



Pohjolan Voima's Annual Report 2011

Review by the President

Investing in our common future

In the course of the last ten years, Pohjolan Voima has invested almost four billion euros in hydropower, thermal power, nuclear power and wind power. In 2011, the cornerstone was laid for a bioenergy-fired power plant in Hämeenkyrö, the 15th bioenergy-fired power plant constructed by Pohjolan Voima. This year, a biogasifier will be completed in the Vaasa plant of our affiliate Vaskiluodon Voima, making it possible to replace a significant share of the current fuel – coal – with wood chips. This gasification-based plant solution is the first of its kind and the latest example of Pohjolan Voima's pioneering approach.

In 2011, the capacity of the Olkiluoto 2 unit of TVO's nuclear power plant was increased. A corresponding project had been undertaken in the Olkiluoto 1 unit the previous year. The construction of the third reactor went ahead, and all Pohjolan Voima's shareholders decided to participate in the bidding and engineering phase of fourth plant unit that was commenced. This major investment decision illustrates our shareholders' strong trust in the future and in the development of nuclear power. Also the construction of the disposal facility for spent nuclear fuel proceeded as planned.

With determined investment policy, Pohjolan Voima is able to increase the share of carbon-free production from 70 per cent of the past few years to 90 per cent by 2015. These investments help Pohjolan Voima contribute to the energy sector's carbon-neutral energy production target for 2050.

Concentrating on our large-scale electricity and heat generation

Pohjolan Voima's focus is on large-scale electricity and heat generation for our shareholders. An operating model based on cost price is an effective way to implement energy investments. This operating model enables a large number of companies and municipalities of various sizes to participate in projects both directly and indirectly. Large projects allow our extensive experience and expertise to be utilised in an ideal way.

Pohjolan Voima has played an important role in developing wind power in Finland. However, contrary to our strategy, wind power generation had not turned into large-scale energy production, which is why wind power was separated from Pohjolan Voima and a new, independent wind power company was established. Pohjolan Voima also discontinued its involvement in the power distribution business by selling its shares in Fingrid. This decision was based on EU legislation that requires electricity generation and power distribution business to be separated from each other.

Investments require a stable operating environment

Our far-reaching investments need to be supported by a stable, predictable investment environment. The national energy policy for the next few years is outlined in the Government Programme. From the perspective of investments, it is encouraging to see that the Government has promised to handle nuclear power plants' construction permit decisions without delay. On the other hand, the Government's plans to introduce new taxes targeted at electricity production, such as a windfall tax, will make investments less profitable. Policies aimed at reducing the use of peat may, for their part, undermine the profitability of wood energy use. The starting point for the national climate and energy strategy, to be updated in 2012, should be the fundamental elements of energy policy: securing availability and competitive prices, keeping the environmental impact as low as possible, and increasing self-sufficiency in energy production.

Hydropower is the only renewable form of electricity generation that can be increased without financial support from the Government. However, the Government Programme prevents the construction of new hydropower facilities. Finland should have more balancing power capacity, as the demand for it is going to increase significantly, particularly with large-scale deployment of wind power. As we know, hydropower is the best and most cost-efficient production form of balancing power.

Towards new challenges

The financial situation in Finland and everywhere in Europe is challenging. This is going to have a major impact on the operating environment of Pohjolan Voima and the energy sector at large. The situation requires further improvements in our operations and competences to keep our production system

competitive and prepare the ground for the development of new innovations. Pohjolan Voima has always had the courage to look forward, and we will continue to strive for that in the future as well. Our new development sectors include biocoal and turning ash from power plants into utilizable products.

When it comes to our organisation, the most important energy source is the people. Good leadership and a strong corporate culture are success factors that provide conditions for excellent performance. At the same time, we want to make sure that every staff member is committed to working to achieve our goals. Our primary task is to produce energy at cost on a large scale for our shareholders. In 2011, we did well in this task, creating possibilities for future success in the process. I wish to warmly thank our employees, shareholders and partners.

Pohjolan Voima is a reforming, transparent organisation, able to foresee changes in the operating environment and, thanks to its expertise, always one step ahead.

Lauri Virkkunen

President and CEO

Pohjolan Voima Oy

© Pohjolan Voima Oy 2012



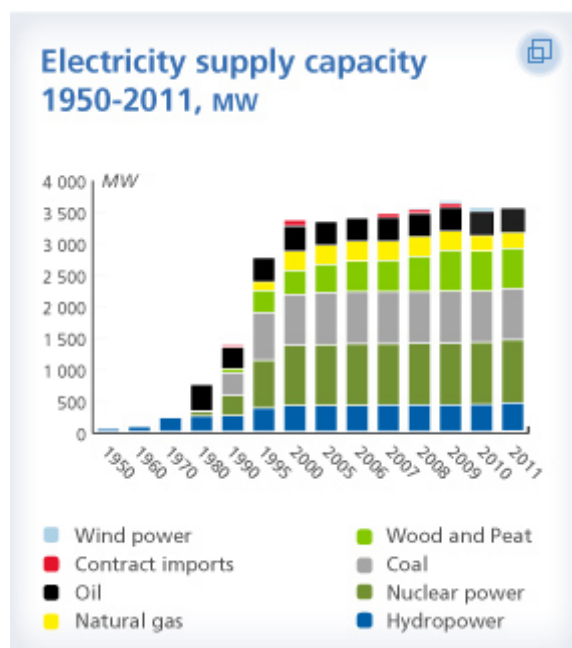
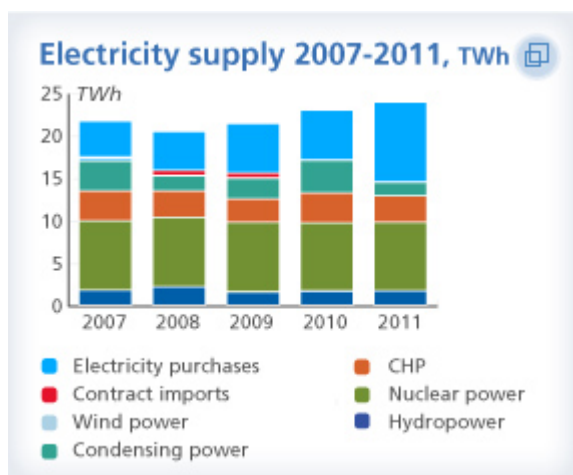
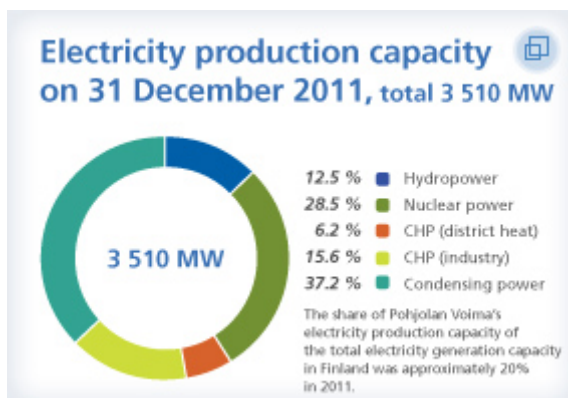
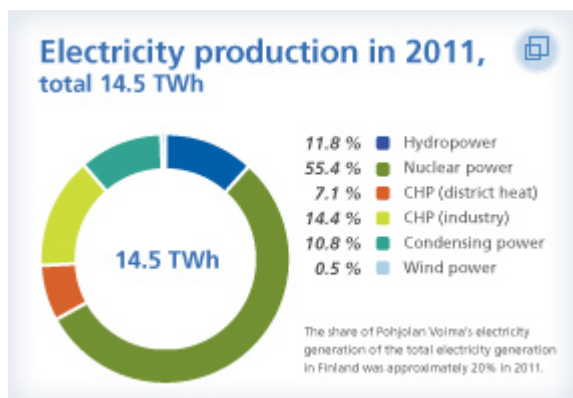
Pohjolan Voima's Annual Report 2011

