

The Nuclear Energy Renaissance in Europe

Introduction

There are more than 150 nuclear power reactors in operation across the new enlarged European Union. About one third (32%) of all the electricity produced in the EU is nuclear-generated. When the EU grew from 15 to 25 Member States on 1 May 2004, the number of EU nations using nuclear power rose from 8 to 13.

Nuclear power makes a valuable contribution towards achieving Europe's objectives for:

- Energy supply,
- Support for the EU economy and
- Environmental protection.

This paper aims to show:

- How nuclear power helps Europe to achieve a viable and diverse energy mix,
- Benefit from stable and affordable electricity prices,
- Maintain security of energy supply, along with some level of energy independence and
- Control airborne pollution,

while helping to reduce emissions of CO₂.

All these reasons make nuclear energy part of the solution for challenges that Europe is now facing and fuel the so called nuclear renaissance that we can now observe in Europe and worldwide, on the national level as well as on the European level of policy-making.

1. Reasons for the nuclear renaissance

Policy makers in Europe will have to make some very difficult energy choices in the years ahead. They will have to manage their energy needs in a way to ensure sustainable development, goals of the Lisbon Strategy – industrial competitiveness in a global market, promote economic development and employment, security of energy supply - said to be the biggest bottleneck for growth, and safety of energy installations, while protecting the precious environment.

Security of energy supply

For highly industrialised societies to function properly, adequate and reliable supplies of energy are absolutely essential. Security of supply in terms of electricity means having sufficient generating capacity available to deliver power reliably when needed. We can stockpile fossil fuels for future use but, as yet, we cannot do the same with electricity on a large enough scale. Europe is already heavily dependent on energy imports. About half the region's energy resources are imported, and level of dependency is expected to rise from 50% to 70% in the next 20-30 years. Most of Europe's gas and oil supplies come from the Gulf region or from Russia. Political instability in certain parts of the world could lead, at any time, to energy supplies shortages and price rises. On the other hand, the price of uranium – the raw material used in most nuclear fuels – accounts for only a small portion of the total generating costs. Uranium prices have been stable for many years. It is also available from a wide range of sources in different parts of the world, including countries with a long history of political stability, such as Australia and Canada. Greater reliance on nuclear energy reduces the likelihood of adverse economic effects resulting from fossil fuel shortages and unexpected sharp rises in fossil fuel prices. Despite these positive contributions from nuclear power, several Member States have introduced plans of nuclear phase out which will result in a very fossil fuel dependent energy mix for Europe in 2030. It is forecasted that due to the loss of nuclear output and to an insufficient growth in renewable energy generation, 82% of EU-25 energy demands will be supplied by fossil fuels in 2030. Moreover, EU-25 will exceed its 1990 levels of CO₂ emissions by 14% due to the same factors.

Economics of electricity generation

Nuclear power plants are an excellent source of baseload power. Most operate continuously and with a maximum capacity, being stopped only for a maximum of few weeks a year for refuelling and maintenance. Energy generating costs of nuclear power plants are predictable and stable. Nuclear power plants generate electricity without emitting any greenhouse or acid rain gasses. This means that NPPs will not face increased generation costs due to the EU emission trading schemes. Improving performance, increasing fuel efficiency, and cost-

effectiveness of nuclear power plants, contributed to decisions for plant life extension on the one hand and to reductions of costs on the other, which means lower prices for consumers.

The Figure 1¹ shows a comparison of six different power generation scenarios in terms of electricity generation costs. The electricity generation costs of the nuclear power plant with the annual full-load utilization time of 8000 hours is 23.7 €/MWh. This is the lowest cost option of all the electricity generation alternatives studied. The gas-based electricity would cost 32.3 €/MWh and coal-based electricity 28.1 €/MWh. All other alternatives were more expensive.

