

**PRASEG Seminar:  
“DECIDING ON NUCLEAR”**

**Satu Hassi MEP  
Former Minister of Environment in Finland**

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**Alan Whitehead MP, Chair, PRASEG**

I'm delighted this evening to be able to welcome Satu Hassi, a Member of the European Parliament, to talk to PRASEG this evening. And I think it is particularly appropriate and important, in view of the debate that is coming up over the next few months and years in the UK about which way we go, as far as our future energy security and energy supplies are concerned, to actually be able to hear from Satu Hassi – someone who was at the centre of the discussions on the future of energy policy in Finland. She was Minister for the Environment in the Finnish Government between 1999 and 2002, the period during which, the Finnish Government debated and approved the construction of a nuclear power plant – the 5<sup>th</sup> nuclear power plant in Finland, the first to be built in western Europe since 1991. Mrs Hassi will be able to talk to us this evening about her views on that decision, how it's happened, and what the appraisal and costs and decision-making proved to be, in the context of the Finnish debate on energy futures. All of which I think – everyone will agree – is absolutely apposite to the discussion that I think we will be entering into as far as UK future energy power is concerned. So can I welcome Satu Hassi and invite her to address us.

**Satu Hassi MEP**

Thank you very much, I'm very pleased to accept this invitation; I'm happy to have the opportunity to tell [you] about this process in Finland. And maybe it's evident from the beginning that I am ... partial, because I belong to one side [of] this nuclear debate in Finland – [against] nuclear power stations.

So maybe you wonder how it was possible that there was a Government which disagreed about such an issue as nuclear power, but in Finland the political reality is that our election system never produces a one party majority in parliament. So all Finnish Governments in practice are coalition Governments, formed not only by two parties, but [usually] by several parties. We agreed a lot of issues when this Government was formed, but we also agreed that we disagree on nuclear power. And all of us knew that from the beginning.

The nuclear decision was [made] in 2002. And of course, the process concerning the Kyoto Protocol was going on at the same time. And one of the first decisions of the Lipponen second Government, where I was the Minister of Environment, was that we prepare a national climate programme, which is the programme of how we – the Finns – meet the Kyoto target. The Kyoto Protocol was not yet in force, but the Kyoto Protocol existed; the Protocol itself had been agreed in 1997. And also the EU burden sharing was clear, so the Finnish Kyoto target was clear. But, to lead this work, [it] was not ... the Environment Ministry [that was chosen], but the Ministry for Trade and Industry, which is also responsible for energy. And there was a ministerial group following this work, but pretty much it was in the hands of the Minister of Trade and Industry.

In this national climate programme, two alternative scenarios for meeting the Kyoto target were prepared. Alternative number one, which we call KIO 1 ('KIO' actually doesn't come from 'Kyoto', but from the Finnish for 'National Climate Programme'). This version number one consisted of intensifying ... energy conservation, investing in renewables, and replacing practically all coal used in electricity production by natural gas. And [in] option two [KIO 2] there was also energy conservation and renewables to some extent, but not as much as in the first option, plus 1000MW of nuclear power capacity. And this programme was presented to the parliament in spring 2001 – I have two copies here. ...

A background calculation on what this would mean to our national economy was done by two research institutes, one of those state-owned and one private. They found a difference in GDP for 2010, between these two options. But the difference in GDP - nine years from the date that this was given to parliament - was between 0.1 to 0.3 percent. I think that all you understand that ... you cannot forecast the GDP of the present year – not the next year, and not 10 years after the present moment, you cannot forecast with that kind of precision. But anyway, for example, in both cases there was a need to raise energy taxes. And in this picture [SLIDE 4], it is in Finnish, but [the grey bars<sup>1</sup>] are the private and [the black bars<sup>2</sup>] is the state-owned. And these are different energy tax alternatives and "Sähköhankintavaihtoehto 1" is the non-nuclear KIO 1 option and "Sähköhankintavaihtoehto 2" is the [KIO 2] nuclear option. So you see, some zero point something, is the difference between the non-nuclear and nuclear options. And this difference is tested for several energy taxation ("Energiavero") alternatives.