Production in 2011

In 2011, Pohjolan Voima's electricity production was **14.5 TWh**. At the end of 2011, Pohjolan Voima's electricity production capacity totalled 3,510 MW.

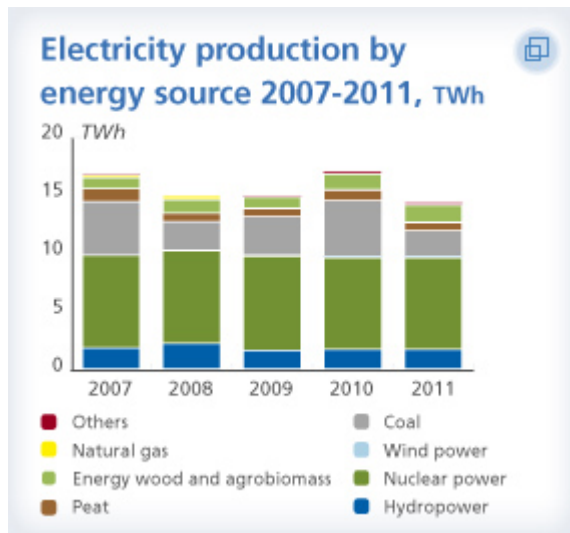
Nuclear power production remained at the previous year's level in spite of capacity increases, as the annual maintenance outage at Olkiluoto 2 was longer than usual. The volume of electricity produced using hydropower remained at the previous year's level. The production of condensing power plants decreased significantly compared to the previous year. The water conditions in the Nordic Countries in the spring were markedly better than before and the autumn weather was warm, which decreased the use of condensing power capacity by 59 per cent on the previous year. Similarly, electricity production in CHP plants decreased compared to the previous year; the reasons for this include the warm autumn weather and a decrease in industry's demand for electricity. District heat and process steam supply to shareholders remained unchanged and amounted to 6.3 TWh. Wind power production remained at the previous year's level.

The consumption of electricity in Finland decreased by 3.8 percent compared to the previous year, as the weather towards the end of the year was warmer than usual and industry's demand for electricity was down. The total electricity consumption in Finland in 2011 was 84.4 TWh.



Pohjolan Voima's production capacity split by power plant on 31 December 2011

© Pohjolan Voima Oy 2012



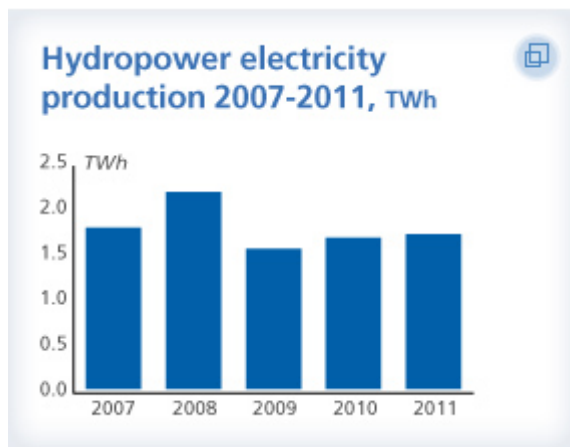


Pohjolan Voima's Annual Report 2011

Hydropower

Pohjolan Voima has a total of 12 hydropower plants on the rivers Iijoki, Kemijoki, Kokemäenjoki and Tengeliönjoki. The combined electricity generation capacity of the plants is 505 MW, of which Pohjolan Voima's share is 440 MW.

Hydropower production at a normal annual level



In 2011, a total of 1.7 TWh of electricity was produced using hydropower, about the same volume as in the previous year. The produced volume corresponds to that of an average water year. The total hydropower capacity was up, thanks to the increase in the capacity of the Maalismaa power plant.

- [Read more on last year's environmental issues in hydropower production](#)
- [Read more on investments in hydropower](#)

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Nuclear power

Teollisuuden Voima Oyj (TVO), a joint venture partially owned by Pohjolan Voima, has a nuclear power plant located in Olkiluoto, Eurajoki. The power plant comprises two plant units with a combined electricity capacity of 1,760 MW.

The most extensive annual maintenance to date at Olkiluoto 2

In 2011, the Olkiluoto nuclear power plant generated 14.1 TWh of electricity. Pohjolan Voima's share of the production amounted to 8.0 TWh. The average capacity factor of the plant units remained high and was 92.8 per cent. The capacity factor of the Olkiluoto 1 plant unit was 94.8 per cent, while in Olkiluoto 2 it was 90.9 per cent. Overall, the production year was a satisfactory one.

