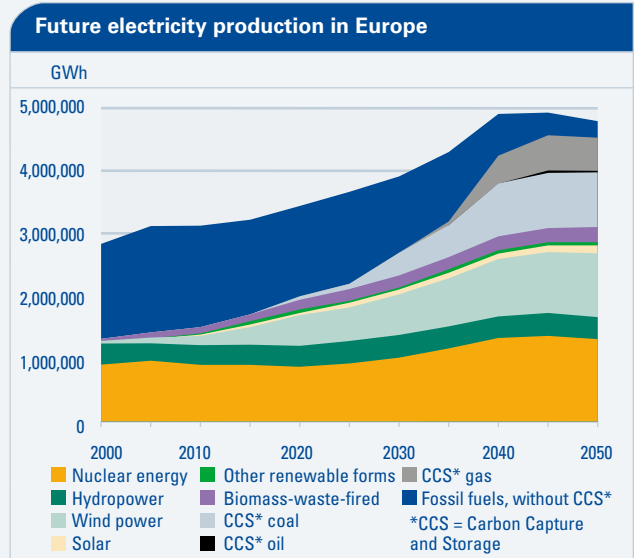
## Aiming at low-carbon power generation in Europe

In November 2009, Eurelectric, the association of European power companies, presented its report on the options available for power production called "Power Choices 2050: Eurelectric Outlines at Parliament Event the Path to Carbon-Neutral Electricity in Europe by Mid-Century". According to the report, the right market measures can ensure that electricity production in Europe releases only low amounts of





Source: Eurelectric 2009



Source: Eurelectric 2009

## Combating climate change and improving energy efficiency to increase carbon-neutral power production

### Nuclear power plants under construction in the EU

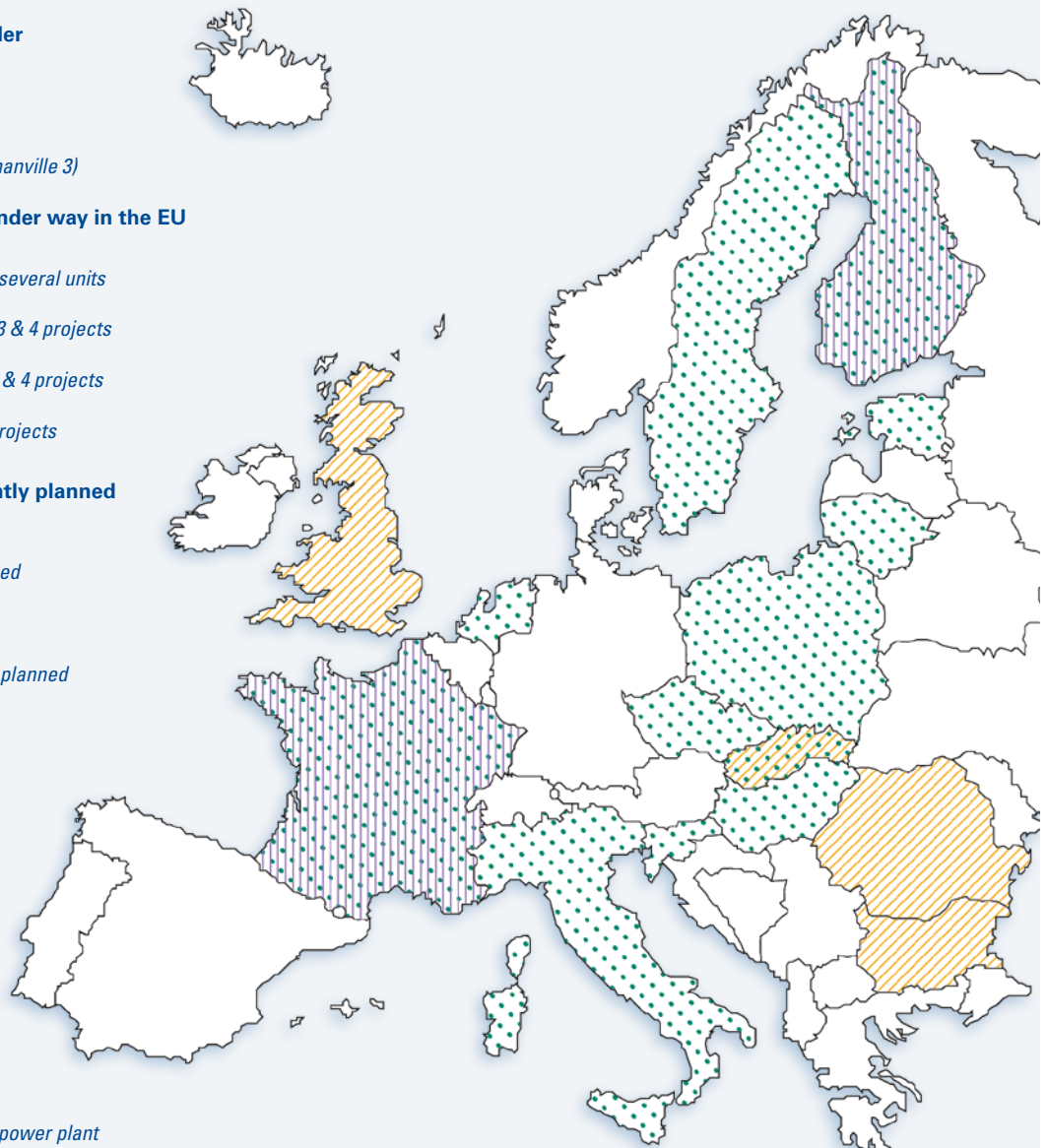
- Finland  
1 EPR under construction
- France  
1 EPR under construction (Flamanville 3)

### Nuclear power projects under way in the EU

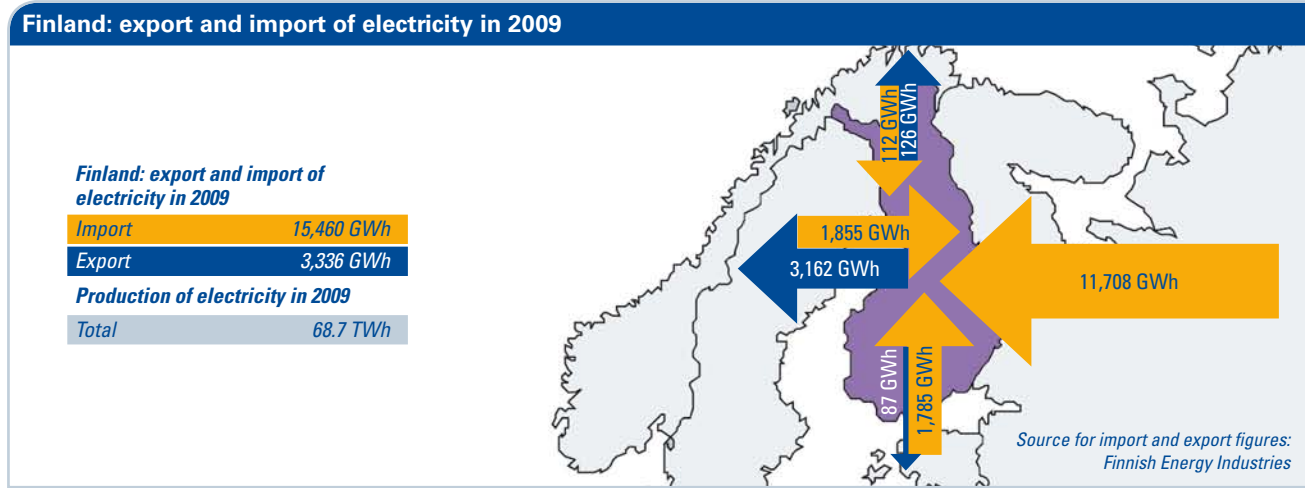
- UK  
Development project covering several units
- Slovakia  
Completion of the Mochovce 3 & 4 projects
- Romania  
Completion of the Cernavoda 3 & 4 projects
- Bulgaria  
Development of Belene 1 & 2 projects

### Nuclear plant units currently planned in the EU

- Sweden  
Replacement of old units planned
- Netherlands  
New unit planned
- France  
Penly 3 (EPR) and another EPR planned
- Slovenia  
1 unit planned
- Italy  
4 units planned
- Finland  
3 applications submitted
- Estonia  
1 unit planned
- Lithuania  
1 unit planned
- Poland  
1 unit planned
- Czech Republic  
Temelin 5 & 6 planned
- Slovakia  
Bohunice 4 & 5 planned
- Hungary  
New unit planned for the Paks power plant



Source: Eurelectric 2009



carbon dioxide in 2050. Cost-efficient reductions in carbon dioxide emissions require global climate agreements, and all actors must take the costs of greenhouse gases into account. It must also be ensured that all forms of production with only low carbon dioxide emissions can be employed.

