



MILJØVERNDEPARTEMENTET

*Ministry of the Environment*

Summary in English: Report No. 54 to the Storting (2000-2001)

# Norwegian climate policy







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# 1 Summary

## 1.1 The problem of climate change – a global challenge

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Climate change is the most serious environmental problem on a global scale today. Concentrations of greenhouse gases in the atmosphere are rising as a result of anthropogenic (man-made) emissions. The anthropogenic greenhouse effect is generally taken to mean this rise in greenhouse gas concentrations and the resulting rise in global mean temperature. The UN Intergovernmental Panel on Climate Change (IPCC) has recently published its Third Assessment Report, which states that trends in temperature, sea level, ice thickness, precipitation, etc. give a collective picture of a warming world. The report concludes that there is now new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.

The IPCC has also developed various greenhouse gas emission scenarios that give projections of future emissions and concentrations. These indicate that the concentration of CO<sub>2</sub> in the atmosphere will at least double from the present until 2100 unless additional climate initiatives are taken. Partly on the basis of the greenhouse gas scenarios, the IPCC projects that the globally averaged surface temperature will rise by between 1.4 °C and 5.8 °C in the course of the next 100 years. This is considerably higher than the projection made in the IPCC's previous Assessment Report. A temperature rise on this scale would result in the most rapid rate of rise in mean temperature in the past 10 000 years and the highest global mean temperature for 150 000 years.

The climate problem also has an important North-South dimension, because in historical terms it is the industrial countries that have been responsible for most of the emissions that are causing the problem, whereas the developing countries are most vulnerable to climate change. It has been shown that climate change has consequences for socio-economic conditions, ecological systems and human health. In some areas, extreme weather and climate events such as drought, flooding, heat waves, storms and avalanches are expected to become more common. Those countries that have

fewest resources to start with will be least able to adapt to such changes and will therefore be hardest hit. Climate change will tend to reinforce already existing problems related to population growth and poverty.

The IPCC has also looked at options to limit or reduce greenhouse gas emissions and assessed the costs of reducing global emissions in the future. According to its report, it is quite possible to reverse the trend of rising emissions at relatively moderate cost, and using existing technology. However, many technical, economic, political, behavioural and institutional barriers will have to be overcome to achieve this. The IPCC also points out that early action to mitigate climate change and a gradual changeover to a less emission-intensive economy will allow countries more flexibility in carrying out emission reductions, and make it possible to limit the costs.

## 1.2 Norway's strategy for following up the Climate Change Convention and the Kyoto Protocol

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The UN Framework Convention on Climate Change (UNFCCC) from 1992 and the 1997 Kyoto Protocol under the Convention are the international agreements that are intended to limit global greenhouse gas emissions. As of June 2001, 185 states and the EU had ratified the UNFCCC, which came into effect on 21 March 1994. The Convention includes binding obligations for the industrial countries to adopt national climate strategies and take action to limit emissions and enhance sinks of greenhouse gases.

The Kyoto Protocol was a new milestone in the global efforts to counteract anthropogenic climate change. The Protocol is a legally binding agreement that elaborates and quantifies the commitments of industrial countries under the Convention. Its most important elements are that it sets an upper ceiling for aggregate emissions from this group of countries, and contains specific emission commitments for each country and for the EU. The Protocol also includes flexible mechanisms that it will be important to build on in implementing coun-

tries' Kyoto commitments. The work of clarifying definitions and drawing up operational rules under several of the provisions of the Kyoto Protocol was postponed until subsequent Conferences of the Parties (COP) under the UNFCCC.

After it proved impossible to reach agreement on the remaining issues during the Sixth Conference of the Parties (COP 6) in The Hague in November 2000, it was decided to resume the meeting in Bonn in 2001. It is of fundamental importance for future progress in international climate cooperation that the parties manage to agree on the outstanding issues relating to the Kyoto Protocol, so that it can enter into force. In the short term, the Government's overriding priority is to play its part in ensuring that the results of the climate negotiations in 2001 are so satisfactory that enough countries ratify the Kyoto Protocol for it to enter into force at the earliest possible date. The Government wishes Norway to ratify the Kyoto Protocol and aims to start the ratification process after the completion of the remaining negotiations in 2001. Norway will work on the ratification issue in close cooperation with the EU and other countries that wish the Kyoto Protocol to enter into force at the earliest possible date. The Government has already developed a strategy for following up Norway's commitments under the UNFCCC and the Kyoto Protocol, which is presented in this white paper.

In spring 2001, the new US Administration expressed a lack of support for the Kyoto Protocol. However, the Administration is still in the process of drawing up its positions. Norway considers this to be an important point, and expects that the USA will take part in the forthcoming negotiations with a view to finding solutions that are acceptable to all parties within the framework of the Kyoto Protocol. Norway, like many other countries, has been seeking to influence the position of the USA on this issue. Without the Kyoto Protocol, we would lose the framework that the international community can use to lay down commitments to implement specific limits on emissions. If the Protocol does not enter into force, international efforts will be put back a decade, and it will be difficult to negotiate an equally good or better result.

Norway will also take part in other forms of international climate cooperation to follow up the UNFCCC by means of bilateral cooperation and international action, for example through the World Bank's Prototype Carbon Fund and by supporting capacity and knowledge building on climate issues in countries with economies in transition and developing countries. Norway will help to

put the developing countries in a better position to take action themselves to mitigate climate change, and will enter into cooperation with these countries on measures to reduce emissions through the clean development mechanism (CDM).

The Government is basing its national climate policy on a situation where the Kyoto Protocol enters into force. It is therefore necessary to devise a policy to ensure that Norway meets its commitments under the Protocol. During the first commitment period, this means primarily the actual quantitative emission commitment for the period 2008–2012, but also other commitments following from the Protocol, such as the requirement to show «demonstrable progress» by 2005.

Norway has pursued an active domestic climate policy since the late 1980s, and was one of the first countries to introduce CO<sub>2</sub> taxes, in 1991. To meet Norway's commitments, it will be necessary to make use of a wide variety of policy instruments. Greenhouse gas emissions are generated by many different activities related to energy use, transport, industrial processes, waste management and so on, and an integrated approach will be needed. Measures must be implemented at national level, and at the same time it will be necessary to cooperate with other countries and make use of the flexible mechanisms under the Kyoto Protocol.

