



NORWEGIAN MINISTRY OF  
THE ENVIRONMENT

**Norwegian National Allocation Plan  
for the Emissions Trading System  
in 2008–2012**

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## Norwegian National Allocation Plan for the emissions trading system in 2008-2012

### Summary

The Norwegian National Allocation Plan (NAP) sets out the framework for the allocation to installations obliged to surrender emission allowances under the emissions trading scheme. The Norwegian emission trading system (ETS) will cover 35–40% of the greenhouse gas emissions from Norwegian sources, and hence become a vital part of the Norwegian efforts to ensure compliance with the Kyoto Protocol. The principles for allocation will give incentives for emission reductions, and enable cost-effectiveness across different sectors. About half of the allowances will be allocated free of charge to existing installations, and the other half of the total quantity of allowances could be sold at market conditions. The allocation free of charge for the trading period 2008–2012 will be calculated based on the installations' historical emissions in 1998–2001. Moreover, a reserve will be set aside for new gas-fired power plants based on technology for carbon capture and storage (CCS) and for highly efficient heat and power plants. The government's position is that no business shall rely upon allocation free of charge post 2012.

### Key figures

Norwegian ETS	Volume
Emissions 2005	~18 Mt
Projected emissions 2010	~ 21 Mt/year
Total allocation 2008–2012	≤ 75 Mt (≤15 Mt/year)
Allocation free of charge	~5.8 Mt/year
Reserve	1.8 Mt/year
Sale/auctioning	~ 7.4 Mt/year.
CDM/JI limit	20 % of total allocation, ≤ 3 Mt/year

# **PART I**

## **THE NORWEGIAN EMISSIONS TRADING SYSTEM**

### **1. INTRODUCTION**

On 26 October 2007 the Joint Committee of the European Economic Area agreed to incorporate the Emissions Trading Directive 2003/87/EC and a number of implementing provisions into the Agreement on the European Economic Area (EEA). This decision entered into force 29 December 2007 following parliamentary approval from the EFTA/EEA states Iceland, Liechtenstein and Norway.

Pursuant to Directive 2003/87/EF of 13 October 2003, as applied in accordance with the decision of the Joint Committee of the EEA, Norway must develop a National Allocation Plan. This plan sets out the framework for the allocation of allowances to installations obliged to surrender emission allowances under the emissions trading scheme. It reflects both the provisions of the EEA legislation as well as their application through Norwegian law and regulations. The NAP must be approved by the EFTA Surveillance Authority (ESA) before Norwegian installations can transfer allowances between accounts in the European emissions trading system.

The Norwegian government considers emission trading to be an important tool in reducing greenhouse gas emissions. The Norwegian greenhouse gas emission trading act entered into force on 1 January 2005 (see Ot.prp. No. 13 (2004–2005)). Amendments pertaining to the period 2008–2012 entered into force 1 July 2007 (see Ot.prp. No. 66 (2006–2007)). These amendments were aimed at making the law consistent with the Directive's provisions for 2008–2012. They extend the scope of the trading scheme and define the framework for allocation of allowances, as well as reflecting other provisions of the directive.

The Norwegian emission trading system (ETS) will cover 35–40 % of the greenhouse gas emissions from Norwegian sources, and hence become a vital part of the Norwegian efforts to ensure compliance with the Kyoto Protocol.

The principles for allocation will give incentives for emission reductions, and enable cost-effectiveness across different sectors. The total quantity of allowances will not exceed 15 Mt/year compared to an emission level of about 18 Mt for the trading sector in 2005 and a projection of about 21 Mt in 2010. About half of the allowances will be allocated free of charge to existing installations, and the other half of the total quantity can be sold at market conditions. Units from the project based Kyoto mechanisms Joint Implementation and the Clean Development Mechanism can be used up to an overall level of 3 Mt as an annual average, derived from the limit of 20 % of the total quantity of allowances.

The allocation free of charge in 2008–2012 will be calculated based on the installations' historical emissions in the period 1998–2001. Moreover, a reserve is set aside for new gas-fired power plants based on CCS technology and for highly efficient plants for cogenerating heat and power. The government's position is that no business shall rely upon allocation free of charge post 2012, but this will be reconsidered in light of future revisions of the EU directive on emissions trading.

In the period 2005–2007, various elements of the trading system were tested before the first commitment period under the Kyoto protocol. Norway has established well functioning procedures

for application (permits and allowances), monitoring, reporting and compliance. The electronic registry is in place and will become operational when Norway's emissions trading system is physically linked to the EU ETS. These elements of the trading system are all established in accordance with the requirements of the directive and its implementing provisions.

## 2. EMISSIONS OF GREENHOUSE GASES

### 2.1 Emissions of greenhouse gases in 2005 – national totals

According to the inventories carried out by The Pollution Control Authority and Statistics Norway, the emissions of greenhouse gases were 54.15 Mt CO<sub>2</sub>e in 2005. Emissions had increased about 9 % from 1990 to 2005. While emissions from oil and gas extraction have increased by 80 % during this period, Norwegian emissions from other sources were reduced by 3.5 %.

Table 2.1 shows the total emissions of GHG in Norway in 2005 in IPCC classification of sources. Energy sources (stationary and mobile combustion) are by far the most important, contributing with 71 % of the total emissions. Emissions from the energy sector in 2005 mainly consist of emissions from electricity generation on offshore installations and in refineries. Up to 2007, on the mainland virtually all electricity was produced from hydro power. Industrial processes represented more than 20 % of the total emissions, agriculture about 8 and the waste sector about 3 %.

In 2005 the land-use category forest land remaining forest land was the single contributor to the total amount of sequestration with 29.9 Mt CO<sub>2</sub>. All other land-use categories showed net emissions, which totalled 2.7 Mt CO<sub>2</sub>. This gave a net CO<sub>2</sub> removal from the land use, land use change and forestry (LULUCF) sector of 27.2 Mt. The net greenhouse gas emissions including all sources and sinks were 26.8 Mt in 2005.

*Table 2.1 Total emissions of GHGs by sources and removals from LULUCF in Norway 2005*

Sector	MtCO <sub>2</sub> e
Energy generation	12.6
Transport	14.6
Commercial and institutional, Residential, and Agricultural energy use	3.4
Industrial processes	10.2
Agriculture	4.3
Waste	1.5
All other sectors	7.5
Total – without LULUCF	54.15
LULUCF <sup>1</sup>	-27.2

Source: Statistics Norway and the Pollution Control Authority.

<sup>1</sup> Norway can and will issue Kyoto units up to a level of 1,47 Mt/year from forest management under art. 3.4 in the Kyoto protocol, but these units will not be used for compliance with the Protocol.

## 2.2 Emissions from the ETS sector in 2005

Table 2.2 below shows the CO<sub>2</sub> emissions in 2005 from installations that will be part of the Norwegian ETS in 2008–2012.

Table 2.2 CO<sub>2</sub> emissions (million tonnes) from the Norwegian ETS sector in 2005

Sector	2005
Combustion installations total, including offshore installations and natural gas refineries	13.90
Mineral oil refineries	1.96
Coke ovens	0.00
Metal ore roasting, sintering, pig iron and steel producing installations	0.07
Cement producing installations	1.14
Lime producing installations	0.18
Glass and glass fibre producing installations	0.03
Ceramics producing installations	0.00
Pulp, paper and board producing installations	0.53
<b>Total</b>	<b>17.82</b>

Source: Statistics Norway and the Norwegian Pollution Control Authority.

Nearly 80 % of the total ETS emissions are from combustion installations and most of these emissions are from oil and gas extraction, gas processing plants and petrochemical industry.

## 2.3 Projections of greenhouse gas emissions

The emissions of greenhouse gases are estimated to increase from 54 Mt CO<sub>2</sub>e in 2005 to 58.5 Mt CO<sub>2</sub>e in 2010. Emissions of CO<sub>2</sub> are expected to continue to grow up to 2010, while emissions of other greenhouse gases than CO<sub>2</sub> are assumed to continue to decline towards 2010.

Table 2.3 shows the emission projection and inventory of greenhouse gases by source. The main contributing sectors are the energy generation sector (oil and gas extraction represent virtually all historical and most projected emissions), the transport sector and emissions from industry processes.

Table 2.3 Emissions of greenhouse gases by source, inventory and projections for 2010.  
Mill. tonnes CO<sub>2</sub>-equivalents

	2003	2004	2005	2010	Average annual projected emission 2008–2012
<b>Energy generation,</b> including offshore installations and refineries	12.4	12.5	12.6	16.8	16.8
<b>Transport</b>	13.9	14.3	14.6	15.8	15.8
<b>Commercial and institutional, Residential, and Agricultural energy use</b>	4.2	3.8	3.4	3.4	3.4
<b>Industrial processes</b>	9.7	10.5	10.2	9.6	9.6
<b>Agriculture</b>	4.4	4.3	4.3	4.3	4.3
<b>Waste</b>	1.6	1.6	1.5	1.4	1.4
<b>All other sectors</b>	8.1	7.9	7.5	7.1	7.1
<b>Sum</b>	54.2	54.9	54.1	58.5	58.5

Sources: Statistics Norway, The Pollution Control Authority and Ministry of Finance.