The future of low-carbon Europe is largely based on the more efficient use of energy. Furthermore, we must switch from the direct use of fossil fuels to more energy-efficient power systems and technologies, such as electric cars and heat pumps.

**No binding agreement from Copenhagen**

The UN’s climate conference in Copenhagen in December 2009 failed to reach a unanimous, legally or politically binding agreement. Industrial countries and developing countries disagreed on how to cut emissions on a global scale and what

obligations should be imposed on the various parties.

An essential element in the unofficial final document was a common target of cutting emissions to hold the global rise in temperature at less than two degrees. By the end of January 2010, the industrial countries will have announced how much they will be willing to cut their own emissions by 2020 and the developing countries will announce what measures they will take to reduce emissions. Industrial countries will fund emission cuts and adjustment measures in developing countries by 30 billion dollars in 2010–2012 and thereafter by 100 billion dollars until 2020.

The European Union prepared for the climate negotiations in autumn 2009 by making its climate policies of recent years more specific. At the negotiations, the EU offered binding cuts in emissions to all industrial countries; these cuts would have been 25–40 per cent by the year 2020 and 80–95 per cent by the year 2050. So far, EU industries remain alone with their unilaterally set emission limits, and the UN is not about to impose any similar obligations on the competing economies. Since the Copenhagen Climate Summit, the EU has held on to its former goal of 20 per cent cuts in emissions.

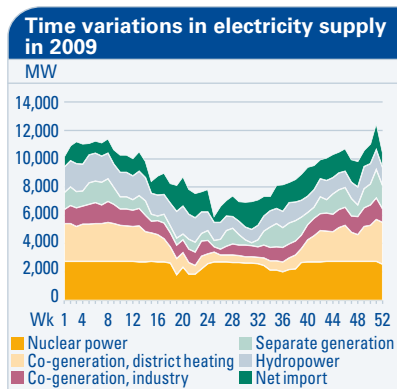
**The goal of the climate and energy strategy: self-sufficiency in power production**

In June 2009, the Finnish Parliament approved a Government report as Finland’s long-term climate and energy strategy. According to the report, Finland’s need for electricity will continue to grow after the current recession. The country will need new capacity to replace imported electricity, to reduce carbon dioxide emissions and to prepare for the projected increase in consumption.

According to the climate and energy strategy, Finland’s electricity supply must primarily be based on domestic capacity, which will cover peak consumption and any disruptions in energy import. Building new domestic capacity must give priority to emission-free and low-emission power plants. The option of constructing more nuclear energy has also been taken into account in political decision-making.

**Recession reduces electricity consumption**

In 2009, Finland used 80.8 TWh of electricity, which was 6.4 TWh, or 7.3 per cent, less than in 2008. This was a second year of decrease in electricity consumption. The economic recession reduced the need for electricity in industry in particular. Towards the end of the year, however, industrial production began to pick up, which also increased industry’s demand for electricity.



Forest industry remained the largest industrial branch using electricity, with its consumption of 19.4 TWh.

In 2009, the combined heat and power production accounted for nearly 30 per cent, nuclear power for 27.9 per cent, hydropower for 15.6 per cent and coal-fired and other conventional condensing power for 11.3 per cent of the electricity consumption. Net import covered 15.0 per cent of the required amount of electricity, which was nearly 3 per cent less than in the previous year. Import of electricity from Russia rose to a record high. Wind power accounted for 0.3 per cent.

### Aiming at an emission-free energy system and passenger transport

Fighting climate change is the most important factor affecting energy decisions for the future. According to the Government's Foresight Report on Long-term Climate and Energy Policy, Finland should cut its greenhouse gas emissions by at least 80 per cent by the year 2050. To support this goal, the Government proposes that Finland transfers to a practically zero-emission energy system and passenger transport in the long run.

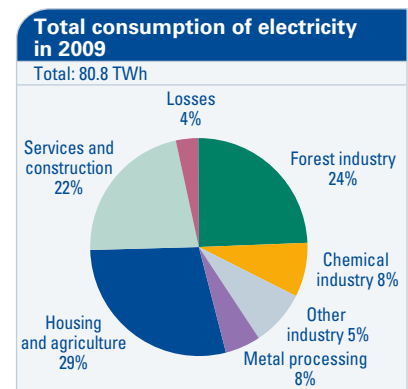
A carbon-neutral vision of electricity production and district heating for 2050 presented by the Finnish Energy Industries promotes striving for energy efficiency and increasing the use of renewable energy sources and nuclear power as the

most practical means. At the same time, electricity and district heating could replace fossil fuels in transport, heating and industry in places where electricity or district heating have so far not been used. Electricity will increase its share of energy end use in the short, medium and long term alike.

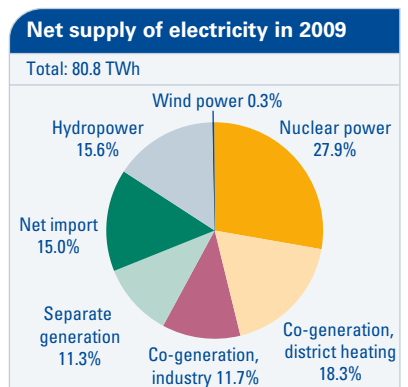
### Greater energy efficiency will increase electricity consumption

The outlook of electricity consumption and capacity increase has been examined in reports compiled both by the Ministry of Employment and the Economy and Finnish businesses. Once Finland's economy picks up after the current recession, the need for electricity will also grow, as industrial products are processed even further and there will be new industrial plants, such as biorefineries. Increased demand for services will also mean a greater need for electricity.

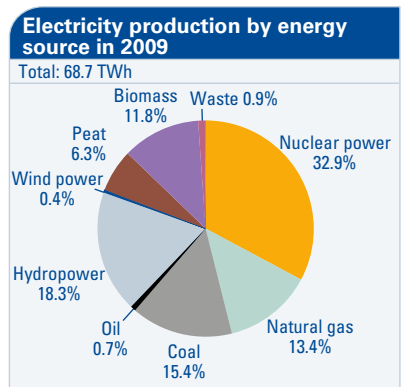
Improved energy efficiency often increases electricity use – examples of this are the electrification of transport and the soaring popularity of heat pumps. According to the above reports, Finland will need thousands of megawatts' worth of new power production capacity in the decades to come. In addition to meeting the growing demand for electricity, we will need to build capacity to replace old power plants and to ensure self-sufficiency in electricity production.



Source: Finnish Energy Industries



Source: Finnish Energy Industries



Source: Finnish Energy Industries

# Safe and responsible production of electricity

TVO's electricity production at the Olkiluoto nuclear power plant is responsible, environmentally friendly and reliable, and it releases no greenhouse gas emissions causing climate change. With regard to its life cycle, nuclear power produced in a responsible manner is a safe and environmentally friendly form of producing electricity.