And here is also a picture [SLIDE 5] of how much we will need to raise energy taxes and here again is one tax option (Verovaihtoehto 1), here is the second tax option (Verovaihtoehto 2) and here is the third tax option (Verovaihtoehto 3). These columns are raising of taxes, and these are other kinds of costs, in billions of Finnish marks (FIM). So you see, that also here the difference was not huge. And this is a calculation in difference of household expenses, also that was small [SLIDE 6].

When this report was given to parliament, the big news and the headlines were that nuclear is more cost efficient, it's the cheaper option. And many, many times, the information given by the Minister of Trade and Industry, [was] talk about the cost of implementing Kyoto, meeting Kyoto targets, as if there would only be costs in the non-nuclear option. So, for example, many times '7 billion FIM per year' was mentioned. So ... they didn't directly say that the nuclear option was cost free, but they gave that image. They didn't speak about difference, but about the rise of total electricity price in Finland – the price paid by all in Finland. And also the need to raise energy taxes, it was presented as if it would be a cost for society, whereas all these calculations had a starting point that no one of the energy taxation options raises total taxation, in other words everything which is collected through energy taxes, [would be] used to lower taxes of labour..

And one thing that was not advertised by the Minister of Trade and Industry, and also not by the press, is that the basic assumptions for these calculations ... [were] chosen in such a way that the nuclear option was not only slightly cheaper, but it was also dirtier. And the reason why this is so, is that scenario number two [KIO 2] assumed that use of coal was not reduced before 2008, before the time of the Kyoto Protocol, and before connecting the new nuclear unit to the grid.

So, according to the forecast, the nuclear option produced more greenhouse gases, both before 2010 and thereafter. And here you see the picture [SLIDE 10] produced by the Ministry of Trade and Industry about these solutions. This is the historical CO<sub>2</sub> emissions (grey solid line, Tilasto). And this is from 1990 it's all the 6 Kyoto gases ... this dotted line (Paastot vuonna 1990) is the Finnish Kyoto target, which is the same as our emission level in 1990. This one is business as usual (black solid line, BAU), and this light grey is the nuclear option (KIO 2), and this black one is the non-nuclear option (KIO 1). [Conclusion – up until 2020, the KIO 1 option would emit slightly less CO<sub>2</sub> than the nuclear KIO 2 option.] In the Government, I proposed that, because this was the climate strategy to the Parliament, of course this picture should be given to the parliament also. But the decision was that this was not included in the report to parliament ... everyone is able to check from the versions [I brought]; you don't find this picture in the report. There were members of parliament who distributed this picture, but that didn't have the same authority as being part of the report. And the picture that was shown was not produced by my Ministry, it was produced by the Ministry of Trade and Industry.

One year later, in 2002, we had the nuclear decision in parliament. The climate report by the government was in 2001 and the nuclear decision was in 2002. In 2002 the discussion was [no longer] about the economic difference between nuclear and non-nuclear option; the main message by the nuclear lobbyists was that nuclear is the only option to meet the Finnish Kyoto targets. So, I must admit that I was astonished. I was prepared for a debate about whether this cost calculation was really fair, and even if we accept that cost calculation, are we ready to pay that slight difference for the alternative which I find safer, which would mean some tenths of euros per family per year to 2010?

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<sup>1</sup> ETLA: Research Institute of the Finnish Economy

<sup>2</sup> VATT: Government Institute for Economic Research

Are we ready to pay that difference? But the argument from the nuclear side was that nuclear is our only option, as if scenario number one produced by the Ministry of Trade and Industry one year ago and was sent to the parliament, would not exist anymore. Also in the committee – the Economic Committee of the parliament – many experts showed that this KIO 1 (non-nuclear option) was not the cleanest option. We had much more resources for both energy conservation and renewable energies. The figures counted by environmental NGOs, counted a better option. These are the Government figures about the potential of renewables and energy conservation and this is the potential that the NGO people found in the background reports prepared for the Ministry of Trade and Industry which were not used in preparing the climate strategy. [SLIDE 12]

Even if we would expect that in principle renewables, needing to do something else than the nuclear power station, would be done only with wind power, which is by far not the cheapest renewable alternative in Finland, because the much cheaper alternative option in my country is bioenergy, especially woodchips ... even in that case the increase in typical household electricity costs would be twenty to thirty euros per year.

