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Part I
Introduction

1

The Transillumination of Finnish Nuclear Policy: Seeking a Shortcut to a Low Carbon Society

Tapio Litmanen

At the beginning of the new millennium Finland's national energy policy, in common with other nation-states, was at a crossroads. The Finnish decision was to allow the construction of a new nuclear power plant (NPP), a development which can be regarded as unique in international terms. In May 2002 the Finnish Parliament ratified the government's earlier favourable Decision-in-Principle (DiP) on a fifth NPP unit.¹ In December 2003 the power company Teollisuuden Voima (TVO) made an investment decision about the European Pressurised Water Reactor (EPR), which has a net electrical output of about 1,600 MW. This plant is being built by a consortium of Framatome ANP and Siemens AG.² The country also has an international reputation as a pioneer of nuclear waste management. In May 1999 Posiva, the company responsible for the final disposal of spent nuclear fuel in Finland, suggested that the government of Finland should consider only Olkiluoto in Eurajoki in its application for a DiP as the final disposal site. In January 2000 the municipal council of Eurajoki made a positive statement on the DiP. The government made the DiP on 21 December 2000, and its decision was ratified by Parliament on 18 May 2001.

This nuclear power decision making was met with acclaim from various parties. For instance, the Chatham House Report states that 'The Scandinavian model of decision-making is characterized by a relatively consensual approach to cross-party politics and considerable public trust in government and regulators...' (Grimston 2005, 43–4).³

In recent years there has been increased international interest in Finnish energy policy. In addition, the country's energy policy has undergone a number of changes. The electricity markets have been liberalized very rapidly, with Finland being among the first countries to do so, even before the EU directive came into force. Today Finland is part of Nord Pool, the largest electricity market in Europe. During the 1990s Denmark, Finland, Norway and Sweden cooperated to form a unique multinational electricity market.

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The national electricity markets were opened up to cross-border trade and a common power exchange. This reform began in Norway in 1991, continued in Sweden in 1996 and Finland in 1998, and was completed by Denmark in 2000 (Holttinen 2005; Amundsen and Bergman 2007). Furthermore, as a result of its membership of the European Union Finland can be viewed as an interesting case study for the examination of energy policy power and governance. In recent years the EU has increased its efforts to coordinate national energy policies; for instance, during Finland's EU Presidency in 2006 one of the main objectives for the work of the European Council was to develop the EU's energy policy.

Because of developments in Finland's energy sector representatives of its nuclear power industry, governmental authorities and politicians have been sought-after speakers at seminars throughout the world. Their task has been to analyse these unique decisions so that people can understand what is so special about the Finnish model of decision making on controversial energy policy issues. For instance, the former long-standing Prime Minister Paavo Lipponen has been active in promoting national energy policy and the country's very open and democratic decision-making processes.

The Parliament made its decision on 24 May 2002 to regard the project to be 'in accordance with the overall good of society'. The government of Mr. Matti Vanhanen granted the construction licence in February 2005. The operating licence that is needed before the starting the commercial operation in 2010 ... 2011, will also be subject to government approval. The very democratic and open decision process, aiming at the broadest possible social and political consensus, has turned out to be a great strength to our energy policy. Consensus was enhanced by combining the nuclear decision with a programme of developing more domestic and renewable sources. The Economic Affairs Committee of our parliament deliberations were extremely thorough – the Committee heard dozens of experts, including representatives of environmental NGOs. (Lipponen 2007)

Metaphorically speaking, the floodgates were now open. The debate about a sixth nuclear reactor is ongoing and the private electricity industry is planning its own NPP, which could be the seventh. The three major Finnish political parties – the Centre Party of Finland,⁴ the Finnish Social Democratic Party⁵ and the National Coalition Party⁶ – are currently formulating their stance in respect of these new plans.

This book offers a critical analysis of Finnish nuclear energy policy, which seeks to address some of the shortcomings of the one-dimensional picture of the country's nuclear power policy that has been advanced in much of the other literature. The understanding of nuclear power decisions needs more thorough analysis than that which appears in rapid policy evaluations or glib

diplomatic speeches. We hope that the book will offer a more comprehensive description of how the acclaimed Finnish democracy functions and what other instruments of power are in use. Thus, the critical stance adopted in this book may also contribute to the development of policy studies. However, our aim is not to make a detailed and systematic study of policy arrangements in the energy policy field, but rather to highlight some recent features relating to how the governance of the field functions. We concur with those scholars who emphasize the complexity of policy governance. For us it is important that there should be a focus on the roles of actors, actor coalitions, resources, the rules of the game, policy discourses and socio-techno-cultural institutional circumstances.

Living through the turbulent years of the first decade of the new millennium we have witnessed how the importance of energy policy has grown and how the role of active energy policy has been re-evaluated in domestic, security and foreign policy fields. The end of the Cold War presented an opportunity for the ideology of market liberalism in the 1990s, but developments after the September 11 attacks have forced governments to take a more active role in energy policy. Today state control and the state ownership of crucial infrastructures and resources are seen in a very different light. It is difficult to give an exact description of today's dominant energy policy orientation, but in the context of this book suffice it to say that most of the actors involved have a considerable stake in the business. Our aim is not to analyze global energy policy developments, but to try to understand recent changes in Finnish nuclear policy in the context of domestic and international energy policy trends.

The difficulty of establishing a coherent picture of energy policy

Our understanding of energy policy goes beyond the conventional definition. It is rather narrow to regard energy policy as a plan of action for tackling issues related to energy supply, demand, the development of energy-related industries but also the different environmental and social implications of energy activities. It may be suggested that it is inappropriate to talk of energy policy in the singular. Even within a single nation-state there are a number of influential actors, such as governmental authorities, institutions or more locally based actors in addition to the energy industry, which cannot be seen as monolithic actors. Each of these actors may exercise their own policies or policies, which may differ somewhat from the measures of other actors. Policy measures taken by these different entities may not be in concert, and the aims of the actors may vary – some of them can be acting in the benefit of public interest and serving the general interest of the society, whereas others serve narrower interests. A complex combination of different measures, aims and interests at a certain point in time may justify us in

claiming that there is something we can call national energy policy. We can, of course, draw a still-life picture from those conventional national actions, such as the legislation on commercial energy activities (trading, transport, storage, and so on), the legislation governing energy use (for example, efficiency standards, emission standards), instructions for state-owned energy sector assets and organizations, and fiscal policies related to energy products and services (taxes, exemptions, subsidies). The real problem in any discussion of national energy policy is how to include this complex configuration of different actors pulling in a variety of directions into one single picture. In addition, the fluidity of policies is evident as important policy actors make decisions and take actions all the time. To construct a comprehensive understanding of the issues on which the actors have reached consensus is easier than in those cases where a lack of congruity or absence of coherence is evident. For instance, the Climate Strategy for 2001 was under reconstruction in Autumn 2005 in order to take into account the emissions trading in the European Union and the Kyoto mechanisms, but because of continual disension in various ministries and political parties on energy policy questions its completion was delayed by months. From this example we can observe that national policy is also contingent upon international policy measures such as international environmental treaties and agreements. The important factors include not only international energy sector treaties and alliances, but also general supranational trade agreements and intergovernmental legislation such as the key European legislation to establish the Internal Market of Electricity (The Electricity Directive 2003/55/EC of the European Union).

One way to understand energy policy in modern societies is to consider the policy arrangements. For instance, van Rooijen and van Wees (2006) apply this concept when trying to understand policy changes in the field of green electricity (see also van Tatenhove, Arts and Leroy 2000). They use it to refer to the way in which a policy field is organized in terms of content (the policy discourse and programmes) and organization (actors, coalitions, power, influence and rules). For them actors are organizations or institutions that operate in a specific policy domain, such as the promotion of green electricity. They use the term 'coalition' to refer to a group of actors who share broadly similar policy goals and programmes and whose common objectives form the basis for their involvement in the policy process. They perceive that the determinants of power and influence are actors' relationships, particularly their interdependency and the distribution of resources among the actors. Resources can take the form of financial means, knowledge or media access, and their distribution indicates the relative influence of actors at various stages in the policy process. The policy arrangements also include formal and informal rules, which provide a framework for policies and political actions and determine which norms are regarded as legitimate. Formal rules are much easier to comprehend, precisely because they are formally agreed to; however, informal rules reflect the dominant political culture and it is therefore more

difficult to trace them empirically. A shared understanding of single events or certain choices requires an established policy discourse, which is a specific combination of ideas, concepts and categorizations produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities. Van Rooijen and van Wees (2006) state that a policy discourse encompasses the content of policy in terms of norms, values and the specific content of policy papers and measures.

Arts and van Tatenhove (2004) describe how the vocabulary of policy and policy studies has undergone a process of renewal. Making reference to several scholars, they point out how certain terms, such as governance, networks, institutional capacity, discourse coalition and deliberation, have gained ascendancy in scientific language over earlier terms, through which we perceive the world from the perspective of concrete actors or isolated power centres. Their suggestion is that an enthusiasm to adopt new vocabulary should not cause us to overlook important concepts, such as power. Their theoretical aim is to strengthen the analytical power of their own conceptual innovation, the policy arrangement approach, by combining it with the old power perspective. As they state, their programmatic task has been the creation of a policy arrangement approach to understand recent shifts in governance and power. The basic assumptions of this approach are: (1) the institutional embeddedness of multi-actor policy processes; (2) the manifestation of structural developments, such as globalization, in concrete policy practices; (3) the role of different faces of power in policy making; and (4) the importance of both substance and organization, as well as of change and continuity in policy practices. They are interested in the shaping of the policy domain. Therefore they stress the importance of substance (such as principles, objectives and measures) and organization (such as departments, instruments, procedures and the division of tasks and competence).