Our operations are based on a clear vision, ethical principles, values and a stringent safety culture. Our safety culture consists of operating methods, operating instructions and attitudes. Promoting our safety culture is one of our key tasks.

Our values – responsibility, proactivity, transparency and continuous improvement – reflect what is essential for our working procedures and guide all our operations and decisions.

Our ethical principles are based on our values. Our personnel are educated about our values and ethical principles during their induction and training as well as through internal communication. All TVO employees are required to observe our ethical principles.

*Careful, precise work, which is part of our safety culture, is particularly important in the control room, where the operation of the plant units is monitored.*



We strive for high reliability both in terms of operation and production. Each issue is given the treatment and attention that plant safety calls for, and this is also something that we train and instruct our personnel to take note of. In addition to skills and know-how, key elements of our safety culture include detailed instructions, attention and precision.

## **We contribute to economic welfare**

We help to create conditions for the welfare and development of Finnish society by generating reasonably priced nuclear power for the needs of the entire country. Nuclear power can be used to replace those forms of energy production that have an adverse effect on the environment.

The stable production of nuclear power at Olkiluoto contributes to the long-term operating conditions of our industrial clients and ensures their international competitiveness. In this way, we help to keep jobs in Finland.

We create welfare by offering jobs, by paying considerable municipal taxes and by boosting and developing Finnish business.

## **Harmful environmental effects brought to a minimum**

The generation of nuclear power causes no carbon dioxide emissions, which is why our operations help to combat climate change.

We strive to minimise any harmful effects that may arise from any stage of the production chain throughout its life. We ensure that the fuel is used safely and in compliance with the 'from bedrock to bedrock' principle, from purchase of the raw material to final disposal of nuclear waste and the spent fuel.

Any radioactivity released by TVO into air or water is clearly below the limits set by the authorities. The most significant environmental effect of the production is the rise of a few degrees in the temperature of the seawater in the vicinity of the plant units.

## **We support open and responsible interaction and partnership**

Our objective for a high-quality, equal working life for our personnel is to ensure their well-being and safety, and to continuously develop their skills and expertise.

We act responsibly and ethically towards our supply chain and business partners and ensure that our partners follow responsible procedures in their own operations.

We strengthen the mutual trust between our stakeholders and us by promoting open interaction with our stakeholders both globally in our business sector and within Finnish society and the neighbouring area. We are an active participant in our field of research and development both in Finland and internationally.

## TVO's ethical principles

### Responsibility

- We ensure safe production.
- We nurture and promote a stringent safety culture.
- We comply with all rules and regulations.
- We demand high, uncompromising quality from our work.
- We respect and look after the environment.
- Our actions are open, honest, fair and equal.
- We respect the individual and accept diversity. We do not discriminate anyone on the basis of their age, gender, ethnic background, religion, ideology or other personal characteristics.
- We do not approve of child labour nor do we allow our partners to use child labour.
- We respect an individual's right to privacy.
- We look after the company's property, including intellectual property, carefully and use it for the sole purpose of promoting the company's business.

### Transparency

- We act with transparency, yet maintaining confidentiality.
- We do not disclose or submit any confidential information to any unauthorised party.
- Our cooperation with our stakeholders is transparent, objective and interactive.
- We do not accept or offer any benefit to ourselves or anyone else that is not part of standard business practice or our employment relationships.

### Proactivity

- Our actions are systematic and consistent.
- We aim to prevent any disruptions or discrepancies.
- We promote good, safe and equal work conditions.
- We promote skills and know-how, a good work atmosphere and coping at work.
- We encourage our employees to look after their physical and mental well-being and to maintain a healthy balance between work and leisure.

### Continuous improvement

- We are open to new opportunities for developing and promoting safety, economy, know-how, work procedures and work conditions.
- We are actively looking for areas that could be further improved.
- We assess and correct any faults or problems immediately and prevent them from appearing again.

*We create welfare and development potential for Finnish society by generating reasonably priced nuclear power that will meet the needs of the entire country and can replace those forms of energy production that are harmful to the environment.*



### A management system that guides our practical work

The policies adopted by TVO provide the operational guidelines for our personnel's and cooperation partners' actions. Based on our values and our business idea, these policies focus on nuclear safety and quality, corporate responsibility, production and corporate security.

The procedures for applying the business idea, the values and the policies to our work are described in the management system, which guides all work carried out at TVO. Our management system provides the correct procedures for ensuring safe, competitive, high-quality and environmentally friendly production of electricity.

Certified by DNV Certification OY/AB, it is also the licensee's quality assurance programme required

*We assess our partners' work regularly through supplier assessments.*



by STUK, the Finnish Radiation and Nuclear Safety Authority.

The management system is based on the following instructions and documents, for example:

- Management systems for nuclear facilities (YVL1(4))
- Quality assurance during operation of nuclear power plants (YVL 1(9))
- Quality management of nuclear fuel (YVL 6(7))
- ISO 9001:2008, Quality Management Systems
- ISO 14001:2004, Environmental Management Systems
- EU Regulation on allowing voluntary participation by organisations in a Community Eco-Management and Audit Scheme (EMAS)
- OHSAS 18001:2007, Occupational Health and Safety Management Systems.

### Our partners are committed to follow our principles

In 2009, we conducted about 200 supplier evaluations to ensure that our partners met the criteria we had set for quality and operations and that they comply to our safety culture and our ethical principles.

Each supplier's operations are examined as closely as possible so that we can be sure of their capacity to deliver products or services that are in accordance with the set requirements. By ensuring the high quality of all operations, we can guarantee nuclear safety, maintain the availa-

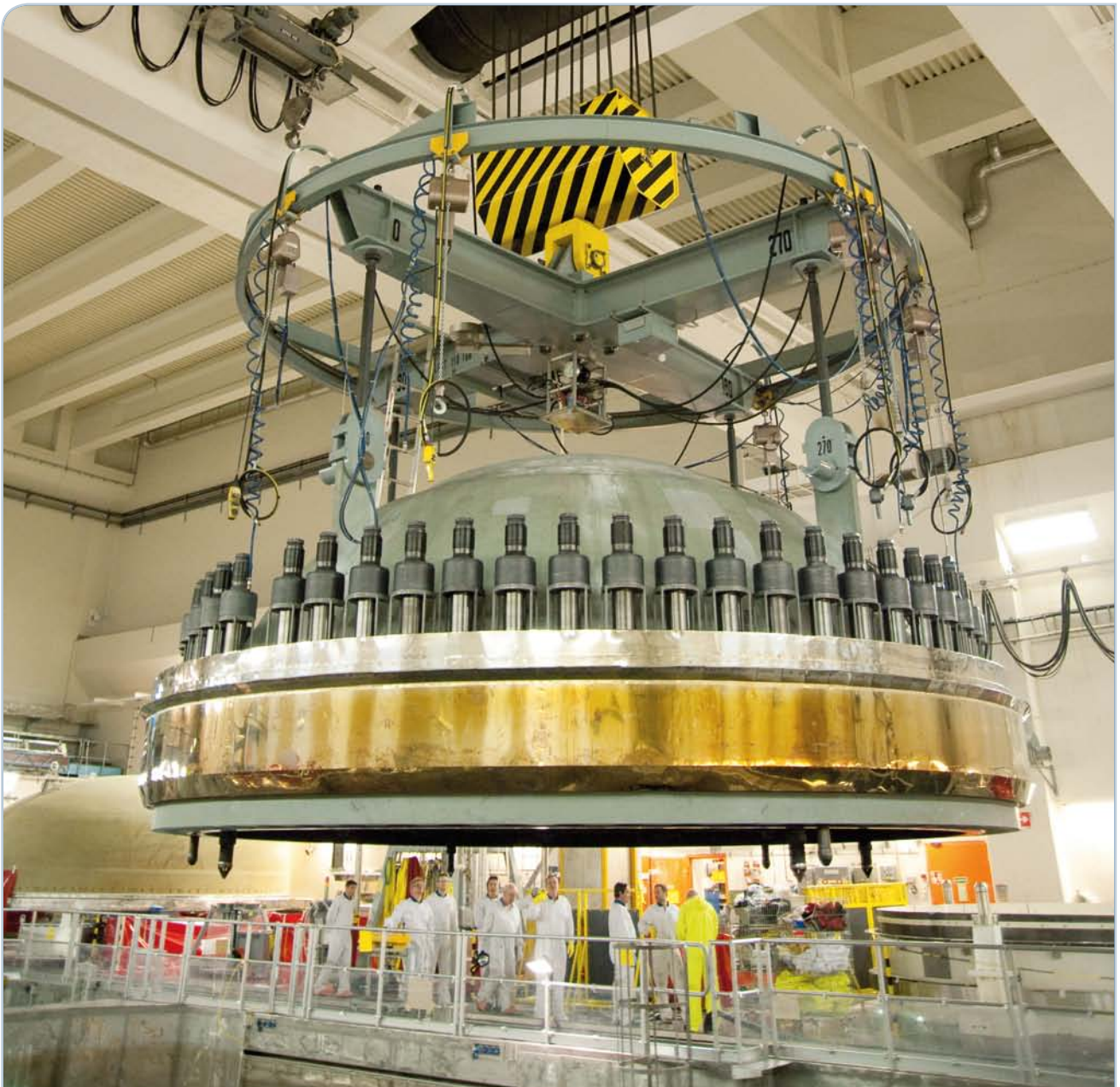
bility of the plant units and keep the operation environmentally friendly. Our ethical principles guarantee the long-term acceptability of the operations.

