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**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND
THE COUNCIL**

**under Council Decision 93/389/EEC as amended by Decision 99/296/EC for
a monitoring mechanism of Community greenhouse gas emissions**

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¹ <http://europa.eu.int/comm/environment/eussd/index.htm>.

1. EXECUTIVE SUMMARY

This is the second progress report under Council Decision 93/389/EEC as amended by Decision 99/296/EC for a monitoring mechanism of Community CO₂ and other greenhouse gas emissions. It assesses the actual and projected progress of Member States and the Community towards fulfilling their greenhouse gas (GHG) emission commitments under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Convention was aimed at stabilising CO₂ emissions at the 1990 level, while the Kyoto Protocol sets the EU a target of –8% from the 1990 level for six greenhouse gases by 2008-2012.

The report covers data on actual GHG emissions from 1990 up to and including 1999 as well as emissions projections up to 2010, the mid-point of the Kyoto Protocol's first commitment period.

Main findings:

- Greenhouse gas emissions (excluding land use change and forestry) in the EU in 1999 have decreased by 4% compared to 1990 and the EU as a whole is in line with its targets path for both 2000 and 2008-12. This favourable trend is mainly due to reductions in Germany and the UK. However, most Member States were well above their target path and more than half are, on present trends, headed towards substantially exceeding their agreed share of EU emissions in 2010.
- Member States' projections suggest that existing policies and measures will not be sufficient to continue the EU-wide reductions of total EU greenhouse gas emissions (excluding land use change and forestry). Instead, progress made so far will be outweighed by further increases. All Member States, except UK, project their emissions (by 2010) to be above their Burden Sharing target. Community-wide projections show comparable results.
- This means that by 2010 at best a stabilisation of emissions at 1990 level will be achieved. The Kyoto target of –8% is still valid and meeting it will require significant efforts from most Member States.
- Emission trends in the transport sector are of particular concern. The sector is responsible for the biggest increase of actual greenhouse gas emissions, in particular of CO₂ and N₂O. Furthermore, projections of GHG emissions from the transport sector indicate a rise of more than 30% by 2010.
- Member States have identified additional policies and measures that could help meeting this gap by about 210 Mt CO₂ eq, or –5% from 1990 emissions. The missing 3% of about 110 Mt CO₂ eq. will need to be closed by further measures both at Member State and EU level. The savings of about 190 Mt CO₂ eq. that have been identified by Germany and the UK, should be regarded as an 'over-delivery' of reductions that cannot be taken for granted by the rest of the Community as a way of helping to meet the Kyoto target.
- EU-wide policies and measures complementing action by Member States have been identified by the European Climate Change Programme. Measures in an advanced stage of preparation (e.g. Directives on Emission Trading, Bio-fuels, Promotion of Renewable Energy Sources or Energy Performance of Buildings)

are estimated to provide a cost-effective reduction potential of 240 Mt CO₂ eq.. The realisation of this technical potential depends on a number of factors including the accuracy of data, political acceptability and the timeframe within which they are implemented. Additional savings were also identified by the ECCP, but these are likely to be realised over longer time scales.²

- Reporting by Member States on actual progress has improved compared to the first progress report. Reporting on projected progress has not significantly improved. Due to a lack of detail on the methodologies used, on the timetable of implementation of policies and measures and inherent uncertainties in projecting future behaviour, all projections must be treated with considerable caution.
- A future Proposal for a Review of the Monitoring Mechanism under Council Decision 99/296/EC, as foreseen in COM (2001) 580 final will need to make provisions for extended reporting requirements under the Kyoto Protocol and a forthcoming EU Emissions Trading scheme as well as enhanced provisions on the reporting of national policies and measures.

² Proposals for further measures are included in 'Category 2' (11) and 'Category 3' (22) of the ECCP June report. These measures need further work before a political decision about their realisation can be made. The ECCP identified an overall cost-effective technical potential (< 20 €/t Co₂ eq.) of between 664 – 765 Mt/Co₂ eq.

2. CONCLUSIONS

In this second progress report under Council Decision 93/389/EEC as amended by Decision 99/296/EC, the EC monitoring mechanism has seen continued progress in Member States' reporting on emission inventories. There has been limited progress compared with the first progress report with regard to reporting on national policies/measures and projections - only nine Member States have provided quantification of their additional measures.