The Olkiluoto 2 unit had its largest annual maintenance yet, after which the nominal net electricity production capacity was stepped up by 20 MW. The maintenance outage lasted for 29 days.

© Pohjolan Voima Oy 2012



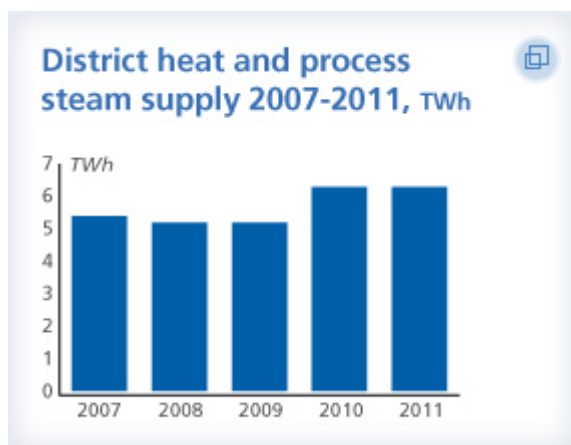
Pohjolan Voima's Annual Report 2011

Thermal power

Pohjolan Voima's total electricity generation capacity in thermal power production is 3,518 MW. In addition to electricity, combined heat and power production plants produce district heat and process steam for consumption by local industry and communities.

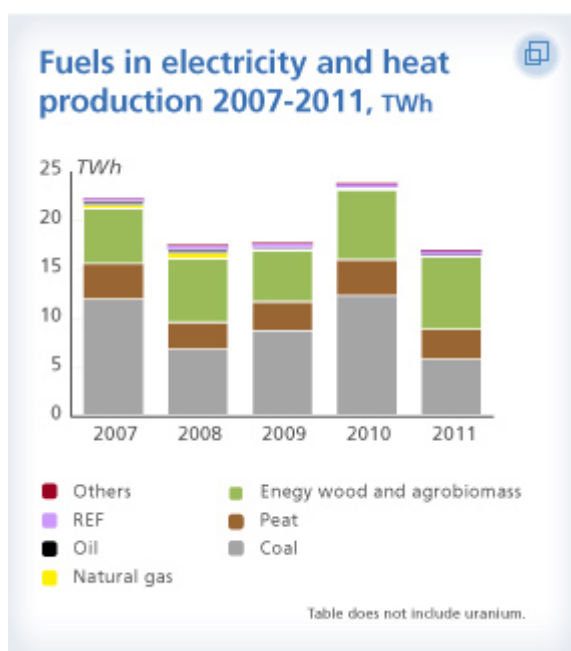
Thermal power production in 2011

The total electricity generation in thermal power plants was 4.7 TWh, falling short of the 2010 figure by 36 per cent. Combined heat and power production plants generated 3.1 TWh of electricity. This is 12 per cent less than in the previous year. Electricity production plummeted because of the deteriorating financial situation that reduced industry's demand for electricity.



Total heat production in 2011 was 6.3 TWh, which corresponds to the 2010 level.

The total volume of electricity produced in condensing power plants in 2011 was 1.5 TWh. This was 59 per cent less than in the previous year. Condensing power production was affected by a significant improvement in the water conditions in the Nordic countries and a mild autumn.



As the production of electricity decreased, so did the consumption of fossil fuels. The consumption of biofuels, on the contrary, increased slightly, while that of refuse-derived fuels (REF) remained at the previous year's level. Peat consumption was down on the previous year. The thermal power plants consumed 5.7 TWh of coal, 7.4 TWh of biofuels, 3.2 TWh of peat, 0.4 TWh of refuse-derived fuels, 0.1 TWh of natural gas and 0.1 TWh of oil in 2011.

Reserve power plants

Pohjolan Voima's oil-fired condensing power plants in Kristiinankaupunki and Vaasa and the Mussalo gas-fired condensing power plant in Kotka belonged to the national power reserve system that was in effect until 28 February 2011. The oil-fired condensing power plants in Kristiinankaupunki and Vaasa were included in the power reserve system, based on the Power Reserve Act and managed by the Energy Market Authority, on 1 October 2011. The plants are kept at 12-hour starting readiness during the winter season from December to February. The combined electricity generation capacity of the two plants is 370 MW.

- [Read more on last year's environmental issues in thermal power production](#)
- [Read more on investments in bioenergy.](#)

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Wind power

Pohjolan Voima's wind power production was transferred to shareholders from 1 November 2011. The combined electricity generation capacity of the wind power plants was 50 MW, of which Pohjolan Voima's share was 38 MW.

In addition, TVO, a joint venture partially owned by Pohjolan Voima, has a one-megawatt wind power turbine in Eurajoki at the Olkiluoto nuclear power plant site.

In 2011, Pohjolan Voima produced 0.07 TWh of wind electricity.

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Personnel

There is strong expertise and competence with respect to energy production in Pohjolan Voima. Pohjolan Voima is considered to be a good employer and a reliable and responsible organisation.

Personnel and reforms

Well-being at work

[Read more on Pohjolan Voima's HR responsibility »](#)

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Personnel and reforms

The key to the success of the reformed personnel strategy, derived from the Group Strategy and the strategies of different business operations, is the personnel itself, contributing to Pohjolan Voima's reforms with its competence and commitment. Successful HR management ensures the availability of skilled, competitive and committed workers, which helps us achieve our business targets.

Personnel participates in preparing for changes

Particular attention in the strategy work was paid to personnel's perspective and preparation for changes required by the strategies. An example of this is the fact that personnel representatives participated in the preparation of the business strategy of PVO-Vesivoima Oy, necessary for addressing the challenges brought about by the current reform. Supervisors in Proma-Palvelut Oy received training in strategy implementation. Strategy work also included a review of the current situation of support functions to underpin development activities. Towards the end of the year, a decision was made to launch the planning of a possible new operating model for support functions, which effectively began in January 2012.

The Group meeting, which convened twice in 2011, is the joint forum of personnel representatives. Thorough the year, strategies held a central role in the meetings. The Group meeting also discussed the updated HR policy that was adopted at the end of the year.

