

# Outline of the Energy and Climate Policy for the Near Future – National Strategy to Implement the Kyoto Protocol

Government Report to Parliament  
24 November 2005



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<b>Title</b> <b>Outline of the Energy and Climate Policy for the Near Future – National Strategy to Implement the Kyoto Protocol</b> <b>Government Report to Parliament 24 November 2005</b>	
<b>Abstract</b> <p>The energy and climate policy carried out in recent years has been based on the National Climate Strategy approved by the Government in 2001 and submitted to the Finnish Parliament as a government report. After completion of the strategy, however, the operating environment of the energy and climate policy has undergone so many changes that, in summer 2003, a stand was recorded in the programme of Prime Minister Matti Vanhanen's Government stating that the Government will implement and revise the National Climate Strategy taking into account the EU Directive on emissions trading and the Kyoto mechanisms. The revised strategy, presented in the document "Energy and climate policy outlines for the near future – national strategy for implementation of the Kyoto Protocol", is given to Parliament as a government report.</p> <p>The report was prepared under the supervision of the Ministerial Working Group on Climate and Energy Policy. The practical preparatory work was carried out by the Climate and Energy Policy Network, comprised of representatives of the Ministry of Trade and Industry, the Ministry of Transport and Communications, the Ministry of Agriculture and Forestry, the Ministry for Foreign Affairs, the Ministry of Finance, and the Ministry of the Environment.</p> <p>The report consists of outline and strategy texts, including background information and stands taken, and four appendices. The strategy proper describes the changes that have taken place in the international operating environment, and presents the Government's outlines for the energy and climate policy in the coming years as well as the actions required by these outlines. The national emission target set for Finland for the Kyoto commitment period can be met with the actions specified in the strategy.</p> <p>According to the trend outlined in the strategy, the diversity of our energy system and the security of energy supply will be preserved, or even improved. The volume of indigenous energy sources, and their share of total energy consumption, will increase during the period 2005–2025. The share of renewable energy sources will increase markedly; on the whole, the share of bio-energy will also rise. Imported energy will account for a smaller percentage of total consumption; this is mainly because of the substantial fall in the amounts of coal and oil used. In contrast, the share of natural gas will rise.</p> <p>The strategy gives an estimate of how the actions presented will affect the energy costs of energy uses, the State economy and other economic indicators, such as the GDP, the consumption expenditure of households, and employment. Implementing the goals of the strategy, especially meeting the emission target, involves more costs for energy users and for the economy. The State economy must also face extra expenditure, although some expenses can also be cut.</p> <p>The appendices contain a report of the measures that the Government has taken in response to statements made by Parliament within the last few years, in connection with the adoption of government reports and legislative proposals submitted to Parliament. The appendices also contain more detailed information on the drafting of scenarios extending up to the year 2025, and of the departure points and results of these scenarios. A summary of the strategy on how to adapt to climate change, drawn up separately, is also presented. In addition, the appendices include a list of the sources used, the studies commissioned during the work, and the bodies and persons who participated in the preparatory work.</p> <p>The Government has not handled the appendices; they have been drawn up by civil servants in the Ministry of Trade and Industry and in other relevant ministries.</p> <p>Contact person at the Ministry of Trade and Industry: Energy Department/Taisto Turunen, tel. (09) 1606 4700 and Petteri Kuuva, tel. (09) 1606 4819.</p>	
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# 1 Introduction

The energy and climate policy followed during the past few years is based on the national Climate Strategy adopted in 2001 by the Government and presented to Parliament as a Government report. However, the operating environment of Finland's energy and climate policy has changed since the adoption of the Strategy to the extent that in summer 2003 Prime Minister Vanhanen's Government decided to complement the Government programme with an opinion stating that the Government will implement a national Climate Strategy and renew it, taking the contents of the EU emissions trading directive and the Kyoto mechanisms into account.

It was decided that the renewed Strategy would be presented to Parliament in the form of a report. The report was prepared under the Government's ministerial working group for climate and energy policy, chaired by Mauri Pekkarinen, Minister of Trade and Industry. The other members of the ministerial group are Jan-Erik Enestam, Minister of the Environment, Antti Kalliomäki (as of 23 September 2005 Eero Heinäluoma), Minister of Finance, Leena Luhtanen, Minister of Transport and Communications (as of 23 September 2005 Minister of Justice) and Juha Korkeaoja, Minister of Agriculture and Forestry.

A preparatory body for the ministerial working group, the climate and energy policy network chaired by the Ministry of Trade and Industry comprises representatives of the Ministries for Foreign Affairs, Finance, Agriculture and Forestry, Transportation and Communications and the Environment.

The organisation of the preparatory work follows the decision in principle of 30 January 2003 by the Government concerning the organisation of climate policy actions by the authorities within government.

The national Energy and Climate Strategy comprises the strategy text proper with background materials and opinions as well as four Appendices.

The Strategy focuses on the changes that have taken place in the international operating environment and presents the Government's outline for the future energy and climate policy, as well as the appropriate measures.

The background report describes the premises of the Strategy preparation, set by the Government programme and statements by Parliament presented during the past few years in relation to the reports issued to Parliament and the adoption of Government bills. A more detailed description of the measures taken by the Government on the basis of the opinions of Parliament can be found in Appendix 1.

The background report also describes the past development related to greenhouse gases both in the EU and Finland, and a forecast for the future trend based on the most recent studies. It also contains the main development scenarios for the strategic outlines, describing the measures necessary for the implementation of the Strategy, as well as the economic and other impacts of these measures. The background report has, however, not been discussed by the ministerial working group responsible for the preparation of the Strategy or by the Government.

Appendix 1 contains a report on the measures taken by the Government as a result of the statements made by Parliament in recent years in relation to the reports given to Parliament and the bills adopted by it.

Appendix 2 is a more detailed description of the writing, premises and results of the scenarios extending to 2025.

Appendix 3 is a summary of a separate strategy regarding adaptation to climate change. Published by the Ministry of Agriculture and Industry, the entire strategy has been included as part of the present Strategy and its implementation.

Appendix 4 is a list of the major studies ordered for this work, as well as the individuals and organisations that have participated in the preparation work.

The Government has not discussed the Appendices which have been prepared by government employees at the Ministry of Trade and Industry and at other competent Ministries.

## **2 Premises of the Strategy**

### **2.1 Changes in the operating environment**

The energy and climate policy followed in recent years is based on the national Climate Strategy adopted in 2001 by the Government and presented to Parliament as a Government report, as well as on earlier energy policy strategies and outlines. After the issuance of the Climate Strategy, the operating environment of Finnish energy and climate policy has changed substantially. For this reason, Premier Matti Vanhanen's Government recorded a new statement in summer 2003, according to which the Government will implement the national Climate Strategy, and renew it with due consideration of the EU emissions trading directive and the Kyoto mechanisms.

The most important change in the operating environment is the emissions trading (ET) directive adopted in the EU which aims at decreasing greenhouse gases and is a part of the European Climate Change Programme, ECCP. Based on the programme, the emissions trading system focusing on carbon dioxide emissions was introduced in the beginning of 2005. Moreover, when the former Climate Strategy was prepared, the implementation rules related to the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC), and the rules governing the use of the flexible mechanisms were only just under negotiations and so could therefore not be addressed in detail in the Climate Strategy.

The emissions trading directive has a major impact on the premises of energy policy, as well as the policy to reduce emissions of other greenhouse gases in other industrial sectors. The principle of the emissions trading directive to set an upper limit of allowable emissions is alone sufficient to guarantee that the units included in the emissions trading sector (ET sector), and the sector as a whole, will meet the objectives set for them. From the emission objective perspective, the traditional control mechanisms, such as taxes and subsidies, would in principle no longer be needed in the ET sector. However, in view of the other objectives, such as ensuring diversified and secure energy supplies, the traditional control mechanisms will also be needed in the future.

The emissions from the sectors outside the emissions trading regime (non-ET sectors), such as traffic, agriculture and individual heating, are not directly influenced by emissions trading. However, it does influence the trend in fuel prices, with an upward impact on power prices also in these sectors.

After the 2001 Climate Strategy, the Government made a decision in principle on Finland's fifth nuclear power unit, adopted in full by Parliament in April 2002. The Government issued the construction permit for the unit in February 2005. The decisions on nuclear power have a major influence on power procurement and CO<sub>2</sub> emissions.

Besides the above premises that have a considerable impact on the Strategy contents, another important cornerstone of the Strategy is that Finland will comply with the greenhouse gas reduction obligation adopted for the obligation period 2008–2012 of the Kyoto Protocol and will implement the national allocation plan regarding the allocation of ETS allowances for 2008–2012. Moreover, the Strategy also takes into account Finland's views on the post-Kyoto international negotiations for the reduction of global greenhouse gas emissions, and outlines the national energy policy so that Finland would meet its international environmental responsibilities, and that the energy policy would support a balanced growth of the economy and development of employment, maintain secure energy supplies and diversified energy procurement structures, and would contribute to the competitiveness of the Finnish economy. Strengthening and intensifying the production and use of energy, intensive utilisation of renewable energy resources and biofuels and developing the procurement structure of electric power are key issues in this respect. In fact, the Government will invest heavily in these areas in the coming years.

The global price of oil has gone up dramatically, impacting the fuel price relationships and levels, which is another factor in favour of the utilisation of renewable energy sources.

## **2.2 International climate negotiations and Finland**

It became clear that the Kyoto Protocol would enter into force as Russia ratified it towards the end of 2004. The Protocol took effect on 16 February 2005. Thus the provisions are binding to the signatory parties. To date, 156 parties have ratified the Protocol. The quantitative greenhouse gas reduction obligations apply to the industrialised countries, with the United States and Australia opting to remain excluded.

A member of the European Union, Finland has undertaken to fulfil its obligations under the Protocol, the most significant of which is that Finland must maintain its annual greenhouse gas emissions at the 1990 level on average during the obligation period 2008–2012.

The Kyoto Protocol commitment period will end in 2012. The EU and several other parties will try to initiate, as soon as possible, new negotiations to develop the climate convention system after the commitment period of the Kyoto Protocol, that is 2012. However, this initiative is not yet backed by sufficient global understanding.

In its meeting of March 2005, the EU Summit, or the European Council, underlined the EU's determination to strengthen the international negotiations by exploring the possible development of the post-2012 arrangements within the framework of the UN climate process and by developing a medium and long-term Climate Strategy for the EU.

The decision by the European Council highlights the importance of global cooperation and participation in the implementation of emission reductions, including a substantial enhancement of joint emission reduction efforts by the industrialised countries. Furthermore, the EU underlined the importance of strengthening the joint efforts by the industrialised countries to reduce emissions, as well as its preparedness to launch a dialogue with other parties. For the developed countries, the focus would be on strategies and reduction paths of the order of 15–30% by 2020, compared to the 1990 level. The means to reach the objective should also be studied, including cost and benefit factors, as well as the ways to involve the most energy-consuming countries in the process, including the developing countries.

The dialogue progressed during late spring and summer 2005. The meeting of government experts, based on the decision of the 10th Conference of Parties to the UN Climate Convention, was arranged in Bonn in May 2005. The meeting conducted constructive discussions on the need and ways to launch discussion on the post-2012 convention arrangements.