The Government has made a thorough review of all areas and sectors that contribute to greenhouse gas emissions, and in this report presents a national programme to enable Norway to honour its overall commitments under the Protocol. From 2008 onwards, the main policy instrument will be a broad-based domestic emissions trading system. Emissions from entities for which the system is mandatory will be regulated by quotas for the commitment period 2008–2012 in accordance with the Kyoto Protocol. The system that has been proposed will be sufficient to ensure that Norway can meet its quantitative emission commitment under the Kyoto Protocol for the period 2008–2012. The Government will also ensure that its policy is backed up by a coherent set of instruments and measures with a long-term perspective as a basis for accepting new and tougher commitments after 2012.

Norway's greenhouse gas emissions will continue to rise sharply in the next few years. Until now, no action has been taken to limit or reduce a substantial proportion of national emissions. The Government will therefore also take steps to improve the efficiency of policy instruments that are already in use within a shorter time frame than 2008, primarily by entering into agreements on

measures to reduce emissions with sectors to which the CO<sub>2</sub> tax does not apply, or if appropriate by making use of the Pollution Control Act.

Under the Kyoto Protocol, the industrial countries have an international obligation to limit their aggregate emissions of greenhouse gases. The Government's clear position is that the world community neither can nor will accept that international climate cooperation is put on ice. If the Kyoto Protocol does not enter into force, the Government will work towards other agreements or forms of cooperation to follow up our commitments under the UNFCCC, both globally and regionally.

### 1.3 Domestic climate policy in other countries

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The industrial countries have used the period since the late 1980s to develop climate strategies and start phasing in policy instruments and actions to reduce greenhouse gas emissions. After the Kyoto Protocol was adopted, there has been more focus on the possibility of regulating greenhouse gas emissions through emissions trading. In many countries, domestic systems for greenhouse gas emissions trading are being reviewed. Denmark has introduced a quota system that regulates carbon dioxide (CO<sub>2</sub>) emissions from electricity producers, at present up to the end of 2003. The United Kingdom is introducing a broader-based voluntary emissions trading system that in principle applies to all companies operating in the country. However, electricity generators will not be ready to take part in the system from the outset. The British Government will consider whether this sector should be involved at a later date in the light of its overall energy policy. Private enterprises such as BP and Shell have also introduced internal trading systems that apply to a large proportion of the companies' activities.

Germany and the Netherlands have extensive systems of agreements with business and industry on more effective energy use and limiting greenhouse gas emissions. These countries are considering whether to use the Kyoto mechanisms, including participation in international emissions trading, to meet the obligations laid down in these agreements.

The European Commission presented its Green Paper on greenhouse gas emissions trading on 8 March 2000. In it, the Commission proposes a Community emissions trading scheme in which companies are allocated emission allowances from 2005. From Norway's point of view, it is particularly

interesting that the Green Paper suggests that the system should be open to extension, for example to include the new applicant countries and EFTA states. The Government has indicated that Norway is interested in cooperation with other countries, including the EU and Nordic countries, on the development of regional emissions trading systems. There has been a round of consultations on the Green Paper with a wide range of environmental and business organizations and other interested parties. Ten EU member states and Norway have also submitted opinions. The Commission is expected to present a proposal for adoption of an emissions trading system in spring 2002.

### 1.4 Norway's short-term domestic climate policy

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In the period up to 2008, Norway has no quantified commitment to limit or reduce its emissions. The framework for the choice of policies and measures is therefore also rather different in the years before the commitment period. Under the Kyoto Protocol, there will be a formal set of rules for cooperation between countries, based on the flexible mechanisms, but this will not exist as long as the Protocol has not entered into force. In choosing domestic policy instruments, especially in relation to enterprises that are exposed to international competition, it will be important to look at how policies are evolving in other countries. The Government will evaluate the use of policy instruments regularly up to 2008, for example in connection with the white papers that are produced at regular intervals on the Government's environmental policy and the state of the environment in Norway.

The Government has evaluated several different short-term climate policy strategies that can be followed irrespective of whether the Kyoto Protocol enters into force. The main objective in making climate policy instruments more effective is to limit the growth of Norway's emissions. It is also important to ensure that the costs are split as evenly as possible between sectors. One important issue in this connection is how to deal with emission sources that are not currently regulated. This white paper gives an account of all national policy instruments and measures at various levels and in different sectors, and describes international cooperation. It focuses on what can be achieved through national policy instruments and through involvement at county and municipal level.

An important element of Norway's overall climate strategy is to find ways of using technological

advances and new solutions to bring about further reductions in emissions, even in sectors that are now paying relatively high CO<sub>2</sub> taxes. For example, projections indicate that the petroleum sector and the transport sector will account for a substantial proportion of the rise in emissions up to 2010. In these sectors, technological developments will be important in determining whether it is possible to cut emissions significantly. The Government attaches great importance to stimulating technological progress, for example by cooperating with business and industry on trials of new technology. In the longer term, new technological solutions will be essential in helping to resolve the problems of climate change on a global scale. Norway has advantages such as large natural gas resources and good opportunities for disposal of CO<sub>2</sub>, which will provide a good starting point for efforts to find solutions for the removal and sequestration of CO<sub>2</sub> from major sources.

#### *The CO<sub>2</sub> tax*

The CO<sub>2</sub> tax is currently Norway's most important climate policy instrument. It is now levied on about 64 per cent of total CO<sub>2</sub> emissions and about 47 per cent of total greenhouse gas emissions. The Government intends to continue the use of the CO<sub>2</sub> tax as one of the main instruments of climate policy until a domestic emissions trading system is introduced, and proposes to combine this with agreements concluded with companies or branches of industry that are not subject to the CO<sub>2</sub> tax at present, or if appropriate with use of the Pollution Control Act to regulate emissions.

#### *Regulation by the Pollution Control Act*

Greenhouse gas emissions are a form of pollution as this is defined in the Pollution Control Act. As a general rule, such emissions must therefore be regulated, i.e. companies that generate greenhouse gas emissions must be licensed to do so, either by obtaining a discharge permit or through regulations pursuant to the Pollution Control Act. In addition, the EU directive concerning integrated pollution prevention and control (the IPCC Directive), which applies to most major sources of emissions, requires the use of the best available techniques (BAT) and efficient use of energy by industrial installations.

Until now, few requirements to reduce emissions of greenhouse gases have been included in discharge permits that have been issued pursuant to the Pollution Control Act. However, Norway is

playing an active role in work on the IPCC Directive within the framework of the EEA Agreement, and will continue to follow up the directive's provisions by requiring Norwegian industry to make use of the best available techniques and use energy efficiently. To date, BAT standards only include individual requirements for energy efficiency measures at installations, but these may result in cuts in CO<sub>2</sub> emissions. Depending on technological advances, stricter requirements for cuts in greenhouse gas emissions may be laid down. When issuing discharge permits for greenhouse gases, the Government will make arrangements to allow flexible implementation of measures to reduce emissions in accordance with the Pollution Control Act.