Emissions from the transport sector are projected to increase throughout the projection period due to increased economic activity, including private consumption. In particular emissions from goods transport could grow, while emissions from domestic transport by sea and air show a more moderate development. Up to 2010, emissions from the energy sector mainly consist of emissions from oil and gas extraction, reflecting the near 100 % hydro-based electricity sector in Norway. Emissions of greenhouse gases from the energy generation sector are projected to increase towards 2010, largely reflecting the start-up of two gas fired power plants. Emissions from industrial processes, as well as other sources, are expected to show a moderate decline from 2005 to 2010.

## 2.4 Projected emissions from the ETS sector in 2010

Table 2.4 below show the projected CO<sub>2</sub> emissions in 2010 from installations expected to be part of the Norwegian ETS in 2008–2012.

Table 2.4 Projected CO<sub>2</sub> emissions (million tonnes) from the Norwegian ETS sector in 2010

Sector	2010
Combustion installations total, including offshore installations and natural gas refineries	16.3
Mineral oil refineries	1.90
Coke ovens	0.00
Metal ore roasting, sintering, pig iron and steel producing installations	0.12
Cement producing installations	1.25
Lime producing installations	0.58
Glass and glass fibre producing installations	0.04
Ceramics producing installations	0.00
Pulp, paper and board producing installations	0.50
Total	20.70

Source: Statistics Norway, the Pollution Control Authority and Ministry of Finance.

The projected CO<sub>2</sub> emissions in 2010 from installations that fall within the scope of the Norwegian ETS in 2008–2012 are based on plant specific information regarding large point sources, expected oil and gas production profiles and projections developed by the Ministry of Finance and the Norwegian Pollution Control Authority.

Without any new policy measures the emissions from the Norwegian ETS sector are projected to increase from 18 million tonnes CO<sub>2</sub> in 2005 to about 21 million tonnes CO<sub>2</sub> in 2010. The emissions from the oil and gas extraction are expected to decrease compared to 2005 while increased emissions are expected from new gas fired power plants and a new gas processing terminal.

### **3. THE NATIONAL EMISSION TRADING SYSTEM FOR 2008-2012**

#### **3.1 Scope of the Norwegian trading scheme**

The scope of the Norwegian trading scheme for 2008–2012 will include CO<sub>2</sub> emissions from activities that are listed in Annex I of the Emissions Trading Directive and any installations that are opted into the system under Article 24 of the Directive. A tentative list of installations, which is based on *inter alia* the applications for permits, the Commission's guidance on allocation plans and decisions related to other countries' NAPs, is presented in Annex 1 to this plan.

The distribution of emissions reflects the industrial structure built over the years in particular based on natural resources of hydro power, oil and natural gas. While two thirds of the EU ETS covers mainland production of electricity and heat, Norwegian emissions from such categories are relatively small. Correspondingly, on the mainland emissions from other industrial sources play a more dominant role compared to other parts of Europe.

The petroleum sector is included in the ETS as of 2008. It represents about 60 % of the emissions covered by the scheme. On the mainland, the system covers combustion installations as well as district heating systems and CHPs. These represent a fairly small part of the Norwegian energy mix and consequently of emissions. Some of these installations were included in the 2005–2007 system, while others were subject to a CO<sub>2</sub>-tax. One gas-fired power plant (Naturkraft at Kårstø) came into production in autumn 2007 and another (Statoil at Mongstad) is under construction to be operational from 2010. Other plants could probably only come into operation towards the end of the period 2008–2012, depending upon future investment decisions.

Norway's two mineral oil refineries were included in the trading system already in 2005–2007. This is also true for the onshore gas processing and terminals at Sture, Kollsnes and Kårstø, as well as "Ormen Lange" at Aukra, which came into production in 2007 (all four plants are included since they are energy combustion installations). Petrochemical installations (also energy combustion) covered from 2005 include catalytic crackers in Grenland and a methanol plant at Tjeldbergodden.

Pulp and paper is included in full as of 2008 (about 20 installations), as are emissions from energy combustion in production of fishmeal and oil (8 installations). A number of installations (12) in the mineral industry are included, among them two cement plants in Brevik and Kjølsvik as well as installations producing lime, leca and mineral wool.

Norway at present only has one installation falling into the category specified under "Production and processing of ferrous metals", and none filling the criteria for glass and ceramic manufacturing.

In the Annex 1 installations identified per 20 February 2008 are listed. In total, more than 120 Norwegian installations are included in the trading scheme. The list has been revised since the NAP was sent on consultation in December based *inter alia* on the Pollution Control Authority's information from applications for permits. Following a closer consideration of the nature of installations' emissions, it has been clarified that some installations fall outside the scope (all or parts of the emissions), some have been closed, others will not be established, while a few more expected new entrants have been identified. The list also draws on other sources of information available to the Pollution Control Authority's and is considered fairly exhaustive for existing installations and known new entrants.

### *Opt-in*

The government wants the emission trading system to be as broad in scope as practically possible, both with regard to greenhouse gases and activities. The Emission Trading Directive Article 24 allows for the unilateral inclusion of additional activities and gases, i.e. the inclusion of activities other than those listed in Annex I to the Directive, and the inclusion of gases other than CO<sub>2</sub> listed in Annex II to the Directive.

Norway intends to include N<sub>2</sub>O emissions from the production of nitric acid in the emission trading scheme and will put forward an application for such opt-in to the EFTA Surveillance Authority (ESA). Emissions of N<sub>2</sub>O from Norwegian installations were about 2 Mt CO<sub>2</sub>-equivalents in 2005, corresponding to about 4 % of total Norwegian emissions. A preliminary version of monitoring and reporting guidelines (MRG) for N<sub>2</sub>O and CO<sub>2</sub> emissions from the production of fertilizers was subject to a public consultation during summer 2007. Since then, the EU has developed a draft MRG for N<sub>2</sub>O which in certain aspects differs from the preliminary Norwegian MRG. Opt-in initiatives from France and the Netherlands form the background for the N<sub>2</sub>O-MRG. Adoption of and MRG for N<sub>2</sub>O in the EU ETS may necessitate another public consultation before an MRG, which is consistent with the EU approach can be decided. Proposed allocation rules are described under chapter 3.2, and the draft domestic regulation required has been subject to a public consultation. If additional activities and gases are included in accordance with Article 24, the total quantity of allowances will increase accordingly.

The inclusion in the emission trading scheme can provide an important incentive to develop and install technology for carbon capture and storage (CCS). The government is therefore considering the inclusion of CCS projects in the ETS under Article 24 of the directive. The government does not expect full scale CCS facilities to be in operation before 2011/2012 at the earliest; i.e. the last year of the trading period in question. Including CCS requires a detailed framework for monitoring and reporting of emissions, both from the capture facility, during transport and for the storage of captured CO<sub>2</sub>, as well as a set of rules defining liabilities. Norway co-operates with countries and institutions within the EU to establish the necessary framework.

The Norwegian government is currently assessing the possibilities for including emissions from other energy intensive industries in the ETS, for instance emissions of CO<sub>2</sub> and PFCs from the production of aluminium, and emissions of CO<sub>2</sub> from ferrous metals and chemicals. These are mostly process related emissions. As other countries have so far not taken initiatives to opt in such installations, this would require Norway to develop a separate MRG to be accepted by the ESA. The Norwegian government will also assess the possibilities for including emissions from transport in a separate domestic ETS.

## 3.2 Allocation of allowances for 2008-2012

### *Introduction*

Following the Joint Committee decision 26 October 2007, Norway and other EEA states are not bound by Article 10 of the Directive, which restricts sale in EU countries to a maximum of 10 % of the total quantity of allowances. All installations should in principle face the full environmental cost of their activities in accordance with the Polluter Pays Principle. The government believes that sale should be the only form for allocation in Europe post 2012. Sale of allowances implies that operators and investors will face the full cost of their emissions. For the period 2008–2012 about half of the Norwegian allowances may be sold through auction or by other means at market conditions. Approximately one third of the Norwegian installations' estimated needs could be covered from allowances allocated free of charge.

### *Land based industries*

Land based industries covered by the Directive will be allocated allowances free of charge based strictly on the installations' actual historic emissions during the base period 1998–2001, according to the following formula: 87 % of the installation's average annual emissions from energy combustion and 100 % of its average annual emissions from industrial processes. This averages 92 % of these installations' historical emissions during the base period, or 80 % of their verified emissions in 2005. The volume of allowances allocated according to this formula is estimated to a total of 5.8 million tonnes of CO<sub>2</sub> per year.