Representatives of the large industrialised countries at the G8 Summit of July 2005 adopted a declaration which contained a promise to act resolutely and quickly to reduce greenhouse gases, a recognition of the UN Climate Convention as the suitable forum for the future actions related to climate change, as well as a promise to work together to promote the agreed objectives in the following Conference of Parties (COP11) in December 2005. G8 also agreed on a working programme which includes concrete joint measures, such a technology measures, aiming at emission reduction. Attendants of the Summit, South Africa, Brazil, India, China and Mexico also adhered to the decisions.

Moreover, six Pacific Rim states – Australia, India, Japan, China, Korea and the US – issued a declaration in July on a Partnership of Clean Development and

Climate, with the objective of developing, introducing and transferring cleaner and more efficient technology. The form of co-operation based on a partnership is thus a continuation of the mode of operation selected by the US and Australia. The practical forms of working within the partnership will be decided later. The COP11 will be preceded by several other meetings on the above processes as well as high-level preparatory meetings.

The programme of Premier Matti Vanhanen's Government states that in order to stop climate change, the Government will work actively for the start of a new round of negotiations involving all countries. Finland will prepare itself for these negotiations taking the competitiveness of the economy in consideration. For this purpose, the Ministries must appropriate funds for investigations and research in order to chart and study which kind of emission reduction paths are achievable through various strategies, without endangering the balanced development of the economy.

The UN Convention on Climate Change and the implementation and follow-up of the Kyoto Protocol, as well as the further development of the convention system, entail costs which will be funded by membership fees payable by all parties. Moreover, the implementation rules of the Kyoto Protocol also include a political declaration by the EU and certain other industrialised countries regarding the support provided for the measures taken by developing countries in relation to climate change. The impact of these expenses on the public finances is discussed in Chapter 13.3.

### **3 Outlook of greenhouse gas emissions until 2025**

The Finnish greenhouse gas emissions have grown since 1990, and reached a peak in 2000–2004 which was 20% above the 1990 level.

For this Strategy, the energy consumption and procurement scenarios and emission scenarios have been updated. The scenarios have been compiled so that the “WM scenario” (With Measures) shows the trend with no new measures taken, while the “WAM Scenario” (With Additional Measures) is based on the assumption that new measures impacting both the consumption and procurement of energy and emission will be taken. The updated calculations show that according to both scenarios, the consumption of both primary energy and electricity will grow in Finland in the future. Along with the increase in energy consumption, CO<sub>2</sub> emissions will also grow. Figure 1 shows the trend in greenhouse gas emissions. The increase in emissions is almost entirely caused by the increased emissions from the ET sector, as referred to in the EU emissions trading directive, or mainly energy production and industrial processes. The emissions of the non-ET sectors, mainly traffic, individual heating and agriculture, remain at the current level as a whole.

Finnish greenhouse gas emissions will take a downward turn during the Kyoto Protocol period between 2008 and 2012 once the fifth nuclear power unit is completed. According to estimates, the emissions will, however, exceed the obligation level by about 56 million tonnes, or by about 15% during those years. Calculated in terms of annual averages, the emissions exceed the Finnish commitment by about 11 million tonnes. After the Kyoto obligation period, the greenhouse gas emission will start to grow if no measures are taken. However, the growth rate will be clearly slower than in the past.

Key for the future trend in emissions is, on the one hand, economic growth and its structure, and, on the other, the structure of energy production, especially the solutions in energy procurement. The long-term variation in emissions may be several million tonnes annually, depending on whether the Finnish procurement of electricity is based on emission-free or low-emission fuels and forms of procurement, such as renewable energy sources, nuclear power or electricity imports. However, only some of these decisions can be directly influenced through energy policy.

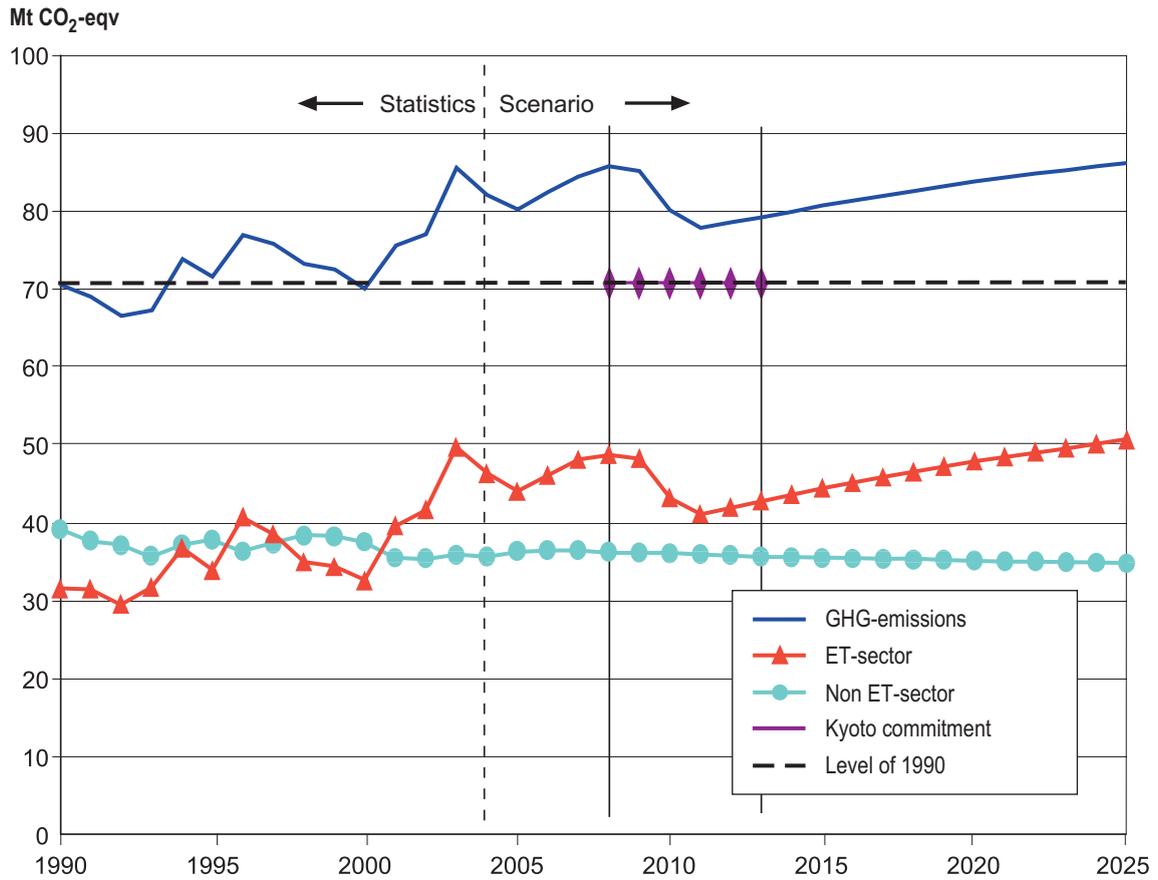


Figure 1. Finnish greenhouse gas emission in 1990–2025, 1990–2004 materialised development, thereafter to 2025 the trend in line with the WM scenario (With Measures), Mt CO<sub>2</sub> eqv.

## **4 Implementation of the emission commitment**

### **4.1 Focal areas of action**

During the Kyoto commitment period, Finland can avail itself of 70.5 million tonnes worth of assigned amount units, or AAUs per year on average. They will not be sufficient to cover the estimated requirement but according to the studies made, the average additional need would be approximately 11 million tonnes higher annually, carbon sink impacts considered. According to the 2001 Climate Strategy, the deficit would have been covered through national measures only. However, today's selection of measures is clearly more diversified, allowing for a more cost-efficient way of managing the emission obligation.

The entry into force of the EU emissions trading system and the chance to use the Kyoto mechanisms extend the use and principles of the means to tackle the greenhouse gas emissions. In addition to the traditional national reduction measures, we can now and in the future also contribute to emission reduction outside our national borders in a manner that these emission reductions will be, as far as the verification of the Finnish emission reduction is concerned, equal to the measures taken to reduce domestic emissions.

One of the central tasks for the Energy and Climate Strategy is to allocate the obligations ensuing from the emission commitments between the companies and institutions included in emissions trading, the sectors remaining outside the trading regime, and the State. The role of government is to allocate the obligations resulting from the emission commitment between the various sectors and actors. The AAUs available to Finland must be divided between the ET sector and the non-ET sector in a cost-efficient manner.

### **4.2 Utilising the Kyoto mechanisms**

According to the calculations ordered by the European Commission, the costs incurred by Finland for greenhouse gas reduction are the third highest in the Union. For this reason, and considering the economic burden caused by emission reduction, this Strategy begins with the premise that the State contributes to emission reduction by utilising the flexible mechanisms provided by the Kyoto Protocol, which makes it possible to increase the Finnish allowable emissions

correspondingly. The flexible mechanisms available to government are the Joint Implementation (JI) projects, Clean Development Mechanism (CDM) and emissions trading (ET) between the states. The State will be prepared to finance about 10 million tonnes of emission reductions procured through these mechanisms during the period from 2008 to 2012. When AAUs are being procured, the mutual cost-efficiency of various flexible mechanisms will be taken into account. Moreover, the State can avail itself of approximately 2.0 million tonnes of verified emission reductions obtained through a pilot programme for 2008–2012.

The management of the flexible mechanisms will be organised as follows: the Ministry of Trade and Industry is responsible for coordination while the Ministry of the Environment is in charge of the JI projects and the Ministry for Foreign Affairs for CDM projects. The JI and CDM are international projects to reduce greenhouse gas emissions. JI projects are implemented between industrialised countries whereas CDM projects are conducted between industrialised and developing countries. The administrative and financing plans and decisions related to the projects will be included in the plant-specific proposal for the national allocation plan regarding the allocation of allowances under EU's Emission Trading Scheme focused on the period from 2008 to 2012. The respective legislation should be completed well before June 2006, the deadline for submitting the proposed allocation plan to the Commission.

The Ministry of the Environment will prepare the JI strategy and also study the feasibility of the national JI projects on that occasion. The implementation plan for the CDM projects will be drawn up by the Ministry for Foreign Affairs, with special consideration to the status of developing countries in the upcoming climate convention negotiations.

### **4.3 Outlines concerning the allocation plan of emission allowances in the period 2008–2012**

Without the additional measures presented in this Strategy, Finnish greenhouse gas emissions would exceed the Kyoto commitment annually by about 11 million tonnes on average between 2008–2012. Using the Kyoto flexible mechanisms, the State will be prepared to procure 10 million tonnes worth of emission reductions for the entire period, an annual average of 2 million tonnes. The annual need for reductions is thus about 9 million tonnes.

Outside the ET sector proper, in other words in traffic, agriculture, individual heating and waste management, the emission reduction costs will be high. According to estimates, the cost-efficient potential of reducing emissions in the non-ET sectors during the Kyoto period is about one tonne per year on average. That leaves an average of about 8 million tonnes of annual reduction needed in the ET sector, which means that the total quantity of emission allowances allocable to the ET sector falls somewhat short of the estimated need. The Government will make the final decision on the proposed allocation plan of Finnish emission allowances.

The preparation of the proposed Finnish allocation plan has started. As in the period 2005–2007, the allocation plan only concerns CO<sub>2</sub> emissions in the same sectors as in the former plan.

A preliminary opinion at this point, the Government finds that the proposed allocation plan could group the production sites and their production in similar sub-groups as in 2005–2007, and that the emission allowances allocable to the industrial processes in which the emissions originate in the raw materials or fuels used for the processes, should be based on their estimated needs.

The proposed allocation plan could be prepared so that when the emission allowances of power units are considered, their overall efficiency should be taken into account.