This approach also subsumes the idea of dynamic processes, as they explain how any shape of a policy domain is only temporary, because arrangements are constantly under pressure to change. The other dimension besides time is space. Arrangements are not universal, but are characterized by specific spatial boundaries. They can be found at different levels of policy making – local, national and transnational – or interconnect these levels, e.g. as specific forms of multi-level governance. The substantial and organizational characteristics of a policy arrangement can be analysed on the basis of four dimensions: policy coalitions, ‘rules of the game’, policy discourses, and resources. The number of players who share resources and/or interpretations of policy discourse in the context of the rules of the game can be regarded as policy coalitions. These coalitions identify more or less similar policy goals, and engage in policy processes to achieve them. The authors distinguish between supportive and challenging coalitions. The rules of the game refer to legitimate norms and the political weight of issues, agendas, interests, policies, decisions and measures. They can be characterized as procedure guidelines

giving instructions from the right political discourse and right players for a proper constitution of the field. The third dimension of policy arrangement is policy discourse, which is defined as a dominant interpretative scheme, ranging from formal policy discourse to popular story lines by which meaning is given to a policy domain. The final dimension is resources related to the concept of power, meaning that more or less permanent capacity of agents-in-interaction to achieve certain policy outcomes, but also dispositional and structural phenomena or a social and political system. The authors share the view that power is also concerned with the asymmetrical distribution of resources in society (domination as a structural phenomenon), revealing itself in positions of autonomy and dependency between actors (dispositional phenomenon) (Arts and van Tatenhove 2004, 339–43).

The history of Finnish energy policy

Since the earliest days of Finnish energy policy the issue has been regarded not only from the point of view of economic and technological investments but also as an important factor in the modernization of Finnish society. Studying the electrification of Finland from 1877 to 1977 Myllyntaus (1991, 284) describe how rapidly the country's electricity consumption increased.

... Finland leapfrogged over some phases of development, direct from an archaic subsistence economy to hectic industrialization. In Chapter 4, it was claimed that Finland reached approximately the same level of electricity consumption per capita in 1900 as Britain or some major Continental countries, such as France and Italy. After some setbacks between 1900 and 1925, Finland rose to be among the top ten electricity consumers in per capita terms during both the interwar years and postwar period. This performance was fairly exceptional, because of the late industrializing countries only Iceland, New Zealand and Finland managed to enter the group of the top ten electricity users (in per capita terms) between 1925 and 1975.

Myllyntaus emphasizes that the relationship between rapid industrialization and electrification was a mutually supportive one and that there was a societal consensus to modernize the country rapidly. According to him (Myllyntaus 1991, 285–8), the factors behind this atypical brisk development were: (1) general cultural and societal factors; (2) cultural resources; (3) extensive use of indigenous energy sources other than coal and oil; (4) early integration into the world market; and (5) the energy-intensive structure of industry. Over the years public opinion in relation to industry and new technology has been positive. For instance, Finnish peasants adopted the capitalist way of thinking at a very early in the development of society and entrepreneurship and the introduction of innovations were seen as

virtues – or even as a national duty. Thus a favourable attitude towards industrialism has been part of Finnish nationalism for many generations. Consensual thinking about the matter among a variety of interest groups has accelerated this development. Cultural resources, such as a well-developed education system, an active media and networks to educate experts abroad before Finland's own expertise expanded were necessary factors in the electrification of Finland. Although the country lacked reserves of coal and oil, it had massive indigenous resources of timber and peat. The processing of these resources led to the adoption of new technology, but it was hydropower which became the main indigenous energy source for electricity generation at the turn of the nineteenth century. Its early integration into the world market hastened the development of energy technology. The export of sawn timber, pulp and paper strengthened the Finnish economy and advanced the overall process of industrialization. New machinery and technology were needed as well as energy to run the economy. The fifth factor to which Myllyntaus refers is related to the previous one, because the Finnish wood processing industry is extremely energy-intensive. In summary, Myllyntaus argues that these factors contributed to the rapid early development of electricity technology and business.

In the earliest energy policy formulation the main interest was in increasing electricity production through the use of hydroelectric power (Myllyntaus 1991, 130). In point of fact there were two separate energy policies: electricity policy and fuel policy. The fuel economy was principally seen as a separate issue of foreign trade, indigenous fuels and employment. Electricity and domestic heating were considered to be separate issues. As recently as the 1970s a split approach to energy led to a crisis. The oil crises of 1973–74 and the growing share of thermal power compelled decision-makers to formulate an integrated energy policy. The main objectives of electricity policy were low price and reliability, and imported coal and oil largely replaced indigenous fuels. The oil crisis led to a reformulation of the objectives: the security of energy supply, the conservation of energy, an increasing share of indigenous energy sources, management efficiency and the state planning of the national energy economy (see also Nurmi 1980).

During the 1970s and 1980s the most important principle in Finnish energy policy was regulation and central planning. Planning ideology was strong until the 1980s, which saw the emergence of more liberalistic trends in the energy sector. Ruostetsaari (1998) describes how this decade was a period of two competing ideologies. Gradually state-centred planning and regulation ideology had to make more room for market mechanisms and open competition. During the neo-liberal phase of the 1990s the dominant principle was deregulation, that is, a dismantling of the energy sector's regulation and its replacement by free markets. Both Ruostetsaari (1998) and Pineau and Hämäläinen (2000) have documented this historic change in energy policy. They all agree that the Electricity Market Act (EMA), passed in 1995, forms a

milestone in increasing competition and decreasing regulation in the Finnish electricity industry. The objectives of EMA were to increase the levels of efficiency and competition in power generation and transmission in order to prepare the Finnish electricity market for opening up to international competition. Decision makers also anticipated new EU energy policy developments and wanted the country to participate in the creation of a Nordic electricity market. According to Pineau and Hämäläinen (2000, 186), EMA had several consequences. In terms of this book perhaps the most important ones are the complete opening of the market, the gradual opening of networks and the creation of Fingrid.⁷ Regarding the overall conclusion of the reform the authors point out that even before the reform the market in Finland was liberalized and that one should not hesitate to make simplifying inferences.⁸ They state that a comparison of the Finnish electricity market before and after the restructuring revealed that some vertical breakdown had occurred – for example, the creation of Fingrid – but at the level of power generation the horizontal integration maintained the same, as did the ownership. The coordination of sales became greater following the opening of the unique Nord Pool spot market. System operations and transmission came under the sole control of Fingrid. At the distribution level, mergers even increased the level of horizontal integration, but market type and ownership remained the same. Rather surprisingly, it was found that the so-called regulated market contained several uncommon features. The earlier emphasis on central planning and regulation did not prevent a considerable degree of diversity in generation and competition, in terms of technologies and the number of producers. In addition, the transmission field was not a monopoly and even without regulatory agency supervision⁹ the actors behaved reasonably and engaged in cooperation.

Ruostetsaari (1998, 190) stresses that in the 1990s the political parties also internalized and accepted the principle of competition.¹⁰ One illustration of this was that during the parliamentary processing of the new electricity markets law (1995) and during the discussion on the fusion of two large state-owned energy companies, IVO and Neste, in 1998 the politicians did not bother to make speeches or get involved in the preparation. Ruostetsaari (1998, 200–2) reports that politicians were not interested in these big energy policy questions, even though these decisions led Finnish energy policy towards the adoption of a market ideology. The result of political apathy in respect of energy policy questions meant that the role of government officials had been strengthened. Therefore the principles of energy policy were shaped in the ministries when separate decisions were prepared by key officials, which overcame the political void. Kyllönen (2004), Lammi (1994) and Kojo (2004) give a description of how during the preparation of the governmental DiP for a new nuclear reactor the Ministry of Trade and Industry (MTI) and certain officials acted in a particularly goal-oriented manner. In addition to the preparation of the nuclear power decision the ministry was in charge of

the formulation of climate strategy. They purposefully constructed two scenarios in which the export of natural gas was an alternative to nuclear power in preventing the increasing production of greenhouse gases. Environmental organizations demanded that the ministry announce the assumptions of their calculative scenarios, but the head of the energy office refused to do so. The authors criticize the behaviour of both civil servants and leading experts in the preparation of nuclear power and climate strategy decisions. Their conclusion is that the openness and transparency of decision-making was not what it should be in a democratic society.