#### *Agreements with industry*

The Government will initiate negotiations with enterprises that are not currently subject to the CO<sub>2</sub> tax in order to encourage measures to cut emissions. Any agreements drawn up with industry will apply until an international agreement is put into effect. The Government considers such agreements to be a suitable element of climate policy provided that they result in satisfactory environmental solutions. Agreements must be drawn up so as to give enterprises some freedom of action and flexibility in implementing measures, but must at the same time ensure that real cuts in emissions are achieved. Any such agreements must of course comply with the procedural rules of administrative law. If it is not successful in concluding agreements with industry, the Government will consider whether to regulate emissions pursuant to the Pollution Control Act.

The Government will continue the agreement with the aluminium manufacturing industry with a view to achieving further cuts in emissions. Reports from the industry show that in 2000, emissions were reduced by more than the target set in the agreement. The parties will determine whether further cuts in emissions are possible well before 2005.

The Government will also take the initiative for an agreement with the relevant branches of industry on the reduction of non-industrial emissions of SF<sub>6</sub>. In addition, the Government will take active steps to strengthen cooperation with business and industry on the development and testing of new technology.

The Government will consider the allocation of funding to promote action at national level that may encourage business and industry to take part in

joint implementation projects nationally and internationally.

#### *Possible emissions trading systems in the short term*

The Government wishes Norway to cooperate with other countries to develop a quota and emissions trading market. If an emissions trading system is developed outside the framework of the Kyoto Protocol, Norwegian participation must be evaluated at a later stage.

If an emissions trading system is to be introduced at an early date in Norway, the authorities will have to make decisions on various elements of its design. These elements are discussed in this white paper. They include an emission ceiling for the system, whether the system should be mandatory, and in this case for which entities, sectors and emission sources, fines for contravention of the rules, whether to allow joint implementation with entities for which the system is not mandatory, and whether emission allowances may be saved for transfer to a later period. If several countries are to participate in a joint emissions trading scheme, negotiations will probably be needed on most of these elements. Some elements, such as fines, should probably be harmonized, whereas in other cases mutual recognition would be sufficient, for example for reporting and control of emissions from entities that are required to join the scheme. In a submission to the commission of experts appointed to devise a domestic emissions trading system, the Confederation of Norwegian Business and Industry proposed that enterprises that are subject to the CO<sub>2</sub> tax could be allowed to opt into the emissions trading system. Such enterprises would be allocated quotas which would replace other instruments (CO<sub>2</sub> tax, agreements with the authorities, Pollution Control Act) as a means of regulating greenhouse gas emissions. The consequences of this proposal are also discussed.

The structure and effects of an emissions trading system that is not based on the Kyoto Protocol have not been discussed in any detail, and the parameters for such a system are very uncertain. This white paper therefore only includes a preliminary discussion of possible emissions trading systems in the short term. The Government will review policy instruments regularly and put forward proposals in the light of international developments.

#### *Research and development*

Climate change is a long-term, complex problem that affects all sectors of society. Climate research is therefore extremely important both as a basis for developing policy and as a climate policy instrument. In addition, some of the research may be important for industrial development and wealth creation in the future. The Government plans a long-term effort to strengthen climate research in Norway. More specific proposals for increasing allocations to research into scientific, technological and social aspects of the problem will be put forward in connection with the annual budget deliberations.

One of the main priorities will be climate science, including our fundamental understanding of the relationship between natural and anthropogenic variations in climate, climate models and the consequences of climate change. Another priority area is analyses of social constraints and various climate policy instruments. A new theme, which involves information work and competence-building as well as research, is emergency preparedness and adaptation to climate change.

The Government will play an active role in developing emergency preparedness and preparing for the necessary adaptations in various sectors to limit the damage and losses that are expected as a result of climate change, and will make use of research, information work and competence-building to this end.

The third main priority in climate research is the development of technology to reduce emissions of CO<sub>2</sub> and other greenhouse gases, and will also include the development of new renewable or alternative energy sources and more environmentally friendly and efficient use of energy.

In recent years, several different technological concepts have been presented for the removal and sequestration of CO<sub>2</sub> generated by power plants. In all these, the process of CO<sub>2</sub> removal is energy-intensive and therefore costly. However, there is reason to believe that further research and development will make it possible to reduce energy losses and the cost of the process. After removal, CO<sub>2</sub> can either be used or stored. It may be disposed of on land, in the deep oceans or in underground reservoirs or formations. The costs of disposal generally only constitute a small proportion of the total costs of CO<sub>2</sub> removal, and if the captured CO<sub>2</sub> can be utilized, the costs can be reduced. In the short term, the most important use of CO<sub>2</sub> will probably be for injection into reservoirs in the process of enhanced oil recovery.

There are currently several plans for the construction of gas-fired power plants in Norway. On the basis of trends in the power balance and a desire to increase the processing of natural gas in Norway, a majority of the Storting has opened the way for the construction of gas-fired power plants in Norway. This gives Norway more reason to play an active part in efforts to develop technology that can in the long term reduce CO<sub>2</sub> emissions from the use of gas. But Norwegian companies and research institutions have for a long time been working on ways to cut emissions below the levels achieved by today's best available technology for gas-fired power production. For example, Statoil, Norsk Hydro, Kværner and Aker Maritim have been developing technology for CO<sub>2</sub> separation from exhaust gases from turbines or CO<sub>2</sub>-efficient gas-fired power production. Norway has also been at the forefront of research into the storage of CO<sub>2</sub> in geological formations.

In the 2001 budget, the Government increased the allocations for further development of emission treatment technology for gas-fired power plants by NOK 20 million. A central element of the programme will be the development and testing of technologies for reducing CO<sub>2</sub> emissions from power production. Another line of research and development may deal with the disposal or utilization of CO<sub>2</sub>.

The development of technologies for CO<sub>2</sub> separation requires a long-term effort and must as far as possible be seen in connection with international processes in this field. The pace of technological progress will depend strongly on whether international suppliers for power plants can see a market potential in the further development of such technology. The Government will intensify the research effort in order to reduce emissions of greenhouse gases, increase wealth creation and promote industrial development, and will increase allocations to the development of climate-friendly technology in the next few years. The Government's goal is to ensure that a sound scientific basis is developed for CO<sub>2</sub> reduction technology in the period 2004–2006, with a view to establishing a pilot or demonstration plant around 2005. A more detailed research and development programme on CO<sub>2</sub>-free electricity production from gas will be drawn up.