The emissions trading Act will be amended as far as the allocation criteria and the implementation of the so-called linking directive are concerned.

The opportunity could be reserved for the actors to use the Kyoto mechanism in emissions trading, to the plant-specific maximum extents allowed by the implementation rules of the Kyoto Protocol and the linking directive.

## **5 Energy policy outlines and objectives**

### **5.1 Securing energy procurements**

Securing the procurement of fuels, electric power and heat is one of the major objectives of energy policy not only for the International Energy Agency IEA and the EU, but also for Finland. From the international perspective, the biggest concern has been to secure the availability of oil because the centre of global oil production is in areas which, for quite some time, have been characterised by political instability.

In the EU, in particular, natural gas has also attracted increasing attention from the supply security of supply and availability point of view. In the long term, the EU and the rest of Europe must rely increasingly on imports for their gas supplies. The most important source of imports will be Russia in the future.

The extensive power outages in the past few years both in Europe and in the US have attracted great attention, showing how important the uninterrupted power supply is for modern society. From this perspective, the focus of the preparations for emergencies and interruptions in power supplies has been sharpened.

In accordance with the decision (350/2002) of the Government, the national objective for safeguarding energy availability is to promote energy production based on several fuels and procurement sources. Due to the particular conditions of Finland, the energy supply security is maintained at least at the level of the EU and IEA obligations.

The Finnish procurement of primary energy and electric power is very diversified and balanced by international standards. With the exception of natural gas, fuels are imported from various sources available in the international markets. This also applies to electricity imports. The objective of the energy policy is to maintain a diversified, decentralised and balanced energy system in the future. For its part, the Government continues to try to ensure an optimally diversified and sufficient availability of electric power and other forms of energy. The focus in this respect is on domestic energy, in other words renewable energy sources and biofuels.

Emissions trading, for its part, will improve the security of the energy supply by increasing the market price of electric power considerably, which, in turn, makes renewable energy more competitive in the electricity markets. However, if no cor-

rective measures are taken, emissions trading may also weaken Finland's energy security by unbalancing the fuel procurement structure because the competitiveness of peat in the production of condensing power would weaken vis-à-vis the imports and imported fuels.

The consumption of power is estimated to grow so that the capacity requirement would increase by some 200 MW annually until 2015, and thereafter by about 100 MW. This increase, combined with the exit of the existing capacity, will be covered by the construction of new domestic capacity and by electricity imports. In view of the security of the energy supply, the domestic capacity should, however, be sufficient also in situations in which imports would not be possible due to exceptional climate or other conditions. Cogeneration of power and heat, as well as the nuclear power unit under construction, will cover most of the additional need for domestic capacity, at least until the mid-2010s.

The Government will continue to promote the combined heat and power production (CHP) in the future. The premise of the decisions influencing power procurement is that the consumption of heat is combined as efficiently as possible with the CHP, paying due attention to the technical and economical aspects. The status of CHP is promoted by, for example, considering the overall efficiency of power units as a factor in the allocation of emission allowances.

One of the strengths of Finnish energy supply is the diversity of procurements, as well as the share of bioenergy and renewable energy sources which is larger than the European average in both primary energy and electric power. It is vital that also in the future, the procurement of electric power will remain diversified and the capacity sufficient. The Government finds that no production form that has no adverse emission effects and is cost-efficient, even if of minor importance, should be excluded when the new capacity is being built in the future. This will help to create conditions for persistent investment activities in Finland, as well as for investments in new base-load capacity in electricity production by the year 2015. At the same time, Finland will be preparing itself for the international, probably increasingly tough emission reduction obligations of the post-2012 period.

The premise of Finnish electricity market legislation is that under normal circumstances the decisions to add new capacity are made by the companies in this sector based on commercial criteria. Only in extremely threatening and exceptional situations of shortage of capacity will it be purposeful to start the capacity tendering procedure envisaged by the current Electricity Market Act. In the framework of this procedure, the State will launch the measures to build new capacity and procurements based on a call for tenders.

In order to promote combined heat and power production, as well as to increase the use of biofuels and renewable energy sources, the connection of small power units in the power grid is facilitated through a developed regulation of the energy markets. The ensuing additional costs will be taken into account in the tariffs of other grid users.

## **5.2 Developing the energy market**

As far as the infrastructure of the energy network is concerned, the objective is to be able to feed fuels and electricity to the networks flexibly from various directions and sources, and that it will be uncomplicated to join the energy networks and systems.

With this objective in mind, Finland has actively participated in the development of the pan-Nordic electricity market, opening its domestic market in the same way as the other Nordic countries have done. The aim is to proceed in this respect so that the remaining obstacles in the electricity market, such as the power transmission bottlenecks between the countries, will be eliminated, at the same time increasing the transparency of the market and the pricing of electricity.

The emissions trading within the EU has increased the price of electricity in the Nordic electricity exchange, also resulting in the increase in the cost incurred by power consumers. The Government will study ways to limit the unearned increment or the windfall profits from power production.

The optimal self-sufficiency of Finnish electricity supply will be taken into account, when the permits for new import transmission lines are being considered.

A second pipeline would be particularly important for the gas network. This pipeline would enhance the users' confidence in the stability of gas prices, improving the conditions for the investments related to the use of gas. The plan to construct a new pipeline from Russia to Germany and beyond is increasingly a matter between the Russian and German gas companies and consortia. It would be important for Finland that the plan classified by the EU as one of the primary pipelines (the North-European Gas Pipeline), or a pipeline that would cross the Baltic countries, would also cater to the needs of the Finnish gas market. Indeed, Finland's objective in relation to gas is to establish a pipeline connecting the country with the continental European gas network.

### **5.3 Efficiency of energy production and use, and energy conservation**

Measures related to the efficiency of energy production and use, as well as to energy conservation, are included as competitiveness factors in various EU policy actions, such as the Lisbon strategy. The EU's joint energy policy actions are underpinned by factors such as enhanced competitiveness, secure energy supplies and greenhouse gas reduction. These objectives also constitute the focal premises of energy conservation in Finland.

According to the Council directive on energy end-use efficiency and energy services, amended in the first reading, the member states should show to have improved their energy efficiency by one percentage point annually for six years. This is an indicative target. The Commission proposed initially a binding target. However, the European Parliament proposes a binding target which is higher than the one proposed by the Commission. The directive would apply to sectors outside the emissions trading regime, and the public sector and energy companies would be objects of special obligations. Moreover, the Commission published a Green Paper on energy efficiency on 22 June 2005. In time, it will lead to new legislative projects at the community level.

The implementation of the EU emissions trading scheme will have a major impact on a more efficient use of energy. Caused by emissions trading, the increase in the market price of electricity and the increase in the cost of emission-intensive fuels will substantially improve the cost-efficiency of energy conservation, thereby contributing to the attainment of energy conservation objectives not only in the ET sector but also in the sectors outside it. Energy conservation is particularly important in the non-ET sector because the emissions there are not limited through the use of emission allowances, as is the case in the ET sector.

The energy conservation measures are underpinned by the objectives and obligations imposed by the EC directives. In the national implementation voluntary actions, such as energy conservation agreements, energy audits and sector or measure-specific programmes will be utilised. The economic subsidies targeted at the development and implementation of energy efficient technology and innovative modes of operation play a central role in this respect. These measures are complemented, as necessary, with targeted regulation, with due attention paid to cost-efficiency, as well as disseminating target group specific informations.

The preparations to extend the energy conservation agreements will proceed rapidly. Special attention will be paid to the question of how the agreement covering

the non-ET sectors could be also used for the attainment of the greenhouse gas reduction objectives. The implementation of new energy efficient technology is highlighted in the new agreements.

The measures taken to date have resulted in significant energy savings. By continuing and intensifying these operations, as well as by adopting new energy saving measures related to the implementation of EU directives, the target is to obtain 5% additional savings in energy consumption by 2015, compared to a situation with no new measures taken.

The long-term objective of the energy conservation measures is to curb the growth in the overall consumption of primary energy and to bring about a downturn in the trend.

## **5.4 Promoting the use of renewable energy**

The renewable energy sources used in Finland comprise hydropower, wind power, heat recovered from the environment and solar energy, as well as renewable bioenergy which includes wood-based fuels, field-derived biomass (energy crops), biogas and the biodegradable part of REF, or recycled energy fuels. In Finland, peat is considered to be a slowly renewable biofuel.

### **5.4.1 Premises for promoting the use of renewable energy**

The factors influencing the efforts to promote the use of renewable energy include the decisions taken and directives adopted by the EU, to be taken into account in the Finnish energy policy.

The EU target is to increase the renewable energy's share of primary energy from 5.4% in 1997 to 12% by 2010. However, the development materialised to date has not complied with the trend objective because in 2002 the renewables accounted for only about 6% of the whole.

Under the directive on the use of renewable energy in power production, the overall EU target is to increase the share of electricity generated with renewable energy from about 14% in 1997 to 22% by 2010. As is the case with the other directive, the EU is not going to reach its objectives set in this directive: electricity generated in the EU with renewables has remained at the level of the comparison year 1997, or at about 14%. In the Commission's judgement, the measures taken to date will not allow the targets to be met.

The Commission is currently preparing an action plan to increase the use of bioenergy in the EU. In time, this will lead to new community legislation to be enacted.

In Finland, renewable energy has accounted for 22–25 % of primary energy in the past few years. The share of electricity generated with renewable energy sources, with the annual rainfall being average, has been about 27% of the overall consumption of electricity. According to an indicative target set with the above directive, electricity generated with renewable energy sources should account for 31.5% of the Finnish overall power consumption in 2010. This is a very demanding objective under Finnish circumstances since the most important part of domestic renewable energy sources, or hydropower, can hardly be increased without legislative amendments. Despite this, this objective is pursued through intensified measures in line with the present Strategy. Emissions trading and the ensuing influence on higher power prices will contribute to the attainment of the objective.

According to the directive on the promotion of the use of biofuels in traffic, the indicative target for the share of biofuels in all fuels in traffic is 2% in 2005 and 5.75% in 2010. For justified reasons, the national targets can differ from the EU targets. The target set by Finland for 2005 is a 0.1% share. The national target for 2010 must be set in 2007, and a working group has been instituted for the definition of the target and the preparation of the measures required by the implementation of the directive. During preparation, special attention must be paid to the opportunities to use not only economic instruments, but also norms and regulations, as well as to the means used by the other EU countries. Due to the higher price of oil, the conditions for the utilisation of biofuels have improved.

The introduction of the EU emissions trading scheme has changed the situation substantially, as far as the promotion of the use of renewable energy sources is concerned. As such, emissions trading furthers the use and competitiveness of renewable energy. Triggered by the emissions trading scheme, the increase in the market price of electricity and in the costs for the fuels causing emissions enhances the competitiveness of, for example, wood-based energy clearly more than the conventional investment subsidies and tax relieves.

The subsidies appropriated to the ET sector for the promotion of renewable energy have no impact on the attainment of the emission reduction targets. Therefore the subsidy criteria have more to do with the security and diversity of energy supply as well as on employment and regional policy aspects. From the perspective of climate policy objectives, during the Kyoto period it is advisable to use the State budget money for the procurement of emission reductions through the Kyoto

mechanisms in cases in which they are more cost-efficient than subsidised domestic projects. Outside the ET sector proper, in other words in traffic, agriculture, individual heating and waste management, emission reduction continues to call for economic steering tools/instruments.

