



World Nuclear Association Annual Symposium
5-7 September 2001 - London

Visions for the Global Nuclear Industry in the 21st Century – a Finnish View

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It gives me great pleasure to have been given the opportunity to tell to this distinguished audience about plans regarding nuclear power in Finland.

Dependency on external energy sources over 70% in Finland

Finland is the northernmost member of the European Union countries (*Figure 1*). We have a cold climate, long transportation distances and energy intensive industry. Therefore, energy plays a vital role in our economy and welfare.

Finland is one of the world's leading industrial countries in utilizing renewable energy sources, especially bio energy (*Figure 2*). Our main raw material is wood, which we process into paper and pulp. Our own energy resources are very limited and we are highly dependent on imported energy. Today, we import more than 70% of primary energy demand in Finland, and more than half of that is imported from one country only, Russia (*Figure 3*).

Energy consumption has stabilized in Finland but electricity consumption has grown steadily and it is estimated that it will grow in the future, too. Electricity production is diversified and is based on the use of several fuels. The share of nuclear electricity is 27% (*Figure 4*).

To be over-dependent on energy from one country only secures neither predictable nor economical energy supply for industry and society in the long term. In this respect, the situation in Finland seems to be very similar to that in the EU countries as a whole. It is difficult to build more coal-fired power stations because of the need to curb CO₂ emissions. Ignoring nuclear, the only major source of primary energy for the growing electricity demand is natural gas. But are we then compromising the security of energy supply, if the growing needs are met by relying solely on Russian gas? This question was raised also in the Green Paper on security of energy supply recently published by the European Commission.

Nuclear provides safe and lowest-cost base-load electricity

We have four nuclear reactors in operation in Finland. Operational experience has been very good. Production has been reliable, for example at Olkiluoto the average capacity factor over the past 10 years has been about 94% (*Figure 5*). The safety of generation has not been challenged. Nuclear electricity has proved to be very competitive in the deregulated electricity market which we have in the Nordic countries.

The main reasons for successful experience in the use of nuclear power have been political stability in Finland, progressive nuclear legislation and strict but clear safety requirements. The operating policy, to take good care of the plant units, has proved to be very beneficial too. Our philosophy is to keep the plant units in good condition, like a new plant. Well educated and trained personnel are a necessity, as are efforts to continuously improve working methods.

Solution for nuclear waste exist

In Finland, we have solved one politically difficult question concerning nuclear operations - the management of waste. Our nuclear law demands that spent nuclear fuel, and only Finnish spent fuel, shall be finally disposed of in the Finnish bedrock. Geological studies carried out over two decades show that Finnish bedrock is very suitable for that purpose. We have decided to locate the final repository close to the existing power plant units at Olkiluoto at a depth of several hundred meters in two billion year old bedrock. The safety authorities have approved the principal plans for the repository. The local municipality has accepted that the repository should be located on their territory. Our government has given approval in principle for our plans, and the Finnish parliament has ratified the government's approval, by a large majority.

We believe that gaining public acceptance for the final repository was possible in particular because of the open and factually-based information that TVO has made available throughout the whole process. In fact, TVO has followed an 'open doors' information distribution policy throughout its existence. The neighbours of the power plant and local decision makers know the company and its activities well.

During the coming years, we will excavate a shaft of about 500 meters depth in order to finally verify the properties of the bedrock. The construction of the final repository will start round 2010 and its operation in 2020. The money needed to construct the repository has already been collected in the fund managed by the Finnish state.

Kyoto obligations unrealistic without nuclear energy

The requirements to prevent climate change will increase in the future. Nuclear power does not create greenhouse gas emissions and therefore plays a vital role in protecting the environment. Without the production of our four nuclear units, the CO₂ emissions from electricity production in Finland would be twice as high as today (*Figure 6*).

According to the business as usual scenarios on electricity consumption until 2010, the need to reduce greenhouse gas emissions in Finland is of the magnitude of 20%, one of the highest in the European Union. With the extensive use of combined heat and power and the large share of renewable energy sources in electricity production, Finland has

already put to use the methods which are considered essential for reducing CO₂ emissions. Scope for the further use of these methods is limited.

Studies carried out by the Finnish Ministry of Trade and Industry show that using more nuclear power together with renewables is the most efficient and economic way to meet the reduction targets of greenhouse gas emissions set by the Kyoto Protocol. The majority of Finns approve the construction of additional nuclear power plants, if that can be considered a means to reduce greenhouse gas emissions.