Today's energy policy

This power shift in energy policy issues did not mean, however, that the political parties abandoned all interest in energy policy. Ruostetsaari (1998, 212–15) recognizes that since the 1980s Finnish energy policy has been characterized by three strong party-related subsystems: domestic energy sources, natural gas and nuclear power.¹¹ The first and most obvious political coalition is around the issue of domestic energy sources and, in particular, peat. The Centre Party of Finland, the Finnish Rural Party,¹² the Finnish Christian League¹³ and partly also the Swedish People's Party¹⁴ have shared the aim that state should promote and subsidize both peat and wood as energy sources. The Green League¹⁵ is something of an outside member of this subsystem, because they favour the use of wood as an energy source, but are concerned about the use of peat as an energy source because of the possible environmental damage. The other ideology of this coalition has been their anti-nuclear stance, which is in opposition to the nuclear power subsystem. The Finnish Social Democratic Party and particularly the National Coalition Party have been keen supporters of nuclear power. Their lack of interest in domestic energy sources is based on the fact that peat and wood are produced in rural areas, which is the power base of the Centre Party of Finland. These three parties usually compete for the position of the biggest party in Finland. The coalition around nuclear power is perhaps the strongest, because in addition to these influential parties it also includes power companies, the majority of the labour unions and almost the whole of industry and commerce, along with their representative organizations. The role of the third energy policy subsystem around natural gas has disintegrated gradually. Traditionally the support for this energy source has increased from political right to left, but the collapse of the Soviet Union changed the situation. During the previous nuclear debates natural gas exported from Russia had been seen as an alternative to the further construction of nuclear power facilities. This argument about increasing the exports of natural gas has also been supported by the political parties of the domestic energy sources subsystem. The Left Alliance¹⁶ and its predecessors have been particular advocates of this energy source. As a consequence of the restructuring of Finnish economic life during the

1990s the argument in favour of increasing energy exports from Russia and also increasing the level of energy dependence was not viewed with delight. Today the Left Alliance also speaks for domestic energy sources and supports the development of Finnish nuclear power.

The present-day objectives of energy policy are: security of supply; effective energy markets and economy; environmental questions and safety (MTI 2005; IAEA 2003, 280). The International Energy Agency (IEA),¹⁷ which reviews national energy policies, has praised Finland's policy, stating that it is characterized by three commendable traits: holistic strategy, utilization of the international energy trade, and minor share of energy regulation (IEA 2004a). First, they state that a holistic approach to energy means that energy policy strives to pursue the three E's simultaneously – Energy security, Economic development and Environmental sustainability. The approach is perceived as an effective way to communicate on energy policy issues between the various ministries and energy programmes. The reviewers emphasize that in an ideal case these actors and programmes can pursue numerous policy goals in tandem and act in concert rather than in conflict with one another. Second, in pursuit of low energy costs and security of supply, Finland uses the international trade system. Because of a lack of substantial domestic energy resources the country imports fuels and electricity from a variety of countries. For example, Finland is part of the Nordic Power Market (Nord Pool), which means that it has common electricity markets with other Scandinavian countries. Third, national policy contains very little regulation. For instance, the IEA has found that its electricity sector is one of the least regulated in the world, with companies free to build power plants as they wish and all of the customers free to choose their own supplier. Although the agency is in favour of deregulation they recommend that the regulatory authority should also be expanded, e.g., in the field of high-level nuclear waste management and electricity transmission and distribution (IEA 2004a, 9–12). In addition, energy supply decisions on energy systems take place at a fairly decentralized level. A substantial proportion of energy is imported and produced by private enterprises and the state-owned energy companies are also run on a commercial basis (IAEA 2003, 280).

Recently in a press conference in Helsinki IEA praised Finland's commitment to balanced and realistic energy policy.¹⁸ They also published a country review report (IEA 2008) 'Energy Policies of IEA Countries – Finland – 2007' which concluded that:

A small, somewhat isolated country, Finland takes a balanced view of its energy policy, taking advantage of its situation wherever possible. [...] For example, it makes straightforward use of European Union directives and policies, without adding too many extra layers of regulations that could undermine the effectiveness of continent-wide policies. A small electricity market by itself, the country makes extensive use of gains from trade

with its neighbours, not only as part of the well-functioning Nordic electricity market, but also with connections to Russia and the Baltics. [...] The greatest of these challenges may be energy supply security – its very high import dependence in general and its strong reliance on one import source in particular. To balance the lack of import diversity, the country has high domestic diversity, drawing its supply from many different sources, including domestic sources – namely nuclear, biomass and hydro. Finland, like most IEA countries, also faces the challenge of rising greenhouse gas emissions [...] Here, again, the country has taken a pragmatic approach. It has taken as much advantage of domestic and international trading as possible, allowing it to lower its own cost of compliance, as well as driving international development of a market for carbon emissions ... (IEA 2008)

In order to understand Finnish energy policy one must also pay attention to some basic facts of energy consumption, resources and supply. It is characteristic of the Finnish energy field that on the one hand the primary fuel supply is diverse and on the other the country's industrial structure is very energy intensive. Its relative dependence on foreign energy supplies can be seen from the fact that crude oil and oil products constitute a major part of imported energy. Other main fuels imported to Finland are coal and natural gas (IAEA 2003, 278). The IEA (2004a) report states that Finland's primary fuel supply is a sensible mixture of different energy sources. The largest contributor is oil, which in 2001 accounted for 28 per cent of total primary energy supply (TPES). Four other fuel sources contribute at least 10 per cent each, including biomass (20 per cent), nuclear power (18 per cent), coal (12 per cent) and natural gas (11 per cent). One peculiar feature of Finnish energy policy is that, although the share of renewable energy in Finland is relatively high as a result of the use of by-products and waste from the massive forest industry sector, the share of other renewable sources, such as wind power, has remained low by international comparison. The fuel mix is projected to become further diversified as the share of oil of TPES falls to 24 per cent by 2010 with gains made by nuclear, coal and natural gas. Wind power as a source of energy increased its output by 200 per cent between 1998 and 2001. Nevertheless, its contribution remains small, accounting for only 0.02 per cent of TPES in 2000. By 2010, it is expected to represent 0.08 per cent of TPES and by 2020, 0.14 per cent.

The other side of the coin is that the total primary energy consumption per capita was about 65 per cent higher than the European Union average (according to 2001 statistics) and about 39 per cent higher than the OECD average. This is mainly the result of Finland's cold climate, which demands that houses are heated throughout much of the year, and the structure of its industrial base, which is dominated by energy-intensive processing industries (wood, especially paper, heavy metal and chemicals). A third factor

is the relatively high transportation requirements per capita caused by the low levels of population density (IAEA 2003, 277). The primary indigenous energy resources in Finland are hydroelectric power, wood, wood waste, pulp-ling liqueurs and peat. Indigenous fuels and hydroelectric power cover about 30 per cent of the energy demand. Finland imports all of its oil, natural gas, coal and uranium. The percentage shares of primary energy sources in 2002 were: oil 26, coal 13, natural gas 11, indigenous fuels 27, hydro power 3, nuclear power 17, net electricity imports 3 (IAEA 2003, 278).

In 1994, Finland ratified the Framework Convention on Climatic Change. According to the 'Burden Sharing Agreement' among EU Member States, Finland has agreed to keep its greenhouse gas (GHG) emissions at 1990 levels during the 2008–12 Kyoto target period. For the reference year (1990) of the convention, the total CO₂ emissions in Finland were 53.9 million tons (Mt) and the total amount of greenhouse gases was 71.5 Mt. Meeting the emission limits seems to be a challenging task, because, for instance, between 2000 and 2002 CO₂ emissions increased by almost 15 per cent. According to Lampinen (2005), in 2003 the figure of total GHGs was 86 Mt, which meant that it was more than 20 per cent higher than the total in the reference year. Finland was among the poorest industrial nations in reducing greenhouse gases.¹⁹ According to the IEA, the most important factors behind this volatility are the climate and energy-intensive industry. The climate increases the cost of heating, but can also reduce the amount of hydroelectric power available in Finland (20 per cent of the country's electricity) and, what is also crucial, the availability of inexpensive imported electricity from the other Nordic countries, primarily Norway. Another important factor is the number of energy-intensive industries competing in international markets, such as the pulp and paper industry and metals. The ebbs and flows of international markets affect the emissions so that increased levels of industrial production increase emissions – and vice versa. 'While these two factors – the weather and economic activity – affect the emissions paths of all countries, they are particularly important for Finland' (IEA 2004, 29).

Finnish environmental organizations and some scholars do not agree with the opinion of the IEA and the MTI that Finland is unable to reduce its CO₂ emissions. Lampinen (2000) has analysed those six arguments²⁰ supporting non-reduction policy and he finds that they do not withstand critical analysis. Although they are partly valid, Lampinen stresses that changing the assumptions behind the arguments may lead to different conclusions in which the reduction of emissions might produce benefits and open up opportunities. Kaivo-oja and Luukkainen's (2004, 358) analysis also indicates that some commonly used arguments may not be valid. The authors show that in recent decades there have been no significant improvements in the level of Finland's total energy efficiency. Comparing the amount of energy that was used to produce one Finnmark of GDP in 1960 with the amount required in 1998, they point out that there has been no change

towards less energy-intensive production modes. On the contrary, the 1990s were a period of reindustrialization, which meant that energy efficiency did not improve. Finland is one of the EU Member States that has not improved their level of energy efficiency. To a large extent, France, Sweden and Finland have relied on nuclear power for their supply and on energy-intensive industrial development of their economy (Kaivo-oja and Luukkainen 2004, 380). In contrast to this the most important changes in Finnish CO₂ emissions happened in the 1960s, when a fuel switch towards carbon-intensive energy production took place and in the late 1970s and early 1980s, when the introduction of four NPPs caused remarkable fuel switch towards less CO₂-intensive energy production. Since then there has been non major fuel switch in Finland. One striking feature in their analysis is the substantial fluctuations in terms of energy and CO₂ intensity. They have been caused principally by changes in hydroelectric power production in the common Nordic market. As in Denmark, the domestic coal-based condensing power production adapts to changes in hydroelectric power supply and fluctuations.

