

THE CONSTRUCTION OF OLKILUOTO 3 IN FINLAND

A CASE STUDY

Summary

The recent publication of the energy review and CoRWM's findings have ensured nuclear is currently top of the news agenda. With new build looking increasingly likely, focus is now being drawn by nuclear plants currently being built across the world such as Olkiluoto 3 in Finland. This project, which has gained support from the government and public, is the first nuclear power plant to be built in Western Europe for over 10 years.

The Olkiluoto 3 nuclear power plant, being built in Eurajoki, Finland, is due for completion in 2009. The project was first proposed and rejected in 1993, and it wasn't until 2002, nine years later, that public opinion and government policy changed sufficiently to allow the construction of the plant to start.

Finland, compared to other European countries, has very high energy consumption. This is due to several factors that are specific to Finland. The cold climate means all public and private buildings need to be heated for much of the year, a large portion of Finland's industry is very energy intensive and due to its sparse population spread over large distances, transportation costs are high (Figure 1.a). Finland also has few indigenous resources. The main fuel resource, oil, has to be imported which is expensive and can mean there are energy cuts if something happens along the supply route. Figure 1.b shows a breakdown of Finland's primary energy fuels. Over 50% of its energy resources are from sources that have to be imported, with a further 20% coming from nuclear and hydro power.

Finland's energy policy is a holistic policy. On climate it has been heavily influenced by international treatise such as the Kyoto Protocol and the EU "Burden Sharing Agreement". At a national level it looks at areas more specific to Finland's energy needs, such as security of

supply and economic viability. When researching into increasing Finland's power output, all power options are considered looking at these same requirements.

Nuclear energy has been a power source in Finland since the late 1970's. The plants built between then and the early 1980's are still producing electricity, and are consistently available for over 90% of the time. They all are considered to have very good safety records because of the low number of incidents reported. The reason more plants have not been built since the early 1980's is the Chernobyl disaster in 1986 and the detrimental effect that had on public opinion.

The process of getting a nuclear power plant built in Finland has been described as a "stepwise decision - making process". This means there is a clear, predefined timetable, dictating what happens at each stage of a proposal and explicitly stating who is responsible for what.

There were several types of lobby groups involved campaigning for, and against, the new plant to be built before any final decision was made. There was the pro-nuclear power group made up of power companies, the host municipalities and labour unions. In opposition to this was the anti-nuclear power group made up of NGO's and local community groups. There was also the Radiation and Nuclear Safety Authority (STUK), however this group had a long standing campaign to properly inform the public about nuclear power, and so was seen as non-partisan. There was also a document produced called the Environment Impact Assessment. This was a consultation document which had to give all stakeholders a chance to voice their opinions, both positive and negative, and also looked at alternative solutions to Finland's looming energy gap.

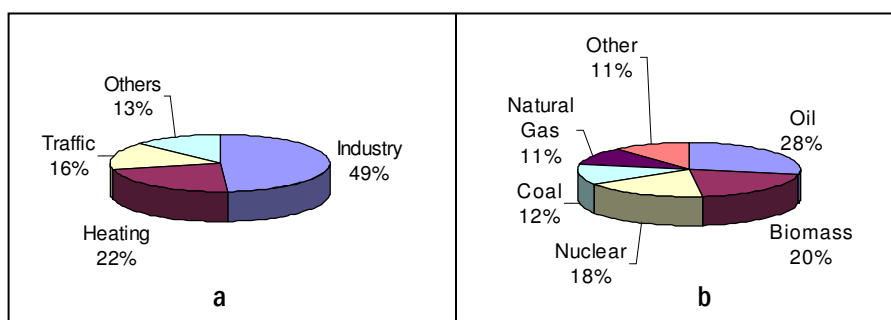


Figure 1 a. Chart showing a break down of the energy consumption in Finland, b. chart showing the break down of the primary energy sources in Finland¹.

Background

Energy

Over the next 30 years Finland's economy is predicted to grow by 2.5%, which means demand for electricity is set to soar. It is predicted that by 2025, electricity consumption will have increased by 40%². Finland's energy consumption is currently 65% higher than the European average³. This is because the climate means the demand for heat in public and private spaces is high, the economy relies heavily on energy intensive industries and low population density mean transportation of goods is costly.