Excellence in management and leadership

Management and leadership development is a key objective of Pohjolan Voima. A personnel survey on the quality of management and leadership, linked to one of the indicators in the Group's scorecard, was conducted in November. The assessment will be conducted twice a year.

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Competence development

A competent personnel is a guarantee of high-quality, efficient operation. The aims are to ensure that adequate competence is retained and to support the personnel in changes. In personnel development issues, the management is backed up by an HR executive group and a training committee that both include representatives from subsidiaries.

Making progress with education and training

Efforts to support leadership included

- Pohjolan Voima's supervisor training day
- supervisor training follow-up event
- training for supervisors in the energy sector
- management forum
- setting up the supervisor toolbox
- training on salary systems and collective labour agreements
- training related to well-being at work under the title "Early support, strengthened ability to work".

Furthermore, internal training sessions were conducted on development themes suggested by the personnel.

The average number of training days per staff member was two.

Continuous development as an all-encompassing approach

To confirm the organisation's competences, the competence list was updated, helping to identify the competence profiles for key posts and to assess the competence development needs for different duties. The planned leadership excellence development model is the framework for the planning and development of leadership training sessions. Development targets identified in the previous personnel survey were related to organisation of tasks and to clarifying responsibilities and communicating them. Newly launched projects have made development activities a part of each company's HR management, thus contributing to an improved operating model.

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Well-being at work

In Pohjolan Voima, well-being at work is a matter of management, competence, workplace community and health. During the year, a model was developed to organise efforts to promote well-being at work, both at the Group level and at local level.

Early support approach introduced

Early in 2011, an early support approach was introduced. The essential idea of the “strengthened ability to work” model is to help supervisors identify in a timely manner problems that subordinates may have in managing their work, find solutions together with the respective subordinate and agree on actions to be taken.

More knowledge on well-being at work

A Master's thesis prepared for Pohjolan Voima provided information on the personnel's views and wishes and a number of suggestions for concrete measures. The material will be utilised in preparing individualised plans concerning well-being at work.

Health and safety at work as an element of a more extensive approach

With regard to thermal power production, health and safety issues were made a part of a comprehensive system comprising matters related to the environment, energy efficiency and health and safety at work. Following the principle of continuous improvement, the newly established management system aims to improve the level of health and safety at work.

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

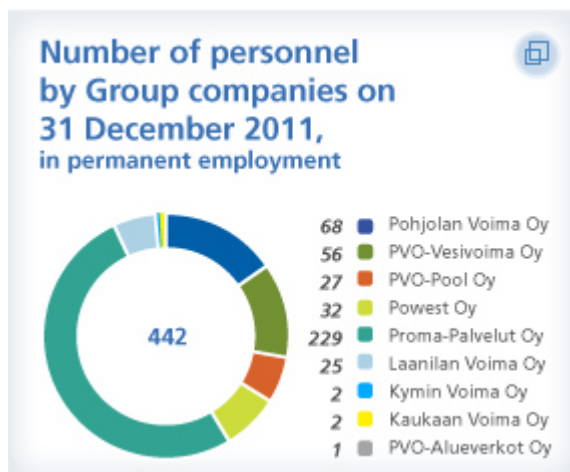
Facts and figures about the personnel

The reformed strategy is supported by a new organisation model, in effect from 1 February 2011. Adjusting to the evolving operating environment, improving efficiency and streamlining the business control operations are among the challenges to be addressed with the revamped organisation structure.

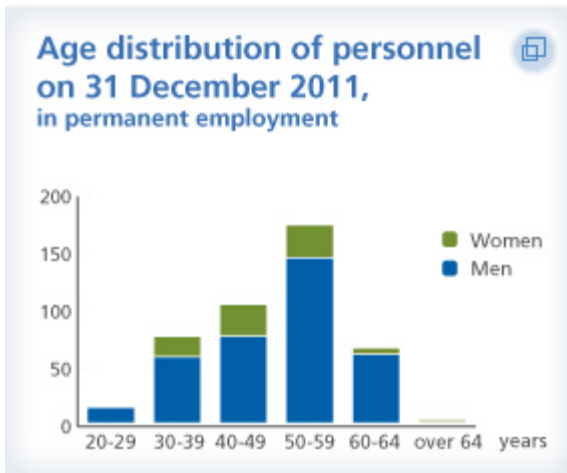
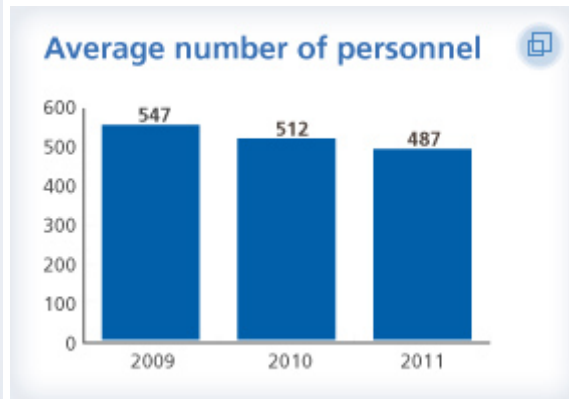
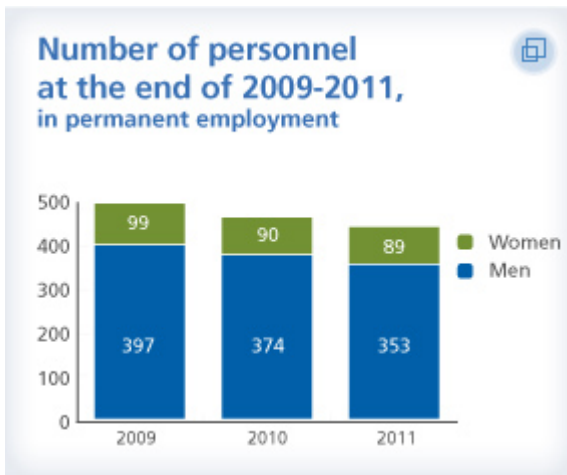
The line-up of the Corporate Executive Team, reporting to President and CEO Lauri Virkkunen, was complemented in the course of the year. The members of the Corporate Executive Team are Petri Hurri, Executive Vice President, Thermal Power; Minna Korkeaoja, Executive Vice President, CFO, Deputy to the President and CEO; Riitta Larnimaa, Executive Vice President, Communications and Public Affairs; Marko Nylund, Executive Vice President, Electricity Supply and Generation Management; Tiina Nyström, General Counsel, Executive Vice President; Pertti Pietinen, Executive Vice President, Hydropower; and Merja Tyrväinen, Executive Vice President, Human Resources.

