

Review by the President

Pohjolan Voima's operations in 2009 were successful and flourished in all sectors. The Group's total electricity supply was 21.3 TWh, covering 26% of the total electricity demand in Finland. A special mention should be given to the all-time record high production of 14.5 TWh at the Olkiluoto nuclear power plant, owned by our subsidiary Teollisuuden Voima.

During the report year, Pohjolan Voima's newest bioenergy-based power plants in Kerava and Lappeenranta were completed. Both investments have been success stories. The plants were commissioned just before spells of low winter temperatures and high electricity prices. Natural gas that had become more expensive was replaced with Finnish fuels; their supply has an extensive positive effect on employment.

Towards carbon-free production

The share of Pohjolan Voima's carbon-neutral electricity was 72% of the total production. In spite of a slight decrease on the previous year, the future trend is clear. We are prepared to increase the share of our emission-free production to 90% during the next three or four years.

The year 2009 was characterised by a difficult financial situation on a global scale, and industrial electricity demand decreased from the earlier record years. As part of our long-term development efforts, there were several projects under preparation in our Group, but no significant new investments decisions were made. The main reasons for this were the general uncertainty concerning the economy and the limited progress made in energy policy.

Decisions on energy policy called for

Achievements in energy and climate policy in 2009 were negligible: a global climate agreement was not reached in Copenhagen, decisions for boosting the use of bioenergy and hydropower were not made, the almost two-year-old application for a Decision in Principle on Olkiluoto 4 is still waiting for a political decision, and the preparatory work for a feed-in tariff for wind power was delayed. These unsolved questions constituted an obstacle to Pohjolan Voima's projects and in the energy sector as a whole. The electricity supply in Finland relies too heavily on imports – we need decisions in energy policy.

A praiseworthy and essential policy reform was to focus efforts on fighting off climate change to 2050 instead of 2020. In the energy sector, reforms are slow and require investments worth several billion euros. Miracles cannot be performed in just ten years; however, over the next forty years, the possibilities to introduce almost carbon-neutral energy production in Finland are entirely realistic. At the same time, however, this means increasing energy costs. The final bill depends mostly on whether it is possible to increase nuclear energy and whether cost-effective solutions in renewable energy will prove successful.

Pohjolan Voima prepared to keep growing

The future of Pohjolan Voima looks good. I am convinced that the Finnish Government and the Parliament will make a positive decision on Olkiluoto 4. Wood-based energy production in the Group can be significantly increased given that tailor-made solutions for supporting it are available. The demand for increasing hydropower and constructing more flood water reservoirs is still acute, and I believe that the energy policy will find its correct direction in this respect as well. During 2010, reform of energy tax will be prepared, hopefully removing the windfall tax threat and relieving the tax burden, currently higher than in competitor countries, on energy-intensive export industry operating in the global market. This would make possible a new, much hoped for boom in industrial investments in Finland.

Pohjolan Voima's effective energy production and construction projects and project studies helped to keep the company developing and growing. I wish to thank our employees, shareholders and partners for the accomplishments of the past year.

Timo Rajala President & CEO Pohjolan Voima Oy



Production in 2009

In 2009, electricity generated at Pohjolan Voima's power plants amounted to <u>**15.0 TWh**</u>, 2% down on the previous year. A greater share of the electricity was produced using nuclear power than in the previous year. The volume of electricity produced using hydropower did not reach the 2008 production record. The production of condensing power plants increased significantly from the previous year's level, while the production of combined heat and power (CHP) decreased. Electricity generation in industrial CHP plants decreased, and the production of district heat remained at the previous year's level. Heat production amounted to 5.1 TWh, 1% down on 2008. Production of wind power continued to increase.

The recession caused a fall of 7% in Finnish electricity consumption compared to 2008. The levels of Nordic reservoirs were below the average level for the most of the year. Regardless of the reduced consumption, the record-long annual outages in Swedish nuclear power plants increased the demand for condensing power in the Nordic electricity market. The lack of capacity at times of high consumption was clearly indicated by the December peak prices of market electricity.