Evaluation of actual progress was undertaken successfully with the main emission data available for almost all Member States. Data gaps on fluorinated gases were significantly smaller than in last year. Data on land-use is not yet included, since the report was drawn up before the Bonn agreement. Assessing projected progress was more difficult since the reported detail concerning quantification of policies and measures, methodologies used and underlying assumptions continues to vary widely between Member States.

Member States' projections were generally supported by Community-wide projections on future progress. However, all projections should be treated with caution, due to considerable uncertainties in some of the underlying assumptions and the lack of comparable methodologies. These uncertainties suggest that a 'safety margin' should be applied when identifying remaining EU emission reduction obligations towards achieving the Kyoto Protocol target. To be certain of complying with its Kyoto commitments the EU should therefore consider further reductions for which additional policies will have to be developed.

The following chapters provide more specific conclusions.

2.1. Compliance on reporting

- Reporting on actual progress (greenhouse gas inventories) has improved over recent years with most countries using the Common Reporting Format, a standardised tool developed by the UNFCCC. However the Commission encounters great problems in receiving the information from Member States on time.
- Data gaps on the fluorinated greenhouse gases (HFCs, PFCs, SF₆) are significantly smaller than last year. Only two Member States failed to provide any data at all and another provided an incomplete time series.
- Reporting on policies, measures and projections was not significantly improved for most Member States compared with the first progress report. There is an urgent need for many Member States to improve the quantitative assessment of the measures as well as providing the information on time.
- Information is still incomplete regarding information on methodologies used and the assumptions underlying the projections and should be improved with regard to the clarity of documents, for example by adopting common format tables for key information.

- Compliance with the monitoring mechanism guidelines is insufficient and more efforts have to be undertaken to apply them to their full extent.

2.2. Actual progress of the EU

- Greenhouse gas emissions in the European Union have decreased by 4 % since 1990. CO₂ emissions were slightly below 1990 levels in 1999 (-1.6 %), CH₄ and N₂O emissions decreased by 17 % and 14 % respectively. These figures suggest that in 1999, the European Union, as a whole, was in line with its target path for both 2000 and 2008-2012³. However, this positive situation is mainly due to large emission reductions in Germany and the UK. Together with Luxembourg they were the only Member States well below their emissions target paths in 1999. France, Finland and Sweden were near but all other Member States were well above their target paths. A cautious approach in interpreting progress in the EU as a whole is therefore needed.
- CO₂ emissions per capita for the EU-15 fell slightly between 1990 and 1999, again largely due to reductions in Germany and the UK.
- All Member States showed large increases in transport emissions

2.3. Projected progress of the EU

Progress based on Member States' projections

- With existing policies and measures, Member State projections suggest total EU emissions of greenhouse gases (excluding land use change and forestry) will be at 1990 levels in 2010. Compared to 1999 data this will mean that overall emissions will increase. CO₂ is projected to increase by 3.1 % (mainly due to increases in the transport sector) and fluorinated gases by 66 %. Decreases are projected for CH₄ and N₂O by 31 % and 17 % respectively over the period 1990 to 2010. Stabilisation of overall greenhouse gas emissions in 2010 at 1990 levels means that the emission reduction target is still about -7.5 %. Compared to last year's projections this presents an increase of 0.9 % in the gap between commitments and actual efforts. Due to the continuing uncertainty related to the implementation of policies and the methodologies used, concern about the accuracy of this figure must be expressed.
- Additional policies and measures identified by the Member States are calculated to close this gap by about 210 Mt CO₂ eq. or 5% (assuming Germany and UK meet but do not exceed their Burden Sharing target). Again this is lower than last year's projections that amounted to 270 Mt CO₂ eq /yr. However, six Member States have not yet adequately identified or assessed additional policies and measures. In addition, the effects of these policies and measures are subject to a significant degree of uncertainty arising from their nature (these tend to be policies in the early stage of development) and the methodologies used.

³ The analysis compares actual emissions in 1999 with hypothetical values in 1999 on a linear target path from the base year to 2000 and 2008-2012 respectively.

- If Germany and the UK deliver the savings identified as additional measures in their national strategies, the EU as a whole would more than meet the Kyoto commitment (reaching –10% of 1990 levels). However, “over-compliance” by some Member States should not be taken for granted by other Member States as a way of helping to meet the overall EU target under the Kyoto Protocol. Moreover, the EU has to prepare for more important emission reductions under the 2nd Commitment Period, for which significant and sustained efforts will be required by all Member States.

