Can Slovakia Secure Energy Supply and Sustainable Development without Nuclear? Go Nuke Slovakia!

Bratislava, Slovakia, May 5 – 6, 2004

Finnish Energy Outlook - Role of Nuclear Energy

Mr. Juhani Santaholma
President
Finnish Energy Industries Federation, Finergy

Juhani Santaholma
President
Finnish Energy Industries Federation
Finergy 5.5.2004

ENERGY IN FINLAND

Finland is an energy intensive country: high living standard for good five million people, structure of the industry, cold climate and long distances. Half of the energy is consumed by the industry, a good fifth is used for space heating and more than 10 per cent in the traffic. Traditionally, the basic industry (forest industry, heavy metal and chemical industry) is very energy consuming. These industries will also in the future be the cornerstones of the Finnish economical development, despite of the structural industrial change to electro-technical as well as information and communication technologies. Electricity consumption per capita is the second highest in EU 15, about 17 000 kWh/a.

Oil is representing more than fourth, biomass (mostly from forest industry) near fifth, nuclear energy also near fifth, natural gas and coal, both a good 10 % of the overall energy supply of the country. Finland's own energy resources are limited, with the exception of biomass, hydro-energy, peat and wind. The growth of the overall energy consumption in Finland has been increasing in the last few years amounting to approx. 35 million tons oil equivalent in 2003.

Electricity consumption and supply

Finland has totally liberalised its electricity market. Finland, Sweden, Norway and Denmark form a common electricity market. They have an integrated electricity transmission system.

The consumption of electricity in Finland will increase by approximately one fifth during the next fifteen years, from about 80 billion-kilowatt hours to about 105 billion kilowatt hours by 2020. Finnish industries will continue to account for the biggest proportion of this growth, some 60 per cent. Urbanisation, increasing number of households and free time homes, due to the lifestyle change and higher standard of living, will increase electricity consumption of the households and service sector. Despite the fact that the industry is subject to structural changes and strong intensification in its energy use, the industrial consumption of electricity will grow from the present over 45 billion kilowatt hours to over 57 billion kilowatt hours by 2020. This development corresponds to an annual growth of 2,0 per cent until the year 2010, and after this about one per cent per year. These are figures in the average, but they are lagging behind the real development. Even during the present economically low conjuncture electricity consumption increased by 1,4 percent in 2003.

In order to ensure sound economical growth and investment opportunities for the Finnish industry, Finland will need approx. 4000 MW of new power supply capacity by 2020. The peak in the consumption of electricity was about 14 000 MW in the turn of 2002/2003. The peak is estimated to grow to 18 000 MW by 2020. Moreover, reserve generation capacity will be required for disorders in electricity generation, availability of fuels and transmission connections. Combined heat and power generation (CHP) in district heating systems and in industrial applications represents more than one third of the electricity generation, nuclear energy made 26 per cent, hydropower about 11 per cent (normally 15 %), and coal and other condensing power about 24 per cent of the electricity supply in 2003 (normally between 10 – 15 %). The share of wind power was 0,1 per cent. Net import of electricity is normally about 15 per cent of the electricity mix but only six per cent in 2003. The exceptional 2003 figures above are due to the dry hydro year in the Nordic countries.

The share of the industry of the electricity consumption is over 50 per cent, the forest industry using more than half of the total industrial use. The households and agriculture about one quarter and services and the public sector less than fifth, the electrical heating representing good 10 per cent.

Finland is the leading country in the world in the use of CHP. The advantage of this technology is that the efficiency rate in the simultaneous generation of electricity and heat can reach a level of 90 per cent, in comparison with less than 50 per cent in the condensing electricity generation at its best. The CHP technology can utilise all forms of fuels in its processes – natural gas, biomass, peat, coal and limited amounts of oil in Finland.

All the natural gas consumed in the country is imported from Russia. The pipeline infrastructure covers parts of southern Finland. In connection with the Nordic dimension of the European Union a new trunkline pipeline connection from northern Russia via Finland to the Continent-Europe is under planning (the North Trans Gas concept). Such a pipeline would provide new supply connections for the country. The decision making, however, depends on the final commitments of big Central-European gas suppliers and consumers. In Finland natural gas is mostly used in the CHP processes, district heating and industrial applications and, to minor degree, in municipal gas supply systems.

Finland and climate change process

According to the burden sharing of the European Union the target for Finland is to stabilise its greenhouse gas emissions to the level of the reference year 1990 by 2008-2012. This target is extremely demanding for the country. It seems to be that the carbon dioxide emissions by Finnish electricity generation will grow in a significant manner in the beginning of the first commitment period before the new nuclear unit is in operation. The cold and dry winter 2002-2003 is very revealing in this respect. CO_2 emissions rose in 2003 to 30 % above 1990 –level, and the emissions seem to continue their increase despite of the measures initiated by the Government to harness them. The scale of such growth will greatly depend on how the required additional electricity is generated. For this reason, Finland should keep all the non-emission and less-emitting options open for future electricity generation capacity decisions, including nuclear energy, natural gas for replacement of other fossil fuels, as well as new and renewable energy forms, especially biomass use. A strong R&D investment must

be maintained in Finland in order to further develop required technologies to this effect. However, already today Finland has advanced energy technologies to offer to other countries so as to facilitate them to meet their climate targets.