Hydropower

Pohjolan Voima has a total of 12 hydropower plants on the rivers lijoki, Kemijoki, Kokemäenjoki and Tengeliönjoki. The combined electricity generation capacity of the plants is 485 MW, of which Pohjolan Voima's share is 419 MW.

Hydropower production below average levels

In 2009, a total of 1.6 TWh of electricity was produced using hydropower, less than on an average year. Hydrological conditions deteriorated particularly in the latter half of the year due to scarce rains.

- Read more on hydropower production and the environment in 2009
- <u>Read more on investments in hydropower</u>

Nuclear power

The nuclear power plant of TVO, a subsidiary of Pohjolan Voima, is located in Olkiluoto, Eurajoki. The power plant comprises two 860-MW plant units.

Record production year for nuclear power

In 2009, the Olkiluoto nuclear power plant generated 14.5 TWh of electricity. This was the highest ever production volume in the plant's history. Pohjolan Voima's share of the production amounted to 8.2 TWh. The average capacity factor of the plant units was 96.0%.

The capacity factor of the OL1 plant unit was 97%, while the capacity factor of the OL2 plant unit was 95.1%. There were no major failures during the production year.

Read more at www.tvo.fi »

Thermal power

At the end of 2009, the electricity production capacity of Pohjolan Voima's thermal power plants totalled 2 150 MW. The thermal power capacity consists of condensing power plants and of combined heat and power (CHP) plants that produce not only electricity, but also steam and district heat for the local industry and community.

Highly variable year in thermal power production

In 2009, the electricity generation in thermal power plants was 5.2 TWh, 6% up on 2008.

Compared to the previous year, the total volume of electricity produced in condensing power plants increased to 2.4 TWh in 2009.

In the production of CHP, the production of industry process heat and electricity decreased as a consequence of decreased industrial heat demand. District heat CHP production, on the other hand, increased slightly on the previous year. Combined heat and power production plants generated 2.8 TWh of electricity. This is 12% less than in the previous year.

The total heat production by Pohjolan Voima in 2009 was 5.1 TWh, 1% down on 2008.

Late in 2009, the bioenergy plant in Kerava and the plant owned by Kaukaan Voima in Lappeenranta were connected to the national grid. The Nokia power plant was sold to Fortum Power and Heat Oy at the end of the year. The Mussalo coal-fired power plant was transferred to a long-term reserve in the spring 2009.

The thermal power plants consumed 8.6 TWh of coal, 5.2 TWh of biofuels, 3.1 TWh of peat, 0.1 TWh of natural gas and 0.2 TWh of oil in 2009. The total consumption of fuels remained at the previous year's level.

Reserve power plants

Pohjolan Voima's oil-fired condensing power plants in Kristiinankaupunki and Vaasa and the Mussalo gasfired condensing power plant in Kotka will belong to the national power reserve system coordinated by Fingrid until 28 February 2011. The combined electricity generation capacity of the three plants is 600 MW.

- Read more on thermal power production and the environment in 2009
- Read more on investments in bioenergy

Wind power

Pohjolan Voima's wind power plants are located in Kokkola, Kristiinankaupunki, Oulu, Oulunsalo and Kemi. In addition, TVO has a 1-MW wind power turbine in Eurajoki at the Olkiluoto nuclear power plant site. The combined electricity generation capacity of the wind power plants is 50 MW, of which Pohjolan Voima's share is 38 MW.

Wind power production on the increase

The volume of electricity generated by wind power continued to grow. In 2009, Pohjolan Voima produced 0.1 TWh of wind electricity. After the second construction phase of Ajos in Kemi was completed, wind power capacity increased by 15 MW. Pohjolan Voima's share of this volume is 11 MW.

Read more on investments in wind power

Electricity purchases

Electricity purchases grew

In 2009, Pohjolan Voima purchased a total of 5.8 TWh of electricity from the Nordic market to optimise procurement. This was a quarter more than in 2008. In addition to the Nordic countries, Pohjolan Voima purchased a total of 0.6 TWh of electricity from Estonia on the basis of an agreement terminated at the end of 2009.