Application to construct an additional nuclear unit

Different studies show that the price of new nuclear electricity in Finland is lower than that produced by, for example, coal and gas. Based on Spring 2001 price levels, the studies indicate that nuclear electricity maintains its position even when the interest rate is varied up to 10% per year.

As a result of the above, and because of the increasing need for safe, economic and environmentally friendly electricity, TVO decided to submit an application to the Finnish government to construct an additional nuclear reactor in Finland. Most probably, this application will be handled by the government in the next few months. If the decision is positive, it will need the ratification by parliament, where discussion is expected next Spring.

It has been said that the construction of new nuclear plants is not possible in the deregulated electricity market due to the large economic and political risks. However, the TVO company structure as a pure power producer is very suitable for taking care of big investments such as the construction of nuclear power plants. TVO produces electricity only for its shareholders. TVO's task is to produce electricity as economically as possible, and not to make any profit from it. TVO's shareholders in turn can use the electricity in their own production activities or sell it on the open market. Moreover, they are responsible for paying their share of all production costs to TVO, but without any profit. Therefore, the economic risk is divided amongst various shareholders and remains reasonable for any single shareholder.

Conclusion

As a summary, I want to state that I do not see any reason why nuclear should not have a promising future ahead of it. In Finland we have positive experiences from nuclear power. We see that without nuclear energy it is not possible to guarantee predictable and economic electricity production, and nuclear power also helps us to save the environment and the climate.

But we have to work for to ensure nuclear's future. Both safety levels and the economics of the production of existing units must be improved. This will require continuous investments in nuclear power, good housekeeping in the plants and high standards amongst staff. Open information between operators is necessary, even as the opening of the electricity markets continues and causes increasing competition between operators.

Another important prerequisite is to continue putting effort into R&D activities, to continue the development of safer and more efficient nuclear power plants. It is the

responsibility of the whole nuclear industry, but especially plant suppliers, to take efforts to decrease investment costs and to shorten the construction time of new units. Otherwise, investment decisions will be difficult to make.

So far, the outlook is good. Nuclear technology has evolved as operational experience has accumulated. State-of-the-art nuclear power plants are more efficient and safer than those that we are operating successfully today. We must work for nuclear power and trust in it. If we do not believe in the future of nuclear power, who will?