#### *Information and education*

The Government will give higher priority to providing information on climate problems and Norway's climate policy, and will continue the dialogue and

cooperation with important actors in this field. It is also considered important to ensure that the school system makes pupils aware of the problems and teaches them about energy and climate issues.

CICERO (the Center for International Climate and Environmental Research) has played an important role in disseminating information ever since it was founded. The Government is following the recommendations of the coordinating committee for climate research in proposing that CICERO should have a national responsibility for providing information on climate change issues and for disseminating research results.

#### *Climate and energy cooperation with other countries*

Norway has already gained considerable experience of project-based cooperation during the AIJ (activities implemented jointly) pilot phase, and has a good basis for taking part in an operative phase under the Kyoto Protocol. One goal during the changeover to an operative system will be to make use of and further develop the advantages Norway has developed through its experience in this field. In connection with the budget deliberations, the Government will evaluate allocations that can encourage participation in project-based cooperation nationally and internationally (both joint implementation (JI) and the clean development mechanism (CDM)). As JI and the CDM become operative, more advanced forms of project-based cooperation may also be developed, through arrangements such as the World Bank's Prototype Carbon Fund, which became operative in 2000. The Government has undertaken to provide USD 10 million towards the Carbon Fund, and Norwegian private-sector contributors include Norsk Hydro and Statoil. The Polish EcoFund can also be used actively by Norwegian companies to obtain grants or loans towards projects that can help to reduce environmentally-harmful emissions, including emissions of greenhouse gases. Norwegian membership of the fund was formalized by an agreement between Norway and Poland in 2000, and Norway is providing government funds totalling NOK 180 million.

In 2000, the Nordic energy and environment ministers decided to use the Baltic Sea region as a testing ground for the use of the flexible mechanisms. This trial will involve both pilot projects and a further review of the possibility of establishing a Nordic emissions trading scheme. Norway will play an active part in this work.

### *Registration system for project-based cooperation (JI and the CDM)*

In autumn 2000, the Government decided to establish a registration system for JI and CDM projects as a means of encouraging participation by business and industry. Another important goal was to maintain an overview of Norwegian participation in such projects abroad. The Norwegian Pollution Control Authority has been assigned responsibility for drawing up the system, which will be operative from autumn 2001 and will include projects in both industrial and developing countries.

### *Capacity-building*

Capacity-building in developing countries and in countries with transition economies is one of the main themes of the UNFCCC. This work includes countries' efforts to develop their own climate strategies, adaptation measures that they implement, and their participation in future project cooperation to reduce greenhouse gas emissions. Norwegian support for capacity-building in the climate field has been provided through both bilateral and multilateral channels.

### *The role of the municipalities and county authorities*

The Government will continue its efforts to develop and strengthen the role of the municipalities and county authorities in the climate field as a means of meeting Norway's international commitments and national targets. Local initiatives and measures to cut greenhouse gas emissions may for example include reducing the use of fossil fuels for energy and transport purposes and reducing methane and nitrous oxide emissions from landfills and the agricultural sector. Reducing the use of fossil fuels for transport purposes, heating and industrial purposes will also improve local air quality by cutting emissions of particulate matter, SO<sub>2</sub> and NO<sub>x</sub>, and reducing energy costs.

Local Agenda 21 efforts can catalyse a positive process involving politicians, business and industry, administrative bodies and environmental organizations, thus helping to put energy and climate issues on the agenda at local and county level and playing a part in formulating local policy. The work of preparing local climate plans and energy planning has helped many municipalities to identify targets and measures that can reduce greenhouse gas emissions and energy use.

The Government will encourage these processes by improving the coordination of informa-

tion and policy instruments targeted at the regional and local level. The Government will provide grants for the preparation of climate plans at municipal and county level and for local climate measures. The Government will also give priority to energy efficiency measures and new renewable energy sources. Energy efficiency efforts will be reorganized with the establishment of the new government agency Enova. Land-use planning pursuant to the Planning and Building Act is one of several policy instruments the counties and municipalities can use to supplement direct climate policy instruments. This is because greenhouse gas emissions are related to land use patterns: for example, they have a strong influence on the demand for transport and how easy it is to ensure efficient public transport systems. Land-use planning may also play a part in determining the choice of energy solutions, energy use and waste management options. The authorities are developing a coherent information strategy intended to improve energy planning in municipalities and counties, and this will also be of importance for climate planning. One important element of the strategy is information on how more active use can be made of the Planning and Building Act at local level. Guidelines have already been produced for energy planning and for the development of climate action plans. The Government will consider whether to give the municipalities greater opportunities to influence the choice of energy solutions in specific cases, including the choice of heating systems, for example by making more active use of the Planning and Building Act. Any amendments to the legislation in this field will be considered in conjunction with a national action plan for the development of infrastructure for water-based central heating systems that the Government will be presenting.

### *Waste management policy*

Final waste treatment results in emissions to air, soil and water and is a source of local and global environmental problems. Landfilling of organic waste results in emissions of the greenhouse gas methane. In 1999, methane emissions from landfills accounted for seven per cent of Norway's total greenhouse gas emissions.

The Government will continue an ambitious waste management policy to reduce emissions of methane from landfills. The most important policy instruments to this end are licensing requirements laid down under the Pollution Control Act and the tax on final waste treatment. Licences include requirements for collection and combustion of

methane from landfills. The licensing requirements are being steadily tightened up, and a recent EU directive on the landfill of waste will in the near future be implemented in Norwegian legislation. The directive requires substantial reductions in the proportion of biodegradable municipal waste landfilled and the measures to collect methane generated in landfills. A reduction in the proportion of wet organic/organic waste landfilled and collection of landfill gas are two of the measures that will have the greatest effect on methane emissions from landfills.

Norway introduced a tax on final treatment of waste (including both landfilling and incineration) on 1 January 1999. The purpose of the tax is to put a price on the environmental costs of emissions from final waste treatment. For waste that is incinerated, the tax rate varies depending on the degree to which energy generated by the plant is utilized. The tax increases the costs of final waste treatment and therefore acts as an incentive to increase recycling, reduce the quantities of waste landfilled and thus reduce methane emissions from landfills.

In Recommendation No. 1 from the Storting (2000–2001), the Storting asked the Government to «evaluate how the tax on final waste treatment can be altered to provide a greater incentive for energy recovery than today and so that it corresponds to the environmental costs associated with final treatment of waste at all facilities. The evaluation should include the option of levying the tax directly on emissions during incineration.» The Government's review of the tax on final waste treatment will be presented to the Storting in Proposition No. 1 (2001–2002).