Nordic Electricity view

As mentioned above Finland, Sweden, Norway and Denmark form a common and integrated electricity market.

The Nordic countries make up a very hydropower intensive area. In a normal hydro year the hydropower production volume can make as much as over 50 percent of the total electricity generation. However, there are only limited opportunities to increase the hydro power production volume; consequently, its share of Nordic will go down below 50 percent by the year 2010.

After hydropower nuclear power is clearly the second most important energy source in electricity generation in the Nordic countries (Nuclear Power Plants are in Sweden and Finland). It accounts a little less than fourth of the electricity production capacity. Biomass fuels and wind power provide about five percent of the electricity and fossil fuels and peat about 15 percent.

Production of electricity from natural gas is expected to increase in the Nordic countries, as will be the case in respect of production by biomass fuels and wind power, too.

As far as nuclear energy in Nordic countries is concerned, a new nuclear power unit is in the electricity plans of Finland. However, the share of nuclear power production in the Nordic countries will essentially decrease by 2020 if Sweden will start to close its nuclear power facilities gradually, as politically planned.

Based on the demand and the production estimates used here, the electricity balance in the Nordic counties will turn to a deficit of 14 TWh by the year 2010. Because of extensive annual variations in hydro power production, the deficit would be considerable bigger in a dry year. In the light of winter 2002/03 this risk is a real one.

All this means that the perspective on capacity for the Nordic electricity market is very gloomy. The demand is increasing but the generation capacity is decreasing if the prevailing policies are really applied. Only Finland is planning new major capacity for electricity generation. Consequently, uncertainties around the generation capacity make it justified for Finland to plan new nuclear generation capacity for the needs of coming decades.

As generation capacity is one bottleneck preventing further reliance on imported electricity for Finland from the Nordic market, the other is limited international electricity transmission capacity.

In the Nordic electricity market, electricity transmission volumes between Nordic countries vary considerably due to variations between different hydropower years. The significant

transmission congestion in the Nordic countries exist between Sweden and Norway and on the direct current connections from Norway and Sweden to Jutland in Denmark.

The electricity transmission capacity between Finland and Sweden is a good 3000 MW, and between Russia and Finland 1 500 MW. The connections between the Nordic countries and Continent-Europe are limited to less than 3 000 MW.

Thus, a conclusion can be drawn that another bottleneck in respect of increased electricity import to Finland is the limited capacity of transboundary electricity transmission connections.

Ratification of Government's nuclear decision in the Parliament

The two Finnish nuclear power stations in Loviisa and Olkiluoto with their four units belong year after year to the leading nuclear power plants in the world, with a load factor exceeding 90 per cent in the average. These plants are used for base load power generation. They are featured by high-level safety culture, strict safety requirements, independent control of the safety authorities and demanding training programmes of the operating personnel in order to avoid human errors in the plant operation. The quality standards applied are very stringent. The SAHARA principle is applied.

Finland is well proceeding in its nuclear waste management programmes. The steady bedrock offers solid solutions for the final repositories of the spent nuclear fuel and other nuclear waste. The two nuclear sites, Loviisa and Olkiluoto have for several years had well working repositories in operation for final storage of medium and low level operational wastes of the two nuclear power stations.

The Parliament of Finland ratified on June 24, 2002 the positive decision in principle of the Government to go on with the nuclear power plant project of the Teollisuuden Voima Oy (TVO). Consequently, green light is on to continue the Finnish nuclear programme. The Parliament has also ratified the Government decision in principle to construct final repository for the spent fuel of the Finnish nuclear power plants in Olkiluoto.

The present step in the nuclear power plant project Finn 5, after plant supplier selection by the TVO-company, is handling of the construction permit. Site selection between Loviisa and Olkiluoto – the sites of the existing nuclear stations - has been made by TVO and the winner is the Olkiluoto site. The selected plant concept is the EPR-Framatome-Siemens Plant 1600 MW. The project is well in the time schedule, and the construction permit is expected to be granted by the end of 2004.

Thus, in the licensing process the next steps for both projects (NPP and spent fuel final repository) are the construction permits to be granted by the Government. Year 2004 is reserved for handling of the construction permit for Finn 5. The construction works should begin in 2005, and the plant is designed to come into operation late 2009 or 2010. The Posiva–company plans to apply construction permit for the final repository for the spent fuel in the next few years.

Ratification of the Government's two positive nuclear power decisions by the Finnish Parliament stand up to the most critical review of how well the principles of democracy were fulfilled in the process. "The nuclear power package" includes policy decisions that a new nuclear power unit and building of a final repository for spent nuclear fuel are in accordance with the overall interests of the Finnish society.