Personnel

Updated HR strategy

Pohjolan Voima's human resources strategy was updated in 2009. The updated priority areas in our HR strategy are securing required personnel resources, commitment to an open leadership model, systematic rewarding, positive employer branding and clear allocation of tasks in human resources management.

Group Meetings as part of co-operation

Three Group Meetings were held in 2009. In these Group Meetings, personnel representatives were informed by company management of the operating environment in the energy sector, of the situation in the company in terms of production, projects and finances, of guidelines on procedures and operations in HR-related matters as well as of HR development issues. Group Meetings consist of 16 appointed representatives from various personnel groups. As required under the Act on Co-Operation within Undertakings, information in Teollisuuden Voima Oyj is disseminated in co-operation meetings that take place between four and five times a year.

Personnel survey led to development of operating methods

Group-level targets for development selected on the basis of the 2008 personnel survey – management, compensation, flow of information – were reviewed by working parties, who then issued propositions for measures that have for a large part already been carried out. The personnel were extensively informed of the development measures.

Special focus on HR development and competence

At the beginning of the year, a group-level survey was conducted on the current state, processes, tools and requirements of HR development. On this basis, a series of development measures were undertaken, including a review of task-specific competence profiles, training data documentation practices and career development discussion practices as well as the introduction of a recruiting system. A pilot study on well-being at work was conducted in the parent company, preparing the ground for a well-being project in 2010.

Changes in the number of personnel

The average number of personnel employed by the Group in 2009 was 1 467. The figure for personnel also includes the Powest subgroup, and therefore it is different from the number given in the financial statements. The average age of the personnel was about 45 years. During the year, 60 new permanent employees joined the Group. A total of 54 left permanent employment within the Group and 26 retired.

The personnel employed by Kokkolan Voima Oy, 16 persons, transferred from Pohjolan Voima Group to Kokkola Power Oy as from 1 November 2009. The reason for the transfer was an acquisition of increased synergy in Kokkolan Energia's other business operations. Towards the end of the year, the co-operation negotiations for reducing the number of maintenance personnel employed by Proma-Palvelut Oy at the Nokia power plant were completed. The number of personnel had to be adjusted to new production circumstances, resulting in a reduction from 26 to 11 through different readjustment measures.

Read more »

Environmental Issues

A basic requirement for persistent and long-term energy production is maintaining a safe, healthy and biodiverse environment. Pohjolan Voima's production companies have certified environmental management systems that follow the ISO 14001 standard. In terms of environmental issues, 2009 was a good year, and there were no significant environment-related deviations.

Hydropower and the environment

Fry stocks in water systems at 2.8 million

Did you know?

Did you know that besides following the obligations imposed by authorities, Pohjolan Voima cares for the environment through many voluntary actions? **Read more**

In order to sustain the fish stocks of the Kemijoki and lijoki waterways and the sea area, around 2.8 million fry were stocked in 2009, as planned.

At the Maalismaa power plant in July 2009, the surface level in the upper reservoir fell momentarily below the lower threshold indicated in new permit conditions because of a system error. Falling below the threshold did not cause damage to waterfront buildings, and the system error has been repaired.

Nuclear power and the environment

Nuclear power production complies with environmental permits

The operations of TVO's nuclear power plant units complied with the company's environmental policy, environmental permits and environmental management system. No significant environment-related deviations were identified. Emissions from the Olkiluoto power plant were minor, only fractions of the permitted limits.

A total of 228 new fuel rod bundles (39.8 tonnes) were loaded in the OL1 and OL2 plant units during annual maintenance, and 228 bundles of spent nuclear fuel (37.1 tonnes) were removed from the reactors.

Read more at www.tvo.fi »

Thermal power and the environment

Variable thermal power production emissions

Emissions into the air from Pohjolan Voima's thermal power plants varied according to production volumes and fuels. Carbon dioxide emissions increased compared to the previous year, amounting to 4.2 million tonnes. Particle emissions dropped to 0.3 thousand tonnes. Sulphur dioxide emissions remained at 3.4 thousand tonnes, whereas nitrogen oxide emissions rose to 5.7 thousand tonnes.