The Government is not currently planning to include methane emissions from waste treatment in an emissions trading system or make it mandatory for owners of landfills to participate in the system. Whether methane emissions from landfills can be included in the emissions trading system, and how this should be done, will be evaluated at a later date. An alternative to mandatory inclusion in the emissions trading system for some or all landfills would be a form of joint implementation at national level, in which other entities invest in measures at landfills and thereby obtain quotas. This would ensure that as many low-cost measures as possible are carried out. This option will be reviewed more closely.

### *The energy sector*

Norwegian energy production is currently almost 100 per cent hydropower-based. This means that

emissions related to domestic energy production are low, but also that Norway has more limited opportunities for further reductions in emissions than other countries. In 1999, emissions from heating accounted for 15 per cent of Norway's total greenhouse gas emissions.

Since electricity production generates almost no greenhouse gas emissions at present, relevant measures in the energy sector are primarily related to the use of gas, kerosene and fuel oils. The degree to which these energy carriers are used can be altered by means of taxes and energy efficiency measures and by increasing the use of renewable energy sources. In addition to the current CO<sub>2</sub> tax on coal, coke and fuel oil, a substantial proportion of electricity consumption is taxed. The electricity tax base has been expanded to include some commercial electricity consumption. These taxes can help to improve the competitive position of new alternative energy sources and water-based central heating. The Government will continue to levy the CO<sub>2</sub> tax on mineral oil until a national emissions trading system has been introduced.

Production support is provided for wind power plants at a rate corresponding to half the electricity tax, and investment grants are available for specific projects to encourage efficient production, trading and use of new renewable forms of energy, including bioenergy, heat pumps and district heating. As part of its high-profile and active climate policy, the Government will give priority to energy efficiency measures and renewable energy sources. The new government agency Enova, which is to give new impetus to efforts to bring about a shift in energy production and use, will be one channel for this work. The agency is being established during summer 2001, and will be operative from January 2002. Enova's responsibilities include helping to achieve national energy and environmental targets, and the agency's funding will probably total about NOK 500 million per year.

Norway has substantial natural gas resources, but their potential has not so far been fully utilized. The Government has sought to facilitate increased use of natural gas in Norway, for example through its taxation policy. Natural gas has a number of areas of use, for example in energy supplies, in the transport sector, and in the manufacture of industrial products. The Government is therefore taking steps to ensure that a larger proportion of this resource is used within the country in the future. Natural gas used in Norway can replace other fossil fuels that generate higher emissions of environmentally harmful gases. All use of natural gas in

Norway is required to be compatible with Norway's international climate commitments.

The development of Norwegian power production based on some form of natural gas involves processing a Norwegian raw material within the country. The Government will intensify its efforts to ensure that Norway and Norwegian technological institutions, in cooperation with other countries, are at the forefront of efforts to develop technology that can be used as a basis for CO<sub>2</sub>-free generation of electricity from gas.

### *The petroleum sector*

In 1999, the petroleum sector accounted for about 19 per cent of total Norwegian greenhouse gas emissions. The main source of CO<sub>2</sub> emissions from this sector is the combustion of gas in turbines during energy production. Flaring of natural gas is also an important source. The industry also generates direct emissions of methane.

Total CO<sub>2</sub> emissions from the petroleum sector have been rising from year to year. This is mainly because of a rise in the level of activity resulting in higher overall production and a rise in the number of production units. Improvements in energy utilization and reductions in flaring have not been sufficient to compensate for the rise in energy use resulting from higher activity levels. It is expected that emissions will continue to rise somewhat until 2005 and then drop as a result of lower production and other factors. Developments on the Norwegian continental shelf, with a trend towards larger numbers of older, smaller production units and a northward shift in activities, are tending to lead to a rise in emissions per unit produced. Continued efforts to improve the efficiency of power generation and make energy use more efficient are needed to curb the expected rise in emissions.

The petroleum industry has already carried out a number of measures to cut CO<sub>2</sub> emissions. The development of combined solutions for offshore electricity production and the reinjection of CO<sub>2</sub> from produced gas on Sleipner Vest are two examples which show that the operators on the Norwegian continental shelf are at the forefront of efforts to introduce eco-efficient solutions. The largest potential for further reductions in emissions is to be found in reducing energy needs, transmitting electricity from land, increasing the efficiency of electricity production, separating CO<sub>2</sub> from waste gases and storing it in underground geological formations, and reducing flaring. In order to make large cuts in emissions, a substantial proportion of

the measures must be carried out on existing platforms.

The MILJØSOK programme run by the Norwegian oil industry focused on environmental improvements on the continental shelf. In the final report for phase 2 of the programme, it was estimated that greenhouse gas emissions could be cut by about 18 per cent in 2010 compared with the level in a scenario in which no emission-reduction measures were introduced. About half of the possible cuts are included in the existing projections of emissions. In order to achieve these cuts, all measures for which the costs are lower than the CO<sub>2</sub> tax must be implemented. In addition, it will be necessary to increase the research effort in several research programmes that are already underway and make a systematic survey of possible measures, and the industry must give priority to investments in measures to cut emissions. MILJØSOK concluded that if any substantial emission reductions beyond the estimated 18 per cent are to be achieved, major technological innovations that we cannot envisage today will be needed. This applies particularly to technologies for transmitting electricity from land and for the separation of CO<sub>2</sub> from exhaust gases.

The Government will continue to levy the CO<sub>2</sub> tax on CO<sub>2</sub> emissions from the petroleum industry until a domestic emissions trading system has been introduced. The authorities can also ensure that environmental considerations are taken into account through the approval procedures for the oil companies' plans for field development and operation and for pipeline construction and operation. The Government will keep the application of policy instruments in the petroleum sector under continual review and will look more closely at ways of giving further impetus to technological progress.