Tarmo Borisov, former Business Development Manager at Proma-Palvelut Oy, was appointed the President and CEO of Proma-Palvelut on 1 April 2011. Jaakko Alaviitala, President and CEO from 2004, retired on 31 May 2011.

Key personnel figures in 2011

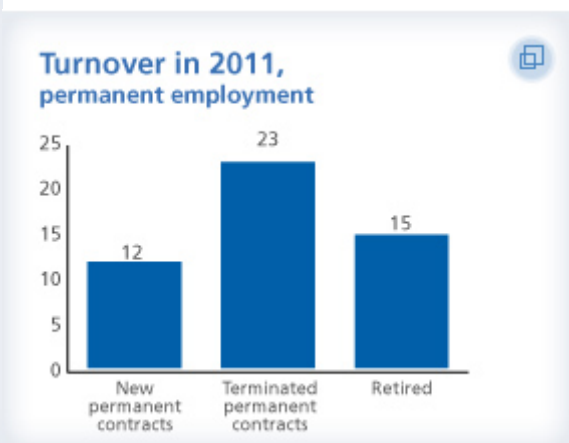
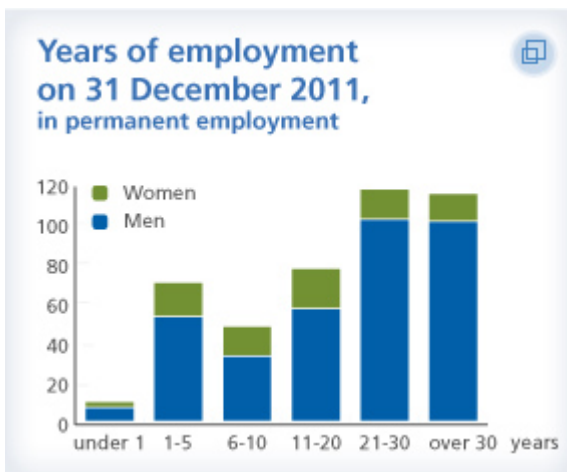


At the end of 2011, the number of personnel in the company was 464, and 22 people, or 4.7 per cent, had fixed-term contracts. There was a slight decrease in the number of personnel on the previous year: at the end of 2010, the number of personnel in the company was 481, and 17 people, or 3.5 per cent, had fixed-term contracts. The share of women of employees with permanent contracts increased somewhat compared to 2010. The share of women in 2011 was 20.1 per cent, while it was 19.4 per cent in 2010.



The most common working time arrangement is full-time work. The share of part-time workers was 7.3 per cent. Part-time work is usually chosen by the employees on their own initiative, and it is often related to parental leave or partial retirement. The total number of summer employees on fixed-term contracts in 2011 was 79.

The average age of personnel in permanent employment increased slightly and was 49.1 years, while in 2010 it was 48.8 years. The share of those over 50 in permanent employment was 244 people, or 55.2 per cent.



A total of 15 employees were granted old-age pensions. The number of permanent employment contracts terminated for other reasons was 23. The number of new permanent contracts was 12. Personnel turnover in 2011 was 5.7 per cent, while the figure in 2010 was 8.3 per cent.

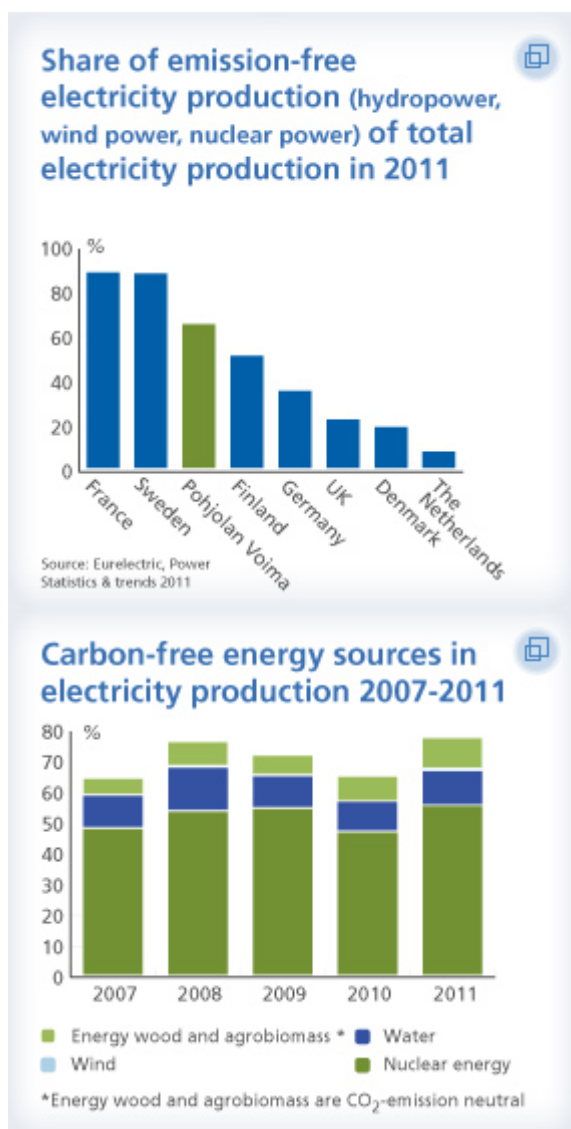


Pohjolan Voima's Annual Report 2011

Environmental Issues

A basic requirement for persistent and long-term energy production is maintaining a safe, healthy and diverse environment. Certified environmental management systems according to the ISO 14001 standard are in use in the majority of Pohjolan Voima's production companies, which helps to ensure the achievement of environmental objectives.

In the context of the 2011 reform of the environmental management system of Pohjolan Voima's thermal power production, issues related to health and safety at work were made a part of this system.