The use of renewable fuels can be promoted through energy policy measures, mainly as far as forestry chips, energy crop-derived biomass, biogas and small-scale use of wood are concerned. The actions envisaged by the Strategy increase the use of these energy sources to a considerable extent, by 65% from 2003 to 2015, and by about 80% by 2025. The use of renewable fuels is particularly important for the small local district heating plants or those in individual buildings, typical representatives of the non-ET sector, since their emissions are not regulated through emission allowances as is the case in the ET sector proper.

The overall use of renewable energy is naturally extremely dependent on the development of the forest industry because the biofuels resulting from the production of the forest industry account for the largest share of all renewable energy in Finland. The objective of the Strategy is that the total consumption of renewable energy would grow by at least one fourth by 2015 and by at least 40% by 2025. Renewable energy could then account for almost one third of primary energy. In 2003 that share was 23%.

#### 5.4.2 Renewable bioenergy

A significant share of Finnish energy is generated with renewable bioenergy (wood-based energy, energy crops, biogas and recovered energy fuel). The Finnish objective is to remain among the leading industrial countries in the use of bioenergy. Bioenergy generation also plays a significant role in regional and rural area development in Finland.

The development of the energy-generation use of black liquors from the forest industry as well as of industrial waste wood will mainly depend on industrial production. Thus many factors outside energy policy play a role. Above all, we must work persistently to ensure that the operating conditions of the Finnish wood processing industry remain favourable. For example, the increased use of wood-based energy must not jeopardise the availability of raw materials in the forest industry.

Energy policy can be used, and has been used, to exercise significant influence on the competitiveness of forest chips and other bioenergy forms. In the evaluation report of the environmental impacts of the Strategy, the potentially adverse influ-

ences of forest energy will be highlighted, such as the impoverishment of forest soils and the decreased biodiversity of the forests. For this reason, we will need to follow the development of forest nature in order to avoid any long-term adverse environmental impacts.

When considering the promotion of the production of power from energy crops, the agricultural policy subsidies play a central role, as such subsidies have decisively improved the profitability of energy crop use and production. When promoting the use of energy crops for the production of energy, Finland will look for solutions which minimise the separate need for the transport of the raw material. The use of power generated from energy crops will also be promoted through technology development measures.

There are significant potentials to increase the small-scale use of wood for energy production purposes in connection with new and refurbishment construction, and as a complementary form of heating together with electric heating, in particular. The small-scale use, in pellets or other form, will be promoted through support targeted at the development of equipment, economic instruments and information activities.

The use of REF, of recovered energy fuel, depends mainly on the waste management solutions. But waste management legislation sets demanding requirements for the energy use of waste. It is vital and urgent that we develop new handling and exploitation forms for biodegradable wastes, because under the EC landfill directive less and less waste can be dumped in landfills.

Generated from community waste and as a by-product of animal husbandry, the exploitation of methane as a biogas would provide considerable benefits in future decades in terms of climate policy, increase in bioenergy use, decrease in odour nuisances and restitution of nutrients in the fields. The subsidies will be targeted at equipment investments, as well as research and experimentation related to biogas, in order to increase the use of biogas at farms and other sites, both as a source of energy and in production.

### 5.4.3 Hydropower and wind power

Together with bioenergy, hydropower is the most significant renewable energy source in Finland. The potential to increase this form of energy is limited if the respective legislation is not amended. On the occasion of the reform of the Water Act, the potential for building additional domestic hydropower will be evaluated. The objective is to exploit a maximal share of the additional hydropower potential, taking the energy and climate policy objective, environmental protection considerations and regional impacts into account.

There is much unused potential in the exploitation of wind power on the Finnish coastal areas and mountains in Lapland, in particular at sea. Although wind power is characterised by weak cost-efficiency in comparison with other forms of renewable energy, we must ensure – mainly in view of the development conditions and export potential of Finnish technology – that the utilisation of wind power continues to be significantly promoted in Finland. Increased production of wind power calls for further development of wind power technology, use of subsidies, as well as an efficient management of land use planning and permit procedures. Investment subsidies will be allocated only to projects involving new technology. Emissions trading, and its upward impact on electricity prices, will further wind power production.

### 5.4.4 Other renewable energy sources

The utilisation of heat from the environment (soil, waters and outside air) as well as exhaust air from apartments through the use of heat pumps has proceeded positively. The emphasis of the promotion measures has been on subsidising information activities. In order to achieve the objectives related to energy produced with the help of heat pumps, the support will be targeted at safeguarding the high level and reliability of the technology in this sector.

To develop the solar energy market, the related R&D and experimental operations will be supported. Moreover, the actions to promote the integration of solar energy into building materials, such as the utilisation of solar panels in external structures, will be intensified.

## 5.5 Renewable energy sources and biofuels

In 2003, renewable energy sources and biofuels, in other words the domestic energy sources, accounted for about 30% of the total consumption of primary energy. The Government aims at increasing this share substantially over the coming ten or fifteen years. For example, the objective is to increase the overall consumption of domestic energy sources at least by one fourth during the same period.

The Strategy envisages a particularly strong advancement of the use of chip made of forest residuals, energy crop biomasses, recovered energy fuels and biogas. In this respect, the objective is to at least triple their share of primary energy, from about 2% in 2004 to over 6 % in 15 to 20 years.

The situation of peat has become more difficult after the start of emissions trading. This is mostly due to the carbon content of peat, and the ensuing CO<sub>2</sub> emission coefficient, being defined solely on the basis of the emissions released by burning. The emission coefficient defined in this way is larger than, for example, that of charcoal. This means that it is worthwhile for the power plant units and district heating centres to replace peat by imported fossil fuels. In order to define an emission balance that would take the entire lifecycle of peat into consideration, an extensive research project has been organised to shed further light on this question by the beginning of 2006. Finland will be active in disseminating the knowledge from this research, to be used for international calculations.

The use of peat, especially for the generation of condensing power, shall remain on a lower level than in earlier years, unless new measures are taken. The objective of the Government is that the resources invested in peat production and utilisation could also be utilised in the future in a manner to further employment and regional development. The Ministry of Trade and Industry has started studies to analyse how the status of peat could be safeguarded in the competition against imported fuels in the production of condensing power.

In view of the bioenergy objectives, it is vital that the competitiveness of peat is ensured in combined heat and power generation, as well as in the separate production of district heating vis-à-vis imported fossil fuels. This will help us unblock the bottlenecks potentially caused by emissions trading as it steers the demand for wood towards energy use, instead of further processing forms. The economic instruments influencing the energy use of peat must not, however, jeopardise the development of the energy use of forest chip and biomasses from energy crops.

## **6 The objectives related to the use of energy by communities and buildings**

The following measures regarding the use of energy by communities and buildings will be taken:

The location of new building stock is directed towards areas with existing service, traffic and energy systems. Such steering is particularly important as far as the important concentrations of workplaces and commercial services are concerned. At the same time, R&D will be promoted to find community structure solutions which would diminish greenhouse gas emissions caused by such structural factors.

The planning co-operation between the Ministries of the Environment, Trade and Industry and Transport and Communications will be activated to reconcile community development, business policy and traffic policy.

In collaboration with municipalities and the construction business, attractive forms of urban residential living as well as urban communities of small houses with efficient land use will be developed.

The objective of the energy subsidies granted for residential buildings is to improve their energy efficiency. Simultaneously, the use of renewable and low-emission energy sources will be promoted, providing indirect opportunities for product development. The current subsidies granted to energy renovations of residential buildings total about 17 million euros annually. A comprehensive analysis of the energy efficiency of energy investment subsidies, as well as of their emission reduction impact, will be performed in 2006. Based on the outcome, the level and allocation of financing will be decided. If the energy renovations of residential buildings continue to be supported, savings must be made in other forms of subsidy. The Government finds it important to speed up the introduction of non-emission and low-emission forms of heating in small houses. For this purpose, a study will be made focusing on the question whether the current subsidies could be targeted at investments aiming at heating system changes in small houses, or alternatively, if the tax deduction granted for household services could be extended to cover these investments. This study will be completed by the end of January 2006.

Energy savings will also be promoted through real estate management tools, such as the development of user and maintenance instructions. Moreover, follow-up of

energy consumption will be improved with the help of various methods, including better consumption measurements.

In the construction of new buildings, energy efficient and low-energy building is promoted through information and R&D activities, including the support allocated to experimental building in residential areas with small houses.

The environmental impact report related to this Strategy will address the adverse health impacts related to methane and small particles from the small-scale burning of wood. Information-based steering to the residents and municipal authorities will be increased to diminish such adverse effects. Moreover, the emission requirements for new solid fuel burners and fireplaces, applicable to individual houses or their consortia, will be both studied and set.

The founding of commercially operating heating plants fired by forest chips and small-scale wood will be promoted in the small house areas in the population centres, at the same time guaranteeing that the air has no harmful health impacts.

## 7 Objectives related to traffic

To reduce greenhouse gas emissions from traffic, the essential measures include more efficient traffic systems, improved competitiveness of energy efficient forms of traffic and utilising technologies that cause minor CO<sub>2</sub> emissions.

Combined with land use planning, the planning of traffic systems will be further developed to make the systems more efficient. The co-operation between the State and municipalities in planning and implementation will be increased. In land use planning, the expansion of growth centres is directed at areas with a well-functioning public transport system. The commitment of the parties to the implementation of the traffic system as a whole, and public transportation investments, in particular, will be supported with the help of a system constituted by memoranda of understanding, because the improved energy efficiency of passenger traffic in urban areas calls for an attractive and competitive public transportation system and sufficient investments in public transportation.

The attractiveness of public transportation is further improved through the introduction of a season ticket for public transportation offered as an employee benefit, as well as through government participation in the development of passenger information services and travel centres. In the Helsinki metropolitan area, the Government will promote a uniform season ticket for the commuter area. The public transportation in rural areas as well as the basic train services will be ensured.

The studies to develop the vehicle tax imposed on private cars will continue, with the objective of account for the CO<sub>2</sub> emissions. The objective is to implement this reform as soon as possible.

Part of the general transportation logistics development task, the energy efficiency of goods traffic will be improved based on a logistics action plan. Conditions will be created to transfer an increasing volume of heavy transport to the railways. The priority will be on investments improving the competitiveness of energy efficient transportation forms, such as the railways and shipping.

The development and implementation of various issues, such as training in energy-saving driving, the savings programmes in goods and public transportation, will continue and the respective follow-up will be increased in order to support the savings measures.

High costs and the requirements related to the distribution systems and the use of biofuels complicate their use in traffic. Despite this, the creation of an EU biofuel market based on cost-efficiency is actively and consistently promoted. A working group has been instituted to promote the use of biofuels, with the task of analysing the various technological alternatives for production and use of these fuels. The working group must also study the eventual normative instruments regarding the obligation to make the fuels available to the markets, as well as other promotion measures. The working group must make their proposal on the national objective and necessary measures under the directive on the promotion of biofuels in traffic use. The working group must also address the conditions that are necessary for Finland to reach the objective set by the directive, or 5.75% of road traffic fuel consumption in 2010.

In its own procurements, the State will promote and prioritise more energy efficient vehicles as well as those run on biofuels.

The feasibility of vehicle user charges as an instrument to steer its use will be analysed as the possibilities offered by the new communications technology evolve.