In 2001 oil, with a 28% share overall, was the largest contributor to Finland's energy production (Figure 1.b). This is expected to reduce to 24% by 2010, with nuclear, coal and natural gas increasing their share, further diversifying Finland's sources. Over half of Finland's fuels are imported. The only domestic fuel used is biomass, producing 20% of Finland's energy.

Finland's energy industry runs on an open market system and is one of the least regulated in Europe. The Energy Market Authority is the regulatory body charged with monitoring price and will step in if problems arise. However, predominantly, market forces determine the price of energy.

Nuclear

Generation

Finland currently has two nuclear power plant sites: Olkiluoto and Loviisa. At the Olkiluoto site there are two boiling-water reactors (BWRs), called Olkiluoto 1 and 2, and in Loviisa, there are two pressurised-water reactors (PWRs), called Loviisa 1 and 2. All of these plants were

built between the late 1970's and early 1980's, and in 2001 provided the country with approximately 31% of its electricity⁴. The four plants are considered to have excellent safety records, and throughout the 1990's⁵, they all consistently worked at above 90% load factor.

Waste

In 1996 the Nuclear Act was amended to state that any nuclear waste produced in Finland could not be exported out of Finland. The act also means that Finland does not allow nuclear waste to be imported and stored in the country⁶. Finland currently has two low and medium level nuclear waste repositories built in 1992 and 1997. There is another deep level bedrock waste repository being built at Olkiluoto 3 alongside the new nuclear plant.

Finnish law states that the disposal of waste from nuclear power plants is the financial responsibility of the nuclear power companies; the cost of waste management is included in the cost of electricity produced by the plant. This money is collected by State Nuclear Waste Management Fund and used for the treatment, storage and disposal of nuclear waste, as well as the cost of decommissioning plants at the end of their lifetime.

Municipals that contain waste storage facilities receive compensation in the form of direct taxation. This taxation comes from the company and goes straight into the local welfare system and can be used to improve public transport, school and hospitals.

Finland's Energy Policy

Finland's energy policy is based on the "Energy Strategy report", first produced in 1997 and then amended in 1999 as part of the "National Climate Strategy" (NCS). One of the main points to be drawn from the amended report was that "in light of growing consumption the option to build a new nuclear power plant should be made possible"⁷. This sent a clear signal to power companies that the government would be open to proposals for new nuclear plants. The rest of the recommendations were based around three main precepts; security of energy supply, climate change, and economic viability.

Climate change

Finland is part of the EU "Burden Sharing Agreement". The agreement means greenhouse gases are to be reduced to 1990 levels in the 2008-2012 period. Finland has also signed the Kyoto Protocol. Also, within the NCS there are specific points relating to climate change to do with

reducing emissions and promoting efficient use of energy and energy conservation.

Security of supply

"Ensuring the secure supply of energy" is one of Finland's main priorities as stated in its NCS. This is due to Finland's lack of indigenous resources and its reliance on fuel and electricity imports. This makes security of supply very important.

Economic viability

Due to Finland's deregulated energy industry, new energy options have to be able to perform in a competitive market; there are no government subsidies. This means the cost of electricity produced has to be comparable to the price of other sources.

The Proposal

The Olkiluoto 3 is a commercial enterprise owned by Teollisuuden Voima Oy (TVO). This is a company owned in part by the private sector and in part by government interests. A subsidiary of this company Posiva Oy, is responsible for the disposal of nuclear waste created by plants run by TVO. The proposal is for a European Pressurised Water Reactor (EPR), with an output of 1,600MW. It also includes plans to build another waste repository in Olkiluoto. This will be deep underground in excavated bedrock.

Finnish nuclear law states that when a new nuclear power plant is being proposed a "decision in principle"⁸ (DiP) has to be reached. This means that a government committee will consider whether or not the proposal is "in line with the overall good of society"⁹. Reports are submitted by various interested parties for the consideration of the committee. After reading these reports, the committee then votes on whether or not they believe the proposal is "in line with the overall good of society".