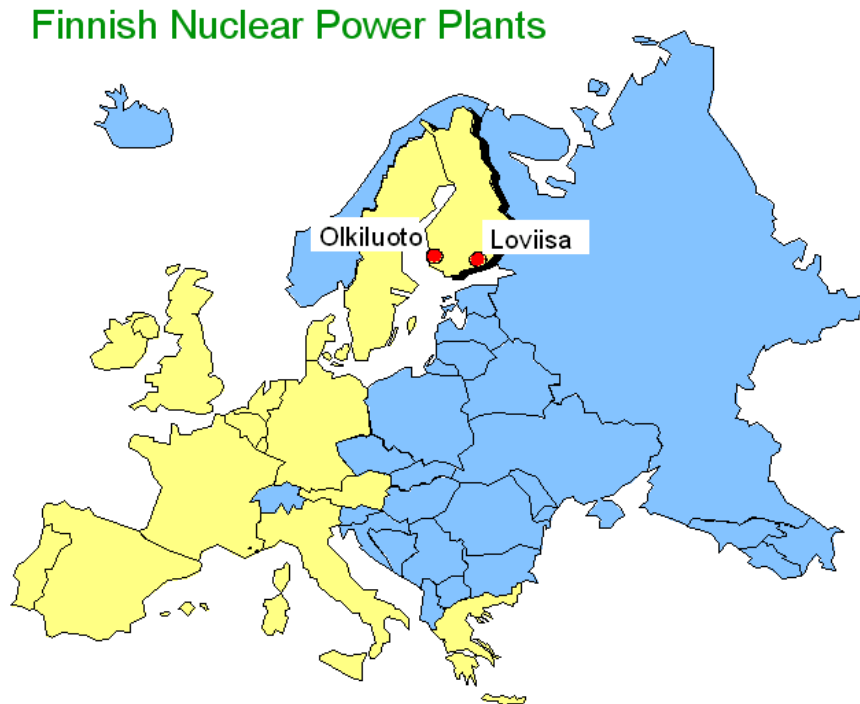


Figure 1: Finnish Nuclear Power Plants

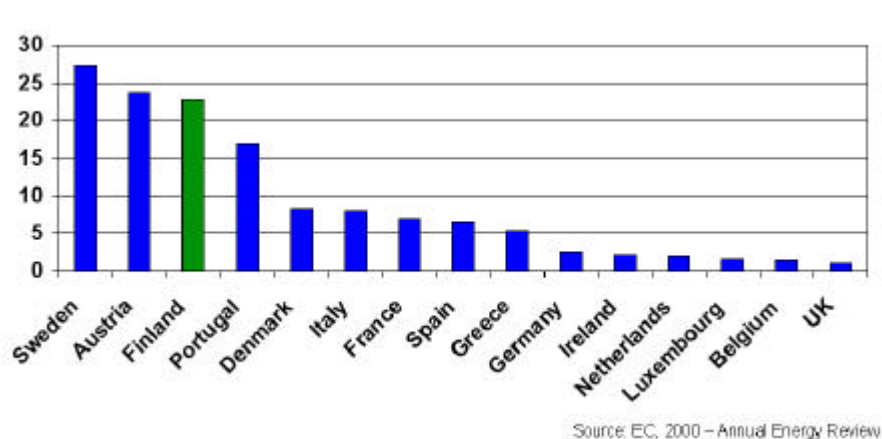


Figure 2: Use of renewables in various countries

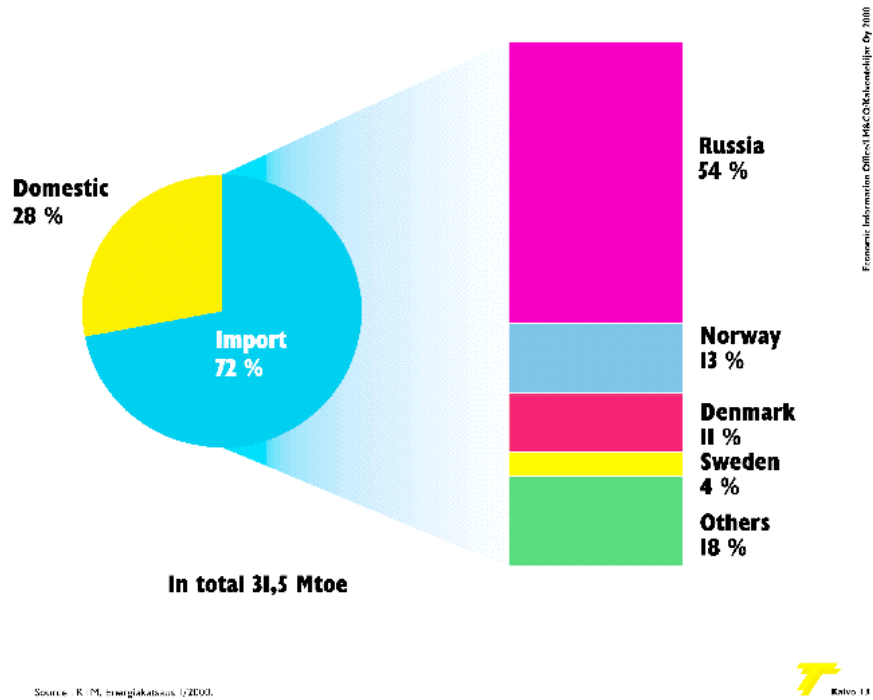


Figure 3: Energy Supply by Countries of Origin in 1999

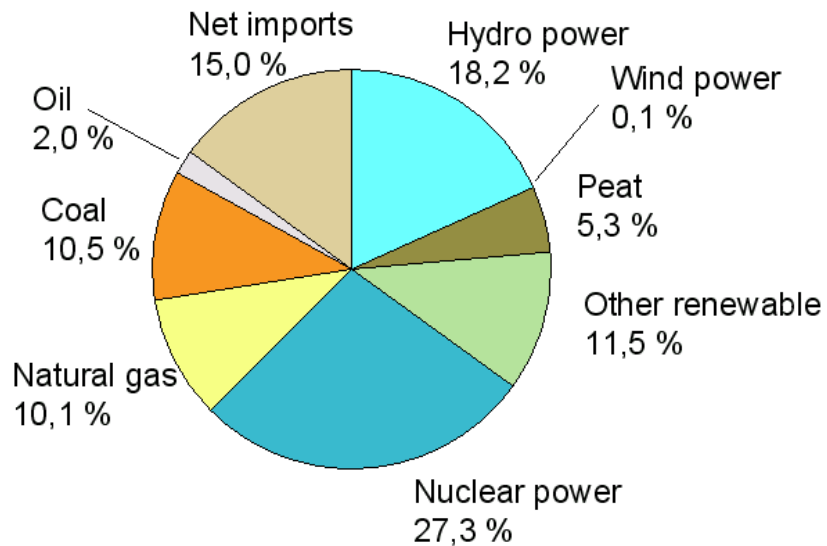