The EC emission directive will be used to steer development of the working machine motor technology. As applicable, the experience gained in road traffic will be utilised in the preparation of the regulations related to the motors and fuels of working machines. Moreover, the information and logistics will be developed to limit the emissions resulting from the use of working machines, and the possibility to use biofuels will be analysed. Voluntary energy saving agreements will also be utilised, and the initiatives to control the greenhouse gas emissions from working machines will be supported at the EU level.

## **8 Municipalities and the climate change**

From the climate policy perspective, municipalities are both energy producers and users. The municipalities are also responsible for community waste management. They could best cater for the climate issues in the planning, construction and refurbishment of new community structures, building stock and infrastructure. The environmental impact report included in the Strategy highlights the role played by the municipalities in the transition towards a community structure utilising energy and other natural resources in a more efficient manner. According to the report, the municipalities can significantly influence the environmental impacts related to community structure. According to the report, the objectives will probably call for stronger steering than in the past.

It is important to continue the co-operation between the State and the municipalities to save energy and promote the use of renewable energy sources. By summer 2005, 70 municipalities and 15 joint municipal authorities had signed an energy saving agreement with the Ministry of Trade and Industry. This agreement procedure aiming at energy savings and use of renewable energy sources will be further developed. Besides the Ministry of Trade and Industry, the Government will study the feasibility of prospective agreements to be concluded with other Ministries.

In order to improve the energy efficiency and use of renewable energy by the municipalities, the following measures are also proposed, with the municipalities carrying the main responsibility for their implementation:

The operating model of the municipal climate protection campaign is continued and further developed.

Through administrative and community planning means, we will promote the creation of a sound community structure characterised by energy economy and generating little traffic. New areas will be planned so that they are easily accessible with public transportation. Energy efficient local and district heating operations will be promoted in areas still in the zoning planning phase.

The co-operation between urban areas will continue and be developed in order to create energy efficient solutions both in planning and provision of services.

The use of renewable energy sources will be promoted.

Energy conservation will be furthered by encouraging municipalities to undertake energy efficient solutions in both goods and service procurement, as well as by including energy savings as an item in the development of local industry and business and the various municipal administrations. The co-operation between municipalities in climate change mitigation is encouraged, also as concerns the planning and service production related to the adaptation to such issues.

The coordination of climate policy measures at regional and municipal levels is developed so that they would efficiently further the objectives of the national Energy and Climate Strategy, while taking the diversity of the municipalities into account. Adapting to climate change will be taken into account in the operation and interaction of the various municipal administrations.

To implement the Strategy, local expertise and competence related to energy and climate issues is particularly needed, and such expertise must be introduced and strengthened through counselling, training and communications.

## **9 Use of energy and climate policy steering tools**

The EU emissions trading scheme is the main climate policy instrument in the ET sector. The use of the traditional energy policy steering tools must be re-considered in the new reality created by emissions trading. This is particularly true for the ET sector and the related State subsidies and energy taxes.

### **9.1 Energy technology development**

The Government finds that technology development and respective financing remain the major tool towards the attainment of energy and climate policy objectives. A strong investment will be made in innovations mitigating climate changes, with a special focus on competence areas that are strong from the Finnish point of view. The public funding appropriated to business-driven projects will be maintained at least at the previous years' level.

In the long term, the development of climate-friendly technologies and innovations will produce the most sustainable and efficient results for the Finnish economy. By investing in a persistent development of technology, we will create opportunities to face and react to the potentially tightening future obligations to reduce greenhouse gas emissions. Besides technology, the development focuses on the entire operating, implementation and business chains. The renewable energy and energy efficiency technologies remain the important sectors.

Intensive and persistent investments in R&D will generate and introduce to the markets new solutions related, in particular, to power and heat cogeneration, industrial energy production, decentralised energy production and efficient use of energy. These solutions could, for example, be based on the efficient and cost-effective utilisation of biofuels, either with the current or new technologies or through new product concepts, including the production of biofuels for traffic use. In view of these objectives, the possible establishment of a special biofuel technology forum will be investigated, to promote the demonstration and commercialisation of new technology, in particular. In addition to the above, the conditions for the export of new energy technology will be enhanced.

Technology development is supported in the framework of the comprehensive technology programmes conducted by the National Technology Agency of Finland, TEKES in which the governmental research organisations and universi-

ties work in close co-operation with the relevant industry. With virtually the same level of financing, the second TEKES form of operation is selective project financing which is allocated either to projects performed by research centres and universities or to industrial product development projects. Moreover, the Ministry of Trade and Industry will finance demonstration and commercialisation projects related to new technology.

Investments related to energy production and use have been supported on both energy and climate policy grounds. It is no longer justified to apply these investment subsidies to ET sector projects, to the same extent as in the past, because the attainment of climate policy objectives can be ensured through emissions trading. Therefore the available funds will be targeted mainly at projects aiming at the introduction of new energy technology on the one hand, and, on the other, at projects associated with an exceptional technological risk, due to the demonstration character of the projects.

## **9.2 Energy taxes and subsidies**

In the ET sector, energy taxes are economic instruments that overlap with emissions trading. According to studies made, emissions trading will have an increasing effect on the price of electricity and the energy bill paid by users and consumers. At the same time, the competitiveness of the production of power based on renewable energy sources improves, while the competitiveness of electric power over other forms of energy, especially in the heating of small houses, weakens.

Considering the climate and energy policy objectives, and the competitiveness of industry, in particular, the Government has reached the following conclusions regarding energy taxes and subsidies:

- The energy subsidies paid to the ET sector, other than those paid to technology and experimental projects, will be abolished. New technology refers in this context to both pilot technologies and progressive technologies already in the market. Outside the ET sector, the traditional technology projects can still obtain State support.
- In order to ensure the competitiveness of fuel peat and the self-sufficiency of energy supplies, the tax and tax support related to peat was abolished as of 1 July 2005.
- The electricity tax imposed on industry and greenhouses will be lowered.

- The tax support granted to electricity production will be abolished as regards electric power generated by black liquors and other industrial wastes and by-products. The tax support granted to electricity produced by other renewable energy sources will remain in force.
- Investments to increase the use of forest chips and small-scale wood will be promoted.
- Ways to promote the introduction of reed canary grass on the markets will be investigated.
- The radical increase in the market prices of liquid traffic fuels and light fuel in autumn 2005 will have a significant impact on the CO<sub>2</sub> emissions from fossil fuels. The increase in the price of liquid fuels will curb the emissions from traffic while the higher price of light fuel will increase the use of renewable fuels in individual heating systems, improving the competitiveness of district heating in residential areas with small houses. In the household sector, the considerable increase in power prices will particularly affect the houses with electric heating. This will enhance the position of heating solutions based on renewable energy as well as that of low-energy construction.
- The Government aims at controlled and persistent reduction in the use of fossil fuels, as well as at the improved energy efficiency of heating solutions and heating based on renewable energy. The Government will follow the materialisation of these objectives in the long term, and if necessary, will increase the taxes on oil products and electricity in tax category I (household, services, etc.), if the objectives are not reached.
- Due to the increase in electricity prices resulting from emissions trading, there is no need to introduce a new separate tax on electric heating. On the basis of studies made, the introduction of such a tax would also involve considerable fiscal problems of a technical nature.
- In order to promote the use of forest fuel, evaluations have been made on the budgetary appropriation need related to the direct subsidies payable to the harvesting of forest fuel, based on the proposal by the workgroup on the forest financing legislation. During the Kyoto period from 2008 to 2012, the appropriation need for forest fuel harvesting and chipping is about 6 million euros annually. With the help of this subsidy, the wood that is not usable as industrial raw materi-

al or does not end in energy use through market mechanisms, will be directed for energy production.

### **9.3 Feed-in tariffs and green certificates**

Some EU countries promote the use of electricity generated with renewable energy sources by feed-in tariffs based on forced purchases, or by green certificates. The introduction of the two systems is also being investigated in Finland, taking the international experiences and especially the progress of the joint Swedish-Norwegian certificate system into account. There are, however, several problems related to the practical implementation of the systems, both from the Finnish and the Nordic electricity market point of view.

The introduction of green certificates is still under consideration if the incentives generated through the emission trading scheme and the current system based on investment and tax support fail to promote renewable energy to a sufficient degree.

### **9.4 Energy conservation agreements, training and communications**

The preparations to extend the energy conservation agreements, the bulk of which will terminate at the end of 2005, will proceed rapidly. In the sectors where the actors commit themselves to target-oriented and efficient energy conservation agreements, the new agreements will be taken into consideration when the eventual new instruments are dimensioned. Special attention will be paid to the question of how the agreement covering the non-ET sectors could be also used for the attainment of the greenhouse gas reduction target. The support to energy audits and analysis operations will continue to constitute a central element of the agreement system. The implementation of new energy-efficient technology and energy use innovations is highlighted in the new agreements. The objectives related to the use of renewable energy sources will also be linked to the agreements, as applicable in the sectors in question. The follow-up system focusing on the results of the energy conservation agreements will be used for the reports required by the upcoming energy services directive.

Instituted by the Ministry of Education, the energy training committee will inform and support the education administration so that the teaching at various levels could pay sufficient attention to the development needs of the knowledge related

to climate change and the energy sector, for example in the teaching objectives and curricular planning of various levels. Targeted at vast user groups, the instruction and information related to energy conservation and use of renewable energy sources will take place in close co-operation with expert organisations as well as regional and local actors.

## **9.5 EU emissions trading as economic instrument**

A market-oriented procedure, the EU emissions trading system is a cost-efficient climate policy economic instrument. However, it works at the EU level, and therefore Finnish domestic policy cannot be used to impact its key influence channel, or the price of emission allowances. The steering influence exercised by emissions trading cannot be dimensioned in advance to meet the energy and climate policy needs. Therefore, the traditional economic instruments are still needed, even under the ET regime, due to the energy policy objectives, in particular.

Emissions trading has some unfavourable consequences for society, which have to be remedied through domestic measures. Thus emissions trading used as a economic instrument also imposes certain costs on the Finnish economy. The most significant unfavourable impacts include the ET leverage on the price of electricity, and thereby also on the international competitiveness of Finnish industry. According to studies made, the price of electricity on the Nordic electricity market would potentially go up by 7.5 euros/MWh if the cost of one emission allowance were 10 euros/tCO<sub>2</sub>, or by as much as 15 euros/MWh at the emission allowance price of 20 euros/tCO<sub>2</sub>. Before the start of emissions trading, the quoted exchange price of electricity was about 20 euros/MWh. We are thus faced with very significant impacts.

Emissions trading combined with the operating mechanisms of the electricity market thus cause significant transfers of income from electricity consumers to its producers. Based on some examples, the following is a description of the dimension of the problem.

According to studies made, the estimated additional benefit gained by the electricity producers who provide their clients with market price power, would be about 450 million euros annually at the emission allowance price of 10 euros/tCO<sub>2</sub>, if the producers would get all emission allowance free of charge. The calculation does not include the industry's own production or the production for power company shareholders. If the price of emission allowance is higher, the benefits grow accordingly. The annual need for emission allowances for the production of market-based elec-

tricity is estimated to be about 14 million tonnes on average during the Kyoto commitment period. At the emission allowance price of 10 euros/tCO<sub>2</sub>, this would correspond to 140 million euros. Even if the producers of market electricity had to buy all the necessary emission allowances on the open market, the impact of emissions trading on their financial performance would still be extremely positive.

The district heating sector also draws significant benefits from the electricity market impact of emissions trading, if the sector sells the power to its clients at market price.