The allocation free of charge is based on objective and transparent criteria. The allocation system gives incentives for existing installations to reduce their emissions. New installations will have to bear the full cost of CO<sub>2</sub> emissions to the atmosphere. Neither installations established after the base period will receive free allowances, nor will installations that have extended their emissions after the base period receive allowances corresponding to the extensions. The base period (1998–2001) is the same as for the trading system in 2005–2007. Prior to that period, the inventories for the installations were assessed by Det Norske Veritas in a "white book". The Norwegian Pollution Control Authority further verified the figures in the application process for allowances in 2005–2007, also using other material available to the Authority. The figures for the base period were reconsidered by the SFT as part of the QA/QC exercise in conjunction with the National Inventory Report (NIR) submitted in 2006 under the UNFCCC.

The government has emphasised the importance of a fixed base period. A moving base period from the first to the second trading period could have given reason for installations to expect that future base periods could include years in which they can influence emissions, and thus motivate strategic behaviour. Other alternatives such as benchmarks or projections would create expectations that full costs need not be paid in the future. This could lead to investments that are not environmentally justified.

According to Section 7 (2)(2) of the Greenhouse Gas Emission Trading Act, the allocation may accommodate installations which utilise surplus gas from land based industries that are not included in the trading scheme, or subject to an emission tax, and thereby reducing total emissions. This rule is expected to apply to installations utilising CO – carbonmonoxide – for energy purposes on certain sites.

### *Opt-in*

The production of nitric acid will be allocated allowances free of charge based strictly on the installations' actual historic emissions during the base period 1998–2001, according to the following formula: 50 % of the installation's average annual N<sub>2</sub>O emissions from industry processes. The

volume of allowances allocated free of charge according to this formula is estimated to a total of about 0.75 Mt of CO<sub>2</sub>e per year.

#### *Petroleum sector*

The petroleum sector will not be allocated allowances free of charge. Installations in the petroleum sector must purchase all their allowances in the market.

#### *Sale of allowances*

About half of the Norwegian allowances in 2008–2012 could be sold through auction or by other means at market conditions. The present estimate for allowances free of charge is 7.6 Mt/year, and assuming a total quantity of allowances of 15 Mt/year this would leave 7.4 Mt/year for sale at market based conditions. The amount might increase due to increased total quantity of allowances according to Article 24, or if not all allowances from the new entrants reserve is distributed. Allowances will not be targeted at Norwegian buyers. The Ministry of Finance is responsible for organising the sale of allowances.

#### *Closure rule*

Installations that are considered permanently closed will not receive allowances in years following the closure. Whether a plant is permanently closed will be considered by the Pollution Control Authority in conjunction with the annual issuance of allowances. This procedure implies that an installation which is permanently closed for example in March, which is after the issuance date (after 28 February), will keep the allowances it has been allocated for that particular year, but will not receive allowances for the following year.

#### *New entrants*

There is no general reserve of free allowances for new entrants. Furthermore, no allowances will be allocated free of charge to compensate for increased activity at existing installations i.e. installations with emissions from regular activities before 1 July 2007. The Emissions Trading Act, however, establishes a reserve for new gas-fired power plants based on CCS technology and highly efficient combined heat and power plants. The size of the reserve has been limited to 9 Mt, corresponding to an annual average of 1.8 Mt/year. The reserve is limited to power plants that have not been in regular operation before the amendments to the Greenhouse Gas Emissions Trading Act entered into force 1 July 2007.

The reserve has not been made fuel specific. However, it seems that all projects scheduled for realization in the 2008–2012 period are based on natural gas. No application for emission permits for installations based on other fuels have been filed as of 12 December 2007.

The Norwegian government's policy is that all new gas fired power plants shall have carbon capture and storage technology. A power plant does not need to establish a full-scale capture facility in order to qualify for allocation from the new entrant reserve as a power plant "based on CCS technology". A power plant "based on CCS technology" may thus be allocated allowances from before the capture, transport and storage facilities are operational.

"Highly efficient combined heat and power plants" are defined as thermal power plants whose overall efficiency exceeds the BAT reference values for combined cycle gas turbine power plants (CCGT) by at least 10 percentage points through the production of power and heat. The reference values for energy efficiency that are used as best available techniques at CCGT power plants are given in BAT-reference documents (BREF) for large combustion installations. BREF-documents for a series of technologies are issued at regular intervals based on the IPPC Directive. The BAT

reference values for CCGT power stations are currently at 54–58 %. A highly efficient thermal power plant consequently needs an overall efficiency of at least 64–68 % in order to qualify for an allocation free of charge from the new entrant reserve. The BAT reference values in the IPPC Directive may be increased in the EU as the technology improves. An increase in the BAT reference values will consequently alter the definition of a highly efficient thermal power plant in the emissions trading regulation.

Energy producing activities that are covered by the Act Relating to CO<sub>2</sub> Tax in the Petroleum Activity on the Continental Shelf do not qualify for an allocation free of charge from the new entrant reserve.

The new entrant reserve will not be refilled. Refilling an empty new entrants reserve is possible, but not recommended by the EU Commission. Most EU Member States reserves are not refilled. Because the reserve may run empty, the Norwegian scheme requires that applications for allocation from the reserve be considered in the order that they are received, provided that the power plant has a valid emissions permit under the Greenhouse Gas Emissions Trading Act. An application will not be considered by the Pollution Control Authority before the application is complete.

According to the preparatory works for the Emissions Trading Act, the allocation to power plants shall be between 75 and 92 % of the expected emissions, depending on the environmental integrity of the plant. The Norwegian scheme bases its allocation on produced power and heat. The government has concluded that the allocation shall be based on standard criteria. The allocation criteria are set at 354 tonnes of CO<sub>2</sub> per GWh electricity and 180 tonnes CO<sub>2</sub> per GWh heat. The allocation will be based on a uniform load factor of 7 500 hours/year applying to all installations. In addition, the allocation is subject to a reduction factor of 0.85. In sum, these criteria result in an allocation free of charge of approximately 80 to 83 % of the eligible installations' expected emissions.

In conjunction with the annual distribution of allowances, the Pollution Control Authority must assess whether the conditions for handing out allowances free of charge have been met. If the installation is closed, if it is significantly delayed, or if the scope of the project deviates significantly from the assumptions upon which the allocation decision is based, the Pollution Control Authorities may set aside this decision and reduce the allocation in accordance with the new assumptions. The decision to reduce the allocation can be appealed in accordance with the general rules of administrative law. The Authority will only set aside its allocation decision in conjunction with the annual distribution of allowances. Allowances that have already been handed out can not be withdrawn.

The intention is to hand out allocated allowances from the moment the power station is in regular operation. Allowances that have been allocated, but are not handed out because the necessary requirements are not satisfied, stay in the reserve. Allowances that are left in the reserve after the trading period belong to the government, and may be sold or used for compliance purposes under the Kyoto Protocol.

#### **4. DETERMINATION OF THE TOTAL QUANTITY OF ALLOWANCES**

The Norwegian government has decided that the total quantity of allowances will not exceed 15 Mt a year. The exact quantity has not yet been decided. This decision will be taken after the scope of the emission trading scheme (i.e. which installations are covered) has been definitely determined.

The emissions in the 2008–2012 trading sector were about 18 Mt in 2005 and are projected to become about 21 Mt in 2008–2012.

A total quantity of allowances of 15 Mt as an annual average represents a reduction of approximately 17 % compared to the 2005 level of emissions in the trading sector, and is almost 30 % less than projected emissions for 2010.

The level of allowances allocated free of charge is determined by the allocation rules described in chapter 3.2. The free allocation to existing industry is expected to be about 5.8 Mt/year, and the reserve represents an average of 1.8 Mt/year. Allowances allocated to installations that will be definitely closed during the period 2008–2012, can be sold or used as AAUs by the state against the commitment under Article 3.3. This also applies to reserve allowances that are not allocated.

The limit on the total quantity of allowances is much lower than the installations' expected needs, as well as the level derived from the formulae used by the Commission in its assessment of EU member states' allocation plans (see chapter 8).

Inclusion of more installations through Article 24 could also be accompanied by a corresponding increase in the total volume of allowances.

## **5. USE OF UNITS FROM JOINT IMPLEMENTATION AND THE CLEAN DEVELOPMENT MECHANISM**

### **5.1 Ceiling – 20 % of total quantity of allowances**

The government has set a limit on the use of credits from the project based Kyoto mechanisms (Emission Reduction Units from Joint Implementation and Certified Emission Reductions under the Clean Development Mechanism), corresponding to 20 % of the total quantity of allocated allowances. The total quantity of allocated allowances will not exceed 15 Mt, limiting the use of credits from the project based Kyoto mechanisms to 3 Mt/year on average, or 15 Mt over the five year period.

If additional activities and gases are included as provided in Article 24, the use of credits from the project based Kyoto mechanisms will increase accordingly.

The ceiling on the use of ERUs and CERs reflects the provision of Criterion 12 in Annex III to the Directive, as adapted by the EEA Joint Committee Decision.