In summary, Finnish industry accounts for a higher proportion of total energy consumption than is the case in other OECD countries. As Kara and Tuhkanen (2002, 14) explain, just over half of both primary energy and electricity is currently consumed by industry. In addition, the pulp and paper sector alone accounts for more than half of all industrial consumption. This is also the reason for the large share of wood biomass, about 20 per cent of primary energy consumption, since more than two-thirds of this consumption takes place in the pulp and paper mills. Kara also points out that another specific feature of the Finnish energy system is its high overall efficiency in energy production, since about one-third of its electricity is produced at the combined heat and power plants. They are either connected to the district heating systems of communities or supply process heat and steam to industrial installations.

Finnish energy policy in an international context

As we emphasize that energy policy is not a custom fixed by tradition, we must pay attention to different forces that are shaping – or trying to shape – national energy policy. Fairly interesting developments are taking place on national and international electricity markets: the reconsideration of the role of nuclear power in reducing atmospheric greenhouse gases, the opening up of the national electricity markets to international competition and attempts to create markets for alternative energy sources. Alongside other developments, these have had a considerable effect on energy policy debates in different countries. Reactions, responses and policy measures to these vary, but almost all actors in the field of energy policy have to consider their attitudes to these issues.

At the national level countries are pondering the effects of the Kyoto Climate agreement on the production of electricity and energy policy. As Morland (2001) suspected, the signing of the agreement has led to a reopening of the debate over the link between climate change and nuclear power. The prevailing assumption – that nuclear power was a source of energy which seemed to belong to the past and was not to be developed in contemporary societies – has been reconsidered (cf. Elliot 1997; Toke 2005; Blowers 2007). Many countries, including Sweden and Germany, had believed that nuclear power should be phased out with no thought being given to the energy sources that could replace it. At the same time the Member States of the EU have drawn up a common strategy on climate in which the most important policy instrument is the EU Emissions Trading Scheme (EU ETS), which was initiated in 2005. Under this scheme, enterprises can buy and sell emissions allowances, so that the level of emissions may increase in one country while at the same time decreasing in another. Governments are making calculations about how to meet the need for electricity without increasing CO₂ emissions, without spending too much on emission trading and without building new NPPs. As Morland (2001, 58) states, not even the most fervent proponents of nuclear power claim that a reliance on nuclear energy alone will help to achieve the necessary reductions in carbon dioxide gases. But the developments he was anticipating occurred in the UK in April 2005, when the advisors to Prime Minister Tony Blair suggested that the construction of new nuclear power stations would be the best way to meet the country's targets for reducing the emissions of gases responsible for global warming (Toke 2005, 55).

The recent history of the British nuclear programme is rather interesting, because as in Finland in 1991 so also in Britain in 1990 the nuclear power option was cancelled and re-opened within the course of just a few years. Toke (2005, 54–5) explains that the newly privatized electricity industry cancelled plans for the construction of three new NPPs despite the existence of a 'fossil fuel levy' intended to subsidize nuclear power, and despite the fact that, as measured by opinion surveys, anti-nuclear attitudes were decreasing. Toke argues that even for the Conservative government who had promised to review energy policy, it would be very difficult to fund new nuclear power through a privatized electricity system. A more detailed picture was drawn up by Winskel (2002), who provided an analysis of various phases of British electricity markets and nuclear policy, moving from the 1920s and ending up with a consideration of the developments of the 1990s. His conclusion is that between the mid-1950s and the mid-1980s nuclear power exerted a powerful influence on British energy policy, but that between 1987 and 1995 the process of privatizing the British Electricity Supply Industry (ESI) marginalized the role of nuclear power in Britain. With no subsidies, and no government funds provided for the construction of new nuclear plants and furthermore in a condition of uncertainty about long-term electricity prices, the still

state-owned British Energy was unable to proceed with the construction of any new NPPs (Winskel 2002, 453–4). According to Winskel, private investors played a crucial role in bringing about the end of the British nuclear power programme. The return of a Labour government in the late 1990s suggested that there would be a bleak future for nuclear power, but the growing awareness of economic consequences, the Kyoto Protocol and the UK's own CO₂ emission targets led them to reconsider the nuclear option.

Many countries in both Europe and North America have started to integrate their electricity sectors into larger communities. For instance, Europe is currently in the process of creating common electricity markets. However, after five years of competition the EU has noted that many aspects of implementation are still disappointing. In October 2004, EU sent a letter warning 18 Member States that they had still failed to comply fully with the Commission in respect of the legal measures taken to transpose the latest Directives (EU 2005). This finding has been verified by van den Hoven and Forschauer (2004) whose study suggests that the liberalization of the electricity markets²¹ in western countries has not succeeded because of strong national interests which have limited the level of domestic electricity market reforms. Their comparative analysis of France and Canada demonstrates that national interests may still prevail in an era of intergovernmental formulation of electricity policy. The EU report lists four reasons for the failure to create common electricity markets. First, foreign companies have been unable to penetrate national markets.²² In most cases, foreign suppliers represent less than 20 per cent of the market share. Secondly, Member States are still failing to deal with the issue of market structure. The electricity markets in too many Member States are dominated by one or two companies, and there is often inadequate capacity for cross-border competition. Third, energy suppliers are still dominating the electricity distribution system. The EU argues that fully independent transmission system operators and regulators without connections to supply companies can ensure cost-reflective tariffs and the removal of any cross-subsidies. Fourth, one obstacle to the internal market is the continued existence of regulated end user prices for electricity and gas alongside the competitive market and associated long-term power purchase arrangements (PPAs).

Amundsen and Bergman (2007) have studied the functioning of Nordic electricity markets. During the second part of the 1990s, Denmark, Finland, Norway and Sweden created a unique multinational market for electricity, which meant that national electricity markets were opened up to cross-border trade and a common power exchange, Nord Pool, was established.²³ One of their conclusions is that there is now an integrated Nordic wholesale market and that this has effectively diluted the market power from national contexts. However, the retail markets have not integrated, at least to the same degree. Retail prices and trade margins differ significantly because of national legislation and structural differences. When studying Norway and Sweden,

Amundsen and Bergman found that in the case of Sweden three major generating companies – Vattenfall, Sydkraft and Fortum – have managed to become the dominant players in the retail market. Their market power is based on a policy of vertical integration in generation and retailing. One precondition for this is that the separation between retailing and distribution is required only in Sweden. The scholars explain that the competitive advantage of generation-retailing integrated companies probably stems from the lack of efficient markets for hedging against area price and quantity risk and that there are very significant entry barriers in generation. Even though there has also been a shift from a ‘public service’ to a ‘business and profit’ perspective among state-owned companies, their criticism is oriented towards problems related to legislation. The intention behind the legal separation of distribution and retailing was to stimulate competition by preventing cross-subsidization, but it opened up vertical integration between generation and retailing, which has in practice led to a reduction in the level of retail competition. Their conclusion is that from the point of view of households there seem to be two national rather than one integrated Norwegian–Swedish retail electricity market. They continue by stating that this also applies in the cases of both Finland and Denmark. Still they admit that to some extent Finland and Denmark are exposed to competition from foreign companies such as Vattenfall and E.ON. Thus they take the view that in future it will also be necessary to increase the market area for the retailers not only between the Nordic countries but also nationally and locally.

One example of creating markets for ‘green’ electricity can be seen in the Netherlands, where the government has made regular interventions in markets, demonstrating fundamental shifts in terms of both policy and approach. Van Rooijen and van Wees (2004) have studied the development of renewable energy policy making in the Netherlands. They characterize Dutch green electricity policy by dividing it into three phases: in the early 1990s, the government negotiated voluntary agreements with the energy distribution sector in relation to targets for green electricity sales, which were never met. In the second half of the 1990s, a regulatory energy tax was introduced, from which customers of green electricity were exempt. This led to a substantial increase in demand, which was met largely by green electricity imports, and did not lead to the development of additional domestic renewable energy capacity. Finally, in the third phase in 2003 there was a change in policy which shifted the focus from the promotion of demand to the promotion of supply through a system of regulated feed-in tariffs. Their conclusion is that, despite the renewable energy policies, the growth of the renewable energy market in the Netherlands has been small and targets have not been met in full. The share of renewable energy produced in the Netherlands in 2001 was 2.8 per cent of electricity consumption. The reasons for this are many, but, for instance, they state that the ambiguity of the policy has not created conditions for confidence among market partners. In contrast, countries such as

Denmark, which derives 21 per cent of its electricity from wind power, Spain, which obtains 7 per cent from wind power, and Germany, which achieves 6 per cent of its electricity from wind power, have succeeded in increasing the share of this alternative energy source, whereas France has invested in nuclear power so that by 2003 nuclear power accounted for a remarkable 80–85 per cent of France's total electricity production (Toke 2005, 48; van den Hoven and Froschauer 2004).

The power to choose between different energy options

One crucial question for the construction of a sustainable energy economy is how societies choose a suitable energy technology strategy from among the array of different options. In light of the convincing number of studies we suggest that even though energy policy is under constant pressure to change, the fundamental nature of national energy policy seems to be relatively stable. There are, of course, developments, collectively binding agreements, events and crises which force governments and other actors to reconsider their current policies, but in general this policy sector is fairly stable in comparison with other sectors. The determining forces are, for instance, those historically agglomerated social organizations, material infrastructures and mental schemes. Recent studies have revealed how solid the structures of the energy sector are and how historical choices have almost petrified the trajectory of energy sector development. To bring some fundamental changes into the energy sector is a laborious task, which requires strong governance, united policy advocacy coalitions and purposeful lobbying instead of wishful thinking and trusting to the benevolence of the main actors.