I counted these various potentials presented by various experts to the parliament, with a measuring stick of 1000MW nuclear unit, which if operating almost constantly through the year, produces roughly 8TWh. So if the operating time at full capacity is 8,000 hours (of the total 8,760 hours of the year), then the unit produces 8 TWh.

Bioenergy potential, which was included in this Government strategy, that was the equivalent of 0.4 units counted in that way [i.e.  $0.4 \times 1000\text{MW} = 400\text{MW}$ ]. And the environmental NGOs scenario which used the data of the Ministry of Trade and Industry as their source material, that was 0.6 nuclear units more. Bioenergy experts presented different figures – one was 0.4 nuclear units, one was 0.7, another was 0.8 units from bioenergy [SLIDE 15].<sup>3</sup>

Wind power potential. The official target of Finland by 2010, is 500 MW. [SLIDE 16] To build 1000MW of [wind power], would take 100 square kilometres and the windmills themselves would take 2-3% of that area. And this one nuclear unit, 8TWh, for that, in the case of wind power, 1000MW is not enough, because wind mills are not operating with full power all the time. [So we would need] 3.5 times more, and for that we would need 300-350 square kilometres, which is 0.1% of the Finnish soil area. And green power experts say that the total theoretical potential with the present wind power technology would be 50 TWh, but no one imagines that this capacity will ever be built.

Energy conservation. [SLIDE 17] In this environmental NGO greener scenario, they come to 0.3 nuclear units for the extended energy conservation. But in Finland where we have a lot of one-family houses heated by electrical heat, if half of them – 300,000 one-family houses – would be equipped with heat pump instead of that so-called direct electric heating ... [this] would correspond to one nuclear unit. And if low-energy houses which already exist (and which consume 10-40 % of the normal electricity consumption), if all new one-family houses were built like these, by 2020 the yearly reduction in electricity consumption would correspond to almost one nuclear unit. And maybe this is the most interesting: because we have a lot of process industry, we have a lot of electric motors in the factories. Every time a motor is operating a pump or fan, an inverter – which is an advanced way of regulating the speed of the motor, it's a very good way of conserving energy – if 35% of the industrial motors in Finland were equipped with an inverter or frequency converter, the electricity spared would also be the equivalent of the production of 1000MW nuclear power (1 nuclear unit).

So, I told you this only to tell that there were facts about cleaner alternatives on the table, that we have more resources, more potential for both renewables and energy conservation.

But anyway, the parliament voted for nuclear power in May 2002, and the parliament also ratified Kyoto in the same month, some weeks before the nuclear vote. And actually, it was a funny coincidence, on the same day we had the nuclear vote in the parliament, the president<sup>4</sup> signed the finished ratification of Kyoto the same day, one hour before we voted on nuclear power.

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<sup>3</sup> An interruption occurred at this point; a vote took place in Parliament.

<sup>4</sup> According to the Finnish Constitution, the president signs the laws, after the parliament position.

But very soon after the nuclear vote, many people made a U-turn on Kyoto. Many of those same people who had argued that because of Kyoto we need this new nuclear power station, and its primarily for climate protection that we want to have this new nuclear power station; the same people started to say that Kyoto is a big mistake, it's very, very unfair for our tiny little brave and clean country, a catastrophe orchestrated by green environment ministers, who in their Green enthusiastic fundamentalism had made a deal which is very, very bad for Finland. And, well, it's a fact, that the Kyoto conference in 1997, the Finnish minister was my Green predecessor, Mr Pekka Haavisto, and in the negotiations about the more detailed rules which were needed to make the Kyoto Protocol ratifiable, I was the Finnish Environment Minister. But it's not true that the burden-sharing would have been decided only by us two, there was a big preparation and negotiation, also nationally, as I expect there was in every country before the burden sharing decision. And this accusation still continues. Almost every week some newspaper in Finland writes that Satu Hassi has done a very, very bad service for Finland because she has negotiated such [a] bad and unfair Kyoto deal for us which is far too costly and far too tight and bad in all ways for the country. And ... actually on my website I have – in Finnish – a more detailed history of how Kyoto was negotiated and how the negotiations were prepared in the Finnish government. In this text I also have exact quotations of those people who before the nuclear vote used Kyoto as an argument and who later blamed Kyoto for being bad for Finland.