The share of carbon-free energy sources in Pohjolan Voima's electricity production increased compared to previous years and amounted to 78 per cent in 2011. Electricity production forms in Pohjolan Voima's portfolio that are considered to be carbon-free are hydropower, nuclear power and wind power, and in thermal power plants, electricity generated with carbon-neutral wood fuel and field biomass.

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Hydropower and the environment

Regulation and fish stocks are priorities in water environments

Did you know?

Did you know that Pohjolan Voima has undertaken decisive water environment management efforts since the 1980s?

Read more

Hydropower production has a regional and local impact on waterways and fish stocks. In order to sustain the fish stocks of the Kemijoki and Iijoki waterways and the sea area and to meet its fishery obligations, PVO-Vesivoima Oy stocked around 2.2 million fry in 2011. Together with Kemijoki Oy, 3.2 million fry were stocked in the Kemijoki sea and river area; of these, PVO-Vesivoima Oy's share was 17 per cent, or 0.5 million fry. On the Iijoki River, transporting of river lampreys past dams and power stations was very successful: the actual number of transported river lampreys - 90,000 - clearly exceeded the obligation of 60,000. On the Kemijoki River, the shared obligation of PVO-Vesivoima and Kemijoki Oy is 100,000 transported specimens, but only 27,000 were transported in 2011. The reason for not meeting the annual obligation was that the best transporting locations had to be abandoned because of the construction of a second fishway at Isohaara.

The water systems of the Kemijoki and Iijoki rivers had, in 2011, less snow than they usually have before the spring floods. This fact, combined with the exceptionally dry and long spring, caused the regulated lakes in the north to fill up slower than in a normal year.

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Nuclear power and the environment

Nuclear power production complies with environmental permits

The operations of the nuclear power plant units owned by TVO, a joint venture partially owned by Pohjolan Voima, complied with the company's environmental policy, environmental permits and environmental management system. The company's EMAS-registered environmental management system, which also covers the construction phase of Olkiluoto 3, meets the requirements of the ISO 14001 international standard.

The greatest environmental impact of the Olkiluoto nuclear power plant resulted from the heat released into the sea via cooling waters, but any other environmental impact was negligible. With the amendments made to turbines during the annual maintenance outages in 2010 and 2011, the efficiency of the process was improved and the heat load released into the sea could be diminished. As was the case in previous years, radioactive emissions into the air and water were minimal and considerably below the authorised limits. No significant environment-related deviations took place during the year.

Read more at www.tvo.fi »

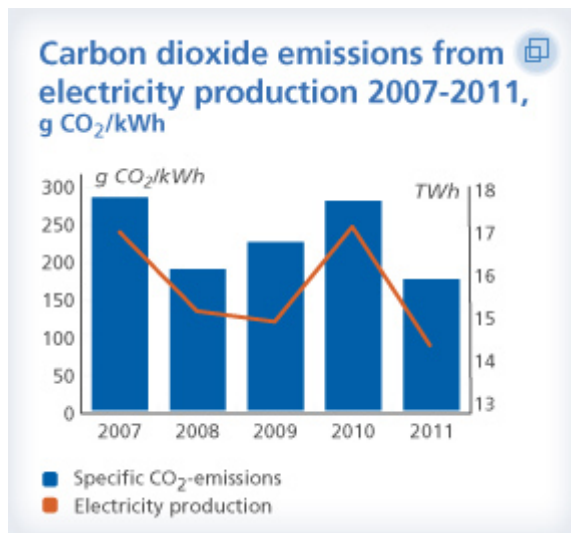
© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

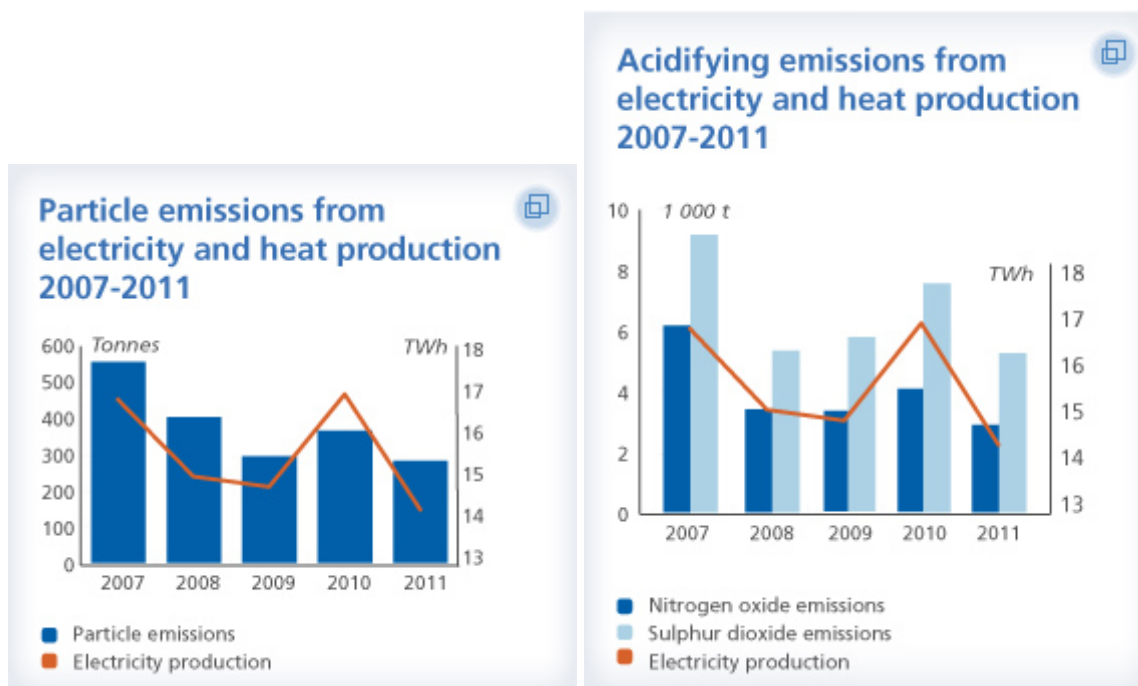
Thermal power and the environment

Emissions into the air caused by thermal power production decrease



Pohjolan Voima's thermal power plants use peat, coal, wood fuel, field biomass and refuse-derived fuels as primary fuels and some natural gas and oil as auxiliary fuels. The most significant environmental impact of thermal power production concerns the atmosphere. The power plants' emissions into the air vary according to the production volumes of electricity and thermal power and the choice of fuel. In 2011, the volume of electricity produced and, consequently, the consumption of coal and peat were down, causing the carbon dioxide emissions from thermal power production to decrease to the current level of 3.3 million tonnes. The nominal carbon dioxide emission of electricity production decreased compared to previous years and was 174 grams of CO₂/kWh.