We only use suppliers that have been assessed thoroughly and approved by us; we aim at long-term contracts with reliable partners; we monitor the quality produced by our partners and respond to any quality problems.

Another key task of ours is to secure the supply chain for the uranium we use at power generation and to guarantee high-quality ethical work throughout the supply chain.

TVO regularly reviews the delivery system related to the supply chain for the uranium as well as its management systems of the related suppliers. In 2009, we carried out a system-level audit of a fuel supplier and another for a supplier of enriched uranium and its isotope enrichment plant. These steps were taken in accordance with the 2009 fuel-supplier assessment plan, and no irregularities were found in these audits.

*Successful annual outages, for example, are an indication of the commitment of our personnel and partners to our safety culture. Lifting the cover of the reactor pressure vessel during annual outages.*



# Stable and reliable production of electricity

As in the previous years, the generation of power at our two nuclear power plant units was safe and stable. The plant units reached a record output of 14,452 GWh. This is approximately one sixth of the electricity used in Finland.

The plant units operated safely throughout the year. The OL2 generator remained continuously connected to the national grid from the 2008 annual outage to the 2009 annual outage for a total of 366 days and 6 hours, setting a new record for the Olkiluoto power plant.

OL1 generated 7,296 (7,066) GWh of electricity and had a capacity factor of 97.0 (93.7) per cent.

OL2 generated a total of 7,156 (7,314) GWh of electricity and its capacity factor was 95.1 (96.9) per cent.

The combined capacity factor for the plant units was 96.0 (95.3) per cent, which was high by international standards, as it has been in the previous years as well.

The output of each plant unit is 860 MW.

## High safety at plant units

Under Finnish legislation, nuclear power plants may be operated for a specific period at a time. In 1998, the Government granted TVO a licence to run the OL1 and OL2 plant units and the interim storage facility for spent fuel on the plant site, the interim storage facility for medium-level waste and the storage facility for low-level waste until the end of 2018. The terms of the operating licence included the licence-holder's obligation to carry out an interim safety assessment in 10 years. In conjunction with the assessment, STUK was submitted safety reports corresponding to those required for

the application for a renewal of the licence.

In its decision, STUK found the safety of the OL1 and OL2 plant units to be sufficient and the licence-holder to have the required procedures in place for continuing the safe operation of the plant units. On 30 October 2009, STUK approved the scheduled safety assessment made by TVO as a comprehensive safety assessment required by the terms of the licence.

## Refuelling outage at OL1

Annual outages ensure that production at the plant units remains continuous and free of any problems. The planning for them begins years in advance, as they must be carried out in cooperation with a range of expert teams. We evaluate our past experiences and use them to continuously improve our operations. The planning and procedures related to annual outages also aim at minimising the amount of waste.

The plant units at Olkiluoto go through maintenance outages and refuelling outages in alternate years.

A refuelling outage consists of refuelling, repairs and annual maintenance, checkups and tests. Only those modifications will be done that are necessary for the plant's reliable use or future maintenance. An outage typically lasts for approximately a week.

In 2009, the refuelling outage at OL1 took place on 3–12 May. In addition to performing checkups and

maintenance, we changed 114 (110) fuel assemblies. The most important of the maintenance tasks focused on one of the reactor coolant pumps, certain internal checks of the reactor and checking one of the low-pressure turbines.

## No major maintenance work at OL2

During maintenance outages, we perform all major maintenance and modification work, in addition to tasks performed during refuelling outages. Maintenance outages generally take 2–3 weeks.

OL2's maintenance outage in 2009 took place on 13–30 May. We changed 124 (124) fuel assemblies and performed scheduled maintenance tasks and other checkups, maintenance and modifications, the greatest of which were replacing a valve in the reactor's cooling system after shutdown of the reactor and checking two of the low-pressure turbines.

The annual maintenance took a total of 24 days and 22 hours (28 days and 4 hours). All checks showed that the plant units were in good condition.

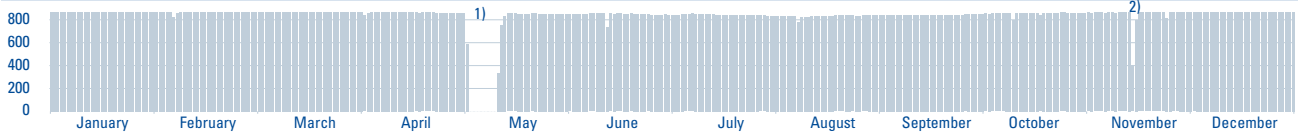
The annual maintenance work in 2009 was carried out by our own personnel and up to about 700 (800) people from other companies. About 600 of these were Finnish.

The total cost of the annual maintenance work was about EUR 17.4 million (12.9 million).

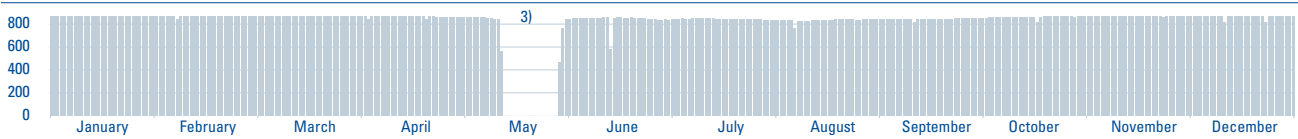


## Production 2009

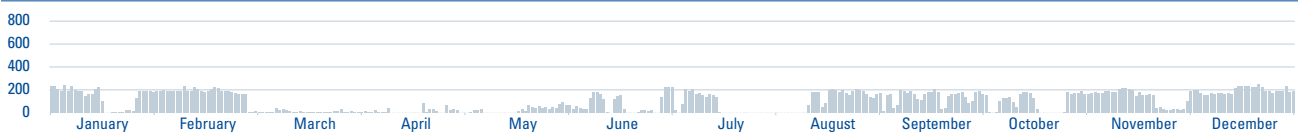
**OL1 average output (MW)**



**OL2 average output (MW)**



**TVO's share of Meri-Pori's production average electrical power MW**



<sup>1)</sup> Refuelling outage, 5–12 May

<sup>2)</sup> Repair of valve in blow-off system, 14 November

<sup>3)</sup> Maintenance outage, 13–30 May

### Greater accuracy for radiation measurement

During the annual maintenance projects, a new annual outage building was taken into use; the building now provides a common entrance point for the plant units. Furthermore, a passage between the plant units was opened. Measurement of radioactive contamination is now carried out even more efficiently than before, as we have now installed a double monitoring system: exit from the plant units is equipped with two different personnel monitors to ensure that no radioactive contamination can spread outside the power plant.