The ceiling on use of ERUs and CERs needs to be transformed to a rule for using such units at the installations level. A ceiling determined as 20 % of the total quantity of allowances means that on average installations in any case can expect to use less than 20 % ERUs/CERs to comply with the obligation to surrender allowances. A rule at installation level needs to result in an overall use of ERUs/CERs that will not exceed the allowed maximum equivalent to about 3 Mt/year.

The government suggests that the right to use ERUs and CERs is allocated the following way. Each installation can use ERUs and CERs up to a maximum level of 13 % of its emissions the previous year. The allowed use of ERUs/CERs is derived from the relation between the total quantity of allowances and projected emissions ( $20 \% \times 15\text{Mt}/21\text{Mt}$ ), and is adjusted downwards to 13 % to reflect the uncertainty. The figure 13 % can be further adjusted for later years in the period. A

higher percentage can be allowed should the use in early years be less than expected in absolute terms, and a lower percentage should the emissions be higher than projected. The intention is to have an operational rule for the installations that will result in maximal utilisation of ERUs and CERs in accordance with the ceiling mentioned above.

The government believes that all installations should have the possibility to use ERUs/CERs. This allocation of the ceiling will treat all installations equally. It would be possible to differentiate between installations/sectors possibilities to use ERUs/CERs.

## **5.2 Other rules for use of the project based Kyoto mechanisms**

The Linking Directive also specifies a number of rules related to project activities, within the EU ETS. These provisions will also apply to the use of ERUs and CERs in the Norwegian emissions trading system. Use of CERs and ERUs from nuclear facilities will not be possible in the emissions trading system. The same applies to CERs and ERUs from land use, land use change and forestry activities. If approval of JI or CDM hydroelectric power production projects with a generating capacity exceeding 20 MW comes into question, relevant international criteria and guidelines, including those in the World Commission on Dams November 2000 Report “Dams and development – a new Framework for Decision-Making”, will be respected during the development of such project activities.

## **6. COMMENTS ON CERTAIN CRITERIA IN ANNEX III OF THE DIRECTIVE**

### **6.1 New entrants (criteria 6 of Annex III)**

In general, all installations established after 2001, including new entrants as defined in the Directive, will have to purchase all the allowances in the market; either from state auctions/sale at market conditions or in the secondary market. The Directive’s definition also covers changes in the nature or functioning, or an extension of an installation. There is no general reserve set aside for new entrants.

A reserve is established for new gas fired power plants based on carbon capture and storage and highly efficient combined heat and power facilities, see chapter 3.2. Eligible installations are those which have come into regular operation after 1 July 2007. This is the date for the entry into force of the amendments to the Emissions Trading Act pertaining to the period 2008–2012. The process for including the Directive in the EEA Agreement, with an uncertain date for entry into force of the EEA Agreement, made it necessary to define a new entrant through the date for entry into force of the Act rather than relating it to the notification of the national allocation plan to ESA, as is specified in Article 3 (h) of the directive. The latter date depended on the date for entry into force of the EEA Joint Committee Decision, which was uncertain at the time the Act was adopted.

### **6.2 Early action (criteria 7 of Annex III)**

Allocation based on a historic base period will favour installations that have undertaken measures since the base period and punish those who have increased emissions. Norway’s base period is 1998-2001, and thus reduction measures taken as early as 2002 will benefit the installations included in the trading system, since they will need fewer allowances.

### **6.3 Clean technology (criteria 8 of Annex III)**

Allocation based on emissions in a historic period does not address clean technologies as such. However, installations using technologies with low emissions in the trading period will benefit, and those with high emissions will have higher costs. There will be incentives to reduce emissions as long as this is cheaper than using allowances.

Eligible installations for the new entrant reserve are gas fired power plants based on carbon capture and storage, and highly efficient combined heat and power plant.

### **6.4 The manner in which the existence of competition from countries and entities outside Europe will be taken into account (criteria 11 of Annex III)**

The installations that will be granted allowances free of charge in Norway are mainly installations facing competition on regional or world markets, having limited possibilities to reflect the added cost incurred by the ETS in the product price. This argument can be put forward for cement production, refineries, pulp and paper and a number of other activities covered by the ETS.

## **7. PUBLIC CONSULTATION**

The draft National Allocation Plan was issued for public consultation during the period 21 December 2007 to 14 January 2008.

The issues presented in the plan have also been subject to public consultation through the process for establishing The Greenhouse Gas Emissions Trading Act and its implementing provisions. The principles for allocation for 2008–2012 were outlined in a consultation paper issued 15 March 2007. Consultation took place on the following issues at the same time the draft NAP was launched (from 21 December 2007 to 28 January 2008):

- Ceiling on installations' use of JI/CDM
- Allocation from the reserve
- Allocation to installations that will be opted in pursuant to Article 24

On 21 December 2007, the national allocation plan was distributed to different stakeholders for public consultation. The central elements in the allocation plan are by and large covered in The Norwegian greenhouse gas emission trading act, which entered into force 1 January 2005 (see Ot.prp. No. 13 (2004–2005)), and the amendments pertaining to the period 2008–2012, which entered into force 1 July 2007 (see Ot.prp. No. 66 (2006–2007)), both papers subjected to public consultation as well. Hence, the comments on the allocation plan mainly focused on the new features of the ETS, namely the new entrant reserve, opt-in, and the limitations on the use of credits from JI/CDM. The statements are available at the Ministry of the Environment's home page:

[www.regjeringen.no/md](http://www.regjeringen.no/md)

Other elements of the trading scheme (Monitoring and reporting guidelines, registry provisions, compliance and enforcement) have also been on public consultation through the normal procedures for establishing the law and regulations.

## **PART II**

### **SUPPLEMENTARY INFORMATION ON POLICIES AND MEASURES OTHER THAN EMISSIONS TRADING**

#### **8. THE OVERALL MITIGATION STRATEGY**

##### **8.1 Compliance with the Kyoto Protocol**

Norway ratified the Framework Convention on Climate Change (UNFCCC) on 9 July 1993 and the Kyoto Protocol on 30 May 2002, and became a Party when the Protocol entered into force on 16 February 2005. Under the Kyoto Protocol, Norway is committed to ensuring that its average annual greenhouse gas emissions do not exceed the 1990-level by more than one per cent in the period 2008–2012. The Assigned Amount corresponds to a level of 50.1 Mt/year (see FCCC/IRR/2007/NOR). Norway will comply with this commitment under the Protocol through a combination of national emission reductions and the use of the Kyoto mechanisms.

Norway has advocated cost-effectiveness across emission sources and sinks, sectors and greenhouse gases both domestically and internationally. This has been a point of departure both for formulating the present climate change policy and for designing and implementing policies and measures that will ensure compliance with the quantitative commitments of the Kyoto Protocol.

In addition to its commitment under the Kyoto Protocol, Norway has undertaken extensive unilateral commitments to reducing emissions of greenhouse gases. An agreement between government and all opposition parties but one in Parliament was reached in January 2008 to this respect. Norway will strengthen the emission reductions for the period up to 2012 by 10 percentage points compared to the commitment under the Kyoto Protocol. By 2020, Norway will reduce greenhouse gas emissions equivalent to 30 % of Norwegian emissions. About two thirds of the necessary cuts from the reference scenario will be taken domestically, including through forestry measures. As part of an international agreement, Norway will undertake to reduce global greenhouse gas emissions equivalent to 100 % of Norwegian emissions in 2030.

## 8.2 Effects of policies and measures

Table 8.1 Effect on domestic emissions of selected measures that have been implemented or adopted since 1990 (million tons CO<sub>2</sub> equivalents)

	1995	2000	2003	2005	2010
<i>Directly related to climate change</i>					
CO <sub>2</sub> tax offshore <sup>1</sup>	0.6	3.0	3.0	3.0	3.7 <sup>3</sup>
CO <sub>2</sub> tax onshore <sup>2</sup>		0.8	0.8	0.8	0.8 <sup>3</sup>
Requirement to collect landfill gas	0.25	0.4	0.45	0.5	0.6
Other measures in the waste sector		0.07	0.2	0.25	0.4
Tax and recycling schemes on HFC and PFC			0.2	0.3	0.5
Climate change agreement with aluminium industry <sup>4</sup>	0–1.6	0.6–3.0	1.2–4.0	1.4–4.0	1.4–4.1
Agreement on SF <sub>6</sub> emissions			0.05	0.06	0.06
<i>Other regulations</i>					
VOC regulation offshore			0.17	0.2	0.25
VOC regulation at the Sture terminal		0.01	0.17	0.02	0.005
<i>Voluntary reductions</i>					
SF <sub>6</sub> reduction from magnesium production	1.0	1.4	0.5 <sup>5</sup>	0.5	0.5
N <sub>2</sub> O reduction from production of nitric acid	0.4	0.3	0.3	0.3	0.3
Use of bicarbon in cement production		0.02	0.03	0.1	0.1
<b>Sum effect of implemented measures in baseline</b>	2.3–3.9	6.6–9.0	7.1–9.9	7.4–10.0	8.5–11.1
<i>New policies and measures post 2004</i>					
Emissions trading scheme 2005–2007				0–0.5	0–0.5 <sup>6</sup>
Consensus with processing industry					0.6
Additional measures addressing the waste sector					0.15
<b>Total emission reductions</b>	2.3–3.9	6.6–9.0	7.1–9.9	7.4–10.5	9.3–12.4

<sup>1</sup> Based on reports from companies operating on the Norwegian Continental Shelf, the Norwegian Petroleum Directorate and the National Pollution Control Authority.