And it was not only a U-turn on how we see Kyoto, but also, the fact is that our emissions are rising [SLIDE 19]. There was a time when our emissions were going down – 2002 and 2001, we had met our Kyoto target – but after the nuclear decision our emissions have only been rising. And here is an updated version of the emissions graph [SLIDE 20] was not included in this report, and here see you this KIO 2, this nuclear forecast from 2001. And this is the estimate of the same Ministry two years later about our emissions path with the measures adopted so far. And it's a fact that all measures in the climate report of 2001 have not been implemented. For example, energy taxation: maybe you remember me telling that in both the nuclear and non-nuclear option, the economists showed that we need to raise energy taxes, but that has not happened. And our emissions are raising very, very rapidly, and now the tone in Finland is that Kyoto is in practice, impossible, and at least it is far too strict.

So, that is my story.

## Questions

### *Explanation of nuclear unit:*

The measuring stick nuclear unit which I have used to illustrate the potential of renewables and energy conservation is 1000 MW nuclear power – what 1000 MW unit produces if operating at full capacity through the year.

### *Demand for electricity and for energy in Finland:*

Roughly 80-90TWh. Electricity is roughly one-third of the energy used in Finland. Both of electricity and the rest of energy, roughly half is used by industry. Small population – 5M. Fairly energy-intensive industry. One of the main reasons Finnish industry was so keen on the nuclear decision, was that they expected they would get cheaper electricity. We will see if that will be the case. I assume that this was the motivation for the industry to do all this lobbying.

### *Hydro:*

Hydro nowadays is not much more than 15% of electricity.

### *Bio-energy:*

Mainly wood. The biggest consumer of bio-energy is the industry. Biofuels, in transport, is non-existent in Finland. The Commission is going to sue Finland because Finland is not meeting the transport / biofuel targets.

In last 15 years, increase in use of wood chips for district heating – small power stations producing only district heat, or [combined heat and power].

The paper industry is the largest user of biomass, because they use wood which they take effectively. In the 1970s when I started to study energy engineering in the Helsinki University of Technology, a

typical cellulose factory bought electricity from the grid. But now the typical cellulose factory sells electricity. For example, one big cellulose factory in an area called north Karelia, they sell the amount of electric energy which is consumed by the nearby city Joensuu. They have improved efficiency.

#### *Electricity Mix in 2004:*

Nuclear is largest (one-quarter). About one-sixth hydro. [SLIDE 22]

#### *Which industries interested in nuclear?*

Paper industry doesn't only look after itself; in the 1980s there was a big strategic choice by the paper industry, a switch from the chemical process to mechanical process, which is a huge consumer of electricity. Another paper factory 100km from Tampere (2<sup>nd</sup> biggest city in Finland), buys the same amount of electricity from the grid as the amount of electricity the city of Tampere consumes.

Paper industry has been one of the principle forces lobbying for nuclear power, but also so-called 'basic' metal producers – metal producer industry, not the industry that is using metal as a raw material, but industry that is turning ore into metals. So, basically the energy-intensive [sectors].

#### *Primary energy (heat & electricity)*

Biofuels are a bigger source of energy than nuclear power, because so much heat is taken out of biofuels. So if you take primary energy, a similar picture [as SLIDE 22], there oil is the biggest, but transport is the only user of oil, and biofuels are the second biggest. I think this will remain so, at least until this 5<sup>th</sup> nuclear power station is connected to the grid.