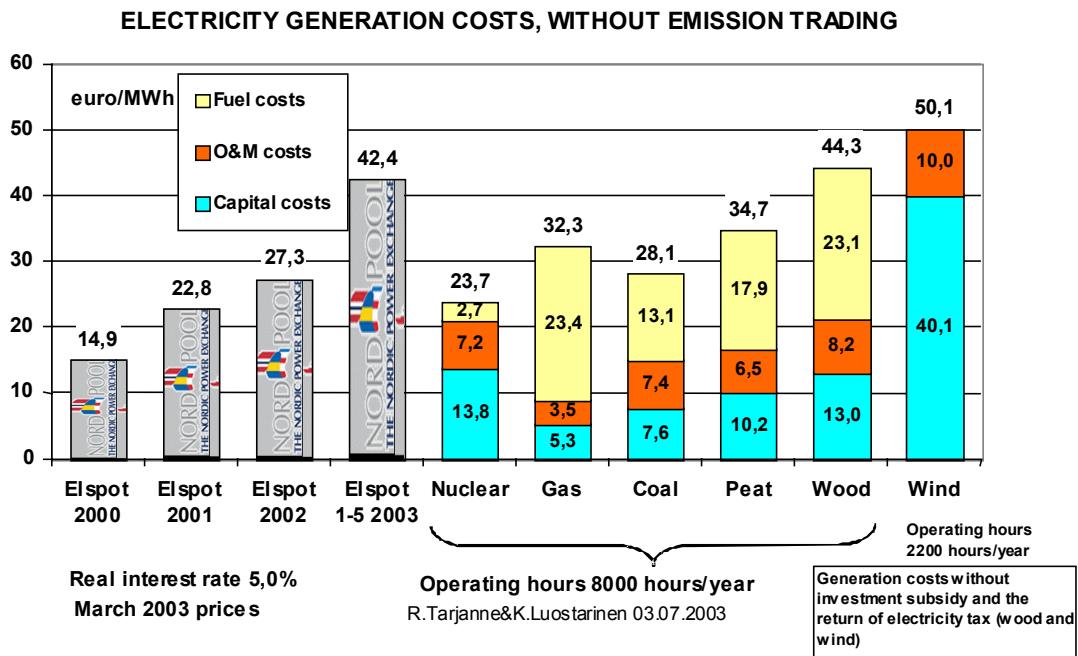


Figure 1. The electricity generation costs of the power plants in the base case without emission trading.

¹ Source: Tarjanne Risto, Luostarinen Kari, *Competitiveness Comparison of the Electricity Production Alternatives*, Research report EN B-156. Lappeenranta University of Technology. Lappeenranta 2004.

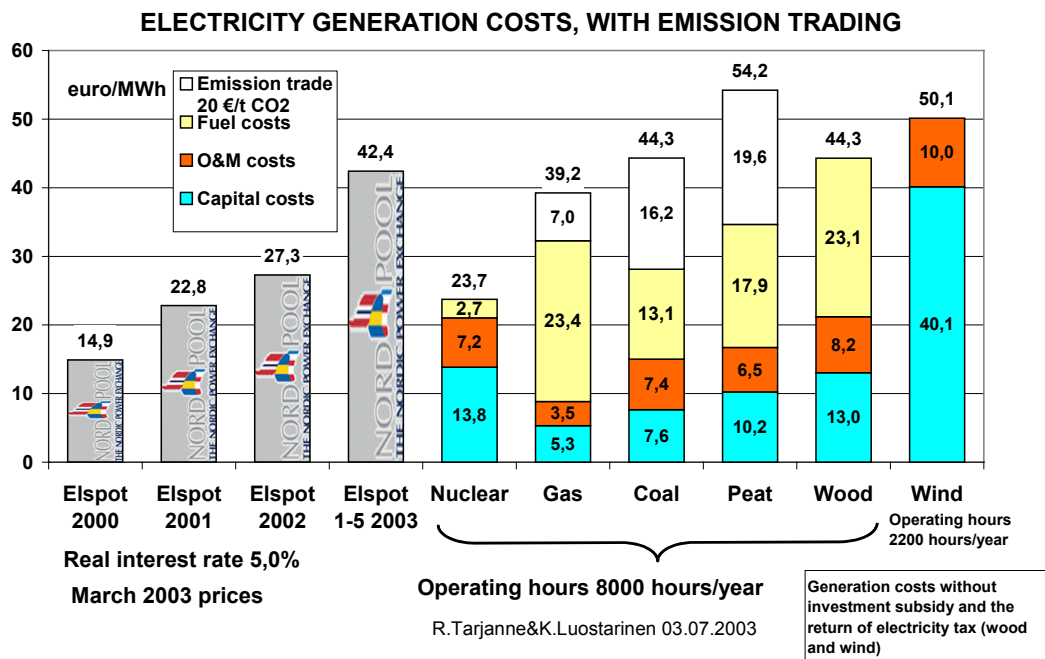


Figure 2. The electricity generation costs of the power plants with the emission trading.