### *The industrial sector*

In 1999, greenhouse gas emissions from the process industries totalled 18 million tonnes CO<sub>2</sub> equivalents, of which 15.5 million tonnes, including 11.5 million tonnes of CO<sub>2</sub>, was exempt from the CO<sub>2</sub> tax and other climate-related taxes. A large proportion of these emissions consisted of process emissions, i.e. greenhouse gas emissions that are not generated by combustion but are related to the use of various raw materials as factor inputs or reducing agents. Emissions from industrial processes made up 21 per cent of Norway's total greenhouse gas emissions in 1999. Manufacturing industries pay a CO<sub>2</sub> tax on the use of fossil fuels

for energy purposes, but at reduced rates. The manufacture of cement and leca aggregate, the use of coal and coke for process purposes and the manufacture of ferro-alloys, carbide and aluminium are all exempt from the CO<sub>2</sub> tax. Until now, the main policy instrument applied to process emissions has been the agreement between the Ministry of the Environment and the aluminium industry on cuts in greenhouse gas emissions. Few requirements to reduce greenhouse gas emissions have been included in discharge permits issued pursuant to the Pollution Control Act. The Norwegian Pollution Control Authority has estimated that process emissions and emissions from stationary combustion in the process industries could be cut by 1.6 million tonnes CO<sub>2</sub> equivalents in 2010, using only measures that will cost less than NOK 125 per tonne. The Government proposes to include greenhouse gas emissions from manufacturing industries in a domestic emissions trading system under the Kyoto Protocol.

The Government will open negotiations with enterprises that are not currently subject to the CO<sub>2</sub> tax with a view to encouraging measures to reduce emissions. Any agreements that are concluded will apply until a domestic emissions trading system is introduced.

There are some non-industrial areas of application, for example refrigeration/air conditioning and the production of electronic components, where the greenhouse gases HFCs and SF<sub>6</sub> are used today. PFCs have been proposed as replacements for CFCs in certain types of cooling systems and as replacements for halons in fire-fighting systems, but have not been taken into use for these purposes in Norway.

Unless effective steps are taken to limit the use of HFCs, PFCs and SF<sub>6</sub> for these purposes, they may be introduced on a more widespread basis than necessary as replacements for the ozone-depleting substances that are being phased out. Policy instruments must be chosen with a view to preventing growth in the use and emissions of these substances. All the gases concerned have high GWP (global warming potential) values and relatively long lifetimes in the atmosphere, so that even limited emissions have a substantial impact on the climate. Norway imports these substances, but does not manufacture them at present. They are used partly in products that are manufactured in the country but largely for export.

The Government will regulate non-industrial emissions of HFCs and PFCs, and will return to this in the 2002 central government budget. The Government will take the initiative for an agree-

ment with the relevant branches of industry on non-industrial emissions of SF<sub>6</sub>. The Government will also consider whether emissions of these gases can be included in the emissions trading system in the longer term.

#### *The transport sector*

The transport sector mainly generates CO<sub>2</sub> emissions, together with some emissions of nitrous oxide and methane. CO<sub>2</sub> emissions from the transport sector have risen somewhat in recent years, and this is related to the rise in the volume of transport. In 1999, road traffic accounted for about 18 per cent of total Norwegian greenhouse gas emissions, coastal shipping for about 5 per cent and air traffic for about 3 per cent. The transport sector will be responsible for a substantial proportion of the projected growth in emissions up to 2010.

The Government will continue to levy the CO<sub>2</sub> tax in the transport sector until a domestic emissions trading system is introduced. Instruments that are primarily targeted towards other environmental problems or that are intended to improve efficiency in economic terms may also have an effect on greenhouse gas emissions. This applies for example to measures to limit the volume of transport.

Fuel taxes help to limit the volume of transport and thus greenhouse gas emissions. Over time, they may also influence the composition of the vehicle stock and vehicle use. In its white paper on the national transport plan for 2002–2011 (Report to the Storting No. 46 (1999–2000)), the Government indicated that taxation policy should be further developed in accordance with the principles of efficient energy use. The Storting has also asked the Government to evaluate and review the purchase tax system for private cars so that proposed changes can be considered in the course of 2003.

A changeover to certain alternative fuels, such as electricity, gas, hydrogen and biodiesel, can limit CO<sub>2</sub> emissions from the transport sector. Taxation policy has been changed in a number of ways that favour the use of electric cars in Norway. In the agreement on the central government budget for 2001, the parties agreed that the purchase tax on sales of electric cars should be set at zero from 1 July 2001. It has also been decided to remove the investment tax from 1 February 2002. This will reduce the total price of electric cars by about 25 per cent. Natural gas is currently used as fuel for buses in certain towns, and there are projects involving the use of natural gas in the municipal

sector. Natural gas is currently not subject to the CO<sub>2</sub> tax.

A focus on public transport can be an important element of an overall strategy for improving access and environmental conditions on a local scale in densely populated areas. Better public transport services can help to cut greenhouse gas emissions in large urban areas and transport corridors where the traffic base is large enough. In the long term, coordinated land-use and transport planning can influence the transport volume and its distribution between different modes of transport. Land-use and transport planning must take into account the effect of climate policy instruments on transport costs and thus on trends in transport.

As regards transport by sea, fuel for domestic passenger transport by ship is subject to the same CO<sub>2</sub> tax as other mineral oils, whereas there is a reduced rate for fuel for domestic goods transport. A pilot project on the use of liquefied natural gas (LNG) as fuel in ferries is under way. The Government will evaluate various measures to reduce emissions from ferries that are part of the national road system, including the use of natural gas.

The issue of central government involvement in the development of infrastructure for natural gas, including LPG, will be further discussed in a white paper on the use of gas in Norway which the Government plans to submit in spring 2002.

Emissions from international sea traffic and international air traffic are not currently included in emission commitments under the Kyoto Protocol. Norway is working through the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO) to develop policy instruments that can be used to limit and reduce emissions from these forms of international activity.

#### *The fisheries sector*

Fisheries within 200 nautical miles of the baseline are currently subject to the CO<sub>2</sub> tax, but individual owners of fishing vessels may apply to have the tax refunded. Fisheries outside the 200-mile zone are exempt from all taxes. In a domestic emissions trading system, the Government plans to provide compensation for the fishing fleet for the cost of its greenhouse gas quotas on the basis of normal figures for fuel consumption, if the competitive situation makes this necessary.

#### *The agricultural sector*

In 1999, the agricultural sector accounted for nine per cent of total Norwegian greenhouse gas emissions. Agriculture results in emissions of the greenhouse gases methane, nitrous oxide and CO<sub>2</sub>. In addition, agricultural soils are both a sink and a source of organic carbon.

Methane emissions are generated mainly by digestive processes in livestock (emissions to air). However, other considerations make it unlikely that livestock numbers will be regulated in order to cut greenhouse gas emissions. Nitrous oxide emissions can be reduced by good agronomic practices, which include maintaining good soil structure and correct application of fertilizer at the right time of year. The Ministry of Agriculture has implemented a number of measures that result in lower emissions of nitrous oxide, although they were originally introduced to reduce runoff of nutrients.

There has been an increasing focus on the carbon content of agricultural soil in connection with climate issues. Instruments that have been introduced to reduce runoff of nutrients, including grants for amended soil management and the cultivation of catch crops, also have a positive impact on the carbon content of the soil.