The constant aim of our radiation safety measures is to keep any radiation doses as low as possible. We constantly monitor the radiation doses received by those working in the controlled area of the power plant with personal dose meters. As

in previous years, employees' radiation doses remained clearly below the maximum limits set by the authorities.

The total dose from the refuelling outage at OL1 was 265 (613) man mSv. The highest personal dose was 5.40 (8.10) mSv. This was caused by pipe checks, during which the largest doses per task were also measured.

The total dose from the maintenance outage at OL2 was 725 (163) man mSv. The highest personal dose was 9.45 (2.40) mSv, which, like at OL2, was caused by pipe checks. Under legislation, the highest radiation dose for a radiation worker is 50 mSv.

### Longer life cycles and higher efficiency through future annual outages

The annual outages in 2010 and 2011 will be the most extensive at Olkiluoto so far, both in terms of labour and cost. At both plant units,

major tasks to be carried out during these outages will be the replacement of the low-pressure turbines, the generator and the cooling system of the generator, the modernisation of the protection systems of the low-pressure turbines, the replacement of the internal isolation valves of the main steam pipes and the replacement of the seawater pumps.

Modernisation of the low-pressure turbines will increase the operating efficiency of the plant units by about one percentage point. Modernisation of the seawater pumps will also increase their capacity and, again, improve their operating efficiency. Higher efficiency will increase the output at each unit by about 25 MW.

Higher output by improving the operating efficiency is highly ecological, as it means that more electricity can be generated with the same amount of fuel.



## Olkiluoto 3 reaches rooftop height

Olkiluoto 3, the fifth nuclear power plant unit in Finland, was commissioned in 2003 as a turnkey project. OL3 represents a new generation of power plants and its construction aims at the same steady and safe power generation as at the two other plant units.

The construction of the OL3 site progressed significantly in 2009. The reactor pressure vessel was delivered to the site at the beginning of the year and the pressuriser, along with the steam generators, which were the largest components of the reactor plant, at the end of the year. The manufacture of the main coolant piping continued in France.

Construction work at the reactor plant continued. The most tangible progress could be seen in early September, when the dome, weighing nearly 200 metric tonnes and forming the roof of the steel liner, was lifted on top of the reactor building and OL3 reached rooftop height. After the hoist and the necessary welding, the structure to be placed on the top head was concreted.

There was also installation work carried out at the reactor plant. The main crane, or the Polar crane, of the reactor building was installed inside the building, and pipes and equipment were installed in the lower room levels. The steel framework of the control room of the plant unit was installed in the security system building in May.

The seawater pumping station at the turbine plant reached rooftop height, and its construction was largely finished. The remaining work consisted mainly of installation, which was nearly completed, and the installation of the turbine and the generator, for example, was completed. The construction of the 400

kV switchyard, which connects the electricity from OL3 to the national grid, was completed.

The planning of the OL3 plant unit, the processing of related documents by the authorities and the two arbitration cases that had begun in 2008 continued. One of these concerns the delay in the completion of the plant unit and the ensuing costs incurred, and the other concerns the costs of a technically resolved matter related to construction. These arbitration proceedings may continue for several years.

### Focusing on occupational safety has paid off

The number of personnel at the construction site reached its peak during the year: at its best, there were nearly 4,400 people of 55 different nationalities working at OL3. By the end of December 2009, more than 16,000 people had been given induction training for work on the site.

Occupational safety at OL3 remained good throughout the year. The number of accidents causing absence from work per one million hours of work, for example, declined and was only about 12.7 at the end of the year (LTA1, Lost Time Accidents causing absence from work for more than one day).

According to the TR index reflecting occupational safety on site, occupational safety issues at OL3 were in good order. Measures to achieve the zero-accident target con-

tinued. Promotion of occupational safety culture continued and was assessed twice in 2009 with different research methods. To increase the workers' awareness of safety matters and to improve communication related to the safety culture, three information screens were installed on the construction site at the end of the year.

### From construction to installation

The goal set for the work at the reactor plant is to have the construction largely completed in 2010 and extensive installation work begun. As many rooms as possible should be completed and made ready for installation work. The main coolant piping, which is being manufactured in France, should be delivered to Olkiluoto in early 2010. Its installation, as well as the installation of the largest main components of the reactor plant – the reactor pressure vessel, the steam generators and the pressuriser –, will begin in the spring.

At the turbine plant, the goal is to have the systems ready for testing and the plant ready for operation.

The training of shift supervisors and operators for OL3 continues; there are nearly forty of them at Olkiluoto. During its operation, OL3 will provide work for a total of about 150–200 people.

### Olkiluoto 3

OL3 is a pressurised water reactor plant with a net output of 1,600 MW using technology that is based on the latest types of reactors built in Europe and the good results and experiences gained from these. The design of the unit draws from the N4 plants in France and the Konvoi plants in Germany. The planned economic life of the plant will be at least 60 years.

The plant unit is delivered as a turnkey project by a consortium (plant contractor) formed by AREVA NP GmbH, AREVA NP SAS and Siemens AG.

On the basis of reports submitted by the plant contractor, TVO believes that the completion of the plant unit may be delayed even further than June 2012, which is the latest date given by the plant contractor. Under the contract on a fixed-price turnkey delivery, the responsibility for the schedule lies with the plant contractor.

*OL3 will replace much of the old power-production capacity based on fossil fuels. If the amount of electricity that OL3 will produce would be generated with coal, the carbon dioxide emissions from the production would be 10–11 million tonnes. This is equal to the amount of emissions caused by traffic in Finland during one year.*



*In December 2009, the workforce total at OL3 was about 4,000. In terms of nationality, the largest groups were Polish (28 per cent), Finnish (25 per cent) and German (17 per cent).*



*OL3 is an EPR-type pressurised water reactor. The pressuriser maintains a high enough pressure in the reactor pressure vessel to prevent the water from boiling even at a temperature of more than 300 degrees.*



*The steam generators are the heaviest components of OL3, weighing more than 500 tonnes each. There are altogether four pressurisers, which were all built at AREVA's plant in Chalon, France.*

*The outer wall of the OL3 reactor building can even withstand the impact of a colliding large passenger plane. The inner wall has a steel lining to ensure that the inner reactor containment remains gas tight. The dome of the steel lining is 14 metres high and has a diameter of nearly 50 metres.*



# Nuclear power for Finland's need for electricity

In April 2008, TVO submitted an application for a decision-in-principle on the construction of a fourth plant unit in Olkiluoto. A fourth plant unit will contribute to the development of Finnish society by providing domestic, environmentally friendly and cost-efficient electricity.

The OL4 project will increase the production of base load power at stable prices in Finland and reduce the country's dependency on imported electricity. The project is also in line with the Government's climate and energy policy, as building more nuclear power will help Finland to achieve the goals set for reducing greenhouse gases.

Olkiluoto 4 will replace coal-fired condensing power plants in particular and thus reduce carbon dioxide emissions from electricity production.

## Using the experiences gained from OL3

Our new nuclear power plant project holds regional and national significance for both the economy and employment. It enables an easy transfer of the know-how, experience and resources accumulated in Olkiluoto to a new project. We also have all the structures, functions and planning ready for the production of nuclear power on the site.