Electricity generation costs from nuclear power are stable. An increase in uranium price causes only a slight increase in the total cost of nuclear electricity. On the other hand for the gas alternative, there is considerably more risk when gas prices increase; however gas based electricity is less sensitive to changes in investment costs. Although nuclear generated electricity requires a greater investment, the initial high investment cost does not change the competitiveness between nuclear and gas electricity. If we add the effect of the emission trading scheme (Figure 2) onto the generation cost, the generation costs of gas-, coal- and peat-based power increase remarkably and the advantage of nuclear power is more visible.

Battle Against the Climate Change – Contribution from Nuclear Energy

Nuclear power plants are environmentally friendly, as they generate electricity without emitting any greenhouse or acid rain gases. As the generation of nuclear electricity is CO₂-free, nuclear electricity saves the emission of nearly 700 million tonnes of CO₂ a year in the EU-25, the equivalent of all the CO₂ emitted each year by the entire car fleet in Europe. Taking nuclear out of the energy mix would result in a 56% increase in CO₂ emissions, according to a FORATOM study based on figures gathered by independent organizations.² Globally, nuclear energy saves the emission of up to 2.2 billion tones of CO₂ every year.

² Source: FORATOM Info Pack, *Energy Matters*

Public acceptance

The development of all types of nuclear infrastructure – from nuclear power plants to nuclear fuel-related facilities and waste installations – depends on consensus among a wide range of stakeholders. The future of nuclear in Europe depends to a great extent on public and political acceptance which can only come about through the transfer of accurate and unbiased information on specific projects and nuclear in general. The recent Eurobarometer survey on the opinions of European citizens on nuclear energy in general and radioactive waste in particular revealed some important facts. 60% of EU citizens believe that nuclear energy enables diversification of energy sources. 61% believe that nuclear power helps reducing Europe's dependency on oil and 62% agreed that it produces less green house gas emissions than coal and oil. These results show the general public's improvements in knowledge with regard to nuclear energy. It is also important to note that the general support for nuclear energy is rising with better information and knowledge of the nuclear energy issues.

Research and Development

Nuclear power plants operate reliably with safety being the top priority for the industry. In-depth research is carried out on the nuclear fuel cycle, in particular on reactor design in order to ensure sustainable electricity supply in the future. Research and Development work will continue to underpin the commercial use of nuclear for power generation. The European Pressurised Reactor (EPR) design and several other reactor types are in different stages of development in various parts of the world. The focus is on the Generation IV nuclear reactors, which will produce less waste of reduced toxicity and lifetime. Future reactors will be safer and more reliable, and will produce electricity at lower cost. The Generation IV reactors are projected to be commercially deployed before 2030. The nuclear industry will also continue to play an important role in the development of nuclear fusion technology, and is committed to supporting work on the International Thermonuclear Experimental Reactor (ITER) giving promising future perspectives. However, the fission research should not be overlooked. The Seventh Framework Programme of the European Community for Research, Technological Development and Demonstration Activities (2007-2013) should ensure that sufficient financial resources for the fission research are available.

2. Downing realization among national policy-makers

If Europe wants to bridge the gap between increasing energy demands and the generation capacity, without becoming too dependent on the energy imports, a vast investment in new generation capacity is needed. Some European countries seem to have acknowledged the arguments discussed earlier and are advancing their nuclear new build projects. Finland is building its fifth nuclear reactor in Olkiluoto, other countries like: France, Slovakia, Czech Republic, Romania and Bulgaria will soon follow.

In France, President Jacques Chirac announced the launch of a programme aimed at building a Generation IV nuclear reactor by 2020. France has been calling for more recognition to the benefits of nuclear power for energy security in Europe and in combating the climate change issues. The three Baltic States: Lithuania, Latvia and Estonia agreed in January to carry out a feasibility study for a future nuclear power plant to address the Baltic's future energy deficiency.