<sup>2</sup> The CO<sub>2</sub> tax will be reduced offshore from 2008 as a result of the inclusion of the petroleum sector in the emission trading scheme.

<sup>3</sup> Based on equilibrium analyses for 1990-1999. Bruvoll A. and B.M.Larsen (2004) «Greenhouse gas emissions in Norway. Do carbon taxes work?» Energy Policies 32 (4), 493 – 505, and assessment made for the Third National Communication.

<sup>4</sup> Lowest number reflects the direct effect of the agreement, while highest estimate includes voluntary measures taken before adopting the agreement in 1997.

<sup>5</sup> A part of a factory was shut down in 2001. The associated emission reductions are not included.

<sup>6</sup> The emissions trading scheme from 2008 will include other effects.

## CARBON INTENSITY IMPROVEMENT

Norway's latest long-term projections for greenhouse gas emissions in Norway were published in October 2006 (National budget 2007). Projections for greenhouse gas emissions were partially updated in National Budget 2008. In the baseline scenario, yearly GDP growth is estimated at 2.4 % from 2004 to 2010, while total greenhouse gas emissions are projected to rise by close to 1.3 % annually. The carbon intensity, defined as CO<sub>2</sub>-equivalents per unit GDP, will thus in 2010 correspond to 93.5 % of the intensity in 2004. At an aggregate level the carbon intensity improvement from 2004 to 2010 are 6.5 %, or 1.1 % as a yearly average.

The projections are based on the assumption of unchanged policies. In particular, the cost of CO<sub>2</sub> emissions (the CO<sub>2</sub>-tax) is kept constant in real terms. In the assessment of long-term electricity prices, the price on CO<sub>2</sub> allowances in the EU ETS market is technically assumed to be 100 NOK per tonne (approximately 12.5 euro) up to 2020, measured in 2007-prices. A description of the projections and the methodology which has been applied can be found in Norway's fourth national communication under the Framework Convention on Climate Change (<http://unfccc.int/resource/docs/natc/nornc4.pdf>).

*Table 8.2 Carbon intensity improvement*

	2004–2010	
	Yearly average	Total
GDP growth	2.4	15.3
CO <sub>2</sub> equivalents	1.3	7.8
Carbon intensity improvement	-1.1	-6.5

Source: National Budget 2007.

### CAP

Emission for installations within the trading scheme:

2005 verified emissions<sup>2</sup>: ~18 million tonnes CO<sub>2</sub>-equivalents

2010 projected emissions: ~ 21 million tonnes

Allocation free of charge: 5.8 million tonnes/year in total<sup>3</sup>

Allocation free of charge from new entrant reserve: ≤ 1.8 million tonnes/year

GDP growth:

2004 => 2010<sup>4</sup>: 2.4 % (yearly average), 15.3 % (total)

Carbon intensity improvement:

2004 => 2010<sup>5</sup>: 1.1 % (yearly average), 6.3 % (total)

We refer to communication from the Commission to the Council and to the European Parliament (COM(2006) 725) on the assessment of national allocation plans A calculation based on the formula chapter 2.1 would give a maximum allowed annual average cap of 19-20 million tonnes.

<sup>2</sup> Source: Ministry of Environment/State Pollution Agency, Ot. prp. nr. 66 (2006-2007)

<sup>3</sup> Source: Ot. prp. nr. 66 (2006-2007)

<sup>4</sup> Source: Ministry of Finance, National Budget 2007

<sup>5</sup> Source: Ministry of Finance, National Budget 2007

### **8.3 Emissions trading**

The total quantity of allowances of about 15 Mt implies that Norway expects that the trading sector will contribute to closing about 6 Mt of the 8–9 Mt projected gap (see chapter on projections) with respect to the fulfilment of the commitment under Article 3 of the Kyoto Protocol. Opt-in of additional installations combined with a tight allocation could further reduce the gap.

Norway's assigned amount is 101 % of 1990 emissions of 49,619,168 tonnes CO<sub>2</sub>e × 5, giving a total of 250,576,797 tonnes, excluding land use, land use change and forestry (LULUCF), see FCCC/IRR/2007/NOR. A total quantity of allowances of approximately 15 Mt/year would leave about 35.1 Mt a year to cover the non-trading sectors. Thus, another 2–3 Mt would have to be reduced in those sectors through domestic policies and measures (see Report No. 34 (2006–2007) Norwegian Climate Policy), or by state acquisitions of Kyoto units. Norway will issue removal units (RMUs) from forest management under Article 3.4 of the Kyoto Protocol (see Norway's Initial Report), however, the government has decided that these RMUs shall not be used to fulfil the commitment under Article 3. These RMUs will thus be cancelled.

Norway established a domestic emission trading scheme from 1 January 2005. The Norwegian scheme for 2005–2007 corresponds to the EU ETS. A total of 51 installations are included, covering roughly 11 % of total Norwegian greenhouse gas emissions. The similar architecture to the EU ETS in the period 2005–2007 is explained by an intention to establish trade between the two emissions trading systems. The similarity between the two systems applies both to the sources and gases that are covered, as well as to other elements of the scheme. The main practical difference is that the sectors subject to the CO<sub>2</sub> tax scheme are not covered by emissions trading in Norway for the period 2005–2007 (which, if the emissions trading directive had been applied, could have been considered as a temporary opt-out under Article 27). These are the offshore petroleum industry and some land based energy installations using of mineral oil onshore, accounting for 25 % of total Norwegian emissions.

### **8.4 The Norwegian CO<sub>2</sub> tax scheme**

CO<sub>2</sub> taxes were introduced in 1991 as a step towards a cost effective policy to limit emissions of greenhouse gases. In 2005, the tax was levied on about 68 % of total CO<sub>2</sub> emissions, corresponding to more than 50 % of total greenhouse gas emissions. The establishment of a domestic ETS has altered the need for CO<sub>2</sub> taxes for activities that are covered by the scheme. In the budget for 2008, the CO<sub>2</sub> tax does not apply for land-based industry that is covered by the trading scheme. For the petroleum industry offshore, which is also included in the trading scheme, the CO<sub>2</sub> tax will be reduced from the current level in 2007 of 0.8 NOK/Sm<sup>3</sup> (app. 340 NOK/tonne CO<sub>2</sub>) to a level of 0.45 NOK/Sm<sup>3</sup> in 2008 to compensate for increased carbon cost due to the emission trading scheme. The reduction corresponds to 160 NOK/tonne CO<sub>2</sub>, which was the 2008 forward allowance price noted at Nordpool/ECX just before the budget was launched Autumn 2007.

### **8.5 Tax and reimbursement scheme for HFC and PFC**

Emissions of fluorinated greenhouse gases constitute approximately 2 % of Norwegian emissions. There is a tax on the production and importation of HFCs and PFCs, approximately 23 Euro per tonne of CO<sub>2</sub> equivalents. The tax is supplemented by a reimbursement scheme which prescribes an equivalent refund when gas is destroyed. The tax and reimbursement scheme have resulted in better maintenance and improved routines during discharge of old equipment, and gives a strong incentive for choosing gases with a low global warming potential. In practice, the tax and reimbursement

scheme has more or less the same function as the EU Regulation on fluorinated greenhouse gases (Regulation (EC) No. 842/2006). The Regulation has not yet been included in the EEA Agreement, pending a unanimous decision by the EEA Joint Committee (consisting of members from Iceland, Norway, Liechtenstein and the European Commission). As soon as agreement has been reached, most probably before the end of 2007, the Regulation will be translated and implemented in Norwegian law.

## **8.6 Pollution Control Act**

The Pollution Control Act applies to greenhouse gas emissions. Greenhouse gas emissions are included in discharge permits that are issued pursuant to the Pollution Control Act. As a general rule, the emitter is granted a discharge permit for CO<sub>2</sub> corresponding to the amount in the application.