The electricity market impact of emissions trading does not affect in full the cost of the electricity produced by the industry for its own uses, nor are there any such additional profits to be gained as is the case in the production of market electricity. This also applies to the production purchased by the industrial companies at cost from the power plant units in which they are shareholders.

Electricity production is thus the only sector that draws considerable benefits from climate policy. The benefits are gained both by separate production and by cogeneration. The extra benefits gained by power producers are paid by its consumers. Industry cannot transfer the increase in electricity prices to the prices of its end products, but the higher power price is reflected as weaker competitiveness. The strongest eroding effect of the power price on competitiveness is seen in energy-intensive export industries with little electricity production of their own. Such sectors include, in particular, metal processing and certain chemical industry sectors. The forest industry also suffers from the increase in the market price of electricity, although its situation is facilitated by the considerable share of electricity produced by the proprietary power plants. The losses of competitiveness can be alleviated by lowering the electricity tax imposed on industry.

The cost impact of electricity prices also hits the service sector and households. If the price of electricity goes up by 15 euros/MWh, the annual combined power bill paid by households would be 400 million euros higher, and that of the service sectors 200 million euros. In agriculture and forestry as well as in construction, the electricity costs would in that case go up by over 20 million euros per year.

National measures are needed as tools for the energy policy objectives, as well as for climate policy, in the non-ET sectors. The current energy taxes and tax support systems promote not only renewable energy sources, but also the competitiveness of domestic fuels at a more general level. The measures continue to be needed, especially in view of energy-related self-sufficiency and regional considerations. Although the ET system as such supports the competitiveness of renewable energy sources, the intensity of the support is not known, because the price of an emission allowance is determined by the international markets. National measures thus ensure the continuity of competitiveness.

## 10 Sectors outside energy production and use

In order to reduce greenhouse gases from the waste management sector, we have to limit the growth in waste volumes and landfill handling, use waste more efficiently and intensify the recovery and use of the methane emissions from landfills through material and fiscal regulatory amendments, including the following measures:

- The landfill handling of biodegradable waste will be limited by issuing provisions on the acceptance procedures related to biodegradable community waste received by the landfills so that the volumes of such waste decrease gradually in line with the EU directive on landfills.
- The handling of landfill gases will be increased by extending the recovery and handling of these gases not only to new landfills but also to the old landfills which were founded before the enactment of the gas recovery obligation, still in active use and, possibly, also to old landfills which are no longer in use.
- The impacts of the waste policy steering tools will be studied. Based on the results, the national waste management plan, to be prepared in 2006, will envisage intensified steering related to, for example, biodegradable wastes, the economic instruments included.

The use of F gases will be controlled through an EU regulation which will limit their use in certain processes and uses, and will impose a regular checking obligation related to certain equipment containing F gases, in order to prevent and repair eventual leaks. The use of F gas as a cooler in the air conditioning of vehicles will be limited through a directive.

The containment of greenhouse gas emissions from agriculture will continue with the help of the promotion of sustainable agriculture and the implementation of comprehensive environmental measures, such as environmental subsidies to agriculture, the environmental conditions of other support forms and the nitrate directive. Moreover, the good management of agricultural land is promoted.

Finnish forests are managed, used and protected in a sustainable manner. In line with the national forest programme and the measures to promote renewable energy sources, the use of wood-based energy, use of wood in construction and increased use of wooden products will be promoted. The role of forests for the mitigation of climate change must be estimated by a span of several years.

## 11 Carbon sinks

Article 3.3 of the Kyoto Protocol obliges the countries in Appendix I (mostly industrialised countries) to consider the emissions and carbon sinks resulting from forestation, reforestation and deforestation in view of the attainment of the Kyoto obligations. The calculations will include measures taken after 1 January 1990. The impact of the measures will be calculated in terms of change in the carbon stock between 1 January 2008 and 31 December 2012. The impact of other greenhouse gases emitting from the soil during the commitment period must also be taken into account. In order to minimise the emission, small-scale forestation of arable fields will be continued to a small extent in suitable areas. Clearing new fields will no longer be promoted through agricultural subsidies. Ways to decrease the clearing of forests for construction, traffic arteries and energy networks will be studied.

Article 3.4 of the Kyoto Protocol provides the countries with the chance to choose additional measures with the resulting carbon sinks included in the calculations. Since the forest management measure is associated with several uncertainties and risks, Finland will not apply the forest management measure under Article 3.4 during the first Kyoto Protocol commitment period.

Agricultural and grazing land management and revegetation are among the other optional measures under Article 3.4 of the Kyoto Protocol. Increasing the carbon stock of agricultural land is a measure with temporary impacts, because the sequestered carbon stock will be released back into the atmosphere when the soil is tilled. Due to the uncertainties related to this issue, Finland will not apply the agricultural and grazing land management or the revegetation measures under Article 3.4 during the first commitment of the Kyoto Protocol.

## 12 Adaptation strategy

In order to adapt to climate change, special resources are already now needed in various climate-sensitive industries. The premise of Finland's national adaptation strategy to climate change is that the country's economic and social welfare is maintained and that we prepare ourselves in view of the climate change in time. The key in this respect is to increase our national preparedness and adaptability at a sufficiently early stage so that we can face the threats and utilise the potentials of climate change.

The following actions to be taken in 2006–2015 will enhance Finland's national preparedness in adapting to climate change:

- Analysis of the impacts of climate change and the definition of adaptation measures will be included in the usual planning, implementation and follow-up operations performed in various sectors.
- Different sectors will prepare for more frequently occurring and increasingly extreme climatic phenomena, including the evaluation of climate change impacts in long-term investment plans.
- In order to improve adaptability, we will develop existing and new observation and alarm systems, engaging in international co-operation if necessary, ensuring that the systems and operations are internationally compatible.
- A research programme on the adaptation to climate change for 2006–2010 will be prepared in 2005.
- Finland will prepare itself in view of the changes in the international operating environment brought about by climate change, highlighting the adaptation to climate change as one of the core issues in Finnish development co-operation work, and integrating adaptation as an integral part of the country's national sustainable development programmes.

No special budget appropriations are proposed for the financing of the adaptation strategy measures at this point but the increase in preparedness is implemented in accordance with the mainstreaming procedures.

## **13 Impacts of the Strategy**

### **13.1 Structure of energy procurement and consumption**

The development in line with the Energy and Climate Strategy will increase the number of domestic energy sources, as well as their share of the total consumption of energy in 2005–2025 in comparison to the current situation. The share of renewable energy sources will grow substantially, and bioenergy will also account for a larger share of the whole. The decrease in imported energy is due to the marked drop in the share of coal and oil. However, the share of natural gas is increasing.

The trend in renewable energy sources will vary considerably between the various energy forms. Among the wood-based fuels, the production volumes of black liquor, bark and industrial chip are dependent on the forest industry production, and therefore the utilisation of these energy forms is growing very slowly. The volumes of bark and industrial chip are decreasing as a result of the expected decline of saw industry production. Hydropower production cannot be increased materially under the current legislation which protects natural rapids. The increase in small-scale use of wood is a consequence of the growing use of pellets and briquettes in small houses.

The use of the energy sources which can be influenced through the Energy and Climate Strategy measures is radically increasing. Such renewable energy sources include forest chip, wind power, energy crop biomass, recycled energy fuels, biogases as well as the recovery of heat from the soil. The objective of the Strategy is to create conditions for these energy forms to grow by an average of 10% annually between 2005 and 2015. Through persistent and target-oriented energy policy, the positive growth rate can also be maintained on a longer term.

### **13.2 Impacts on the Finnish economy**

From the perspective of the Finnish economy, the management of the emission reduction commitment has some adverse effects on the activity of the economy compared to a situation without such obligations. The outlines of the Strategy minimise the adverse effects resulting from the compliance with the obligations; although the EU emissions trading system causes problems, such as those discussed above, the costs incurred for the emission target are, however, smaller under the ET regime, compared to a situation in which only national measures

would be taken. The use of the Kyoto mechanisms also decreases the costs of emission reduction management.

The following Table shows the assessed impacts of the management of Finland's emission reduction commitment on certain key economic parameters, at two alternative prices of emission allowances. The comparison is made against the situation with no commitment.

*Table 1. Economic impacts of the emission commitment in the Kyoto commitment period 2008–2012. Change from situation (level) with no target, in percentage.*

Price of emission allowance	10 euros/tCO <sub>2</sub>	20 euros/tCO <sub>2</sub>
GNP	-0,6	-0,9
Private consumption	-1,4	-2,2
Investments	-0,1	-0,3
Employment	0,0	0,1

Source: Government Institute for Economic Research (VATT)

The studies underpinning the Strategy (VATT) also showed that the State's participation in the management of the emission target through the Kyoto mechanisms will lower the costs incurred by the economy. The impacts will not yet become evident during the Kyoto commitment period, but would start to show clearly in the future, if the State correspondingly increases the purchases of emission reductions along with the tightening of emission reduction commitment.

The regional impacts of the Strategy are most clearly shown in the changes of the competitive situations between peat and energy wood. Some of the peat production jobs will be transferred to forest chip procurement. The total net change in jobs in the production of domestic fuels will be minimal. The losses will be most marked in areas with peat used for condensing power production.

### **13.3 Impacts on public finances**

From the perspective of finances, the Strategy will result in minor amendments in the energy tax system, as well as the criteria for granting energy subsidies. The following tables show estimates of the impacts of the Strategy on government revenues and expenditure during the Kyoto commitment period, using the calculation premises indicated below.

Table 2 shows an estimate of the average annual energy tax revenue broken down by energy sources during the Kyoto obligation commitment period 2008–2012. In line with the Strategy, the unit tax imposed on electricity consumed by industry and greenhouses (electricity tax category II) has been reduced by 50 % in the example calculations. A reduction of this magnitude in the electricity tax would lead to an annual decrease of about 100 million euros in the State tax revenues. In the calculations under Table 2, the unit taxes are assumed to remain at the current level. According to the estimates, the energy tax yield during the Kyoto commitment period would fall somewhat short of the tax yield in 2004. This Strategy does not include any decisions regarding tax levels, and thus the changes in the calculations are only examples.

*Table 2. Estimate of energy tax revenue in 2004 and during the Kyoto period 2008–2012, annual average, million euros (year 2004 = current prices, Kyoto period = 2005 prices).*

	Estimated tax revenue by type of fuel in 2004 <sup>1)</sup>	Average tax revenue in line with Strategy in 2008–2012
Fuel excise taxes	2565	2415
– Motor petrol	1450	1310
– Diesel oil	750	790
– Light oil	190	170
– Heavy fuel	60	50
– Coal	50	40
– Natural gas	50	55
– Peat	15	0
Electricity taxes	470	390
– Tax category I (including households, services)	260	280
– Tax category II (industry, greenhouses) <sup>2)</sup>	210	110
<b>Total</b>	<b>3035</b>	<b>2805</b>

1) Sources: Advance energy information 2004 and estimates by the Ministry of Trade and Industry

2) When estimating the tax revenue of electricity tax category II for 2008–2012, the unit tax has been reduced by 50% as an example only.

In this Strategy, the tax support included in the energy tax system would change so that the support for electricity produced with industrial black liquor, waste and by-products would be abolished. At the same time, we should prepare for increasing tax support granted for other renewable energy sources, such as forest chip, wind power and recovered energy fuels, in particular. The energy tax refund system applied to energy-intensive industry would remain unaltered in the Strategy but the financing need would be markedly smaller when the electricity tax unit of indus-

try is lowered. As a result of the above measures, the tax supports envisaged by the Strategy would amount to some 20 million euros less than in 2004.