The forestry sector can have both direct and indirect effects on the greenhouse gas inventory. In the last few years, the annual net uptake of CO<sub>2</sub> (annual increment minus roundwood removals and calculated natural losses) by Norwegian forests has varied between 12 and 17 million tonnes, and the figures are expected to remain stable or rise towards 2010.

No directly climate-related policy instruments have been introduced in the forestry sector. However, general forestry policy instruments together with other relevant instruments have direct and indirect effects on the development of forest resources and the use of timber and bioenergy, and thus on carbon uptake and storage in forests and forest products.

In evaluating climate-related measures in forests, it is also important to take into account other ways in which they are environmentally valuable. Measures that have a positive effect both as regards climate and on biological diversity or other environmentally-important factors should be given priority.

The Government will take steps to obtain better information on climate-related effects of the agricultural sector and on the effects of climate change on agriculture. In the long term, the aim is to ensure that measures in the agricultural sector can

be credited to new emission reduction commitments in accordance with the actual figures for uptake and emissions of greenhouse gases. Decisions that are reached on the outstanding issues in the international negotiations will determine how much of the agricultural sector's potential for net carbon uptake is included in the first and subsequent commitment periods under the Kyoto Protocol, and which principles are to apply for crediting measures to meet the commitments. This will influence the development of climate policy instruments relating to agriculture and will be of importance in making decisions about linkages to a national or international emissions trading system.

### **1.5 Norway's national climate policy under the Kyoto Protocol**

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The Government intends to develop a broad-based strategy for reducing greenhouse gas emissions once Norway has a legally binding emission commitment under the Kyoto Protocol from 2008. The entry into force of the Protocol will mean that Norway has a quantitative commitment for the period 2008–2012. In this situation, it will be important to ensure that policy instruments are applied cost-effectively and efficiently. The Protocol will offer new opportunities for wider international cooperation, especially within the framework of the Kyoto mechanisms, i.e. joint implementation, the clean development mechanism and emissions trading. The three new mechanisms are of central importance for compliance with commitments under the Protocol, and their use will form an important element of the Government's climate policy.

The Government considers wider international cooperation on climate issues to be very important in a North-South perspective. In the Kyoto Protocol, the clean development mechanism is described as having two purposes. Firstly, it is to assist developing countries in achieving sustainable development and in contributing to the ultimate objective of the UNFCCC. Secondly, it is to assist industrial countries in achieving compliance with their emission limitation and reduction commitments. This will result in more sustainable economic growth and give better opportunities to combat poverty in the developing countries, for example by channelling substantial flows of capital to projects that make use of clean technology. The Government wishes to stimulate efficient use of these mechanisms.

#### *A domestic emissions trading system*

The Government considers that a domestic emissions trading system that gives Norwegian enterprises an opportunity to make use of the Kyoto mechanisms, will be the most important long-term climate policy instrument. The system will form part of a broader climate policy strategy both nationally and vis-à-vis other countries. An emissions trading system can readily be adapted to both global and regional mechanisms and instruments. The Government will take part in efforts to develop an international trading system for the industrial countries under the Kyoto Protocol, and will link the domestic system to this. This will make it possible to agree on more ambitious emission limitation and reduction commitments at a later date.

In this white paper, the Government puts forward a proposal for a domestic emissions trading system in which emissions from the entities to which the system applies will be regulated by quotas for the commitment period 2008–2012 in accordance with the Kyoto Protocol. The system that is proposed is to a large extent based on the recommendations of the commission of experts appointed to devise an emissions trading system, although final decisions have not been made on all the issues discussed by the commission. The emissions trading system that is proposed will be sufficient to ensure that Norway can meet its quantitative emission commitment under the Kyoto Protocol for the period 2008–2012.

The Government plans to make the domestic emissions trading system as broad-based as possible. This means that the system is to apply to all emission sources and gases where practical and economic considerations make this possible. Thus, the system should from the outset include CO<sub>2</sub> emissions from combustion of fossil fuels for energy purposes, CO<sub>2</sub> emissions from the use of fossil fuels in industrial processes, and emissions of nitrous oxide (N<sub>2</sub>O), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) from industrial processes. In all, these emissions make up about 80 per cent of Norway's total emissions. The trading system should be open to all types of entities. In a system based on quotas for greenhouse gas emissions, participation may be mandatory for 100–200 entities in Norway. However, others may also be interested in emissions trading, so that entities that are not required to join the system may be interested in taking part in the quota market. The number of Norwegian quotas available on the market must be evaluated in relation to the number the

state will need to cover emissions from sectors that are not required to become part of the system.

The Government will take steps to enable entities for which the emissions trading system is mandatory to take part in emissions trading and joint implementation (JI) with other industrial countries or the clean development mechanism (CDM) in cooperation with developing countries. This will give them the option of meeting their commitments by cutting their own emissions, reducing their level of activity or making use of opportunities to buy quotas or emission credits in Norway or abroad.

As a general rule, the Government wishes the emission quotas to be sold. However, to reduce the risk of Norwegian enterprises moving their activities to countries that are not applying climate policy instruments (carbon leakage), and to avoid excessively high adjustment costs, it may be necessary to provide quotas free of charge for a period of time. The Government therefore proposes to issue quotas free of charge to enterprises that are exposed to international competition (a process known as «grandfathering»). This will be done for a limited period of time if the prospects for their competitive situation at the beginning of the first Kyoto commitment period indicate that this is necessary.

The European Commission's new Community guidelines on state aid for environmental protection state that since no rules have as yet been laid down for how the EU is to achieve compliance with its Kyoto commitment, it is currently up to each member state to formulate its climate policy and decide how to use climate policy instruments to meet its commitment. The guidelines also indicate that some arrangements that member states decide to implement may be defined as state aid, but that it is too early to decide the conditions for approval of such aid. In the Government's view, an emissions trading system, even if it makes some use of grandfathered quotas to reduce adjustment costs in a transitional period, will provide incentives for enterprises to which the system applies to make environmental improvements. Because compliance with the quotas allocated will represent an additional burden for the entities involved, the system will be in accordance with the conditions the Commission has laid down for approval of state aid in its new guidelines and thus also with the new guidelines in the EEA legislation. New enterprises that become established within the sectors where grandfathered quotas are issued will be treated in the same way as already existing enterprises, as is being done in the Danish system for the electricity

sector and is planned for the British emissions trading system.