## **8.7 New measures and new climate targets**

A recent white paper (Report No. 34 (2006–2007) to the Storting) contains proposals for new measures to reduce greenhouse gas emissions in Norway. An agreement between government and all opposition parties but one in Parliament was reached in January 2008 to this respect. The proposed measures include the following:

- Pledging up to NOK 3 billion annually to avoid deforestation and degradation of forests in developing countries.
- Prohibiting land filling of biodegradable waste as from 2009.
- Prohibiting the installation of oil-fired boilers in new buildings as from 2009.
- Introducing a new scheme for supporting the conversion of oil-fired boilers to boilers using renewable energy.
- Increasing the capital of the fund for the promotion of energy efficiency measures and the use of renewable energy by up to NOK 10 billion by 2012.
- Initiating a programme for the development of marine wind turbines. This will intensify the efforts to develop emission-free energy systems, particularly on the Norwegian continental shelf.
- Taking targeted and coordinated measures to expand the production of bioenergy by up to 14 TWh.
- Continuing the efforts to improve public transport, including the efforts to improve rail transport.
- Promote the use of alternative fuels through the new programme “Transnova”.
- Strengthen the reward arrangement for the promotion of public transportation.
- Reviewing whether all or part of the transport sector should be included in the emissions trading scheme.
- Working to promote the inclusion of international air and sea traffic in future international agreements on climate change.
- Increase the research grants to promote research on renewable energy, particularly offshore wind energy, regional and global impacts of climate change, carbon capture and storage, monitoring and adaptation.
- Establish requirements for flexible energy systems for public estates exceeding 500 m<sup>2</sup>.
- In a dialogue with the manufacturing sector, considering what measures should be taken in those industries that are not obliged to take part in the emissions trading scheme or not

subject to the carbon tax, including the introduction of a requirement for some or all of the industries to take part in the emissions trading scheme and/or voluntary agreements.

- Invite the largest towns to cooperate on reducing local emissions, especially those from road traffic, heating and waste management.

The White Paper also contains proposals for climate targets and action plans for emission reductions in the main sectors responsible for greenhouse gas emissions in Norway: petroleum and energy, transport, the manufacturing industries, primary industries and waste management. The main purpose of such action plans is to identify measures that will result in cost-effective emissions reductions that are not currently being implemented in the sectors concerned. According to the agreement, Norway will strengthen the emission reductions for the period up to 2012 by 10 percentage points compared to the commitment under the Kyoto Protocol. By 2020, Norway will reduce greenhouse gas emissions equivalent to 30 % of Norwegian emissions. About two thirds of the necessary cuts from the reference scenario will be taken domestically, including through forestry measures. As part of an international agreement, Norway will undertake to reduce global greenhouse gas emissions equivalent to 100 % of Norwegian emissions in 2030.

## **8.8 Carbon Capture and Storage (CCS)**

The Norwegian government's policy is that all new gas fired power plants shall have carbon capture technology.

A new gas fired power plant at Kårstø started its production in November 2007. In its political platform from 2005, the current government stated that it would contribute financially to establishing a full scale CCS facility in relation to the power plant as soon as possible. A report from the Norwegian Water Resources and Energy Directorate in 2006, stated that a capture plant could be in place and operational at the Kårstø power plant in 2011/2012 at the earliest. The Government's ambition is to have a capture facility in place as soon as possible.

The Norwegian government and the oil company Statoil have undertaken an agreement to establish a full-scale CCS facility in conjunction with a power plant that is under construction at Mongstad outside Bergen. To minimise costs and risks, the CCS facility will be completed in two stages. The first stage, which will be a capture facility with a capacity of approximately 0.1 Mt CO<sub>2</sub>/year, will be in place in 2011. At this stage there will be no transport and storage of CO<sub>2</sub>. Based on experience from this first stage, full scale carbon capture and storage facilities are to be fully operational by the end of 2014.

The acknowledgment of CCS as a mitigation activity is important to ensure the commercial realization of this technology. The government will therefore consider to opt-in carbon capture and storage facilities into the trading scheme. Norway is co-operating with the EU and individual EU member states to develop the necessary framework to include CCS in the emissions trading scheme.

## **8.9 Transport**

Emissions from transport (road transport, domestic air transport, domestic sea transport, rail transport, snowmobiles, tractors and construction machinery) constituted 15.4 Mt in 2005. Road transport, domestic sea transport and domestic air transport constituted 9.8 Mt, 2.6 Mt and 1.1 Mt, respectively.

In the transport sector, the CO<sub>2</sub> tax is the main instrument for limiting CO<sub>2</sub> emissions. The CO<sub>2</sub> tax rates for 2008 are NOK 0.82 per litre petrol and NOK 0.55 per litre autodiesel. In addition, there are transport taxes on these fuels, amounting to NOK 4.28 per litre of petrol and NOK 3.30 per litre autodiesel. The CO<sub>2</sub> tax rates for 2008 on the use of mineral oils in domestic sea transport and for rail transport are NOK 0.55 per litre. The CO<sub>2</sub> tax rate for 2008 on the use of kerosene in domestic air transport is NOK 0.65 per litre.

The government intends to assess the possibilities for including emissions from transport in a separate, domestic trading scheme.

From 2007, the component of the vehicle purchase tax related to cylinder displacement was replaced by a tax component related to CO<sub>2</sub> emissions. The preliminary results indicate that the change in vehicle taxes has had an effect. Average emissions from new cars have been reduced from 177 g/km in 2006 to 158 g/km from January to August 2007. Norway in October 2007 introduced an official objective of 120 g/km carbon dioxide (CO<sub>2</sub>) emissions on average from new cars by 2012. The new objective forms the basis for the future work in promoting a more environmentally friendly transport sector.

## **8.10 Petroleum**

Emissions from the petroleum sector (petroleum activities offshore, including gas terminals onshore) were 13.5 Mt in 2005, an increase of nearly 80 % from 1990. Roughly 90 % of the emissions are related to energy production, while the remaining 10 % are due to flaring. In the petroleum sector, the CO<sub>2</sub> tax has been the main instrument for limiting CO<sub>2</sub> emissions since 1991. The tax is calculated on the basis of fuel consumption used for energy production, and on the volume of gas that is flared.

The inclusion of the petroleum sector in the emission trading scheme from 2008 has altered the need for the CO<sub>2</sub> tax. The government wants to maintain the incentive to reduce emissions at the current level. No allowances will be allocated free of charge to the Norwegian petroleum sector. For the petroleum industry offshore, the CO<sub>2</sub> tax will be reduced from the current level in 2007 of 0.8 NOK/Sm<sup>3</sup> (app. 340 NOK/tonne CO<sub>2</sub>) to a level of 0.45 NOK/Sm<sup>3</sup> in 2008 to compensate for increased cost from purchase of allowances. The reduction corresponds to 160 NOK/tonne CO<sub>2</sub>, which was the allowance price noted at Nordpool/ECX/EEX just before the budget was launched.

## **8.11 Stationary energy production**

Greenhouse gas emissions from the energy sector were 2.7 Mt in 2005. Heating in the building sector, primarily from the use of heating oils, constitutes the largest part of these emissions. Historically, almost all (99.8 %) electricity production in Norway has been based on renewable energy, almost exclusively hydro power. On the one hand, this contributes to low emissions from domestic energy production. On the other hand, this implies that Norway has a lower potential for reducing emissions in the energy sector. Stationary energy use has increased steadily. In 2005, the total energy consumption was 155 TWh, an increase from 120 TWh in 1980. Electricity constituted 112 TWh in 2005, stationary oil consumption was 20 TWh, while gas consumption was 7 TWh (of which 3 TWh was natural gas). The registered use of bio energy was 12 TWh and district heating constituted 2 TWh in 2005.

Emissions from the energy sector are projected to increase in the future. The first Norwegian gas fired power plant opened November 2007 at Kårstø. Another power gas fired power plant is under construction at Mongstad. CCS technology will be installed at these power plants.

## **8.12 Industry**

Greenhouse gas emissions from land based industries were about 15.4 Mt in 2005, corresponding to about 28 % of total greenhouse gas emissions in Norway. A number of different measures have been introduced to reduce emissions from land based industries, including taxes, regulations under the Pollution Control Act, emission trading and voluntary agreements. Emissions have been reduced by 3 Mt, or roughly 16 %, since 1990.

The Norwegian Ministry of the Environment and the Federation of Norwegian Industries in 2004 reached an arrangement to reduce emissions from aluminium, ferro-alloy, carbon, mineral fertilizer and carbide industries accounting for approximately 30 % of total Norwegian greenhouse gas emissions. The arrangement also includes some installations covered by the Norwegian emissions trading scheme for 2005–2007. The arrangement ensures that operators in the process industry – some of which at this stage are not included in the emissions trading scheme – nevertheless undertake to reduce their greenhouse gas emissions by the end of 2007. According to the arrangement, total emissions of greenhouse gases in the process industry are not to exceed 13.5 Mt CO<sub>2</sub> equivalents (all six Kyoto gases) by the end of 2007.

The Norwegian Ministry of the Environment and the business organisations representing most users of gas-insulated switchgear and the one producer have entered into a voluntary agreement to reduce SF<sub>6</sub> emissions. Emissions are to be reduced by 13 % in 2005 and 30 % in 2010 relative to base year 2000. The total SF<sub>6</sub> emissions from the industry were approximately 4.7 tonnes in 2000, or 110 000 tonnes of CO<sub>2</sub> equivalents. Emissions in 2005 were 49 % lower than emissions in 2000, indicating that the target for 2010 has already been met.