According to a recent study, the UK will face an energy gap of up to 50GW by 2020 and will fall short of its emissions targets unless a more diverse generation mix is developed. A recently published UK Energy Review launched a national consultation on the new generation capacity which is needed to ensure security of energy supply, cut CO2 emissions and promote competitiveness. This review is expected to reinforce the Labour Government's decision to proceed with new nuclear power stations construction.

Hungary and The Netherlands decided to extend the lifetimes of their power plants, in Paks and in Borssele respectively. In Sweden, where basing on a national referendum from 1980, the Government decided to phase out nuclear power by 2010, 64% of the population support nuclear energy as a part of the country's energy mix. Even the Swedish political parties tend to take more pro-nuclear stance. In Spain, a wide national energy debate has been launched in January with the aim of investigating a possibility for a nuclear comeback. Italy is also reconsidering the nuclear option. Here, as well as in Sweden a national referendum carried out in 1986/87 ruled out the use of nuclear power in the future, but presently 47% of Italians see nuclear in a positive light. And finally, Poland, a country that has never had nuclear power, is planning to have its first units operational by 2021-22. The security of energy supply reasons and obligations for environmental protection resulting from Kyoto Protocol and from the EU Accession Treaty make it necessary to consider nuclear power as a part of the solution.

3. European Union perspective

Under these new circumstances, European policy-makers are taking a new look at atomic energy. The European Commission now admits that discussions on the security of EU energy supply must also include the broader debate on nuclear power as a part of the energy mix. The European Energy Commissioner Andris Piebalgs, while visiting the "Energy Research Site" at Petten (The Netherlands) on January 19, advocated exploring all sources of energy and underlined the need to act now to ensure a secure energy supply for Europe. Just a few days earlier, the EU Economic Affairs Commissioner, Joaquin Almunia said that "EU would be committing economic suicide were it not to consider the use of nuclear energy". The President of the European Commission, José Manuel Durao Barroso also said that "none of the options should be excluded" when answering a question about the future of nuclear energy. To complete the

top European team in their opinions regarding nuclear energy, the President of the European Parliament, Josep Borrell Fontelles said that the European Parliament should trigger a frank and open debate on the use of nuclear energy without any prejudice.

With the arrival of members from the new Member States on 20 June 2004, the situation in the European Parliament has changed significantly in many ways. In the nuclear debate, it is interesting to note that nuclear sector plays an important role in the new Member States and that public opinion on nuclear power is very positive. In Hungary for instance, 65% support the use of nuclear power for electricity generation. In Lithuania and Czech Republic the figures are: 60% and 61% respectively.³ 50% of the new Member States seats in the European Parliament are held by “nuclear” countries. When Bulgaria and Romania join the EU, in 2007, 60% of all new seats will belong to “nuclear” Member States. In the past months, the European Parliament has shown several times its openness to discuss nuclear issues, in particular in the context of the overall security of energy supply discussion. In October 2005, FORATOM organized a seminar in the European Parliament on climate change and nuclear energy which was accompanied by the MEP Declaration on climate change and nuclear energy. The Declaration underlining the contribution of nuclear power to combating global climate change was endorsed by 27 MEPs from different countries and representing different political parties.

European Commission Green Paper on secure, competitive and sustainable energy policy for Europe deemed to be adopted during the Finnish Presidency in the European Union in December 2006 will hopefully undertake the role of nuclear power in the heart of the Lisbon process through enforcing competitiveness, CO2 emissions reductions and security of energy supply.

Conclusions

Recent national and European level developments presented in this paper reflect the growing realisation among policy-makers that as part of the overall mix, nuclear energy is contributing to a secure, competitive and environmentally-friendly energy policy. The nuclear renaissance is here to stay, both in the European Union and globally. Public support for nuclear power is growing, as the nuclear energy attributes come into forefront, in the context of increasing gas and oil prices, climate change issues and discussions on a stable and secure energy supply for Europe. The energy policy discussions today are more pragmatic than ever and the energy populism is finally fading away. The future legislation stemming from the Green Paper on secure, competitive and sustainable energy policy for Europe will strengthen the role of nuclear power in the European Union.

³ Source: Special Eurobarometer *Radioactive Waste*, European Commission, September 2005