Comparison between Member State and Community wide projections

- Since Member States projected some increases in emissions they have come closer to Community-wide projections, which expect greenhouse gas emissions to increase by about 1% (compared to 1990 emissions). The gap now identified by Member States and the European Commission is between –8% and –9% of 1990 emissions.
- However, with regards to CO₂ the Community-wide study projects an increase of 4%, compared to 3% from the Member States. There is a larger difference for methane with –18% from the Community-wide projection and –31% from the Member States. Nitrous oxide projections show a similar pattern in the two sets of projections.

Common and co-ordinated policies and measures

- In view of the difficulties experienced by many of the Member States to reach their burden sharing target, common and co-ordinated policies and measures will be an important supplement to reinforce and strengthen their national climate change strategies.
- Additional common and co-ordinated measures have been identified by the European Climate Change Programme (ECCP) with an estimated cost-effective emission reduction potential for the ones in an advanced state of preparation of about 240 MtCO₂ eq. If the potential of these advanced measures could be realised before 2010, they would contribute about 5% of the 8% Kyoto emission reduction target, thereby effectively supporting Member State policies and measures. In total the ECCP could identify cost-effective options costing less than 20 €/t CO₂eq. totalling 664 - 765 MtCO₂eq. However, the realisation of the technical potential depends on a number of factors such as the accuracy of data, the overlap with Member State policies and measures, the timeframe within which measures are implemented and public acceptance. In order to give a better indication of the potential of cost-effective measures at EU level for the 1st Kyoto commitment Period the report makes a distinction between those that are 'at an advanced stage of preparation' and those for which 'more work is needed'.

3. EC MONITORING MECHANISM AND PURPOSE OF THE REPORT

3.1. The EC Monitoring Mechanism

The monitoring mechanism for anthropogenic CO₂ and other greenhouse gases was established in June 1993, following the adoption of Council Decision 93/389/EEC, by the Council of Environment Ministers. This was revised in April 1999, (Council Decision 99/296/EC) to allow for the updating of the monitoring process in line with the inventory requirements incorporated into the Kyoto Protocol (KP).

The monitoring mechanism is an instrument to assess accurately and regularly the extent of progress being made towards the Community's commitments under the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Progress is evaluated by the Commission, in consultation with the Member States, and is based on National Programmes, (incl. updates) supplied by the Member States as described in Article 5(1) and Article 2(2) of Council Decision 1999/296/EC and other relevant information. The National Programmes should include (a) information on actual progress and (b) information on projected progress.

Member States are required by 31 December each year to submit inventory data for the two previous years⁴ and any updates of previous years (including the base year 1990⁵) and their most recent projected emissions for the years 2005, 2010, 2015 and 2020⁶. Any updates to the National Programmes e.g. new policy measures should also be reported to the Commission by 31 December. If no change has occurred, this should be formally indicated to the Commission.

For the purpose of facilitation and harmonisation of collection, reporting and evaluation of data the Monitoring Committee, established under Council Decision 1999/296/EC, set-up two Working Groups. These Working Groups developed a set of guidelines⁷ covering both the collection and evaluation of emission inventories and national programmes. The Monitoring Committee approved the guidelines on 1 September 2000. The information that Member States provided for this report already includes many of the elements in the guidelines, but often to limited extent.

3.2. Purpose of this report

This report presents the results of the evaluation process under the EC Monitoring Mechanism and assesses actual and projected progress of Member States towards

⁴ Member States have to report their inventories annually to the Commission by 31 Dec year n: Anthropogenic CO₂ emissions and CO₂ removals by sinks for the year n-1; Emissions by source and removals by sinks of the other greenhouse gases; final data for the year n-2 and provisional data for the year n-1.

⁵ Base year is 1990, except for HFC, PFC, SF₆ for which the base year can be selected by the Party to be either 1990 or 1995.

⁶ Decision 99/296/EC requires reporting of projected emissions and removals for the period 2008 to 2012 and as far as possible, for 2005. However, in addition the Monitoring Mechanism "Guidelines for the methodology of the evaluation of progress towards the KP targets and for reporting of national programmes" require reporting of the projected emissions and removals also for the year 2015 and 2020.

⁷ Guidelines: Part 1: Guidelines for Member States and EC Annual Inventories; Part 2: Methodology for the Evaluation of Progress and for the Contents of National Programmes, Brussels, 1 September 2000.

fulfilling the Community's commitments under the UNFCCC and the Kyoto Protocol.