The government will also assess the possibilities for introducing new measures, including emissions trading, for installations not presently covered by the emissions trading scheme or subject to the CO<sub>2</sub> tax.

## **8.13 Agriculture and forestry**

Emissions of greenhouse gases from agriculture were 4.9 Mt CO<sub>2</sub> equivalents in 2005, or 9 % of total Norwegian emissions. 48 % of total Norwegian CH<sub>4</sub> emissions and 46 % of total Norwegian N<sub>2</sub>O emissions stem from agriculture. Forestry and land use change has a positive contribution when it comes to reducing anthropogenic climate change. The increase in biomass in 2005 totalled about 27 Mt, equalling roughly 50 % of total greenhouse gas emissions in Norway. There is a potential in the forestry sector to increase uptake even further. So far, no measures directed specifically at reducing greenhouse gas emissions have been introduced in the agricultural sector. Measures that have been introduced for other purposes may have positive effects on the emissions of greenhouse gases. The introduction of measures to limit the run-off of nitrate may for instance have a positive effect on N<sub>2</sub>O emissions.

## 8.14 Waste

Emissions of greenhouse gases from the waste sector in 2005 totalled about 1.3 Mt CO<sub>2</sub> equivalents, corresponding to about 2 % of the total greenhouse gas emissions in Norway. 90 % of these emissions stem from landfills.

The most important policy instruments to reduce methane emissions from landfills are licensing requirements laid down under the Pollution Control Act and a tax on the final treatment of waste. The tax on the final disposal of waste (including both landfilling and incineration) was introduced 1 January 1999. On landfills, the tax in 2007 is NOK 423 or 552 per tonne waste landfilled, depending on the quality of the landfill site. On incineration plants, the tax is levied on the registered emissions of selected substances. Landfill gas extraction systems have been installed to recover methane. Recycling has increased significantly since 1990.

The government has proposed introducing a ban on depositing biodegradable waste from 2009. A regulation introducing such a ban from 1 July 2009 has been on a public hearing which brought massive support from the stakeholders. As of March 2008, a government decision is expected shortly. This is a measure that will have a considerable effect on the emissions from the waste sector. By 2040, emissions are expected to be reduced to about a third of the current level. The reason for the delayed emission reductions is that already deposited waste will continue to emit methane for decades to come.

The government has considered including methane emissions from landfills in the Norwegian emissions trading scheme, but no decision was reached. If and how these emissions should be included in the trading scheme, may be considered at a later date.

## 8.15 Program to purchase units from the Kyoto mechanisms

In a report to the Norwegian Parliament this spring, the Government proposes a very ambitious climate policy for Norway, including specific targets for emission cuts. The Norwegian climate policy targets will be met by both domestic and international cuts in emissions. By 2050 Norway will be carbon neutral.

A first step is to exceed our Kyoto commitment by 10 %. While increasing our efforts to reduce domestic emissions in the National Budget, Norway will support measures to reduce GHG emissions by purchasing Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) from projects abroad. The development of an international carbon market will be a cornerstone when it comes to achieving cuts in global emissions to sustainable levels. Norwegian participation may contribute to the development of these markets. By doing business in the Clean Development Mechanism (CDM), Norway will also give important contributions to growth and sustainable development in developing countries through the transfer of technology and significant financial resources.

Projections presented in the National Budget for 2007 indicate that the difference between the emission commitment and actual emissions will be 8–9 million tons in 2010. To ensure compliance with the Kyoto Protocol, Norway's quota deficit must be made up for by net purchases of quotas from other countries by the government or by companies through the ETS. Assuming a total quantity of allowances of no more than 15 Mt/year, and projected emissions in the trading sector of about 21 Mt, the need for government acquisitions could be 2–3 Mt/year. This need could be reduced by additional policies and measures and through opt-in combined with a tight allocation.

It has been announced that Norway intends to exceed the Protocol until 2012 by 10 %. This means that the government's need for purchases of quotas will increase by some 5 million tons per year.

In the 2007 Budget, an appropriation of NOK 100 million has been made for purchases of greenhouse gas quotas through the Kyoto mechanisms. Additionally, authorisation has been given to buy climate quotas to the amount of NOK 100 million in excess of the proposed appropriation, see Proposition No. 1 (2006–2007). NOK 5.5 million has been allocated to cover administrative costs. The appropriation for quota purchases to cover government employees' international air travel is additional.

In the 2008 budget, a NOK 500 million appropriation was adopted for the purpose of purchasing Emission Reductions eligible for Kyoto Protocol compliance. The appropriation is administered by the Ministry of Finance, which is also authorised through the budget to contract a further NOK 3 600 million for payments against deliveries in 2009 and subsequent years. The Ministry of Finance currently plans to purchase 30–35 Mt over the period (see its website [www.carbonneutralnorway.no](http://www.carbonneutralnorway.no)). The appropriation for quota purchases to cover government employees' international air travel is additional.

The government's quota purchases aim to promote stringent environmental requirements, and only quotas approved by the UN will be bought.

*Purchases of Kyoto quotas for government employees' international air travel*

The Government proposes to buy Kyoto quotas to cover estimated emissions of CO<sub>2</sub> from government employees' international travel by air on official business. A more detailed description is given in Royal Proposition No. 69 (2006–2007) "Additional allocations and reprioritisations in the National Budget 2007".

## PART III: ANNEXES

### Annex 1: List of installations and emissions in 2005 covered by the trading scheme

<b>District heating, 99 614 tons</b>
BKK Varme AS
Mo Fjernvarme AS
Agder Energi Varme AS - Kristiansand
Viken Fjernvarme AS, Oslo
Viken Fjernvarme AS, Gardermoen
Lyse Gass AS
Drammen Fjernvarme AS
Bærum fjernvarme AS, Sanvika
Bærum fjernvarme AS, Lysaker
Bærum fjernvarme AS, Lørenskog
Trondheim Energiverk Fjernvarme AS
Fjernvarme Øst
Hamar-Regionen Fjernvarme AS
FREVAR KF
Østfold Energi
Øraveien Industripark
Tafjord Kraftvarme
Hurum Energigjenvinning
Hønefoss fjernvarme
<b>Gas power plants, 0 tons</b>
Naturkraft AS, Kårstø
BKK Produksjon AS
Statoil AS Mongstad kraftvarmeverk
Statnett - Reservekraft Tjeldbergodden
Statnett- Reservekraft Nyhamna
<b>Pulp and paper, 534 378 tons</b>
Peterson Paper & Board AS Ranheim
Peterson Linerboard AS Moss
Norske Skog ASA - Saugbruks
Norske Skog ASA - Skogn
Norske Skog ASA - Follum
Södra Cell - Tofte AS
Södra Cell - Folla AS
Borregard Industries Ltd
Nordic Paper, Greåker
Huntonitt AS
Hellefoss AS
Hunsfos Fabrikker
Glomma Papp
Hurum Fabrikker
Huhtamaki
Rygene-Smith & Thommesen

Vafos
Larvik Cell
SCA Hygiene Products
<b>Fishmeal and fishoil, 95 607 tons</b>
Egersund Sildeoljefabrikk AS
Karmsund Fiskemel AS
Vedde AS
Welcon Moldtustranda AS
Welcon Egersund AS
Måløy Sildeoljefabrikk AS, Deknepollen
Bodø Siljeoljefabrikk AS
Vadsø Sildoljefabrikk as
<b>Petrochemical industry, 940 744 tons</b>
Borealis AS / INEOS Bamble AS
Hydro Polymers AS, Rafnes
Statoil ASA, Tjeldbergodden Metanolfabrikk
Noretyl AS, Rafnes
<b>Gas processing and terminals, 1 293 008 tons</b>
Norsk Hydro Ormen Lange Landanlegg
Gassco AS, Kollsnes
Gassco AS, Kårstø
Norsk Hydro Sture
Gasnor AS
Statoil ASA, Snøhvit LNG Melkøya
<b>Offshore oil and gasproduction, 11 264 936 tons</b>
Statoil, Glitne
Statoil, Heidrun
Statoil, Huldra/Veslefrikk
Statoil, Kristin
Statoil, Kvitebjørn
Statoil, Norne
Statoil, Sleipner Øst
Statoil, Sleipner Vest
Statoil, Snorre (+Vigdis)
Statoil, Statfjord
Statoil, Visund
Statoil, Åsgård
Statoil, Gullfaks
Statoil/Hydro Volve
Norsk Hydro, Brage
Norsk Hydro, Grane
Norsk Hydro, Heimdal
Norsk Hydro, Njord
Norsk Hydro, Oseberg
Norsk Hydro, Oseberg Sør
Norsk Hydro, Oseberg Øst
StatoilHydro, Troll A
Norsk Hydro, Troll II (B og C)