Hisschemöller, Bode and van de Kerkhof (2006) studied the relationship between technologies and institutions on the assumption that energy options may, in addition to the specific characteristics related to technology, costs and the public perception of risk, have some institutional requirements. Their arguments are that: (1) political institutions show a preference for some specific technologies and a dislike of others; (2) viable technologies do not conquer the market by virtue of their advantages for individual consumers and society at large; (3) socio-technological regimes control the choices of suitable technologies; and (4) breakthroughs in the field of renewables are believed to benefit from incentives for collaboration, especially the formation of new networks between vested interests and newcomers, but institutions still provide formal and informal rules that articulate both competition and collaboration in a specific way. Their conclusion is that the breakthrough of decentralized electricity production in combination with hydrogen needs major government interventions, not any kind of low profile governance or governance by corporate business. They are realists, as they state that this option is likely to be resisted by vested interests in the energy system, which in itself shows that it is in a position of disadvantage vis-à-vis

other options and not only or primarily because of its technical or economic disabilities.

A more realistic picture of the formation of energy policy would acknowledge the substantial role that interest groups also play as active participants in the process. Lobbying the Parliament, politicians or authorities is a fairly conventional and accepted means of promoting the interests of certain actors. For instance, Markussen and Svendsen (2005) analysed how effective the lobbying of main industrial stakeholders was in a 2003 scheme for GHG emission allowance trading within the European Union. They focused only on the industrial groupings, as environmental and consumer organizations tend to be weak and to have limited lobbying power in the political arena. According to the literature to which they refer, the environmental interest groups are of only minor importance in relation to EU policy making (Michaelowa 1998; Daugbjerg and Svendsen 2001; Andresen and Gulbrandsen 2005; Gulbrandsen and Andresen 2005).

The ideology of the liberalization of energy policy and the freeing up of energy markets has suffered severe blows as nation-states have begun to protect their national interests to an increasing degree as the result of the instability of the energy markets. France is often seen as providing an example of very strong state intervention. In France, there are two dominant energy enterprises (the state-owned firms *Electricité de France* (EDF) and *Gaz de France* (GDF)), nuclear power is the main source of electricity and the ideology of energy policy is what Meritet (2007; see also Matlár 1997) calls 'public service'. She describes French energy policy in the context of the EU and refers to criticism in which it has been called the 'black sheep'. Even though there is considerable diversity in terms of energy policy issues among EU's Member States, there is this vision of the creation of a single energy market. At the same time there is also pressure to diversify the energy supply, lower the level of regulation and increase the share of renewable energy sources. The central notion of the establishment of a single competitive market has been a shock to the French culture of state intervention. According to Meritet, changes in the electric and gas industries, but also the reconstruction of network industries, are politically sensitive issues in France. European regulations imply that there should be a complete separation between competitive activities (generation, purchase and supply of gas and electricity) and regulated activities (transmission). The directives of 1996 (electricity) and 1988 (gas), which initiated the deregulation process, and the directive (2003), which aims to achieve the total opening up to competition, have brought about strong opposition from all parts of the French Parliament. Meritet (2007) concludes that France must consider how it can be part of the European process while simultaneously protecting its national interests. It seems obvious that nuclear power is an answer to the country's energy needs, the challenges of climate change and fears of energy supply disruption, even though sceptics counter that it is too costly and dangerous to be

viable. The political elite have to face the challenge of the liberalization of energy markets within the context of domestic public intervention policy.

There are also a number of radical scholars who claim that for environmental and, in particular, climate reasons, the energy sector needs a period of 'creative destruction' (see, for example, Jacobsson, Andersson and Bångens 2002).²⁴ They are seeking the development of renewable energy technologies to replace the use of fossil fuels. They argue that a transformation of the energy sector requires the emergence and growth of new technological systems (see, *inter alia*, Jacobsson and Johnson, 2000) based on a range of renewable energy technologies, such as wind turbines, solar collectors, biomass-based combined heat and power plants and solar cells. There are many obstacles to the development of renewable energy technology, but Jacobsson et al. (2002) argue that governments have to offer support to the new technologies as they attempt to challenge technologies that have had several decades to mature. They base their views on the cases of natural gas and nuclear power, which have demonstrated that support may be needed for decades rather than just a few years. Their analysis of the evolution of the German technological system for solar cells prompts three conclusions: (1) An important role is played by organizations that articulate underlying values in favour of solar cells and legitimate the new technology. This work contains a repertoire of action, such as influencing the regulatory framework so that markets can be formed and coalitions of actors in favour of the new technology built. (2) The technology takes a long time to mature. They speak of the 'learning period', which in the case of solar cells has lasted several decades (defined as starting with the Research, Development and Demonstration (RDD) programme in the mid-1970s and ending when the cost of solar cells is somewhat closer to that of other power technologies). (3) The third conclusion is that, as the result of the nature of 'emerging' technology, there are great uncertainties over the potential performance and cost of the technologies.

In another study, Jacobsson and Lauberb (2006) have explored the reasons for the particularly rapid spread of two technologies in Germany: wind turbines and solar cells. They attributed this diffusion to the nature of the policy instruments employed as well as to the political process which led to the adoption of these instruments. The analysis demonstrates how the regulatory framework is formed in a 'battle over institutions', where the German Parliament, informed and supported by a growing advocacy coalition, backed support policies for electricity sourced from renewables in the face of often-reluctant governments and opposition from nuclear and coal interests. It also demonstrates that this major political and environmental achievement carries a modest price if we consider the total costs to society, *i.e.* including both subsidies to coal and the negative external economies of coal. The success factors in the German case were: (1) institutional changes; (2) market formation; (3) the formation of technology-specific advocacy coalitions; and (4) the

entry of firms and other organizations. When dealing with the first factor, Jacobsson and Lauberb refer to the 'economics of innovation' literature. The institutional change requires a list of different measures, such as a redirection of science and technology policy well in advance of the emergence of markets, developing the value base (as it influences demand patterns), market regulations, tax policies as well as immediate and detailed practices. Second is the ability to generate markets for the new technology, which may involve the formation of standards (such as the Nordic telecommunication operators' decision to share a common Nordic Mobile Telephony (NMT) standard for mobile telecommunications), exploring niche markets (markets where the new technology is superior), a government subsidy and creating a 'protected space' or 'nursing market' for the new technology. Third, the scholars emphasize the importance of a broader constituency behind a specific technology. Their idea is that the development process should include not only individual firms, and related industry associations, but also a range of organizations, such as universities and also non-commercial organizations (like Greenpeace). Fourth, the entry of new firms is crucial to the transformation process, because new knowledge, capital and other resources are required – for example, to strengthen this technology-specific advocacy coalition and to legitimate the claims for the institutional set-up.

Nuclear power as a tempting option

In their Strategic Plan for the period 2005–09 the OECD Nuclear Energy Agency states that important changes have occurred in the energy and nuclear landscapes in recent years. They argue that at the same time as energy use continues to grow inexorably and fossil fuels continue to dominate the energy mix, serious concerns remain in respect of the security of supply, investment in the energy infrastructure and the threat of environmental damage caused by energy production. Another very serious challenge to the energy policy is climate change; at current rates of development, by 2030 CO₂ emissions are projected to be 70 per cent higher than today's levels. OECD member countries must therefore continue to favour energy savings as well as to promote the development of renewable and less CO₂-producing energy sources. In addition, many countries consider nuclear power to be a realistic option as part of their energy mix, because some energy policy actors consider that it provides significant environmental benefits, in particular in limiting CO₂ emissions and helping countries to fulfill commitments under the Kyoto Protocol.

The construction of a sustainable energy economy is a considerable challenge for countries throughout the world, in the face of the growth in worldwide energy demand. With no change of policy the energy needed in 2030 is expected to be 60 per cent higher (IEA, 2004). This increased demand will be met largely by fossil fuels, which will in turn become more expensive and

increasingly scarce in future. Bleischwitz and Fuhrmann (2006) summarize the two most obvious challenges for energy systems: firstly, the world needs to ensure the security of energy supply at affordable and also foreseeable prices; and secondly, the world cannot ignore the environmental concerns and problems, which have been increasing steadily over recent decades.

It is unsurprising that under such circumstances some countries have shown a renewed interest in nuclear energy and have taken decisions to prepare for its future development. The construction of a new NPP has been decided on in Finland, although the competitiveness of new nuclear plants has not been demonstrated everywhere in today's market conditions and the reduction of their capital costs is a real challenge. By contrast, some countries have decided to co-operate in order to prepare a new generation of nuclear energy systems, including power plants and the associated fuel cycle facilities. The countries are forced into this kind of co-operation because they perceive the need for replacing older plants in the future (OECD 2005, 3).