#### *Waste*

There is a principal decision which has been advocated to be the final and safe solution, but myself, I don't think this solution has really been proven to be safe. The first nuclear reactors we had, they were Soviet designs, and they were part of the – at that time – bilateral trade, where Finland exported and imported the same value. And mainly we exported oil and electricity, but we had to buy some industrial products, and these two nuclear power stations were part of that. Part of the deal was that we export the radioactive spent fuel back to the Soviet Union. But then it turned out that it was an environmental catastrophe, on the Soviet side, in a place called Chelyabinsk close to the Ural Mountains. In my first parliamentary term, from 1991-1995, there was the ... decision [to] change our legislation so that we stop the export of nuclear waste. And that meant that we had to find something in Finland. We have this legal process according to our legislation – it is very, very complicated – but also in the case of nuclear waste, a ... principal decision is needed by the government and the parliament. And the principal decision was done by the Government, the same Government in which I was a member. The principal decision was ratified by the parliament. Also in the parliament it was a consensus decision, that so far the best option that we know about, is to bury the nuclear waste underground to the depth of 500 metres. But strictly legally this principal decision is only permission for the company which is responsible for the waste to do the more costly and more in-depth studies underground, so it is not a construction permit and not an operation permit for the storage. But of course, this principle decision was used as an argument, that now we have shown that we have a safe alternative. But in reality, more detailed studies of safe disposal are underway. No one can yet be sure of the safety of this option. For example, some Swedish experts have criticised that its wet storage; in Finland, there is no place underground which is dry. We have ground water everywhere in Finland. So, I don't know, but someone said that in Sweden, because they have higher mountains, they have places underground which are dry, but we don't have them.

#### *Finance*

There is a complaint to the European Commission by some companies producing renewable energy technologies that there are several pieces in this financing that are de facto illegal state aid. For example, [a] big loan is given by Bayerische Landesbank with very low interest – my German colleagues say that in Germany, you don't get a loan with that kind of interest. Unfortunately, I cannot answer all of these issues, but if you are really interested, you can consult the paper from the Commission – the complaint to the Commission is a public paper.

TVO is the company owned by shareholders, but selling electricity only to the shareholders. So the shareholders, which are practically some of the most energy intensive companies, they have also given guarantees to the loans which are needed by TVO. There are a number of special arrangements which some competitors say are illegal state aid, de facto.

### *CO<sub>2</sub> emissions in whole life cycle*

I am not an expert, and I'm sorry I don't have the slide, but I have an interesting graph about what happened to renewables and what happened to cogeneration after the connecting to the grid of the existing 4 nuclear reactors. And from this graph we can see that it meant that a long decline in investing in renewables and in cogeneration.

And we had a nuclear vote also in 1993, when I was a new parliamentarian, and at that time the 'no' side won. This made a big boost for bio-energy in Finland. It was '93 when we discussed in Finland 'yes' or 'no' to nuclear power, the nuclear side ridiculed us for saying that we had renewables potential. But in 2002 no one tried to ridicule renewables anymore because, meanwhile, so many jobs had been created by renewables – both on the side of technology production, and also in the side of producing the fuel itself.

[Member of the audience: referencing Vatenfall Environmental Report – 4.5 grams per kilowatt hour CO<sub>2</sub> emitted from nuclear power station.]

[Member of the audience: low-grade uranium ores can increase the CO<sub>2</sub> emissions immensely – information from Holland.]

[Alan Whitehead MP asked a parliamentary question on this – answer was 'this information is not held by Government'. See

[http://www.publications.parliament.uk/pa/cm200506/cmhansrd/cm051108/text/51108w06.htm#51108w06.html\\_wqn3](http://www.publications.parliament.uk/pa/cm200506/cmhansrd/cm051108/text/51108w06.htm#51108w06.html_wqn3).]

### *Nuclear power vs. renewables – in competition?*

I think that this decline in growth of renewables, it's mainly through the market. After the 1993 'no' vote to nuclear in the Finnish parliament, everyone knew that we need to invest in renewable energy, because the electricity consumption was growing all the time. There was a market, but now the demand for investments in renewable energy, it's not as big anymore; it is there, but it's not as big as it was before. There were big promises by the Government, by the Minister of Trade and Industry, of big subsidies to renewables, in case the parliament votes for nuclear. Official working groups were nominated quickly after the nuclear vote to find the practical measures to define the promotion measures for renewables and energy conservation, according to these promises. After 6 months, they gave their reports, and they didn't propose any new measures – they didn't even pretend that what they proposed fulfils the promises.