Under Article 4 of the UNFCCC adopted in Rio de Janeiro in June 1992, the European Community agreed to adopt policies and measures with the aim of returning their anthropogenic CO₂ and other greenhouse gas emissions, individually or jointly, to 1990 levels by the year 2000.

At the third Conference of the Parties (COP3) to the UNFCCC held in Kyoto in December 1997, the Parties adopted the Kyoto Protocol to the UNFCCC, which sets different binding emission targets for a number of Parties including the European Community (EC). Under this agreement the EC agreed to reduce its greenhouse gas emissions by 8 % by 2008-2012, from 1990 levels. The implementation rules for the Kyoto protocol were agreed at the sixth Conference of Parties held in Bonn in July 2001 (“Bonn Agreement”) and the EU and Member States are now preparing for ratification. The overall target of –8% has since been distributed on a differentiated basis to individual Member States under an ‘EU burden sharing’ mechanism agreed upon by the Council of Ministers in June 1998. The agreed targets are shown in Table 3.2.1.

Table 3.2.1 Member States’ commitments in accordance with article 4 of the Kyoto Protocol agreed upon by the Council of Ministers (EU burden sharing, June 1998)

Member State	Commitment (% change in emissions of the six GHG basket for 2008 to 2012 relative to 1990 base year levels)
Austria	-13
Belgium	-7.5
Denmark⁸	-21
Finland	0
France	0
Germany	-21
Greece	+25
Ireland	+13
Italy	-6.5
Luxembourg	-28
Netherlands	-6
Portugal	+27
Spain	+15
Sweden	+4
United Kingdom	-12.5

⁸ In connection with the agreement Denmark made the following statement “Denmark is able to reduce it’s emissions by 17% in the first Commitment Period compared to it’s 1990 level of about 80 million tonnes corrected CO₂ equivalents through domestic policies and measures and present measures adopted by the Community. In making it’s legal commitment to a 21% reduction as set out in the agreement, Denmark has assumed the further elaboration and adoption of common and co-ordinated policies and measures (CCPMS) prior to the ratification of the Kyoto Protocol”.

The evaluation of progress towards these targets has two main components:

- Evaluation of actual progress

The evaluation of actual progress is based on emission inventories of Member States and the Community and includes the comparison of base year inventories with the latest available inventories to establish actual trends of emissions and a comparison with emission objectives at Member State and Community level.⁹

- Evaluation of projected progress

Projected progress is assessed by the collection and evaluation of adopted and future (planned, or currently under discussion) policies and measures at both national and Community level. This evaluation is based on emission projections of Member States and the Community. It includes an assessment of the consistency and soundness of these projections and their key underlying assumptions and parameters in the context of National Programmes.

The evaluation is based largely on documents provided by Member States. This includes documents produced specifically for submission under the Monitoring Mechanism and other documents, such as national climate change strategies and National Communications to the UNFCCC. In the case of projected progress, the evaluation has also taken into account the results of Community-wide projections of greenhouse gas emissions.

The following chapters in this report evaluate compliance with reporting requirements. This is done by comparing the most recent information that is available from the Member States with the requirements under the Monitoring Mechanism and the Guidelines for reporting adopted by the Monitoring Mechanism Committee on 1st September 2000 (Chapter 4). The report then summarises the results of the evaluation of actual progress, based on work done by the EEA (Chapter 5) and the evaluation of projected progress, based on the information as described above and as was available by July 2001 (Chapter 6).

⁹ Information based on the EEA report 'EC and Member States Greenhouse Gas Emission Trends 1990-1999' (EEA, 2001). Data exclude emissions and removals from land use change and forestry (LUCF).

4. MEMBER STATES COMPLIANCE WITH REPORTING REQUIREMENTS

4.1. Compliance with reporting timescales

Compliance with reporting timescales (31st December each year) under the Monitoring Mechanism is still poor for most Member States. This is particularly so for the reporting of projected progress. Most Member States reported 1999 inventories by April 2001 and data on national policies and measures even later.