Concerns about climate change and the security of supply have not been the only factors to open the door for the expansion of nuclear power. Another less publicly debated reason is the age of the current NPPs. A large number of NPPs are approaching the end of their initially estimated lifetimes and require either license extension or decommissioning. This can be seen from the report on the decommissioning of NPPs by IAEA (2004). The report concludes that 107 NPPs have been shut down or are undergoing decommissioning and that another 14 have been decommissioned already. The number of NPPs worldwide exceeds 500 units, with more than 400 units still in operation (IAEA 2004, 6). In 2002, nuclear power provided around 16 per cent of the world's electricity, with 441 units operating in 30 countries (IAEA 2003). The report states that it has been estimated that there are thousands of facilities worldwide that will eventually require some degree of decommissioning.

Another obstacle to constructing more NPPs has been the disposal of nuclear waste. As Elliot (2003, 449; see also Lowry 2007) states, the problem has not been just a question of the economic costs of nuclear waste disposal, it is also a matter of the longer-term viability of the nuclear option in terms of both safety and security. Some nuclear wastes remain dangerous for thousands of years. In some cases there has been progress in this previously unsolved problem. For instance, the Olkiluoto disposal facilities in Finland, and the identification of two sites in Sweden, are examples of how the nuclear industry and governments have developed approaches to the disposal of spent fuel in circumstances of rather low public and political confidence, even though in international comparison the trust in authorities, experts and also in industry is rather high in both of these countries. Finland and Sweden intended to solve this problem by encapsulating high-level nuclear wastes and storing it all underground in the bedrock. Both countries have carried out rather extensive public consultation at the local

level on this issue (on the Finnish case, see, for example, Hokkanen 2001, 2007; Litmanen 2008). The construction of Finland's final disposal facility is scheduled to start in the 2010s and the facility should be operational after 2020. The deep repository model adopted in both countries has not convinced everyone, but at least in Finland there is one community which is willing to host it. In Chapter 6 Matti Kojo describes the political struggle that resulted in the positive decision at the local level in Eurajoki municipality.

We can say that nuclear power as an option for generating more electricity than previous NPPs produce has been in decline over the past two decades or so. To date this option has not been realistic for a large number of governments. The present-day situation is characterized by some dualism or ambiguity. Even though some countries have decided to phase out nuclear power because of concerns about severe accidents or problems with the management of radioactive waste, others have extended the licences of earlier installations or allowed the power upgrading of some plants. Governments and enterprises have become conscious of NPP closedown and the fact that the cost of electricity generated by existing NPPs is still competitive. For such reasons the number of NPP closures has been less dramatic than expected. For instance, despite regular increases in the demand for electricity, the contribution of nuclear power to electricity production in the OECD countries has remained stable – at approximately 24 per cent. From the global perspective the share of nuclear power global electricity generation has been steady for many years – at around 16 per cent. The IAEA secretariat, which produces a comprehensive Nuclear Technology Review every two years and shorter updates in the intervening years, reports that in 2004 five new NPPs were connected to the grid (two in Ukraine and one each in China, Japan and the Russian Federation), and one inactive plant was reconnected in Canada. This compares to two new grid connections (and, in Canada, two reconstructions) in 2003 and six new grid connections in 2002 (IAEA 2005, 4). By contrast, five NPPs were closed down in 2004 – four 50 MW(e) units in the United Kingdom and the 1,185 MW(e) Ignalina-1 reactor in Lithuania. This compares to six retirements in 2003 and four in 2002 (IAEA 2005, 4). The report states that for the eighteenth consecutive year nuclear generation has continued to grow at the same pace as the overall level of global electricity consumption (IAEA 2005, 1). For instance, in 2002, nuclear power provided about 16 per cent of the world's electricity, with 441 units operating in 30 countries (IAEA 2003). The five new plants that were connected to the grid balanced the number that had retired. However, there were only two new construction starts in 2004, and in accordance with existing nuclear phase-out policies, the Obrigheim reactor in Germany, and Barsebäck-2 in Sweden, were shut down in May 2005.

Ambiguity is an appropriate term to describe the European Union's energy policy and its relationship with nuclear power. As both Matlárý (1997, 14) and Frogatt (2007, 171–2) state, it is something of a paradox that energy

policy in the EU has traditionally been rather insignificant, even though two of the three original treaties, the European Coal and Steel Community (ECSC, which came to existence in 1952), and the Euratom Treaty (signed in 1957), were concerned with the issue of energy. Today there is a shift towards internal energy markets, liberalization and deregulation, but this is far from being a completed process as different member countries have vested interests. Although the EU has 147 nuclear reactors in operation in 13 of the 25 Member States and they generate around one-third of the Union's electricity, some countries – such as France and Finland – are more enthusiastic about this source of energy than some others.

The recent turmoil in the international energy markets has increased the importance of energy policy in the EU. This new determination to shape the EU's energy policy means that Finland, as a member of the EU, is obliged to increase the share of energy from renewable sources in final consumption from the 2005 level of 28.5 per cent to a target share of 38 per cent in 2020. This national target is part of the climate change and energy package published by the European Commission in January 2008 (EU 2008). It includes a proposal for a framework directive relating to an increase in the share of renewable energy. According to a March 2007 European Council decision, the target is for the share to be increased to 20 per cent by 2020. This overall target differs from Member State to Member State.

According to Finnish industry, the strategy towards the development of a low carbon society should be combining nuclear power with renewables. One of their messages is that Finland can be regarded as one of the leading countries in the world in the use of bioenergy. Although the Confederation of Finnish Industries (EK) states that the use of bioenergy could be increased still further, they want to ensure the sufficiency of biomass as a raw material for the forest, food and chemical industries. Therefore their overall conclusion is that 'Taking into account the current, very high use of renewable energy sources in Finland, the national target of 38% is unrealistic' (EK 2008) They continue by stating that:

Nuclear power is a form of energy that does not produce emissions. Alongside energy efficiency and the use of renewables, nuclear power plays an important role in controlling carbon dioxide emissions in Finland. Finland's carbon dioxide emissions were reduced considerably when nuclear energy was introduced in the late 1970s. Without nuclear power Finland's annual carbon dioxide emissions would be up to 20 million tonnes more. The introduction of a sixth nuclear reactor in 2011 will reduce annual emissions by 8 to 11 million tonnes. The low operating costs of nuclear power make it ideal for the production of basic energy. (EK 2008)

The Finnish commitment to nuclear energy is based in part on the fact that the country is part of the Nordic common electricity markets.

The Nordic countries have one of the highest proportions of electricity-intensive industries, including a paper and pulp industry, a steel industry, ferro alloys and aluminium smelting plants. These industries have been able to expand because of relatively low electricity prices. The power price-sensitive industry is closely interwoven with the energy industry and has a great deal of interest in the direction of government environmental policy. This conglomeration of industry is rather reluctant to invest in renewable energy sources and the governments are eager to continue the economic growth. Therefore the increasing use of nuclear power seems to offer a shortcut to a low carbon society without causing too much societal concern.

Determinants of recent Finnish nuclear decisions

This book is a collective effort by Finnish scholars of energy policy issues. The aim is to contribute to the global debate on nuclear power by shedding more light on the country's nuclear energy policy than has been undertaken previously. The analysis reveals the complexity of the country's energy policy and the determinants of recent nuclear power decisions.

Chapter 2, by Ari Lampinen, focuses on how the application for a new nuclear reactor was justified by the energy company TVO. His reading of the justification arguments is crucial in assisting our understanding of the favourable decision as all of the arguments were repeated in the government decision and in the process of parliamentary approval. The critical assessment of those four categories of arguments – namely security of energy supply, climate change and other environmental issues, cost of nuclear electricity and employment benefits – is based on the well-known fact that the Ministry of Trade and Industry has historically been a key player in Finnish nuclear power issues. Lampinen sheds light on how the MTI actually rules over energy policy as it exercises preparatory power, regulatory power, licensing power, energy policy expertise power, research and development power, environmental impact assessment power, energy market authority power and shareholder/ownership power in energy companies and in the transmission grid company. He points to the fact that during its preparation for government and parliamentary decision making, the MTI intentionally restricted energy political scenarios to nuclear and fossil fuel scenarios. In point of fact, the MTI has never included a renewable energy scenario in any of its alternative scenarios. This kind of analysis of justification arguments reveals clearly how one state actor can exert influence over both energy and nuclear policy.

Chapter 3, contributed by Harri Lammi, presents a view of the role of the anti-nuclear movement in the nuclear power debate and the decision-making process. He argues that in explaining the success of the pro-nuclear camp in 2002 we have to analyse the internal development of the anti-nuclear movement and the changing framing of nuclear power in public debate. As a representative of an anti-nuclear organization Lammi took part in the

2000–02 nuclear debate both in public and in Parliament. As a result he is able to describe the role and dynamics of anti-nuclear organizations and their lobbying strategy. His overall argument is that during the previous nuclear power debate of 1991–93 the public and the politicians were more receptive to the messages of the anti-nuclear movement. In these consequences, it was easy for a movement to find allies and to form coalitions. This previously heated nuclear debate crippled the movement as it was perceived that they had won the battle and that there was no need to continue anti-nuclear work. Lammi states that when the new nuclear debate began around 2000, the anti-nuclear movement had lost many members, member organizations, allies and, even more importantly, many capable older activists. Because of this discontinuity, they had to build a new anti-nuclear movement and to rethink the strategy. For a new generation of activists the choice was to leave behind the former antagonistic strategy, which had placed too much emphasis on the risks of nuclear power and did not fit their reformative ecological democracy ideology. The main focus of the campaign was the importance of renewable energy. They tried to promote the idea that renewable energy should play an important role in the fight against climate change and that the further construction of NPPs would have an injurious effect on the development of renewable energy technology. Another dimension in their campaign was the economic benefits that would arise from investing in renewable energy and what they saw as the economic madness of new NPPs. According to Lammi, in 2000 and 2001 there were also some preliminary decisions which need to be taken into account. As Parliament made the DiP on the SNF disposal plans and accepted the climate strategy prepared by the MTI which had only featured nuclear power and natural gas scenarios, the anti-nuclear movement lost powerful instruments. The nuclear waste problems were regarded as having been solved and renewable energy and energy efficiency were both deliberately excluded from the ‘reasonable’ national climate strategy. In addition, the Greens accepted the nuclear waste plans, even though they did not accept the further construction of nuclear power.