Our project organisation has unique experience in carrying out a major project and the latest know-how in building a nuclear power plant. We are now concentrating on preparing for a new construction project. This process is supported by our tried and tested practices and procedures from four decades and the experience of our 800-strong professional personnel.

The electricity production capacity of the new nuclear power plant unit, which will be either a boiling-

water reactor plant or a pressurised-water reactor plant, will be 1,000–1,800 MW. According to our estimate, the cost of this investment will be about EUR 4 billion. Because of the existing infrastructure and the supporting activities at Olkiluoto that can be used for the fourth plant unit, the project will need less financing. The fact that the area is ready for the production of nuclear power will bring a range of benefits related to the environment, safety, delivery reliability and the price of electricity.

## Support to the project from experts and relevant parties

The many favourable opinions submitted by various parties to the Ministry of Employment and the Economy confirm that the OL4 project is safe and will clearly be of overall good for Finnish society. The electricity produced by the OL4 plant unit will help to increase Finland's well-being and meet Finland's electricity demand.

Many of the parties presenting their opinions, such as the municipal council of Eurajoki, are in favour of our application for a decision-in-principle. The municipality of Eurajoki was also in favour of Posiva's final repository project, which is relevant for the OL4 project. The decisions of the municipal council are legally valid.

Examples of the most important opinions issued were the preliminary safety assessment by STUK (the Finnish Radiation and Nuclear Safety

Authority), and the opinion of the Ministry of the Environment. The Ministry of the Environment noted the excellent location of Olkiluoto for proper organisation of nuclear waste management and the fact that there was little need for transporting nuclear waste, while STUK highlighted the good location of Olkiluoto and the vast experience our organisation has gained from the Olkiluoto 3 building project, for example.

In August 2009, we submitted our responses to the statements and are now waiting for the Government's decision-in-principle.

## Natura assessments for guaranteeing the protection of nature values

We submitted the report on the environmental impact assessment (EIA) in February 2008 and a supplement to the report in August 2008 to the Ministry of Employment and the Economy, a liaison authority in this matter. The main effect of the Olkiluoto nuclear power plant on the environment is the combined thermal load from the plant units on the sea area outside Olkiluoto.

We strive to minimise any environmental impacts in all our operations. This is also a starting-point for planning the new plant unit, including, for example, careful choice of the cooling-water intake and discharge locations.

We conducted a Natura assessment of potential impacts of the OL4 project on the Natura site in the Rau-

ma archipelago (FI2000073) and submitted it to the Ministry of Employment and the Economy in October 2009. According to the assessment, OL4's cooling water will not jeopardise the level of protection of the Natura site in the Rauma archipelago or the coherence of the Natura 2000 network on the Bothnian Sea coast. Olkiluoto is an excellent location for a new nuclear power plant unit also in terms of protecting nature values.

### Readiness for prompt implementation of the OL4 project

We have begun the feasibility studies of the various plant options for the OL4 project. The research focuses on safety, environmental issues, the

technologies used in different reactor and turbine plants, feasibility of construction, and the arrangements for the location of the plant and the construction site, for example. The research will continue in 2010. Thoroughly conducted feasibility studies provide the basis for a safe, successful nuclear power plant project.

Our application for a decision-in-principle also covers facilities essential to the operation of the new nuclear power plant unit which are needed for the storage of fresh nuclear fuel, the interim storage of spent fuel and the processing, storage and final disposal of low and medium-active waste from the power plant. In April 2008, Posiva submitted its own application for a decision-in-principle

regarding final disposal of spent fuel from the OL4 unit.

The Ministry of Employment and the Economy will draft a proposal for a decision-in-principle for the Government in 2010. The decision-in-principle regarding the Olkiluoto 4 project will also need to be ratified by the Parliament. In accordance with the Nuclear Energy Act, the Government's decision-in-principle will be based on considering the project for the overall good for Finnish society. In our view, the opinions issued for the decision-in-principle confirm that the project will provide overall good for Finnish society. We also have the readiness to carry out the project promptly and efficiently.



### Renewable sources and nuclear power: cornerstones of the strategy

Timo Rajala, President and CEO, Pohjolan Voima

"Pohjolan Voima is building an overall concept aiming at reliable, diversified, competitive and carbon-free energy production. Renewable energies and nuclear power are the cornerstones of our strategy and their overall combination is very important for us. In the past ten years, we have invested nearly EUR 1.3 billion in renewable energy, a sum that no other player in the sector has reached," says Timo Rajala, President and CEO of Pohjolan Voima.

In addition to OL4, Pohjolan Voima is planning projects on renewable energy that are worth EUR 3 billion in total. According to Rajala, renewable

energies and nuclear power will form a functional combination that best meets the objectives.

In his opinion, building a safe, reasonably priced nuclear power plant is in the nation's interests. "TVO has the site for the plant unit with all the required activities and infrastructures. OL3's personnel are ready to transfer their know-how and experience to the new project without delay. A more expensive project would eventually have to be paid by all of us. What sells electricity on the market is its price, the true competitive factor," Rajala says.

# Final disposal and safety research: the core of TVO's R&D

The goal of research and development at TVO is to support the safe, efficient operation of the existing OL1 and OL2 plant units and the construction of the OL3 unit and to develop methods for the management and final disposal of nuclear waste. We are also actively engaged in international projects on developing new technologies. Most of our R&D work focuses on comprehensive nuclear waste management.



*Final disposal of spent fuel is one of the key areas in our R&D.*



Our investment in waste management includes our share of the R&D on final disposal carried out by Posiva in Olkiluoto, which focuses on developing the technology for final disposal of spent fuel and building the required facilities. Research in waste management also covers the management and final disposal of the waste from power plant operations and the decommissioning in connection with closing down the plant units.

We develop our personnel's expertise continuously and follow the development of nuclear energy technology in cooperation with the nuclear research community. We produce information and develop new techniques for future demand.

## Cooperation with research institutions

In total, we spent EUR 39.7 (37.9) million on research and development, of which EUR 18.5 million on the research related to the OL3 plant unit now under construction.

In addition to the R&D done within TVO, we participate in several nuclear research projects both in Finland and abroad, and we contribute to the work and financing of various research units. We cooperate with STUK, for example, and our main partners in research and development are Fortum Power and Heat Oy, Lappeenranta University of Technology, VTT Technical

Research Centre of Finland and Aalto University.

## Leading roles in nuclear research projects

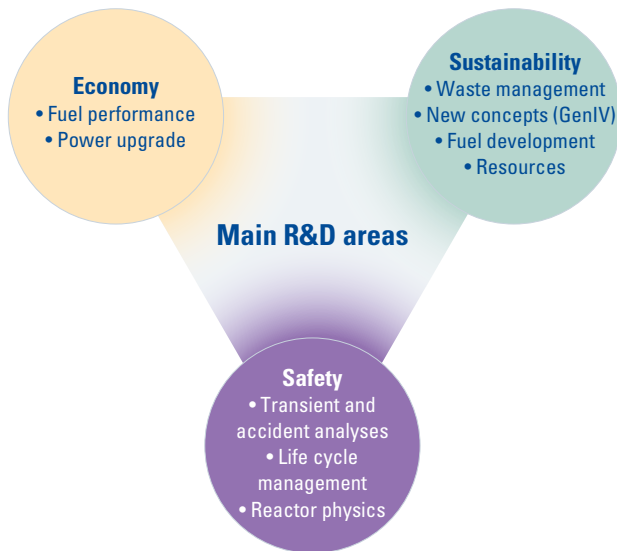
Most of our long-term research and development is carried out under the national programmes SAFIR2010 and KYT2010 funded by the Finnish State Nuclear Waste Management Fund. We have experts in workgroups and research councils related to various research projects under each programme.