Submissions for the DiP are taken from the Radiation and Nuclear Safety Authority (STUK), and the host municipality, which has the power to veto any proposed nuclear plant in their area. The proposal must also demonstrate compliance with the Nuclear Energy Act and receive a

positive Energy Impact Assessment (EIA) report. EIA legislation requires a thorough investigation into the proposed site to be conducted by the company proposing the project. This should take views from the whole community and has to take place before any new plant can be built.

The Olkiluoto 3 project was submitted for a DiP in November 2000. At this stage there were two possible sites, Olkiluoto and Losiiva, both of which had the support of the local municipal government. The Olkiluoto municipal government had voted in favour of the project by 20-7 in January 2000 and a DiP in favour of the project was passed on 17th January 2002 by a vote, 6-10 in favour. This was followed by a free vote in Parliament on the proposal ending in 107-92 for the new nuclear plant. However, this final approval for the project did not mean the state would financially guarantee the project.

This 'yes' vote was viewed as a surprising decision. In 1993, TVO had tried to submit the same proposal for a DiP and it had been rejected. This decision was reversed because of a combination of policy change by the Finnish government and consultation with the local community at the proposed site.

<p>The Olkiluoto 3</p> <ul style="list-style-type: none">▪ European Pressurised Water Reactor (EPR)▪ Total budget approx €3 billion▪ Electrical output approx. 1,600 MW▪ Start of generation 2009▪ Supplier Framatome/Siemens▪ Location Olkiluoto
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Figure 2 Olkiluoto 3 details

Consultation Process

The Pro-Nuclear Lobby

The Pro-Nuclear Lobby consisted of the Finnish Confederation of Industry (including TVO and Posiva), the Eurajoki municipal government, and the labour unions¹⁰. This was seen as a broad ranging group of industrial and economic partners, who were all communicating the same message in favour of the construction.

The Finnish Confederation used its Economic Information Office (EIO) to run its communication programme with the Finnish public. The EIO wanted to show that a new nuclear power plant was essential to Finland's climate and energy policies¹¹. They did this by highlighting:

- Reduction of greenhouse gases was unlikely without either an increase in nuclear power, an increase in imported electricity or an increase in renewable energy sources.

- Security of supply is better. The country does not have to rely on long stretches of oil and gas pipes which are susceptible to damage.
- Nuclear power is relatively insensitive to changes in fuel prices, unlike oil, coal and gas. A study done by the Lappeenranta University of Technology suggested that in the Finnish case, nuclear power is the cheaper option¹², despite the initial, very high, capital costs.

They also wanted to show the positive impact on the local host economies a new plant would have, and linked this specifically to the funding of the welfare state in those areas. These arguments were promoted within Finland using leaflets, brochures posters and other printed material and also a programme of public seminars.

The Anti-Nuclear Lobby

The anti-nuclear lobby was made up of the Green Party, Environmental NGO's, and local opposition. There was never an organised national movement against the project, partly because organisations such as Greenpeace and Friends of the Earth were not considered stakeholders and so were excluded from a lot of the decision making processes,¹³ specifically the EIA.

Local groups questioned the safety of transporting and storing nuclear waste, the safety of having large concentration of nuclear activity in one area, and also how the image of the surrounding area would be affected by the plant. Candidates opposing a new build ran in the local elections with an anti-nuclear manifesto so they could influence the municipality decision and questioned the Environment Impact Assessment process.¹⁴ However, they only managed to stimulate discussion at a local level. At the national level they got no publicity and did not have any funds to run a campaign.

The opposition on a national level was run by NGO's and some Green Party members. They argued that nuclear power could be totally replaced by other "renewable" sources. After the May 2004 vote the Green Party left the coalition government, however the nuclear option was supported by some of its members.