In Chapter 4 Annukka Berg takes a closer look at the decision making in the Parliament of Finland. Berg interviewed 12 members of Parliament approximately one year after the decision on the fifth NPP unit took place on 24 May 2002. The interviewees chosen were parliamentarians who had been potentially influenced by the nuclear discussion and the parliamentary decision-making process preceding the vote. (This included MPs who were undecided about nuclear power, MPs who had changed their voting behaviour compared to earlier nuclear votes and also MPs who had simply voted differently from their peer group.) In addition, her data also include interviews with two senior parliamentarians, both of whom have been influential figures in the opposing camps of the nuclear discussion. Thus the study considers a balanced sample of MPs, half of whom voted to construct the new NPP and half of whom voted against. Berg’s theoretically driven analysis

indicates that some of the MPs' discourses were consonant with the logic of either simple modernization or reflexive modernization. The former highlighted the minimal risk and economic benefits of nuclear power while the latter dealt with a critical stance towards the modern project. More intriguing than these rather straightforward 'for' and 'against' discourses, however, were the two other discourses. Discourses under the rubric of ecological modernization referred either to the idea that nuclear energy is an efficient means to combat climate change without jeopardizing economic development or to the idea that favouring nuclear power does not solve economic, technological and environmental problems, which would be much better addressed through introducing structural changes in energy policy and with renewable energy sources. Berg's analysis also reveals how the decision to declare the voting on the NPP an issue where 'freedom of conscience' would prevail strengthened MPs' positions and weakened the role of the political parties and parliamentary groups. During the parliamentary process MPs took part in the operation of different committees, organized hearings and discussions. Expert hearings in the committees and messages from the interest groups and other peer groups were deemed to be important, even though the contradictory conclusions of some experts forced them to assess the given information very carefully. Generally, Berg states that while the views of independent experts were much appreciated, the messages from influential interest groups such as the Central Union of Agricultural Producers and Forest Owners (MTK), the Central Organization of Finnish Trade Unions (SAK) and the Confederation of Finnish Industry and Employers (TT) – all of whom were in favour of the fifth NPP unit – received very careful consideration. One of her more surprising findings was that representatives of environmental organizations had difficulties in being granted the status of experts in parliamentary hearings. Some parliamentarians reported that they were cautious about accepting the messages of environmental organizations because their argumentation was perceived to be one-sided. Berg points out that the anti-nuclear movement as a whole faced great challenges in the discussion because of the structural changes in the anti- and pro-nuclear discourses and the altered pro-nuclear lobbying strategy that emphasized the importance of environmental issues and the role of nuclear power in dealing with the problems of climate change.

In Chapter 5 Erika Sänässalo's comparative analysis of Finland, France and Sweden indicates that when trying to understand national nuclear policy we have to pay attention to state institutions and their changing roles in the context of constitutions. For instance, in explaining Finnish nuclear power policy it is not sufficient to refer to how the strong state structures in Finland have contributed to the expansion of the nuclear power industry. Instead, her elaboration of strong versus weak state discussion leads to the conclusion that more sophisticated instruments have to be used than are offered by this distinction. Her suggestion is that in order to gain an insight into the three Western European states under consideration what is

more appropriate is to consider the distinction between strong administrative states and strong party states. In a strong administrative state the constitution provides for the protection of the state's key industries from the hasty political reforms of political parties. By contrast, in a strong party state the constitution offers more opportunities for political forces to challenge previous economic and industrial policies when they have gained a majority in Parliament and a position of power within the government. Säynässalo's analysis indicates how in these three states the characteristics of the state are based on the constitution and provide different kinds of prerequisites for the complex interplay between political parties, the nuclear industry and the administration.

Säynässalo argues that France and Finland can be viewed as strong administrative states. According to her, in both of these states the alliance between the state and the nuclear industry is guaranteed through a combination of constitutional and administrative procedures. Furthermore, in both of these states constitutions have been rather hostile to the idea of executive power in the hands of Parliament and, consequently, in neither of these states have the political parties been able to shape nuclear energy policy effectively. According to Säynässalo, in Finland, however, the centralization of power in the hands of the administration has followed a more complex logic than is the case in France. She points out that while the Finnish constitution has restricted the possibilities of Parliament to exert executive power in general, the paradox is that the Nuclear Energy Act (1987) offers members of the Finnish Parliament an exceptional opportunity to exert such power. Yet, in reality, this ability is strongly limited by the law. Parliament has only a kind of administrative power of veto when government hands down the Decision-in-Principle to Parliament. Therefore this administrative procedure laid down by the law limits the MPs' opportunities to affect the government's nuclear energy policy and instead offers to the administrative agencies prerequisites to govern the policy process. In general, she emphasizes that the weakness of Parliament parallels the inabilities of government parties to take a leading role in energy and nuclear power policy. She concludes that the binding role of legal-administrative procedure has contributed to ensuring that the nuclear industry has the ability to protect its legal rights to engage in entrepreneurship. The procedure itself does not allow government to decide on the schedule for decision making in nuclear energy, but it does force the government to take into account the interests of the applicant for the NPP when considering a proper schedule. The legal-administrative procedure is so binding in Finland that political actors can only make decisions according to this procedure – in other words, the political agenda on nuclear power is not defined on the grounds of political premises.

Säynässalo concludes that while the nuclear policies in France and Finland have been administration-led, in Sweden the government parties have had the capacity to govern the nuclear process. She argues that it is largely due to

the important role of parties and party politics in governing nuclear policy that pro-nuclear politics has been challenged by means of the anti-nuclear movement. In Sweden, nuclear policy has been an essential element of governments' programmatic politics, while in Finland nuclear policy has been decided separately outside party-based parliamentary politics.

Chapter 6 by Matti Kojo provides the readers with a view of how Finnish nuclear waste policy was formed and how it was possible to achieve the unique decision to site spent nuclear fuel in Olkiluoto's nuclear oasis in the Eurajoki municipality. It consists of three complementary parts: the development of a national nuclear waste policy; the development of the site selection process since the early 1980s; and gaining local acceptance through interaction with the Eurajoki municipality, the nuclear waste company Posiva, the nuclear power company TVO and the government. It was originally believed that the best method of dealing with spent nuclear fuel was to export it. IVO with its Soviet-western style NPP²⁵ was able to send the waste to Soviet Union and later to Russia until political pressure forced the Finnish government to change the law. At the end of the 1970s TVO tried to secure reprocessing agreements with a French company or with a British company, but the costs were considered to be too high and the MTI did not consider the elimination of the tender from the point of view of TVO's operating licence. This initiated a change in nuclear waste management policy. More effort was put into research and development work by both the nuclear power companies and the MTI. The government made a Decision-in-Principle (DiP) in 1983, which established the timetable for spent fuel final disposal on the basis of TVO's programme. In 1995 these two nuclear power companies formed a joint nuclear waste company, Posiva, to take care of nuclear waste management. IVO's option to send waste to Russia was discontinued because of the amendment to the Nuclear Energy Act. The challenge for nuclear power companies was to find a suitable place for the repository. Kojo calls the siting strategy pragmatic, although originally the official aim was to make a decision on the basis of systematic geological studies. His detailed analysis of the search for a suitable location illustrates how many different policy instruments were in use and how the whole process exemplified multi-level governance. There were many different actors and the actions took place in several arenas. For instance, Kojo's reports on the interaction between TVO and Eurajoki municipality or Eurajoki municipality and the government are intriguing. Eurajoki councillors were placed under considerable pressure by TVO. The local government was lobbied for a good taxation decision by the representatives of Eurajoki. The representatives of Loviisa, the other Finnish nuclear oasis, challenged the dominant position of Eurajoki to host both a nuclear waste repository and also a new NPP. Officially interpreted, it was a fair game with the right cards, but on closer examination one finds that there were several games at different tables, each employing different cards and rules.