Figure 4: Electricity Supply by Energy Sources 2000

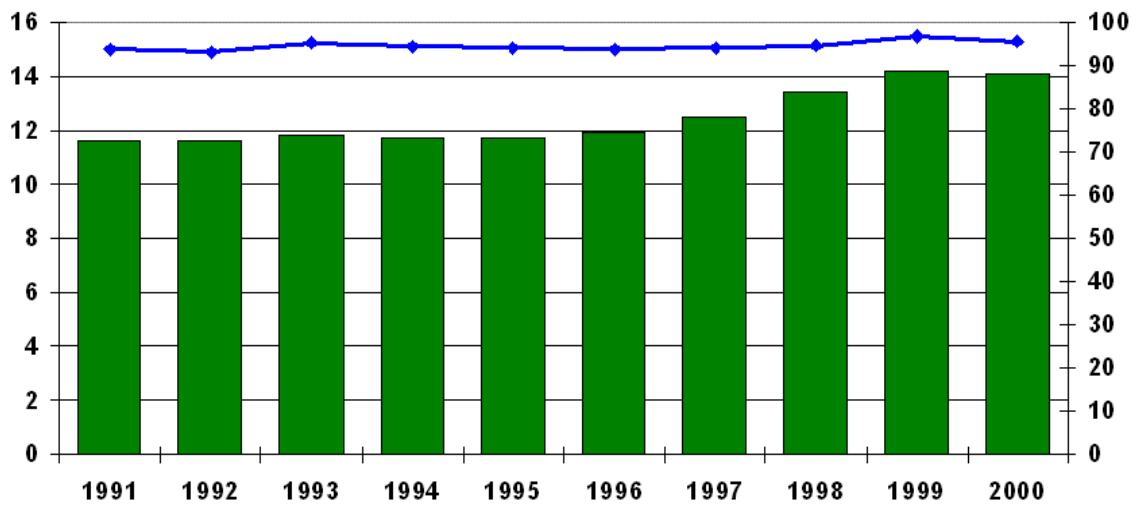


Figure 5: Olkiluoto NPP- Electricity Production and Capacity Factors

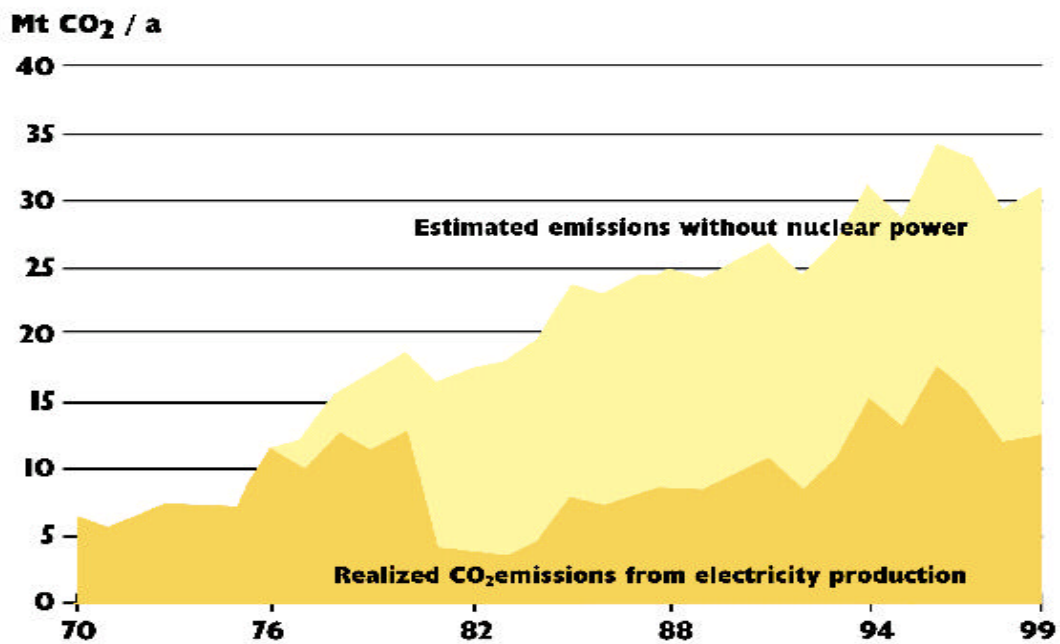


Figure 6: Contribution of Nuclear Power to Reduction of CO₂-emissions in Finland

Finnish Information Office, MäCCO/Silverlight Oy, 2000