There is a market demand for some extent for biomass, in heat and also for combined heat and power production. But Finland has chosen not to use the so-called feed-in tariff subsidy for this, which according to the Commission's figures, is most efficient. I don't know the situation in your country, but for example for windmills, there is a subsidy, but it is an investment subsidy, and if you are planning to invest in wind mills, you don't know in advance if you get the subsidy, and how much, and so on. There is, for example, in Germany - you know the price of the electricity and which you get when you have a windmill and it produces electricity. So, this is much more unsure [in Finland] for the investors, especially in the case of wind power, this has been a catastrophe – we are almost the last one's in Europe in wind power, although we have huge areas with wind potential. There has also been a lack of political will to take the most effective measures.

### *Requirement in Finland for alternative heating sources in houses?*

I must admit that I haven't heard that.

Still, in the case of one-family houses, the most common choice when people build houses is electric heating, which is – in terms of climate protection – the worst option. And there has been clearly a lack of political will of promoting cleaner alternatives. Heat pumps are increasing because electricity prices are increasing and oil price is increasing and people are reacting to that, and some people also think about the environment and climate. But for example, in Sweden, they have more than ten-fold the number of houses heated by heat pumps, compared to Finland, and we have by and large the same climate. But those families who choose electric heating, usually they also have some kind of alternative, some kind of fireplace system – not [exactly a] fireplace, but more energy efficient. It's not

in the regulations, but in practice, very few families build a house where electricity would be the only source of heat.

*As nuclear constitutes 25% of electricity demand (25% of the 80-90TWh), the rest is largely from coal. Will the Large Combustion Plant Directive affect Finland?*

All of the rest is not coal. LDC-directive is not a big issue in Finland, we have fairly good cleaning equipment for the smoke in all power stations. And the share of coal, which in 2004 was 18 %, depends on the year. 2004 happened to be a year when it didn't rain very much [2004 – SLIDE 22], so we couldn't buy electricity from Norwegian or Swedish hydropower stations, and therefore this share of coal is bigger than usual. One Finnish speciality is peat, which in 2004 was 8 %; it's domestic.

*Nuclear lobby used climate change argument; what other tactics did they use to influence public opinion?*

Well, the only argument was not climate. In the spring 2002, when this issue was in the parliament, also a lot of – I would say – scare-mongering was heard. The nuclear side said that, for example, without this nuclear power station we would face electricity cuts in the middle of the coldest winter days - which can be -30°C - and the homes would freeze. And without this nuclear power station we [would] have to buy huge amounts of gas from Russia, we will be too dependent on Russia, which is our 'enemy'. So, to become dependent on Russia, that is a really, really scary argument in Finland. Actually, a journalist from Reuters who came to Finland before this vote, and interviewed me, he said that he thought that he came to witness the rational environmental decision-making, rational environmental argumentation, in the choice of nuclear power, and what he finds is Cold War argumentation.

*Waste: does the Government bear the cost?*

The responsibility for nuclear waste according to the law is the company, the owner of the nuclear power station. But these two companies who own these Finnish nuclear power stations, they have established a joint company for this waste processing, and the law says that every year they have to put a certain amount of money for this waste management. But no one knows if it will be enough in reality, and if it's not, then it falls in the hands of society.

*Who was behind the nuclear lobby?*

Well, those who have economic interest, they were mainly from energy-intensive industry. But also many people from the electricity producing industry, from the energy sector itself, were very active. And also we have many politicians who are very enthusiastic about this issue. And one Finnish speciality was that it was quite obvious that practically all editors-in-chief of all Finnish newspapers were strongly on this nuclear side. And actually there was also an opinion poll which showed that those editors-in-chief in newspapers who oppose nuclear power, they were in very small newspapers. In the Finnish public discussion it was really obvious that the big newspapers had chosen the side of nuclear power.