In Chapter 7 Tapio Litmanen concentrates on the stable sociocultural factors and dynamic societal changes that have proved crucial when trying to

understand Finnish nuclear decisions. His argument is that societal risk evaluation varies over time. The temporary nature of risk evaluation emanates from fairly stable cultural factors, but it is equally important to focus on dynamic changes in society. Drawing on Mary Douglas's cultural risk theory Litmanen first considers the cultural characteristics of Finnish society, and what might be the basic values behind nuclear decisions. The Finnish political system is a particularly stable one, based on people's trust in welfare state structures, but also in a high level of trust in both the authorities and other citizens. Citizens' faith in the ideals of enlightenment, the state, technology and bureaucracy has deep historical roots. These factors help to understand why Finnish politicians are able to make difficult societal decisions without leaving a majority of citizens feeling that they have been cheated. Consensual corporatism, in which the government, labour unions and employers' organizations co-operate in order to predict societal development and foster economic growth, is part of the efficient functional governance of society. Although these factors were already in existence in 1993 Parliament rejected the plans for the construction of further NPPs in Finland. In order to understand the favourable NPP decision in 2002 and the nuclear waste decision in 2001 more detailed societal analysis is needed. More emphasis is given to contextual factors and dynamic changes. For example, changing a negative decision to a positive one requires a variety of actors to be involved in the process. The analysis of pro-nuclear lobbying in this chapter reveals that inside Parliament a powerful group of members of Parliament was directing the lobbying operations. Aided by a largely sympathetic media they were able to dominate the public debate, whereas ten years earlier the media had been more favourably disposed towards the messages of environmental and anti-nuclear movements. The anti-nuclear movement did not have such influential allies among the scientists as had existed during the 1970s and 1980s. In addition, the societal role of science had changed and different stakeholders had invoked the authority of science to promote their aims. As the pro-nuclear camp adopted the concession strategy, the front lines of the previous nuclear debate became blurred. Pro-nuclear actors put their faith in environmental values and anti-nuclear actors praised the good economic prospects of alternative energy sources. At the national level the country went through a dramatic transformation process because the economic depression made it imperative to adjust to a new environment. The rapid structural changes in the economy were followed by improved international competition. The new competition strategy was named Fair and Courageous Finland, meaning that the country also dares to take bold decisions. The nuclear power decisions were made in these national circumstances, but it must be remembered that the actors were also strongly influenced by the international developments triggered by the events of September 11, 2001.

Finally, Chapter 8 by Matti Kojo contains a summary of the most important research findings, describing how Finland has reached a political solution to the problem of nuclear waste disposal. Overall, we can conclude that it

is important to understand the most important factors behind the recent nuclear power construction decision and also Finnish nuclear power policy in general.

Notes

1. At the moment three companies are competing for a licence to build the sixth nuclear power plant. Finnish utility Fortum Corporation (51 per cent owned by the Finnish government and the second largest power company in the Nordic region), Fennovoima (a consortium of companies, including, for example, Germany's E.ON AG, stainless steel maker Outokumpu Oyj, regional utilities and Swedish mining and smelting group Boliden) and Finnish utility Teollisuuden Voima Ltd, TVO, (building Europe's first European Pressurized Reactor at Olkiluoto on the west coast) have submitted their applications for the Decision-in-Principle (DiP) to the Finnish government. The Parliament of Finland will process the DIP during 2010. Some officials and industrial leaders have said that Finland needs more nuclear power to meet growing energy demand and to face the challenges of transforming the country to a low carbon society. At the moment, there is political debate about whether or not permission should be given to all three or only for two or perhaps a single NPP project. The option not to licence any of these rivals has by and large not been on the political agenda.
2. The €3 billion Olkiluoto 3 project started in 2005 and has been plagued by delays and is now expected to be online in 2012. It was supposed to be online in 2009.
3. Malcolm Grimston is acknowledged to be a long-standing consultant, advisor, and supporter of the UK nuclear industry.
4. During the years the name has been changed on a couple of occasions. At the beginning of the twentieth century it was called the Agrarian League (Maalaisliitto) and in the 1960s it was called the Centre Party (Keskustapuolue).
5. Suomen Sosialidemokraattinen Puolue was originally founded as the Finnish Labour Party, but in the early twentieth century it was changed to the present form.
6. Kansallinen Kokoomus is a centre-right political party in Finland.
7. Fingrid is the operator of the national transmission network, which carries all electricity at a voltage equal or higher than 110 kV. It owns 13,600 kilometres of lines, which means that it owns nearly all of the transmission lines in Finland and all of the cross-border lines. It started in September 1997, when Imatran Voima Oy (IVO, nowadays Fortum) and Pohjolan Voima (PVO) merged their transmission assets. Fingrid is owned by IVO and PVO (both 25 per cent), the state (12 per cent) and by institutional investors (38 per cent), with no other interests in electricity business. According to Pineau and Hämäläinen (2000, 187), this type of ownership is distinct from that in other countries.
8. They analyse the structure of the electricity sector in Finland before and after the restructuring of 1995. They divide the electricity market into six levels – generation, coordination of sales, system of operation, transmission, distribution and supply – each of which represents a specific subgroup of the industry that can be structured in its own way. Their sophisticated analysis is complemented with four other dimensions – market type (from monopoly to competition), ownership (from private to governmental), horizontal integration and the vertical integration – that also define structures (Pineau and Hämäläinen 2000, 182).

9. In 1995 the Electricity Market Authority was created as an independent expert body under the Ministry of Trade and Industry. Its main tasks are to supervise transmission pricing and issue licenses for transmission operations.
10. His thorough analysis of Finnish energy policy at the turning point was based on 29 focus interviews. The aim was to ascertain the effects of the changes in guidance ideology from planning and regulation to more competitive energy markets on Finnish energy policy and energy sector actors, such as political decision makers, authorities, enterprises and interest organizations. He interviewed 29 members of the energy policy elite: nine from the energy production sector, including public energy companies, private energy companies, regional electricity production, electricity companies owned by foreign capital and municipalities; 12 from the organization sector, including energy production, municipal, industry, entrepreneur and environmental organizations; four from central government (ministries); and four from the political parties (energy policy experts).
11. Ruostetsaari (1998, 212) perceives the subsystems consisting of: (1) energy enterprises, plants and other energy sector companies; (2) interest organizations; (3) authorities or some parts of some governmental authorities; (4) political parties or fractions of political parties; (5) research institutes or parts of them; and (6) media.
12. Today this former agrarian party is called The True Finns (Perussuomalaiset). It is a modern version of the Finnish Rural Party with a political ideology centred on nationalism and Euroscepticism.
13. This party was called Suomen Kristillinen Liitto, but today it is the Christian Democrats (Kristillisdemokraatit). Its roots are in the Christian faction of the conservative National Coalition Party.
14. Ruotsalainen kansanpuolue represent the Swedish-speaking minority in Finland and its ideology is liberalism.
15. The ideology of Vihreä liitto is a mixture of Green politics, traditional centre-left ideology and criticism of conventional political thinking with the rejection of the classification 'left' or 'right'.
16. Vasemmistoliitto was founded in Spring 1990 by the merger of the Democratic League for the Finnish People, the Finnish Communist Party and the Democratic League of Finnish Women. Ideologically, the party wants to be associated with the 'New Left' and Green socialism.
17. The International Energy Agency (IEA) is an autonomous body which was established in 1974 within the framework of the Organisation for Economic Co-operation and Development (OECD) to implement an international energy programme. It carries out a comprehensive programme of energy cooperation among 26 of the OECD's thirty member countries. The Organisation for Economic Co-operation and Development (OECD) is promoting a policy, which aims, for instance, to achieve the highest sustainable economic growth and employment and a rising standard of living in member countries, while maintaining financial stability, and thus to contribute to the development of the world economy.
18. Even though Finland's energy policies are generally perceived to be advanced, balanced and sound, some criticisms have also been voiced. The Agency states that three areas should be given particular attention. 'The first is supply security. Continued government policies are needed to address this challenge, and we urge a somewhat more diverse and long-term approach. The remaining two key areas are energy efficiency and R&D ... arenas where longer-term policies can benefit

the country's energy situation. Investments and policy enhancements in both of these areas help to improve energy security as well' (IEA 2008).

19. Of the 40 industrial countries, Finland was ranked number 32 (see Chapter 2 by Lampinen in this book).
20. Lampinen (2000) gathered those six strategic arguments from the public debate and official documents: (1) Finland is far more advanced than other countries in energy efficiency and reducing CO₂ gases; (2) Industry and exports are too energy-intensive; (3) Because of being a sparsely populated country, traffic produces higher emissions than in other countries; (4) The climate is cold in Finland; (5) The reference year 1990 is disadvantageous to Finland; (6) Emissions are predicted to rise in Finland more than in the EU on average.
21. Electricity market liberalization includes a number of changes: the introduction of wider market competition to ensure customer's ability to choose their energy supplier, the regulation of the transmission system to ensure suppliers access to potential customers, the deregulation of prices, and the expansion of international trade in electricity (Pineau, Hira and Froschauer 2004).
22. The only exceptions are those markets that are reasonably well integrated with neighbouring Member States or those where the main suppliers have, in fact, been privatized and purchased by foreign companies.
23. This reform started in Norway 1991, continued in Sweden 1996, and in Finland 1998 and was completed by Denmark in 2000.
24. Also the studies by van Rooijen & van Wees (2006) and Ek (2005) indicate how the creation of renewable energy markets is a long and laborious task.
25. To get a NPP Finland had to consider the political realities of the time. It became clear that it was politically impossible to get a purely western construction, because of Soviet Union's political pressure to buy their technology. Politicians understood that some kind of cooperation needed to be carried out with the Soviet Union. In the end the Loviisa NPP became a project, in which West and East cooperated in the field of nuclear technology for the first time. The reactor, turbine, generator and other main components are from the former Soviet Union, but safety systems, control systems and automation systems are of western origin. The steel containment and its related ice condensers were manufactured using Westinghouse licences. The degree of domestic origin was approximately 50 per cent (Michelsen and Särkikoski 2005).

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