By-products in good use

A total of 284 000 tonnes of fly ash gypsum, by-products from flue gas cleaning, and bottom ash were produced. Of this number, 58% was reutilised in earth construction and the construction industry or as forest fertiliser. Reutilisation did not reach the levels of previous years, mainly because of the recession in the construction industry. Pohjolan Voima aims to recycle as much of its by-products into raw materials as possible. For this reason, Pohjolan Voima actively participates in registering power plant by-products in accordance with the requirements of the European Community's REACH Regulation.

Read more on thermal power production in 2009

Wind power and the environment

Environmental impacts of wind power closely monitored

In selecting the sites for building wind power plants, particular attention is paid to the impact on the landscape, noise problems and changes in conventional land use. Environmental impacts caused by wind power are studied and birds and bodies of water are monitored as required in the permit conditions.

Read more on investments in wind power

Investments

Pohjolan Voima is the top Finnish investor in various forms of renewable energy and nuclear power. During 2009, the combined capacity of projects in preparation or underway was more than 4 000 MW.

The bioenergy programme Nuclear power Olkiluoto 3

Olkiluoto 3

Construction of OL3 going forward

Design, regulatory processing of documents, construction and equipment manufacture and installation of the third nuclear power plant unit in Olkiluoto continued in 2009. The roof of the gas-tight steel liner of the reactor containment, also known as the dome, was hoisted into position. Equipment and component deliveries to Olkiluoto continued.

The main equipment of the nuclear island, such as the pressure vessel, four steam generators and the pressurizer, were delivered to Olkiluoto while the manufacture of the reactor coolant pipes continued in France. Installation at the turbine island was at its final stage. The number of personnel at the construction site at the end of the year was around 4 000.

On the basis of the reports submitted by the plant supplier, TVO has estimated that the start-up of the unit may be postponed from June 2012, the latest date reported by the plant supplier.

Read more on the OL3 project »

Olkiluoto 4

TVO prepared to start the OL4 project

TVO applied in the spring 2008 to the Finnish Government for a Decision in Principle on the construction of a fourth nuclear power plant unit at Olkiluoto. Feasibility studies with plant suppliers have been continued. The studies have been extended from safety and licensing to constructability, project implementation and power plant engineering.

TVO's application for the Decision in Principle is, according to TVO's opinion completely ready for decision. The Finnish Government and Parliament are expected to process the application in 2010.

The planned electricity generation capacity of the new plant unit is between 1 000 and 1 800 MW and the heat generation capacity between 2 800 and 4 600 MW. The reactor type may be either a boiling water reactor or a pressurized water reactor.

Read more on the OL4 project »

The bioenergy programme

Together with its shareholders, Pohjolan Voima has constructed 14 new bioenergy plants during the last 20 years. Besides the investments in bioenergy plants, the bioenergy programme includes an extensive research and development programme aimed at increasing the consumption of wood fuels and energy crops. The latest bioenergy plants have been commissioned in Pori, Kerava and Lappeenranta.

Porin Prosessivoima's bioenergy plant inaugurated

Pohjolan Voima's new bioenergy plant in Pori, owned by Porin Prosessivoima, was inaugurated in March 2009. The plant is located at the Sachtleben Pigments Oy industrial site, and it produces electricity and heat for the needs of the area's industry and the City of Pori.

The plant is fired by wood fuels, peat, coal and refuse-derived fuels. The plant will increase the consumption of Finnish energy sources and decrease the consumption of fossil fuels in the production of electricity and heat.

The plant's electricity generation capacity is 78 MW. It also has capacity to produce steam at 140 MW and district heat at 70 MW.

New process steam boiler completed in Kokkola

A new process steam boiler with a capacity of 15 MW and a steam transfer pipeline were completed at Pohjolan Voima's Kokkola power plant in February 2009. The boiler, fired with peat and wood fuels, produces steam for the local process industry facilities. The cost of the project was €7 million.