Radiation and Nuclear Safety Authority (STUK)

The STUK is an independent safety regulatory body, dealing with the disposal of nuclear waste within Finland. After a study it commissioned showed the public's understanding of disposal of nuclear waste to be poor, it initiated an education programme aimed at the public and local decision makers. The education programme used several different methods, oral and written media, and seminars

Conclusion

The Olkiluoto 3 build is ongoing, and although some parts are now behind schedule, TVO still says the plant will come online in 2009. However, this stage would not have been reached, were it not for some important factors, of which two stand out. First the debate not being drawn along party political lines meant that MPs and individuals could make their own personal decision as to whether or not they wanted a new nuclear power plant built, not based on party allegiances. Second the decision making process was completely transparent (allowing access to all submissions to any member of the population that wanted it), was run by a body seen to be independent from the government, consulted all stake holders, (both pro- and anti-nuclear) and had a predefined date at which the decision in principle could be made before being put to a final vote in parliament which would decide finally whether a nuclear plant could be built.

The nuclear lobby also managed to neutralise many of the arguments that could have been used against them.

and discussion meetings giving a chance for safety issues to be discussed in a "passionless and businesslike manner"¹⁵. The aim of this programme was not to boost support for the disposal of nuclear fuel itself. It was to build the general public's confidence in the quality and transparency of the decision making process, which would lead to the building of any disposal site built with a new nuclear plant.

The Environmental Impact Assessment (EIA)

The Environmental Impact Assessment is conducted by the proposer of a project, in this case TVO and Posiva. It provides potential stakeholders with a platform from which to communicate in an open and transparent way with each other. The EIA is used when a project has potentially significant physical and/or social impact on a local environment. Not only does it assess the impact of a project, but it also assesses different solutions to the problem and a zero-alternative; what would happen if the project did not happen at all¹⁶?

The TVO and Posiva used the EIA to open communication with local community groups and their representatives in the municipal government. Using leaflets, videos, reports, brochures and exhibitions they informed the wider community. Interim EIA reports were presented at meetings, and published and distributed to interested parties while the assessment was ongoing.¹⁷ As well as looking at the environmental impact of the proposal, the EIA addressed concerns relating to

- The effect on tourism.
- The marketability of agricultural produce from an area with a nuclear plant and waste storage facility.
- The prices to real estate.

Nuclear waste could have been a huge issue, but the building of the deep level repository in Olkiluoto, alongside the power plant, meant that it was clear where the waste would go and, because of the benefits received by the local municipality and the presence of a nuclear facility already, little local opposition for having it there. Safety was never really an issue as all of the nuclear plants currently in operation in Finland have good safety records and the regulatory body, the STUK, has a good reputation as an independent safety authority. The nuclear lobby also supported a diverse energy system, which bought them onto central ground and sidelined the anti-nuclear lobby as they were calling for a complete ban of nuclear.

These conditions, that led to the building of the Olkiluoto 3 power station in Finland, have shown that with an open, informative and inclusive decision making process which meant the public and media felt they could trust the system, there can be nuclear plants built that have government, national and regional support.

Thank you

We would like to thank Mikko Elo MP, Timo Sepalla (Posiva), Robert Key MP and Simon James (NIA) for their help in putting together this document.

¹ IAEA, 2001 statistics

² IAEA Country Profiles: Finland

³ See note 1

⁴ Energy Policies of IEA Countries: Finland, 2003 Review

⁵ Nuclear Energy in Finland, Uranium Information Centre, Briefing Paper # 76, June 2004

⁶ Stepwise Decision Making in Finland for the Disposal of Spent Nuclear Fuel – A. Lucander, Member of Eurajoki Municipality Council

⁷ NEA – Case Histories of Practical Communication Experiences

⁸ See note 2

⁹ See note 1

¹⁰ See note 6

¹¹ See note 6

¹² Comparison of Electricity Generation Costs in Finland, April 2001

¹³ Stepwise Decision Making in Finland for the Disposal of Spent Nuclear Fuel – T. Rosenberg, Sociologist and Chairman of the former Citizen Movement Against Nuclear Waste Disposal, Lovisa

¹⁴ See note 7

¹⁵ Stepwise Decision Making in Finland for the Disposal of Spent Nuclear Fuel – T. Varjoranta, Director, Radiation and Nuclear Safety Authority (STUK)

¹⁶ Stepwise Decision Making in Finland for the Disposal of Spent Nuclear Fuel – J. Vira, Posiva

¹⁷ See note 16