Safety research, which is a priority for us, is both theoretical and experimental and includes development of research methods, models and tools. Our experimental research in nuclear technology, such as modelling the operation and performance of a boiling-water reactor in various process situations, is carried out at Lappeenranta University of Technology.

We are in charge of two major joint projects funded by Tekes, the Finnish Funding Agency for Technology and Innovation, on the development of nuclear technology. The goal of the project at Lappeenranta University of Technology is to produce empirical data and create readiness for simulating the operation of the steam generators of pressurised-water reactors during operation and transients. Tekes is also funding Finland's part, coordinated by TVO, in the Cabri research project on fuel

### Our research and development focuses on five key areas:

- Research on nuclear waste disposal
- Safety research
- Technical development of existing plants
- Fuel research
- Development of new plants and technologies



research. This project is connected to a joint European experimental programme on research into the effects of increasing nuclear fuel burn-up.

Our own R&D operations primarily focus on the technical development of our power plant units and support the extension of our operating licences and the commissioning of the new plant. Research subjects include the containment building and its structural strength, the manufacture of components and the ageing of components during operation, the structural safety of the reactor circuit and monitoring and modelling the reactor's operation.

At the Meri-Pori coal-fired power plant, we are co-launching a pioneering project on developing a large-scale test plant for carbon capture and storage (CCS). The final decision on the investment will be made during 2011 or 2012, which means that the system may be up and running by the end of 2015.

### Large international joint projects

European research projects have a particularly important role in fuel research, the development of a new generation of nuclear technology and the development of research infrastructure.

We participate in the development of the fourth-generation (GenIV) nuclear power plant technology by actively following the re-

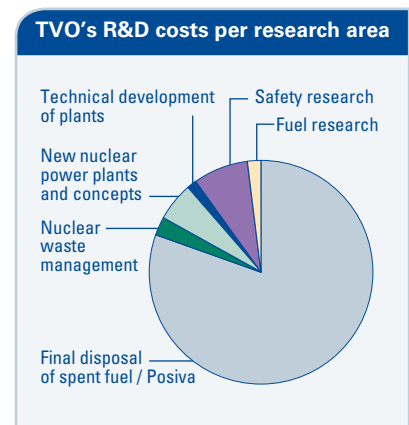
search carried out by Euratom and working in the GEN4FIN network in Finland. The goal of the international programme is to develop new reactor and fuel technology that will have significant impact on reducing the amount of waste for final disposal. An essential target of the programme is to build a demonstration plant with a sodium-cooled fast reactor in France in the early 2020s.

Examples of our participation in international safety research projects are our participation in the work of the Nordic Owners Group (NOG) and the Nordic Probabilistic Safety Analysis Group (NPSAG). We are also involved in various OECD NEA (Nuclear Energy Association) research projects aiming at acquiring and gathering probability safety analysis data, for example. Furthermore, we learn from Euratom's research programme on nuclear fission safety and participate in the management of the Sustainable Nuclear Energy Technology Platform (SNE TP).

TVO is also a co-funder of the international Jules Horowitz Materials Testing Reactor project on building readiness for testing reactors for both third-generation plants and future fourth-generation plants. The coordinator of Finnish participation in this project is VTT Technical Research Centre of Finland.



*Our R&D constantly helps to further develop our plant units. The next annual outages will involve modernisation of the low-pressure turbines, which will increase the plant units' efficiency by about 25 MW.*



# Decades of research into final disposal

In Finland, the responsibility for the final disposal of spent nuclear fuel lies with the producers of nuclear electricity, who also bear all costs incurred from the final disposal. The final disposal of fuel spent at the Olkiluoto and Loviisa power plants is managed by Posiva Oy, which is owned by the owners of these plants.

The producers of nuclear electricity are responsible for nuclear waste management and its costs, including spent fuel, until the closing of the spent fuel repositories. Under the Nuclear Energy Act, any nuclear waste generated in Finland must be treated, stored and permanently disposed of in Finland. All the waste management processes and systems required from TVO are located on the Olkiluoto island.

TVO began exploring the options available for final disposal of spent fuel in the late 1970s. In 1995, the nuclear companies TVO and Fortum Power and Heat Oy established Posiva to manage the final disposal of spent fuel on their behalf.

Posiva is thus in charge of planning, building and operating spent

fuel repositories on behalf of its owners. TVO owns 60 per cent of Posiva.

## Onkalo underground research facility close to the final depth

The site for the underground facilities to be used as a repository for spent fuel from the existing nuclear power plant units and OL3 covers about 150 hectares at Olkiluoto.

Posiva has carried out an environmental impact assessment for expansion of the repository to hold 12,000 tonnes of nuclear fuel. After the expansion, the repository can also receive spent fuel from the nuclear power plant units planned for Olkiluoto (OL4) and Loviisa (Loviisa 3).

The planning of the repository has reached the stage of building an underground research facility in Olkiluoto. The tunnel built in the Olkiluoto bedrock has reached the length of about four kilometres and the depth of 400 metres. The planned depth for the repository, 420 metres, will be reached in early 2010. This is also the depth where the test tunnels, shafts and technical facilities will be built. The excavation work will be finished by the end of 2011.

Posiva will submit an application for a construction license for a spent fuel repository to the Government in 2012. Under the current schedule, the disposal of spent fuel in the repository will begin in 2020. The long-term safety of the repository will not require constant monitoring.

Posiva works in cooperation with the Swedish company Svensk Kärnbränslehantering Ab (SKB), and the plans of both companies are based on a similar repository solution. Both companies are pioneers in the research of nuclear waste management. Their cooperation agreement covers the research, development and technical planning of the repositories.

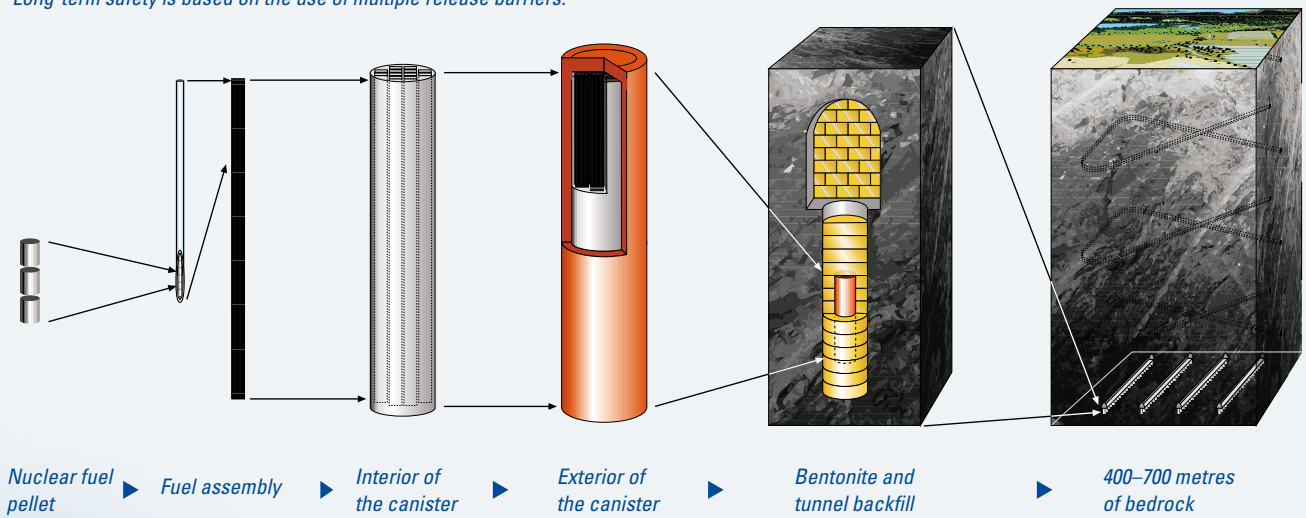
Posiva is also engaged in most EU research projects on building spent fuel repositories in crystalline bedrock. Posiva also has bilateral cooperation agreements with similar construction and research organisations in various countries.