*Table 3. Estimate of the energy tax system expenses under the Strategy in 2004 and during the Kyoto period 2008–2012, annual average, million euros (year 2004 = current prices, Kyoto period = 2005 prices).*

	Year 2004	Tax support under the Strategy in 2008–2012 average
Tax support to production of electricity	39	22
Electricity produced with wood	31	14
– Waste sludge and by-products	26	0
– Forest chip	5	14
Metallurgic gases	3	0
Other tax support to electricity production (incl. wind power)	5	8
Tax refund to energy-intensive industry <sup>1)</sup>	20	4
<b>Total</b>	<b>59</b>	<b>26</b>

1) When estimating the tax refund to the energy-intensive industry for 2008–2012, the unit tax of electricity category II has been reduced by 50% as an example only.

Today, the State finances technological R&D, energy investments, energy sector information and training, energy wood harvesting and chipping as well as energy renovations of residential buildings. The financing of the emission reductions obtained through the Kyoto mechanisms will be a new financing item.

The most important current financing category is constituted by the subsidies to energy technology R&D, about 60 million euros annually. This funding is part of the technology financing managed by the National Technology Agency of Finland, TEKES, and it varies from year to year according to the demand of technology financing by the companies and TEKES's allocable financing resources. The technology R&D financing granted by TEKES is further supported by the energy subsidies appropriated by the Ministry of Trade and Industry.

During the past few years, the Ministry has granted about 30 million euros annually in terms of this subsidy. The support to renewable energy and energy efficiency investments will continue. The subsidies will remain as close to the current amounts as possible, even though the use of the Kyoto mechanisms calls for new, considerable State financing. In the future, energy subsidies will be targeted increasingly at the introduction of new technology. New technology refers in this context to both

pilot technologies and progressive technologies already on the market. Energy subsidies will also be used to support energy audits at companies and institutions. Table 4 shows the suggested investments in energy subsidies, information and training, as well as in the energy wood harvesting and chipping support.

The Government intends to start acting rapidly in the acquisition of the Kyoto mechanisms, thereby procuring them at the best possible price. This would make it possible to spend the resources saved on the promotion of new technology. In practice, the costs incurred for the use of the mechanisms can either increase or decrease the energy subsidies itemised in the State budget under the Ministry of Trade and Industry.

With the help of the subsidy for the energy wood harvesting and chipping, the wood that is not usable as industrial raw material or does not end in energy use through market mechanisms, will be directed for energy production. This appropriation will be used for the harvesting and chipping of waste from the management of young forests. At present, only one fifth of such waste is recovered. The support system calls for development based on the evaluation of its impacts.

The current subsidies granted to energy renovations of residential buildings total about 17 million euros annually. A comprehensive analysis of the energy efficiency of energy investment subsidies, as well as of their emission reduction impact will be performed in 2006. Based on the outcome, the level and allocation of the financing will be decided. If the energy renovations of residential buildings continue to be supported, conservation must be made in other forms of subsidy. The Government finds it important to speed up the introduction of non-emission and low-emission forms of heating in small houses. For this purpose, a study will be made focusing on the question of whether the current subsidies could be targeted at investments aiming at heating system changes in small houses, or alternatively, if the tax deduction granted for household services could be extended to cover these investments. This study will be completed by the end of January 2006.

The UN Convention on Climate Change and the implementation and follow-up of the Kyoto Protocol, as well as the further development of the convention system, entail costs incurred for the operation of the Secretariat of the Climate Convention, which will be funded by membership fees payable by all parties. The entry into force of the Kyoto Protocol will increase these fees. The work performed by the Kyoto mechanism administration bodies and the Kyoto Protocol control committee, as well as the founding of an international emission register entail other financing needs. Besides the participation fee, voluntary financing is used to fund the preparatory and implementation measures, as well as the participation of developing countries in the meeting of the Convention bodies.

Moreover, the Convention and the Protocol impose several obligations on industrial countries to support developing countries in the implementation of the Convention, mitigation of and adaptation to climate change. In the framework of current climate co-operation, the support to developing countries is appropriated mainly through the public development co-operation funds.

In order to meet the Finnish climate commitments, we must utilise the JI and CDM projects under the Kyoto Protocol, intended to be used for the procurement of emission reductions, which would increase assigned amount for Finland in 2008–2012 by a total of 10 million tonnes. The order of magnitude of the appropriation for this purpose cannot be estimated accurately because the price of the emission reductions is determined in the marketplace. If the estimated price is 10 euros/tonne, the Kyoto mechanism procurement would require 100 million euros. Under the ongoing pilot programme, the price has been relatively low but it can be expected to increase in the future. The use of the mechanisms will start promptly and the related financing will be already included in the 2005 and 2006 supplementary budgets.

The Strategy will allow Finland to reach its greenhouse gas commitment in a cost-efficient manner during the Kyoto commitment period, and it seems that it will be possible to contemporaneously safeguard the operating security and diversity of Finland's current energy system. The implementation of the Strategy will result in the need to increase certain State appropriations. The appropriation-related outlines will be taken under new consideration if the compliance with budgetary frames so requires. The Government will decide on the amounts of the appropriation and the respective time schedule at the Government's annual framework and budget talks, also considering the price trends in the energy and emission reduction markets.

Table 4. *Estimate of the financing volume in line with the Strategy in 2008–2012, million euros (in 2006 money).*

	Suggested financing in 2008–2012, annual average (in 2006 prices)
Ministry of Trade and Industry:	
– Technological R&D	60
– Kyoto mechanisms (incl. administration)	12
– Energy subsidies	26
– Information and training	2,5
Ministry of Agriculture and Forestry	
– Energy wood harvesting and chipping	6

## 14 Economic aspects related to later commitments

There are no international emission commitments related to the post-Kyoto period. However, the mitigation of climate change will call for both more extensive involvement and larger emission reduction, and this is the basis on which the EU has outlined the emission reduction policy on a longer term. The conclusion of the European Council in March 2005 pointed out that when studying their emission reduction strategies, the developed countries should focus on emission reduction paths of the order of 15–30% by 2020, compared to the Kyoto Protocol basis level, or the emissions in 1990.

Tighter emission targets mean that the states would have a continuously decreasing number of assigned amount units (AAU) to divide. Finland's average annual obligation during the Kyoto obligation period is 70.5 tonnes of CO<sub>2</sub> equivalents. The tightening of this obligation by 30% would mean that in 2020 there would be only 49 million tonnes worth of AAUs available, compared to the need of about 84 million tonnes. The 35 million discrepancy between the need and availability of the AAUs would have to be covered by national measures and flexible mechanisms.

The allowed emission amount must be divided among the ET sectors and non-ET sectors. The State must retain on its own account an amount of AAUs corresponding to the emissions from the non-ET sectors. The rest would be distributed among the ET sector companies and institutions. As the emission targets tightens, those included in the ET regime will have decreasing amounts to divide among themselves, unless the emissions from the non-ET sector cannot be reduced in a cost-efficient manner. Of course, the State can increase the number of AAUs through flexible mechanisms, but as the obligation is tightened, this alternative becomes burdensome from the public finances point of view.

Besides the costs incurred for emission reduction, the Finnish climate policy costs also include those from adaptation to and control of the damages caused by climate change. The latter costs will increase in proportion to the magnitude of climate change. Any avoided cost for adaptation or damage control can be considered climate policy benefits. Benefits are also created by the export potentials related to climate-friendly technologies.

The post-Kyoto commitments should cover the various countries as comprehensively as possible. Besides influencing climate change, extensive participation is

important from the perspective of competitiveness. The additional costs caused by emission target may lead to distortions in competition and transfers of production towards other industrialised countries or important developing countries, if the obligations do not cover these countries comprehensively. Extensive involvement is also deemed to press down the emission allowance price.

In addition to the toughness of our own target, the costs incurred for emission reduction are also influenced by the severity of the overall EU objective as well as the comprehensiveness of the convention system and the means envisaged in it. The link is created through the EU emissions trading scheme and the price of the emission allowances, in particular. The less emission allowances are allocated within the Union to the ET sectors, the higher the price of emission allowances will be. The price of emission allowances, in turn, will influence the costs of emission target management in the entire EU, Finland included. The price of the emission allowances distributed within the EU is also influenced by the EU emissions trading links to other corresponding systems and the Kyoto mechanisms, possibly already during the Kyoto period. After 2012 the price level will depend, for example, on the potential scope of the international emissions trading in the framework of the convention system valid at that time.

The combined impact of the longer-term objectives, flexible mechanisms and national measures is not currently known. More research in these issues should be promptly carried out in Finland.

## **15 Environmental impact analysis related to the Strategy**

The national Energy and Climate Strategy has significant environmental impacts as referred to in the Act on the Assessment of the Authorities' Plans and Programmes on the Environment. However, the measures envisaged by the Strategy will cause relatively few changes in current production and consumption. According to the report on the environmental impact evaluation, the measures are relatively small and will not lead to significant changes in production or consumption. Furthermore, the Strategy should not envisage great changes in the post-Kyoto period. Thus the environmental impacts of production and consumption do not change radically but gradually.

Models made on the trend in acidifying and particle emissions shows that the scenarios of the Energy and Climate Strategy can be adapted to the emission reduction objectives of climate protection. Finland will be able to comply with the current international obligations to reduce acidifying emissions, although new emission units were procured through the Kyoto mechanisms. Under extreme circumstances, NO<sub>x</sub> emissions might become a limiting factor, calling for new technical measures. About half of all small particles originate from long-range transportation of airborne pollutants, and thus the national Energy and Climate Strategy has only a minimal impact on these emissions.

Many of the probable changes in environmental impacts are in harmony with other environmental objectives, but not all. The Kyoto mechanisms may also help us find cost-efficient solutions for the reduction of greenhouse gases, and promote energy conservation and use of renewable energy resources. The increase of emission units within the economy by the State will, however, partly weaken the steering impact of emissions trading in the EU, in view of the measures targeted at production and consumption that save energy and minimise the use of natural resources.

Conflicts may also be created between the utilisation of renewable energy sources and the objective to ensure biodiversity. It is possible to control or totally prevent these problems by including sufficiently diversified environmental analyses in the plans for the measures.

Peat production causes adverse environmental impacts, especially as regards water systems and biodiversity. Although such impacts have been diminished through developed production technologies and control of the location of the operation, local conflicts remain frequent.

The outlines related to communities and construction are largely in harmony with the more comprehensive objectives aiming at an ecologically efficient society. Efforts to reintegrate communities can also support an economical use of natural resources and the objectives to reduce emissions. The cultural heritage, as well as the safeguarding of recreational and green areas and their diversity, may set limits on the rate of concentration of the structures. Small-scale burning of wood causes small particle emissions but actions to develop more efficient burning techniques may reduce the problem.

Outlines regarding traffic and transportation are in line with the objectives to create more unified and integrated communities, as well as resource-saving infrastructures and traffic. Follow-ups have, however, shown that it is very difficult to influence the increase in traffic. Efficient actions call for closer co-operation between various sectors both in planning and in implementation.

The municipal sector plays an important role in the transition towards a community structure with a more efficient use of energy and other natural resources, and it may have a significant influence on the environmental impacts related to community structures. Reaching the objectives will probably call for stronger steering than in the past.

Economic and other instruments related to waste management promotes the utilisation of biodegradable material and energy, which in turn reduces the need for landfill space and diminishes the adverse environmental impacts of waste management.