4.2. Compliance with reporting requirements on actual progress¹⁰

4.2.1. Greenhouse gas emission inventories

The evaluation of actual progress depends upon the availability of the relevant national inventories from which to compile a complete EC inventory covering all 15 Member States. By 1 April 2001, almost all Member States (except Belgium and Luxembourg) had reported data for 1999. Using a data gap procedure for Belgium and Luxembourg, the European Commission was able to compile a complete inventory for CO₂, CH₄ and N₂O emissions for the full period from 1990 to 1999. Data was provided in accordance with the 1996 Guidelines of the Intergovernmental Panel on Climate Change (IPCC) and, for most Member States, the newly introduced Common Reporting Formats (CRF) adopted at the 5th Conference of the Parties (COP 5) in 1999. Any data gaps should be avoided to produce completely consistent inventories and further progress is needed to achieve this.

4.2.2. Data gaps on CO₂, CH₄ and N₂O

For CO₂, CH₄ and N₂O a data gap procedure has been applied for Luxembourg (1991-1993, 1999) and Belgium (1999)¹¹.

4.2.3. Data gaps on fluorinated gases

Data gaps on the fluorinated greenhouse gases (HFCs, PFCs, SF₆) as reported by Member States by 1 April 2001 are significantly smaller than in previous years. Only for Ireland and Luxembourg were no data available by April 2001. For Belgium a data gap procedure had to be used for the missing years.

¹⁰ The information in this section has been taken from "Annual European Community Greenhouse Gas Inventory 1990-1999, May 2001", prepared by the European Environment Agency and its European Topic Centre on Air and Climate Change and the EEA report "European Community and Member States greenhouse gas emission trends" (EEA, 2001).

¹¹ The data gap filling procedure was to take the emissions reported for the most recent previous year as the first estimates. However, for CO₂ emissions from fossil fuel combustion, the method used the latest estimates reported by the Member States in combination with trend information for more recent years from latest calculations of CO₂ emissions from fossil fuels by Eurostat. In June 2001 Belgium submitted data for 1998 and 1999, which suggests that the Belgian greenhouse gas emissions in 1998 and 1999 as compiled within the EU inventory are underestimated to some extent. After the deadline of 1 April, Luxembourg submitted data for 1999, but data for 1991-1993 is still outstanding. The data submitted by Luxembourg suggests that Luxembourg's greenhouse gas emissions in 1999 as compiled within the EU inventory are slightly overestimated. In accordance with the Monitoring Mechanism guidelines (agreed in September 2000) the latest data from Belgium and Luxembourg will be included in the next annual EU greenhouse gas inventory, to be finalised 15 April 2002.

4.2.4. *Data gaps on land use change and forestry (LUCF)*

Data on CO₂, CH₄ and N₂O emissions used in this report do not include emissions and removals from land use change and forestry. It is only very recently (political agreement at the resumed COP 6, Bonn, July 2001 to be formally confirmed at COP7, Marrakech) that outstanding methodological decisions on CO₂ sinks under the Kyoto Protocol have been agreed. Reporting requirements on sinks are now under development by IPCC, but will only be available at a later stage. Data on carbon sinks were not therefore available for this report.

4.3. **Compliance with reporting requirements on projected progress**

4.3.1. *Greenhouse gas emission inventories*

The evaluation of projected progress requires information on all policies and measures under consideration and also on the emission projections for the Member States. Policies and measures under consideration include existing ones (in the process of being implemented) and additional ones (for future implementation). Projections include estimates of emission reduction effects of existing measures (a 'business-as-usual' scenario) and projections on the effects of additional measures. For most Member States, very little additional information has been provided during 2001 and the quality of their reporting is not significantly improved compared to the first progress report. For some Member States, the information provided during 2000 was already relatively comprehensive (for example those Member State's with Climate Change Strategies). Therefore the lack of additional information is probably related to the lack of anything significantly new to report.

To improve the situation and to facilitate information exchange and comparison between projections, a questionnaire was sent to Member States. The aim of the questionnaire was to gather information on the methodology used for the projections. The additional information obtained was limited for most Member States. Ten Member States replied with some additional information, five Member States (Spain, Greece, Ireland, Luxembourg and Austria¹²) did not return the questionnaire.

4.3.2. *Policies and measures*

- Finland and Ireland have produced national Climate Change Strategies since the first progress report and their reporting of policies and measures has improved.
- Spain, Greece, Sweden and Italy have provided additional information since the first progress report. In the cases of Spain and Greece, this information is limited and does not improve the quality of their reporting compared to 2000.
- Most countries provide a good level of detail on the objectives of policies and measures and the status of implementation.