One of the essentials is that the municipalities Eurajoki (Olkiluoto) and Loviisa were competing for the final repository of spent nuclear fuel and they both were competing to get the new nuclear power plant unit as well. The municipalities submitted their official positive statements based on municipal autonomy as required by the Nuclear Energy Act. Authorities, experts, citizens and non-governmental organisations were heard extensively during the process. Appeals against municipal decision-making were handled by the highest court instances and found unjustified.

Each municipality also have valid detailed land-use plans addressing appropriate areas for new nuclear operations.

At the nuclear sites Eurajoki and Loviisa the Environmental Impact Assessments (EIA) concerning both the new nuclear power plant unit and the final repository of spent nuclear fuel were carried out in good time before the ratification of the political green light of the Parliament. Already during these assessments the citizens and those others interested had the opportunity to preliminarily express their views in accordance with the relevant legislation.

Some details of the decision process

In November 2000, Teollisuuden Voima power company TVO applied for decision in principle from the Government concerning whether a new nuclear power plant project is in accordance with the overall interests of the Finnish society. An extensive circulation of the Government request for comments gave 45 statements, covering the foremost sectors of the society. Most of the requested official statements were in favour of the project. In addition, almost 100 spontaneous comments were also presented to the Ministry of Trade and Industry; major part of these comments were negative. Also local public hearings were organized by the Ministry of Trade and Industry according the Nuclear Energy Act.

The Government made positive decision in principle on TVO's application on January 17th, 2002. According to the Nuclear Energy Act it was submitted to the Parliament for ratification. In the Parliamentary process the matter was submitted to as many as eight Parliamentary committees in the preliminary debate. The Economy Committee was assigned to serve as the committee drawing up the proposal for the decision of the Parliament, and the seven other committees were to give their statements to the Economy Committee. The committees heard more than 100 experts representing authorities, various industrial stakeholders, interest groups, trade unions, science community and other non-governmental organisations. Three committees voted on their stands on the Government's policy decision. The affirmative positive stand of the Economy Committee on the policy decision was achieved with 12 votes against 5.

After the committee process, the Parliamentary proceeding in plenary sessions took more than two days with great majority of the members of the Parliament taking the floor. The final vote on ratification or rejection gave a result of 107 votes in favour of ratification and 92 against it.

It should be noted that the members of the Parliament were free to express their own opinion in the matter. In other words, any party discipline or party decisions did not apply.
The entire 18-month final handling of the matter took place under the persistent interest and monitoring of the media. The progress of the project cannot be reproached in any way. The media took a neutral, businesslike and unbiased attitude towards the matter. Up to 20 000 media hits were identified: opinions, articles and letters sent to the media, both in favour and against the new nuclear.

The trade unions supported strongly the fifth unit, and good co-operation between industry, trade unions and electricity sector prevailed throughout the decision making project.

The public opinion concerning nuclear energy in general has for many years revealed that about 40 percent have positive attitude, about 40 percent negative and 20 percent do not have position. The attitude to the fifth unit for Finland is a little more negative. If, however, asking “Do you believe that a new nuclear power plant will really be built", 90 percent of the answers are positive (yes, absolutely or probably). After the ratification by the Parliament of the positive decision in principle of the Government the positive figure has grown to 45 per cent. The number of "agnostics" has been as before.

Economy of Nuclear Electricity in Finland

In Finland a normal annual full load utilisation time for base load power plants (in the first row the nuclear NPP’s) is 8 000 hrs, corresponding to about 90 percent load factor. A five percent real interest rate and 40 years economic lifetime for nuclear power and 25 years for both coal and gas fired power plants is used in the electricity generation cost assessments.

According to the results of the study on economics of nuclear power in Finland by Lappeenranta University the costs of nuclear electricity would be 24 Euro/MWh, coal electricity 28 Euro/MWh and gas based electricity 32 Euro/MWh. These are the major alternatives for base load generation in Finland. These electricity generation cost evaluations correspond to those made by TVO. The cost calculation of nuclear power includes funding of all the future nuclear waste management measures needed, including spent fuel management and plants' decommissioning. A separate state fund of about 1,3 billion euros has been collected in the price of the electricity of the four nuclear power plant units of Finland to cover the costs of the future waste management measures needed.

Conclusions

New nuclear power partly covers additional electricity demand and replaces retiring power plants in coming decades after 2010.

Nuclear energy secures stable, economical and predictable electricity price as well as operation environment for the electricity intensive industry for coming decades.

Nuclear energy also reduces the dependence on electricity import of Finland.

Nuclear energy partly enables, together with renewables, fulfilment of Finland's Kyoto commitments.
Solutions for nuclear waste management are a conditio sine qua non for sound nuclear programmes. Funding has been arranged.

All this is carried out in Finland in a transparent way and in accordance with any democratic requirements.