In agriculture, the important measures are related to the production of renewable energy, waste utilisation and reduction of emissions from animal husbandry. To date, the development has been relatively slow.

Forestry plays a central role for the production of renewable energy sources. The use of forest chips is estimated to be the most rapidly growing renewable. The use of forest chips is estimated to grow over 5% annually by 2025. It is vital to follow the development and to steer it to avoid adverse environmental impacts in the long term.

The Finnish adaptation strategy is comprehensive by international standards, and sets a good basis for concrete adaptation measures. Some of the adaptation measures also support other environmental objectives but at the same time, adaptation may also cause new environmental impacts. Therefore the environmental impacts of adaptation need to be addressed when the measures are evaluated before their comprehensive application.

The views of businesses and private citizens regarding the Climate Strategy show that climate change is a problem people are aware of, but some of the concrete measures are, nevertheless, opposed by many. Businesses are concerned that Finland needs to invest proportionally more in greenhouse gas emission control than other countries do. Some people are prepared to change their own consumption habits in favour of the environment but counter-reactions are also to be expected if the prices of electricity and fuels, in particular, increase considerably.

Important economic instruments for the implementation of the strategy include energy subsidies, taxes, support to R&D and innovations as well as counselling and training. Details of subsidy and taxation systems, in particular, may influence the ensuing environmental impacts considerably. The probable environmental impacts of the subsidies and taxes related to renewable energy sources must be estimated in detail before their application. It would also be justified to test the support system on a small scale before their comprehensive introduction. For example, the history of swamp drainage shows that a subsidy system may cause significant and extensive adverse effects, hard to fix once the system is in place.

Some of the objectives set in the Strategy can be reached through the Kyoto mechanisms. Their use for the reduction of the emission has proven to be very cost-efficient, particularly as concerns CDM and JI. The CDM projects, in particular, can be implemented with minor costs, and they often contribute to solving the environmental problems of developing countries, as well as to the sustainable development of their infrastructure.

R&D and innovation operations can be furthered through the subsidy systems, but the generation of positive environmental impacts, in particular, also requires that other sectors of policy send clear and systematic signals about the desired development trend. The inclusion of environmental conditions and criteria in financing systems helps to pay increased attention in other environmental impacts. They also help to avoid undesired side effects of the solutions that focus on the reduction of greenhouse gas emissions.

Tekijät (toimielimestä: nimi, puheenjohtaja, sihteeri)  <b>Kauppa- ja teollisuusministeriö</b> <b>Energiaosasto</b>	Julkaisuaika <b>Maaliskuu 2006</b>  Toimeksiantaja(t) <b>Kauppa- ja teollisuusministeriö</b>  Toimielimen asettamispäivä
Julkaisun nimi <b>Lähiajan energia- ja ilmastopolitiikan linjauksia – kansallinen strategia Kioton pöytäkirjan toimeenpanemiseksi. Valtioneuvoston selonteko eduskunnalle 24. päivänä marraskuuta 2005</b>	
Tiivistelmä Viime vuosina harjoitettu energia- ja ilmastopolitiikka on perustunut hallituksen vuonna 2001 hyväksymään ja eduskunnalle selontekona annettuun kansalliseen ilmastostrategiaan. Strategian laadinnan jälkeen energia- ja ilmastopolitiikan toimintaympäristö on kuitenkin muuttunut siinä määrin, että kesällä 2003 pääministeri Matti Vanhasen hallituksen ohjelmaan kirjattiin kanta, jonka mukaan hallitus toteuttaa kansallisen ilmastostrategian ja uudistaa sen ottaen huomioon EU:n päästökauppadirektiivin sisällön ja Kioton mekanismit. Uudistettu strategia, joka on esitetty asiakirjassa ”Lähiajan energia- ja ilmastopolitiikan linjauksia – kansallinen strategia Kioton pöytäkirjan toimeenpanemiseksi”, annetaan eduskunnalle valtioneuvoston selontekona.  Selonteko on valmisteltu hallituksen ilmasto- ja energiapolitiikan ministerityöryhmän ohjauksessa. Ministerityöryhmän valmisteluena on toiminut eri ministeriöiden edustajista koostuva Ilmasto- ja energiapoliittinen yhdysverkko, jossa ovat mukana kauppa- ja teollisuusministeriön, liikenne- ja viestintäministeriön, maa- ja metsätalousministeriön, ulkoasiainministeriön, valtiovarainministeriön ja ympäristöministeriön edustajat.  Selonteko koostuu linjaus- ja strategiateksteistä taustoineen ja kannanottoineen sekä neljästä liitteestä. Varsinaisessa strategiasa kuvataan kansainvälisessä toimintaympäristössä tapahtuneita muutoksia sekä esitetään valtioneuvoston linjaukset tulevien vuosien energia- ja ilmastopolitiikalle sekä näiden linjausten edellyttämät toimenpiteet. Suomen kansallinen päästövelvoite Kioton sitoumuskaudella voidaan strategian mukaisilla toimilla saavuttaa.  Strategian mukaisessa kehityksessä energijärjestelmämme monipuolisuus ja energianhankinnan varmuus säilyy ja paraneekin nykytilaan verrattuna. Kotimaisten energialähteiden määrä ja osuus energian kokonaiskulutuksesta kasvaa vuosien 2005 – 2025 aikana nykytasoon verrattuna. Uusiutuvien energialähteiden osuus kasvaa selvästi ja myös bioenergian osuus kokonaisuudessaan on kasvussa. Tuontien energian osuus alenee, mikä johtuu pääasiassa kivihiiilen ja öljyn osuuden selvästä laskusta. Maa-kaasun osuus sen sijaan kasvaa.  Strategiassa on arvioitu toimenpidekokonaisuuksien vaikutuksia energiankäyttäjien energiakustannuksiin, valtiontalouteen ja kansantaloudellisiin kokonaistekijöihin, kuten bruttokansantuotteeseen, kotitalouksien kulutusmenoihin ja työllisyyteen. Selonteon tavoitteiden toteuttaminen, varsinkin päästövelvoitteen hoitaminen, aiheuttaa kustannuksia energiankäyttäjille ja kansantaloudelle. Myös valtiontaloudelle strategian toimenpiteet aiheuttavat lisämenoja, vaikka eräiltä osin menot vähenevät.  Liitteet sisältävät selvityksen siitä, minkälaisiin toimiin valtioneuvosto on ryhtynyt niiden lausumien johdosta, joita eduskunta on esittänyt viime vuosina sille annettujen selontekojen ja lakiesitysten hyväksymisten yhteydessä. Liitteissä kerrotaan myös yksityiskohtaisemmin vuoteen 2025 ulottuvien skenaarioiden laadinnasta, niiden lähtökohdista ja tuloksista sekä esitetään lyhennelmä erikseen laaditusta ilmastomuutoksen sopeutumisstrategiasta. Liitteissä esitellään myös käytetyt lähteet, työn yhteydessä teetetyt selvitykset sekä työn valmisteluun osallistuneet tahot ja henkilöt.  Valtioneuvosto ei ole käsitellyt liitteitä, vaan ne on laadittu virkatyönä kauppa- ja teollisuusministeriössä ja muissa asianomaisissa ministeriöissä.  KTM:n yhdyshenkilöt: Energiaosasto/Taisto Turunen, puh. (09) 1606 4700 ja Petteri Kuuva, puh. (09) 1606 4819.	
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<p>Titel</p> <p>Riktlinjer för energi- och klimatpolitiken under den närmaste framtiden – en nationell strategi för verkställandet av <u>Kvotoprotokollet</u>. Statsrådets redogörelse till riksdagen den 24 november 2005</p>	
<p>Referat</p> <p>Den energi- och klimatpolitik som drivits under de senaste åren har grundat sig på den nationella klimatstrategi som regeringen antog år 2001 och gav till riksdagen i form av en redogörelse. Sedan strategin utarbetats har emellertid energi- och klimatpolitikens omgivning ändrats så pass mycket att det sommaren 2003 i statsminister Matti Vanhanens regerings program skrevs in en ståndpunkt enligt vilken regeringen genomför den nationella klimatstrategin och reviderar den med beaktande av innehållet i EU:s direktiv om utsläppshandel och Kyotomekanismerna. Den reviderade strategin, som presenteras i dokumentet "Riktlinjer för energi- och klimatpolitiken under den närmaste framtiden – en nationell strategi för verkställandet av <u>Kvotoprotokollet</u>", ges till riksdagen i form av en redogörelse av statsrådet.</p> <p>Redogörelsen har beretts under regeringens klimat- och energipolitiska ministerarbetsgrupps ledning. Beredningsorgan för ministerarbetsgruppen har varit Klimat- och energipolitiska kontaktnätet som har bestått av representanter för olika ministerier. I nätverket ingår representanter för handels- och industriministeriet, kommunikationsministeriet, jord- och skogsbruksministeriet, utrikesministeriet, finansministeriet och miljöministeriet.</p> <p>Redogörelsen består av riktlinje- och strategitexter med bakgrund och ställningstaganden samt av fyra bilagor. I den egentliga strategin beskrivs de ändringar som skett i den internationella omvärlden samt presenteras statsrådets riktlinjer för energi- och klimatpolitiken under de kommande åren samt de åtgärder som dessa riktlinjer förutsätter. Finlands nationella utsläppsförpliktelse under Kyotoåtagandeperioden kan uppnås med åtgärderna enligt strategin.</p> <p>I en utveckling enligt strategin bibehålls vårt energisystems mångsidighet och energianskaffningens säkerhet och de blir t.o.m. bättre jämfört med nuläget. De inhemska energikällornas antal och andel av den totala energiförbrukningen ökar under åren 2005–2025 jämfört med nuvarande nivå. De förnybara energikällornas andel ökar klart och även bioenergens andel är i sin helhet stadd i tillväxt. Den importerade energins andel sjunker, vilket huvudsakligen beror på att stenkolens och oljans andel klart minskar. Däremot ökar naturgasens andel.</p> <p>I strategin har åtgärdselheteras verkningar på energianvändarnas energikostnader, statsekonomi och samhällsekonomiska helhetsfaktorer, såsom bruttonationalprodukten, hushållens konsumtionsutgifter och sysselsättningen, uppskattats. För att målen i redogörelsen skall kunna nås och i synnerhet för att utsläppsförpliktelsen skall kunna skötas krävs det kostnader av energianvändarna och samhällsekonomi. Också statsekonomi förorsakas tilläggsgutgifter av åtgärderna i strategin, även om utgifterna minskar till vissa delar.</p> <p>Bilagorna innehåller en utredning av hurdana åtgärder statsrådet har vidtagit med anledning av de uttalanden som riksdagen har gjort i samband med antagandet av de redogörelser och lagpropositioner som getts till den under de senaste åren. I bilagorna berättas också mera i detalj hur scenarierna, som sträcker sig till år 2025, har utarbetats, om utgångspunkterna för och resultaten av dem samt presenteras en förkortad version av den anpassningsstrategi för klimatförändringen som har utarbetats särskilt. I bilagorna presenteras också de källor som använts, de undersökningar som beställts i samband med arbetet samt de instanser och personer som deltagit i beredningen av arbetet.</p> <p>Statsrådet har inte behandlat bilagorna, utan de har utarbetats som tjänsteuppdrag vid ifrågavarande ministerier.</p> <p>Kontaktperson på HIM: Energiavdelningen/ Taisto Turunen, tfn (09) 1606 4700, Petteri Kuuva tfn (09) 1606 4819</p>	
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