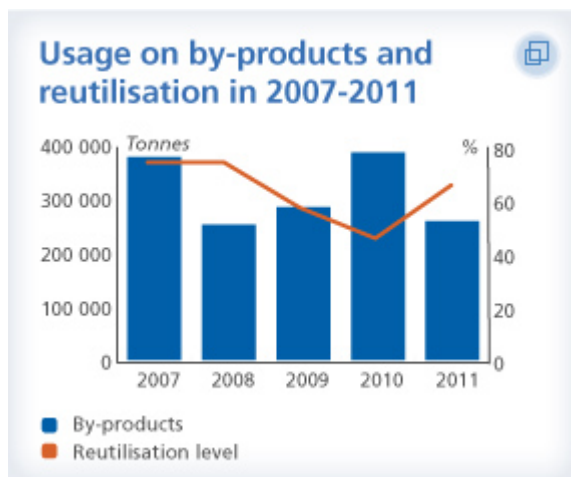
Other emissions into the air were also down compared to the previous year. Sulphur dioxide emissions decreased to 2.9 thousand tonnes, nitrogen oxide emissions were 5.2 thousand tonnes and particle emissions were 0.3 thousand tonnes.



A major future challenge to thermal power production is the Industrial Emissions (IE) Directive that entered into force in January 2011. The Directive establishes extremely rigorous requirements on air emissions

from power plants.

Improved reutilisation of by-products



A total of 285,000 tonnes of fly ash, bottom ash and gypsum were produced, fly ash and gypsum as by-products from flue gas cleaning in the context of power plants' combustion process. Of this volume, 66 per cent was reutilised in earth construction and the construction industry or as forest fertiliser. Reutilisation improved compared to the past two years, when the economic recession and the subsequent deceleration of the construction industry had considerably decreased the use of ash in earth construction. The aim is to reuse a maximum share of the by-products of thermal power production as raw material that could replace non-renewable natural resources, such as rock and stone.

The new Waste Tax Act that entered into force at the beginning of 2011 made dumping of fly ash and gypsum in landfill subject to a waste tax.

Oil spill in Rauma

In February, an oil spill was detected in the cooling water release area at the site of Rauman Voima's power plant, caused by the breakdown of a heat exchanger in the plant's reserve boiler. The volume of spilt oil was about 30 cubic metres, and almost all of it was recovered. Detecting the spill and launching response measures was impeded by the ice that covered the cooling water release area at the time of the incident. Post-cleaning measures were undertaken as ice conditions improved, and the situation was monitored in co-operation with the authorities. In the spring, Pohjolan Voima joined forces with bird-watchers to protect migratory birds from any oil residue left in the sea.

[Read more on thermal power production in 2011](#)

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Wind power and the environment

The greatest environmental impact caused by wind power is the alteration of the landscape. The environmental impact of wind power has been studied extensively during environmental impact assessments. Birds and bodies of water in the wind power production areas were monitored as required under the permit conditions.

Pohjolan Voima's wind power production was transferred to shareholders from 1 November 2011.

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Investments

Pohjolan Voima is a major investor in various forms of new production capacity. With its investments, Pohjolan Voima also wants to ensure the continued operability of its power plants. The investments increase Finland's self-sufficiency in electricity generation and contribute to countering climate change.

Pohjolan Voima's wind power production and the wind power projects in preparation were transferred to shareholders in November. In accordance with its strategy, Pohjolan Voima focuses on hydropower, thermal power and nuclear power and continues to invest extensively in low-carbon energy production.

The bioenergy programme
Hydropower renovation project

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Investments in hydropower

Pohjolan Voima's extensive VESPA hydropower plant renovation and efficiency programme continued with the completion of the renovation of Maalismaa hydropower plant on the Iijoki River. Plans for the Kollaja project were specified further. Based on the adjusted plan, the project's impact on Natura values have been reassessed in co-operation with a number of experts.

Hydropower plant renovation project reached Maalismaa

In the context of Pohjolan Voima's hydropower plant renovation and efficiency programme, the renovation of the Maalismaa hydropower plant on the Iijoki river was completed in 2011. Renewal of the first machine unit at the Maalismaa power plant, which had begun in December 2010, was successfully completed in spring 2011 before the spring floods began. The second machine unit had been renewed between 2009 and 2010. The renovation project proceeded to Pahkakoski power plant in November 2011.

During the hydropower plant renovation programme, initiated in 2005, the machine units of all hydropower plants located on Iijoki will be replaced or overhauled completely. Before the Maalismaa plant, the power plants at Kierikki and Haapakoski were renovated. The renovation of the Pahkakoski power plant will be completed in 2013. The hydropower plant renovation programme will increase the annual volume of energy production by about 35 GWh.

New Natura assessments on the basis of the specified Kollaja plan

In co-operation with a number of experts, Pohjolan Voima has strengthened its assessment of the impact the Kollaja project may have on nature. Specifications of the Kollaja plan take into account the negative estimate concerning the impact of the Kollaja project on Natura values that the coordinating authority presented in its statement in 2009. The specified plan has been a basis for new Natura assessments on the Pudasjärvi estuary in the Kollaja project impact area, and on the Venkaa spring area, which belongs to the Natura network.

In January 2012, the coordinating authority issued its statement on the new Natura assessments, but did not indicate its final opinion on the significance of the impact on the Natura areas, requiring the studies to be completed further. Pohjolan Voima will complete the plan with respect to the shortcomings highlighted by the authority in order to ensure that the Kollaja project will not have a significant negative impact on Natura protection values.