In the Government's view, an international emissions trading system should be as comprehensive as possible. It will also be important to ensure that all countries that take part in a linked system establish mechanisms to ensure the environmental credibility of the system as a whole. This means that sound systems must be established for registering quotas so that they are compatible. Satisfactory systems for reporting and monitoring emissions are also needed, and a system of sanctions comparable to Norway's. The Government will establish a national register of entities that have been issued quotas. The Government also plans a system in which the appropriate authorities control compliance with the emissions trading system and take action against any contraventions.

With the Kyoto Protocol in force, the state's income from the emissions trading system will largely be determined by the international quota price and the volume of grandfathered quotas in the domestic system in the first commitment period. It is estimated that in all, the state can put on the market quotas corresponding to a little over 42 million tonnes CO<sub>2</sub> equivalents per year. The estimates of international quota prices vary from NOK 50 to more than NOK 400 per tonne.

#### *Economic consequences for Norway*

Implementation of the Kyoto Protocol will affect the Norwegian economy partly as a result of Norway's undertaking to limit domestic greenhouse gas emissions, and partly because the value of Norway's net energy exports will be reduced. The costs of complying with the international emission commitment will include the costs of action and adaptation measures in Norway and any costs involved in the use of the Kyoto mechanisms.

Two alternative scenarios have been modelled. The «international agreement scenario» assumes that the Kyoto Protocol is implemented cost-effectively both internationally and in Norway. In this case, the costs incurred by Norway in implementing the Kyoto Protocol are estimated at about NOK 3 billion (2001 NOK), measured as a reduction of the country's real disposable income. In the «domestic implementation scenario», it is assumed that the Kyoto Protocol enters into force and that Norway's commitment is met entirely by means of cost-effective measures within the country. The costs in this case are estimated at NOK 11 billion (2001 NOK).

The estimated costs of meeting Norway's commitment under the Protocol are higher than the estimates presented in the white paper on Norwegian implementation of the Kyoto Protocol (Report No. 29 (1997–98) to the Storting). The increase is particularly large for the domestic implementation scenario. This is partly because there are fewer low-cost measures to limit emissions of greenhouse gases other than CO<sub>2</sub> and partly because measures in the industrial sector are more costly. It is also important to remember that the time frame for implementing emission reductions is shorter than in the earlier white paper, because there is less time left before the deadline for Norway to fulfil its commitment. This means that action must be taken more quickly, and the associated costs are therefore higher. The calculations illustrate the rise in costs as the time available for action becomes shorter. They also show that the Kyoto mechanisms (emissions trading, joint implementation and the clean development mechanism) become more and more important as the time left for adjustment becomes shorter.

#### *«Demonstrable progress» by 2005*

The Kyoto Protocol requires Parties to make demonstrable progress in achieving their commitments by 2005. During the Sixth Conference of the Parties (COP 6) in The Hague, there was general agreement on how this provision can be followed up in practice, but since the meeting was not completed, no final legal text was produced.

The Government will submit a proposition to the Storting including proposed rules for a domestic emissions trading system under the Kyoto Protocol after the Storting has debated this white paper. This means that rules for the system can be finalized well before 2008. If the rules for the emissions trading system are laid down at an early date, this will both ensure a predictable situation for the entities included in the system and show that Norway is taking its emission commitment under the protocol seriously. Norway may be one of the first countries to introduce a broad-based emissions trading system for greenhouse gases. Since this will be supplemented by active use of policy instruments in the period up to 2005, including action to deal with emission sources that are not included in the emissions trading system, Norway will clearly be able to show «demonstrable progress» by 2005. Norway is also one of the first countries to have produced a greenhouse gas emission inventory in the form now required under the UNFCCC, which

is another of the elements required under the provision on demonstrable progress.

#### *National measures*

The Government's policy is for Norway to achieve a reasonable proportion of the emission reductions that are necessary to meet its Kyoto commitment through national action. This white paper presents an overall package of instruments and measures that can bring about substantial domestic emission reductions at an acceptable cost. At the same time, there is a broad political consensus in Norway that the country should make use of the Kyoto mechanisms to reduce the total costs of meeting its commitment.

It does not seem appropriate to quantify how much of the emission commitment is to be met by measures at national level. There is considerable uncertainty as to which measures will be implemented over the whole period up to 2012. If real technological advances are made in important areas, or new or alternative solutions are developed, for example related to energy use, the national pattern of emissions may change greatly.

The Kyoto Protocol contains a provision stating that the use of the flexible mechanisms shall be supplemental to national actions. Implementation of the national climate policy programme presented in this white paper will make it possible for Norway to document substantial action at national level.

In February 2000, the Norwegian Pollution Control Authority presented a catalogue of measures to reduce emissions. Its analysis indicates that national measures with a considerable effect on emissions can be implemented at moderate cost. The catalogue identifies measures that can reduce emissions by about 4.5 million tonnes CO<sub>2</sub> equivalents at a cost of less than NOK 125 per tonne CO<sub>2</sub> equivalent. If measures costing less than NOK 200 per tonne CO<sub>2</sub> equivalent are implemented, the catalogue indicates that emissions could be reduced by about 6 million tonnes CO<sub>2</sub> equivalents. The establishment of a domestic emissions trading system as proposed in this white paper will provide an incentive to realize part of this potential. According to the Norwegian Pollution Control Authority's analysis, emissions from the process industry could be reduced by about 1.6 million tonnes using only measures that cost less than NOK 125 per tonne CO<sub>2</sub> equivalent.

The establishment of an emissions trading system in accordance with the Government's proposal will not be sufficient to ensure that the entire poten-

tial for emission reductions is realized. However, it is also possible to achieve emission reductions by means of other, supplementary measures. Some of the low-cost measures identified by the Norwegian Pollution Control Authority in its catalogue are consequences of energy efficiency measures. Such measures must be viewed in conjunction with trends in energy prices and how energy policy instruments, including energy efficiency measures, are being used. Some of the measures in the catalogue published by the Norwegian Pollution Control Authority are also closely related to policy instruments that are being formulated at municipal level through Local Agenda 21 work and the municipalities' efforts to draw up climate action plans and put them into effect. Furthermore, a

number of the low-cost measures described in the catalogue target emission sources that are not considered appropriate for inclusion in the emissions trading system at present. This applies for example to measures at landfills and measures to limit or reduce emissions of HFCs, PFCs and SF<sub>6</sub> from refrigeration/air conditioning systems. Instruments and measures targeting emissions from these sources in the short term are also discussed in this white paper. In addition to an emissions trading system and other supplementary measures, the Government proposes to make use of policy instruments with a longer perspective, such as research and technological development, which can be used to deal with the long-term problems arising from climate change.

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