Conoco Phillips, Ekofisk
Conoco Philips, Embla
Conoco Phillips, Eldfisk
Conoco Phillips, Tor
Esso, Jotun
Esso, Balder
Esso, Ringhorne
Shell, Draugen
Talisman, Gyda
Talisman, Yme
Talisman, Varg
British Petroleum, Valhall
British Petroleum, Ula
Gassco AS, Draupner
Marathon Petroleum Company (Alvheim)
Pertra Frøy
Statoil/GAz de France Gjøa
British Petroleum, Skarv og Idun
<b>Fertilizer production, 42 000 tons</b>
Yara ASA, Porsgrunn
<b>Other industry with combustion installations, 169 882 tons</b>
Kronos Titan
GE Healthcare AS, Lindesnes Fabrikker
Dynea AS, Lillestrøm fabrikker
Ruukki Profiler AS, avd. Mo
Skretting AS
Norgips as
<b>Refineries, 1 962 692 tons</b>
Esso Norge AS, Slagentangen
Statoil ASA Mongstad Raffineri
<b>Steel production, 68 000 tons</b>
Celsa Armeringsstål AS
<b>Cement production, 1 143 875 tons</b>
Norcem AS, Kjøpsvik
Norcem AS, Brevik
<b>Other mineral industry, 209 670 tons</b>
SMA-Magnesium AS
Verdalskalk AS
Owens Corning Fiberglass Norway AS
Glava AS Produksjon, Askim
Glava AS Produksjon, Stjørdal
NorFraKalk
SMA MoKaDo AS
Maxit Leca Rælingen
Wienerberger AS, Bratsberg Teglverk
<b>Total 2005 emissions; 17 824 406</b>

## **Annex 2: Emission Projections – Main Assumptions**

The emissions projections are based on implemented policies and measures and can not be seen as the Government's targeted emissions levels.

There are uncertainties related both to assumptions, model used for projections, the composition of production and consumption as well as technological development. This leads to a general uncertainty in the projections.

Table 1.1 summarises the macroeconomic assumptions underlying the projections. The average annual growth in GDP is estimated to 2.4 % from 2004 to 2010 and 1.5 % from 2010 to 2020. The reduced growth rate is mainly explained by the expected development of the petroleum sector. It is assumed that exploration of oil and gas will peak in 2008 and gradually be reduced towards 2020.

Towards 2020 the growth rate in the service and construction sectors will also be reduced, following a strong growth from 2004 to 2010. For primary production (agriculture, fisheries), industry and mining growth is assumed stable.

GDP for mainland Norway is assumed to grow 2.8 % on average from 2004–2010. This is somewhat above the trend in the mainland economy. From 2010 to 2020 projections show an annual growth in mainland GDP of 2.2 %.

The projections assume a price of NOK 390 per barrel of oil, corresponding to about USD 60. The oil price is assumed to be reduced gradually to NOK 300 per barrel in 2010 and NOK 220 in 2015 and onwards, measured in 2007 prices.

Virtually all existing production of electricity on the Norwegian mainland is based on hydro power. On the Norwegian continental shelf electricity for production of oil and gas is based on natural gas, which is a major source of CO<sub>2</sub> emissions. The development in emissions from the Norwegian continental shelf will depend on the exploration rate, and the extent to which related consumption of electricity will be based on transfer of electricity from onshore facilities or imports.

Increased activity and income in the mainland economy will increase demand for electricity over time. The composition of the supply side to meet this demand will influence the emissions of greenhouse gases.

Table 1.1 Key macroeconomic assumptions, in billion NOK and percentage change. Fixed prices

	Billion NOK	Annual change in per cent		
		1990–2004	2004–2010	2010–2020
	2004			
Gross domestic product (GDP)	1716.9	3.2	2.4	1.5
Petroleum activities and shipping	384.6	4.7	0.9	-2.5
Mainland Norway	1332.3	3.0	2.8	2.2
Primary production	24.0	2.3	0.9	0.9
Manufacturing and mining	165.9	1.3	1.9	2.1
Construction	68.2	0.9	3.0	1.2
Services	907.9	3.2	3.0	2.2
Private and public consumption	1131.7	3.2	2.8	2.6
Investment in real capital				
Mainland Norway	227.0	3.9	4.1	1.8
Petroleum activities and shipping	82.8	0.5	1.1	-2.5
<i>Memo</i>				
Employment (1000 persons)	2301.9	0.8	1.0	0.3
Petroleum exploration (bn SM <sup>3</sup> )	264	5.8	0.9	-2.1
Oil price (NOK per barrel, 2007-prices)	274	1.4	1.5	-3.1

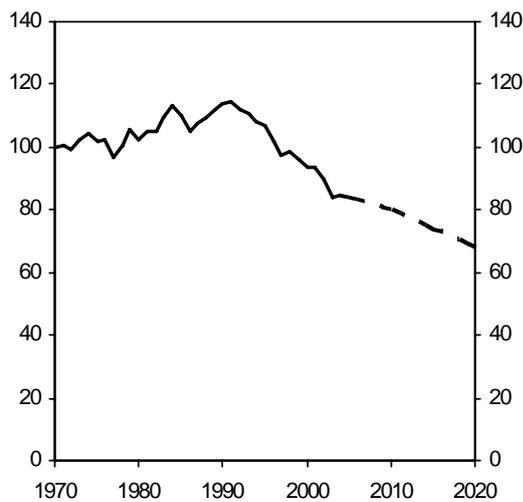
Sources: Statistics Norway and the Ministry of Finance.

The increased use of electricity can in principle be met through the use of natural gas, coal, hydro or other renewables as primary energy sources, or increased imports. The composition of the new capacity in supply will depend on the regulatory framework, development in the electricity market and prices of factors like coal, gas and oil, and the price on emissions of CO<sub>2</sub> (allowance price, taxes). Different scenarios for new capacity and imports would give different levels of emissions both in Norway and in other countries.

The projections are based on stylized assumptions about the electricity balance. Growth in demand could be conservatively estimated. Consumption of electricity in the power intensive industries is projected to remain at the average level for the last five years. There is only assumed a minor growth in electricity supply to the petroleum activities, including on shore facilities for the period 2004 to 2020. Any assumptions of higher electricity use in the petroleum sector will result in a tighter electricity balance. For the economy as a whole, the projections imply a continuation through 2020 of the observed decline in electricity intensity on the mainland over the last 15 years, see figure 1.1.

It is further assumed that the increase in demand for electricity in Norway from 2010 to 2020 partly will be met by increased production from renewable sources and the establishment of two gas-fired power plants.

Figure 1.1 Total net consumption of electricity (GWh) compared to GNP for mainland Norway (fixed prices). Index 1970=100



Source: Statistics Norway and the Ministry of Finance.

## Methodology

The emission projections for Norway presented in this report are based on various sources and methodology. For energy-related emissions, the projections are largely based on macroeconomic model simulations (for more about the macroeconomic model simulation, see section on the MSG model below) supplemented by available micro studies. Emissions from the petroleum sector and for all non-CO<sub>2</sub> emissions from all sources are based on sector- and plant-specific information collected from the industries concerned. The Norwegian Pollution Control Authority, The Norwegian Petroleum Directorate and The Norwegian Oil Industry Association have set up a joint database for discharges to the sea and emissions to the air from petroleum operations. From 2004, all operators of petroleum activities on the Norwegian Continental Shelf report discharge and emission data directly to this database. This facilitates both the operators' and the authorities' ability to produce analyses of historical discharges and emissions in a way that is more comprehensive and consistent than was previously the case. Emissions to the air are, in most cases, calculated on the basis of the quantity of gas and diesel used in combustion processes on the installation. The emission factors used in these calculations are provided through the Norwegian Oil Industry Association (OLF). Emission projections are based on information on activity levels collected from the petroleum industry.

## MSG model

Various versions of the MSG model have been used in the Ministry of Finance since the 1960s. MSG is a general equilibrium model developed by Statistics Norway. The main determinants of growth are capital accumulation, labour supply, availability of natural resources and the rate of technological progress. As all resources are fully utilized, the model is unsuitable for analyzing short-term adjustment problems like unemployment or extensive downscaling of specific industries due to changes in policy or international prices. Simulation results must therefore undergo adjustments to present more realistic projections of possible future situations. The model is quite disaggregated and contains 33 private production sectors, 7 government sectors and 18 private consumption sectors. The main production factors are material inputs, labour, three types of real

capital, three types of energy sources (electricity, heavy duty oil and petrol) and various types of polluting and non-polluting transport services. A certain degree of substitution between production factors is assumed in the model depending on changes in their relative prices and the exogenous assumptions about factor productivity developments. Producers enjoy some market power at home which is, a feature supported by empirical analyses of the Norwegian economy. Producer behaviour at home is therefore characterized by monopolistic competition. On the world market, however, prices are fixed, suggesting that producers behave as price takers in the export markets. In each sector, real capital formation is determined so that expected return on capital equals an exogenously given return on capital. A detailed emission model is incorporated into the MSG, turning it into an effective tool for assessing environmental consequences of changes in economic activity. Nine pollutants disaggregated by source and sector are specified in the model.