Read more about the Kollaja project at www.kollaja.fi » (in Finnish only)

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

The bioenergy programme

During the last 20 years, Pohjolan Voima and its shareholders have built the majority of the new bioelectricity production capacity in Finland by constructing combined heat and power production plants. The fifteenth bioenergy plant belonging to Pohjolan Voima's bioenergy programme is under construction in Hämeenkyrö. Vaskiluoto in Vaasa will be the site of the largest biomass gasification plant in the world, and the produced biogas will substitute the use of coal at the existing coal-fired plant.

Construction of the bioenergy plant in Hämeenkyrö started

Pohjolan Voima, Leppäkosken Sähkö and M-real will together build a new bioenergy plant in Hämeenkyrö at M-real's Kyrö industrial site. The Hämeenkyrö bioenergy plant is Pohjolan Voima's fifteenth bioenergy plant project. The construction began in spring 2011, and the plant will be completed in autumn 2012.

The electricity production capacity of the completed plant will be 12 MW, and the thermal energy production capacity will be 55 MW, and its main consumers are M-real's Kyrö mill and the customers of Leppäkosken Sähkö. The bioenergy plant project involves constructing a new boiler unit and the associated fuel reception and handling systems. The new boiler unit will be situated near the existing mill power plant, using existing equipment to the largest possible extent.

The fuels to be used in the new plant include wood chips and other wood-based fuels, as well as peat as an auxiliary fuel. The Hämeenkyrö bioenergy plant will replace energy production based on natural gas, which is a fossil fuel, and increase the use of Finnish energy sources in the region.

Construction of a major biogasification plant began in Vaskiluoto, Vaasa

The coal-fired Vaskiluodon Voima power plant in Vaasa, jointly owned by Pohjolan Voima and EPV Energia, will be joined by a biomass gasification plant. The aim is to replace coal with Finnish energy sources and, at the same time, contribute to a decrease in the carbon dioxide emissions from the power plant.

In the gasifier, the fuel will be turned into biogas that can be combusted with coal in the existing coal boiler. Biogas can replace between 25 and 40 per cent of the coal used as fuel in the power plant. Thanks to the use of biofuels, the carbon dioxide emissions of the plant will decrease by about 230,000 tonnes a year. The primary renewable Finnish fuel to be used is wood chips, together with smaller volumes of field biomass, such as reed canary grass and straw, as well as some peat. Wood chips will be dried in a separate drying unit before they are conveyed to the gasifier.

The biomass gasification technique to be built in the Vaskiluoto plant in Vaasa is a new technology developed in Finland that has never before been constructed on such a large scale anywhere in the world. The fuel capacity of the Vaskiluoto biogasification plant will be 140 MW.

Studies underway on torrefying biomass into biocoal

Pohjolan Voima is participating in a project, led by VTT Technical Research Centre of Finland, studying the characteristics of biomass refined by torrefying. Through a process called torrefaction, it is possible to turn wood-based biomass into carbon-neutral biocoal that can be used in existing coal-fired plants without further processing. The development efforts, the purpose of which is to find an industrial-scale application, will continue as a research project that also involves PVO-Lämpövoima, a subsidiary of Pohjolan Voima. The research project studies the suitability of biocoal as a coal boiler fuel. In September 2011, Tekes (The Finnish Funding Agency for Technology and Innovation) granted partial funding for the research project, expected to be completed in 2013.

© Pohjolan Voima Oy 2012



Pohjolan Voima's Annual Report 2011

Investments in nuclear power

Olkiluoto 3

The civil construction works at the Olkiluoto 3 nuclear power plant unit have been completed to a large extent. The construction of TVO's office building continued, while the major components of the reactor plant, such as the pressure vessel, the pressurizer and four steam generators, have been installed, and the welding of the primary coolant circuit pipeline has been completed. Installation of other components, the welding of pipelines and the pressure tests at the reactor plant continued. Commissioning tests of the automation cabinets at the turbine plant are underway. Planning, documentation and licensing of the reactor plant automation are still ongoing. Olkiluoto 3's training simulator has been delivered and installed in Olkiluoto, and it is currently being tested. The number of personnel at the construction site at the end of 2011 was around 3,000. Occupational safety at the site remained at a good level.

Originally commercial electricity production at the plant was scheduled to start at the end of April 2009, but the completion of the plant has been delayed. In December 2011, the plant supplier informed TVO that the plant unit has been scheduled to be ready for regular electricity production in August 2014. The plant supplier is responsible for the schedule.

[Read more about the Olkiluoto 3 project »](#)

Olkiluoto 4

On 1 July 2010, the Finnish Parliament approved the favourable decision-in-principle made by the Finnish Government on 6 May 2010 regarding TVO's application to construct a fourth nuclear power plant unit (OL4) in Olkiluoto.

On 7 December 2011, TVO's Extraordinary General Meeting decided to launch the bidding and engineering phase of the OL4 project. All TVO's current shareholders were committed to financing this phase in proportion to their current holdings.

The purpose of the bidding and engineering phase is to verify the costs and schedules of the plant type alternatives for OL4 and that the plant type alternatives are feasible to be licensed and constructed in Finland. This phase features a bidding competition which is organised to select a safe plant type that meets all the latest requirements.

At the bidding and engineering phase, preconditions will be created for TVO to be able to submit a construction licence application to the Government. The construction of the power plant unit may commence after the reception of a positive licensing decision. The electric power of the new unit will be in the range of 1,450 to 1,750 MW.

[Read more on the Olkiluoto 4 project »](#)

The most extensive annual maintenance in the history of Olkiluoto completed

The annual maintenance of the Olkiluoto 2 plant unit in May and June 2011 was the most extensive maintenance outage to date at the Olkiluoto power plant. During the annual maintenance of Olkiluoto 2, low-pressure turbines, the generator and its cooling system, inner isolation valves of the main steam lines, sea water pumps, and steam extraction lines were replaced. Low-voltage switchgears and I&C for condensate clean up system were also replaced. As the efficiency of the turbine island improved, the plant unit's net electricity production was stepped up by about 20 MW, reaching 880 MW. At Olkiluoto 1, a similar large-scale annual maintenance, but without the replacement of the generator, took place in 2010.

Read more at **www.tvo.fi** »

© Pohjolan Voima Oy 2012