*The excavation work for the tunnel into Onkalo, the research facility for the spent fuel repository has reached the depth of 400 metres. The tunnel is about 4 kilometres long.*





Long-term safety is based on the use of multiple release barriers.



### Guaranteed safety

The spent fuel will be inserted into final disposal canisters. The purpose of the canisters is to isolate the spent fuel from its environment. They are made of copper and cast iron and will withstand the mechanical stress of the bedrock and any corroding effect of the groundwater. The canisters will remain tightly sealed for up to millions of years. They will be inserted into the vertical holes bored into the floor of the repository

tunnel, with bentonite clay used as buffer material between each canister and the bedrock. The tunnels will be filled with blocks of clay as the canisters are deposited into the holes. Bentonite clay has excellent corrosion resistance.

For more information on the spent fuel repository, see [www.posiva.fi](http://www.posiva.fi)



## Highest output in Olkiluoto's operating history

In 2009, as in previous years, we produced nuclear electricity at Olkiluoto reliably and cost-efficiently, achieving a production output of 14,452 GWh, which was the highest in the company's history.

In 2009, the Olkiluoto nuclear power plant supplied a total of 14,385 (14,327) gigawatt hours (GWh) of electricity to our shareholders. The amount supplied by the OL1 plant unit was 7,263 (7,039) GWh and the amount supplied by the OL2 plant unit was 7,122 (7,288) GWh. The Meri-Pori coal-fired power plant supplied 845 (817) GWh of electricity to our shareholders.

The reliable electricity generation by OL1 and OL2 throughout the year guarantees steady turnover according to plan. Under what is known as the Mankala principle, shareholders pay for the expenses arising from electricity production and receive electricity at cost price in return in proportion to their shares.

### Long-term investments

Our investments are always planned and carried out for the long term. We continuously modernise the OL1 and OL2 plant units, ensuring that they will retain long life cycles and high availability and carry out new projects, such as plant investments for OL3 and the future OL4.

In 2009, our investments amounted to a total of EUR 802.7 (600.3) million, of which EUR 749.5 (537.0) million in the OL3 project. Preparations for the projects on modernising the low-pressure turbines, the internal isolation valves of the main steam pipes and the seawater pumps at OL1 and OL2 in 2010 and 2011 continued. The annual outage build-

ing for OL1 and OL2 was completed and commissioned before the 2009 annual outage.

These investments are financed through loans and share capital. Thanks to our operating model of supplying electricity to our shareholders at cost price and the steady operation of the OL1 and OL2 plant units, we are able to finance new, large-scale investments. Our prospects regarding financing were deemed stable by the credit rating companies.

### Oversubscribed bond issue

Our financing policy is based on diversified funding sources to ensure the availability of long-term funding. In June, we established a EUR 2 billion Euro Medium Term Note Programme and launched a EUR 750 million bond issue. The bond issue was given an A- credit rating by Fitch Ratings.

More than 200 European investors responded to the bond, which led to considerable oversubscription. We also launched three other, smaller private placements for a total of EUR 185 million. The wide international trust placed on us by our investors reflects our excellent financing potential for future investments as well.

In 2009, our shareholders invested EUR 100 million for new share capital in accordance with the financial plan for the OL3 project.

### Final disposal is reflected in the price of electricity

TVO bears its responsibility for any measures related to nuclear waste management obligations and for the related costs.

The consolidated balance sheet includes a provision related to nuclear waste management obligations, which is based on measures expected to be taken in nuclear waste management and their costs, taking into account measures already carried out. The fair value of the provision has been determined by discounting future cash flows to the present time. In the consolidated financial statements, the liabilities show a nuclear waste management liability of EUR 633.5 (599.8) million, calculated in accordance with the international IFRS accounting standards. A corresponding amount, under assets, represents the Company's share in the Finnish State Nuclear Waste Management Fund.

In order to cover all future costs of nuclear waste management, we contribute to the Finnish State Nuclear Waste Management Fund as provided by the Nuclear Energy Act. The Ministry of Employment and the Economy has set TVO's liability for nuclear waste management at EUR 1,160.7 (1,137.6) million at the end of 2009 and the Company's target reserve for 2010 in the Fund at EUR 1,069.8 (1,001.2) million. The difference is covered by guarantees.

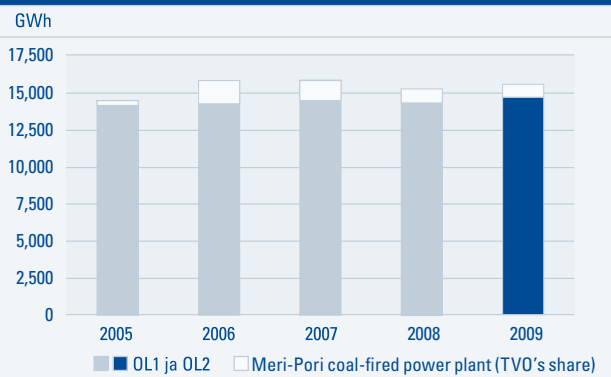
# Teollisuuden Voima Oyj

## Key figure graphs

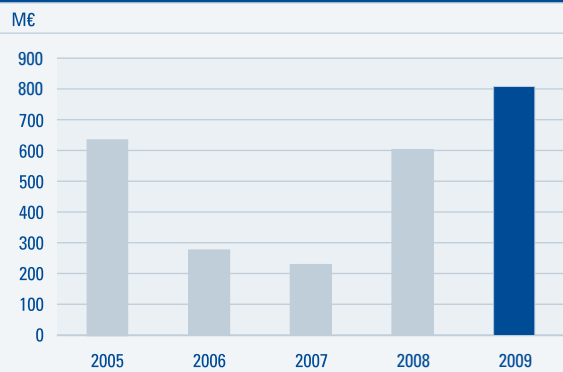
### Development of turnover



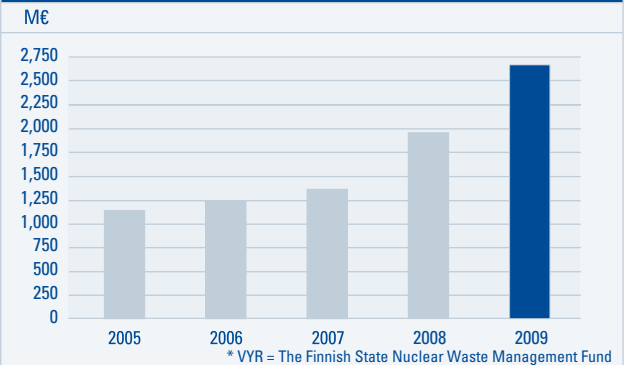
### Delivery of electricity to shareholders



### Investments



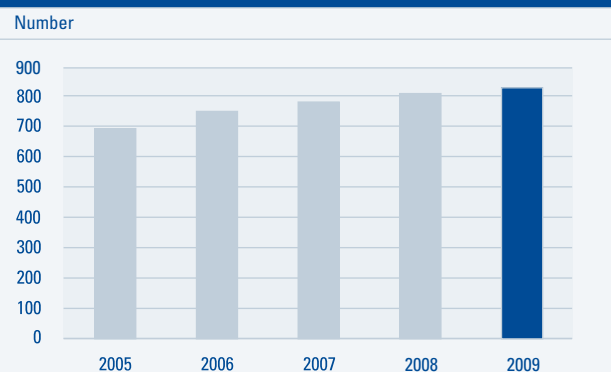
### Non-current and current interest bearing liabilities (excluding loan from VYR\*)



### Equity ratio



### Personnel, average





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