Bioenergy plant in Kerava completed

The Kerava bioenergy plant, a joint venture between Pohjolan Voima and Keravan Energia, was completed and entered commercial use in November 2009. The construction of the plant began in January 2008. The plant reached rooftop height in March 2009 and was synchronised to the national grid for the first time in October.

The Kerava bioenergy plant, fuelled by branches, toppings, stumps, wood from thinning and peat, will introduce Pohjolan Voima's bioenergy programme to the Helsinki region for the first time. The plant's capacity is 21 MW for electricity, 48 MW for district heat and 10 MW for process heat.

Pohjolan Voima's Kerava power plant produces electricity and district heat for the City of Kerava and process heat for local industry. The total costs of the power plant investment amounted to approximately €70 million.

New bioenergy plant commissioned in Lappeenranta

Kaukaan Voima's bioenergy plant, a joint venture between Pohjolan Voima, Lappeenrannan Energia and UPM, was commissioned in Lappeenranta at the end of October 2009. Test use of the bioenergy plant began at the turn of September–October 2009, and heat deliveries started in early October. The power plant was synchronised to the national grid for the first time in October. The entire plant construction project will be completed early in 2010.

Kaukaan Voima's power plant will produce process steam and electricity for UPM's Kaukaa mill and electricity and district heating for Lappeenrannan Energia. The plant's capacity is 125 MW for electricity, 110 MW for district heat and 150 MW for process steam. The plant is fired by bark, branches, toppings, stumps, wood from thinning and peat. Around 80% of the plant's fuel demand will be covered with wood fuels.

The total costs of the power plant investment amounted to approximately €240 million.

Increased use of Finnish fuels planned in Kristiinankaupunki

A gradual increase in the use of Finnish fuels in energy production is planned at Kristiina power plant in Kristiinankaupunki. This can be done by changing the fuel range of the coal boiler and by, at a later stage, replacing the old oil boiler with a new multi-fuel boiler.

According to plans, a gasification plant with fuel power of approximately 100 MW will be constructed in connection with the plant's coal boiler. Biofuel and peat are converted into gas in the gasification plant and the gas is burned with coal in the coal boiler. The aim is to reduce the volume of burned coal and consequently the carbon dioxide emissions from the plant.

An environmental impact assessment report on replacing the oil boiler Kristiina 1 with a multi-fuel boiler was completed in September 2009. An application for an environmental permit for a gradual increase in the use of Finnish fuels was submitted in November 2009.

Environmental permit application for using Finnish fuels in Vaasa

According to plans, a gasification plant with fuel power of approximately 100 MW would be constructed in connection with the coal boiler in Vaskiluoto power plant. The gasification plant would be fired by biofuels and peat. The use of Finnish and renewable fuels would reduce the volume of burned coal, significantly reducing the plant's emissions. An environmental permit for the project was applied for in September 2009.

New multi-fuel boiler under consideration in Kotka

An environmental impact assessment report on constructing a multi-fuel boiler in Mussalo in Kotka was completed by Pohjolan Voima. The aim is to replace, to an extent, the fossil fuels with Finnish fuels, mainly biofuels and peat. The fuel base would be changed by replacing the current boiler in Mussalo 2 power plant with a new multi-fuel boiler.

The environmental impact assessment report for the new boiler was submitted to the environmental authority in November 2009.

Environmental impact assessment for Oulu bioenergy plant proceeded

An environmental impact assessment report on constructing a new bioenergy plant at Kemira's industrial site in Laanila, Oulu, was completed in November 2009. However, the bioenergy plant project will be postponed because of Oulun Energia's decision to construct a waste combustion plant at the site. Once completed, the waste combustion plant will be connected to the steam network of Pohjolan Voima's Laanila plant. The Laanila power plant produces electricity, process steam and district heat for the needs of Kemira's Oulu plants and the City of Oulu.

Investments in wind power

Pohjolan Voima is planning the construction of major-scale offshore wind farms off the coasts of Kristiinankaupunki and Haukipudas as well as the expansion of the wind farm located off Ajos, Kemi. Extensions to onshore wind farms are also under consideration.

Durability of undersea foundations in northern conditions surveyed

In 2009, an undersea wind turbine foundation was constructed at the wind farm in Ajos, Kemi in order to study the technical durability of the steel foundation located at the bottom of the sea. This project is also aimed at developing an industrial scale solution for offshore wind farm foundations suited to Finnish ice conditions. Loads measured from the steel-built pilot foundation, the first in Finland, include those caused by the swell of the sea, ice and wind.

Pohjolan Voima is carrying out the undersea foundation project in co-operation with several other actors who have upcoming wind power projects. The costs of the project are estimated to be €2.5 million. The Ministry of Employment and the Economy has granted the project investment aid worth €0.8 million.

New offshore wind power planned off the coast of Kristiinankaupunki

Pohjolan Voima is assessing the possibility of constructing a major-scale sea wind farm with capacity for about 400 MW in Kristiinankaupunki. For the major part, the wind farm would be constructed at sea off the coast, but a smaller section would be located within the Pohjolan Voima power plant area on Karhusaari in Kristiinankaupunki.

The environmental impact assessment procedure was initiated in the spring 2008 and the reports were completed in November 2009, after which the plans were further specified. In the new plan, the maximum number of new wind turbines is 70.

The environmental impact assessment report was submitted to the coordinating authority in January 2010.

Read more on the project (in Finnish and in Swedish) »

Major-scale offshore wind farm planned off Haukipudas

In co-operation with Oulun Energia, Pohjolan Voima is assessing the possibility of constructing a majorscale wind farm off Haukipudas. According to plans, the maximum number of plant units in the wind farm would be 160 with a combined power of 500–800 MW. The project consists of the offshore wind farm and of the connecting transmission lines to the national grid.

The environmental impact assessment report for the offshore wind farm is expected to be completed early in 2010.

Read more on the project (in Finnish only) »

Extension to the Kemi wind farm under consideration

Pohjolan Voima is planning to extend the wind farm in Ajos, Kemi. The planned total number of new wind power plant units in the Ajos area is about 60 with a combined power of about 200 MW. The environmental impact assessment programme for the extension was completed in December 2009. The current wind farm in Ajos, Kemi consists of ten wind turbines, each with a capacity of 3 MW, constructed partly onshore and partly offshore. The wind farm was inaugurated in February 2009.

More onshore wind farms under consideration

Pohjolan Voima is planning to extend the total power of its existing onshore wind farms by 50 MW. The extensions would be constructed on wind farms located in Kristiinankaupunki, Kemi and Kokkola. In addition, the construction of up to three wind power plant units on the site of Mussalo power plant in Kotka is under consideration.

Hydropower renovation project

Hydropower renovation project increasing the capacity

The hydropower renovation and efficiency programme VESPA proceeded according to plan in 2009. The renovation of Haapakoski hydropower plant on the lijoki river was completed in April before the spring floods. The next target in December was the Maalismaa power plant, where the renovation started with the renewal of the second machine unit.

The hydropower renovation and efficiency programme VESPA proceeded according to plan in 2009. The renovation of Haapakoski hydropower plant on the lijoki river was completed in April before the spring floods. The next target in December was the Maalismaa power plant, where the renovation started with the renewal of the second machine unit.

Kollaja EIA completed

The environmental impact assessment for Kollaja reservoir and power plant has been completed. The EIA project was initiated in the spring 2007 after the regional energy programme of Northern Ostrobothnia had recommended it and the envisaged substantial increase in hydropower had been indicated in the government programme of the present Finnish Government.

The EIA process was completed in October 2009 when the coordinating authority issued its statement on the EIA report. According to the statement, the project significantly deteriorates the level of Natura conservation in Pudasjärvi. The statement does not constitute a final obstacle to the project as long as it can be implemented in a manner that abides by Natura conservation. However, the implementation of the Kollaja project would require a reform of the Rapids Protection Act.

Read more on the Kollaja project (in Finnish only) »