¹² Austria is developing new projections for its 3rd National Communication and provided some information on those projections to the Monitoring Mechanism.

- Quantification (in terms of greenhouse gas emission savings in millions of tonnes) of policies and measures (including existing measures as well as additional measures) is very limited for the majority of Member States. This is also the case for information on compliance costs related to them.

4.3.3. *Projections*

- Sources of information on projections differ considerably: National Climate Change Programmes are the most comprehensive set of data received and they are available for nine Member States (Austria, Denmark, Finland, France, Germany, Ireland, Luxembourg, Netherlands, UK). By November 2001, all Member States will have to produce a 3rd National Communication under UNFCCC which can only be taken in next years' progress report and it is expected that many will present new projections in that Communication.
- Two more Member States (Finland and Ireland) provide quantification of additional measures, in comparison to the first progress report.
- Some Member States have provided additional information on the parameters and modelling assumptions used for the projections in response to the questionnaire. However, significant effort would be required to obtain enough detail to compare different projections.
- According to the reporting guidelines (FCCC/CP/1999/L.3/Add.1, paragraph 35) Parties are requested to present projections on a gas-by-gas basis. A few countries give splits of projections by gas and by sector, but unlike the inventories there is no detailed common format for reporting or common definition of sector. This also makes comparison of projections difficult.

Projections generally suffer from a lack of quantification of the effects of individual policies and measures as already discussed. This is of particular concern because this makes the evaluation of projected progress difficult.

5. EVALUATION OF ACTUAL PROGRESS

5.1. Introduction

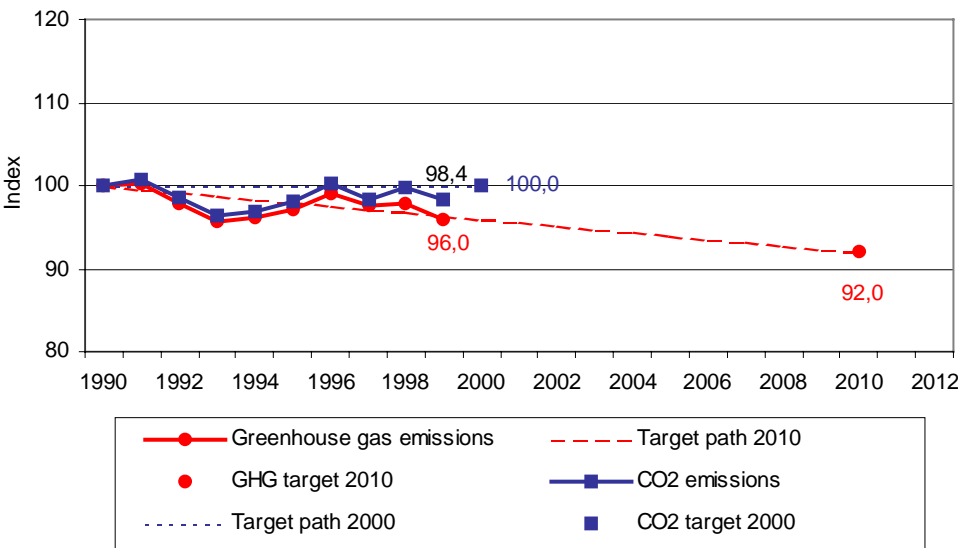
The purpose of this section is to contribute to the evaluation of progress of the European Community and its Member States towards meeting their greenhouse gas commitments under the UNFCCC and the Kyoto Protocol based on information compiled by the EEA⁶. The intention has been to perform a consistent and comparable assessment of the contribution of each Member State towards meeting the greenhouse gas targets of the EC as a whole. The analysis does not aim to evaluate compliance of Member States with their targets, but rather their contribution to the EC greenhouse gas emissions in 1999. The progress evaluation is carried out by comparing 1990-1999 greenhouse gas emission data of the EC and its Member States with two (hypothetical) linear target paths: (1) the UNFCCC target path for 2000; and (2) the Kyoto target path for 2008-2012. By calculating the deviations from these target paths in 1999, a measure of actual progress of the EC and its Member States in 1999 is established.

5.2. Progress in the European Union

5.2.1. Progress at European Union level

Total EC greenhouse gas emissions decreased by 4 % between 1990 and 1999 (Figure 5.2.1), but trends for the different gases varied considerably. Assuming a linear target path for 1990 to 2000 (for CO₂) and 1990 to 2010 (midpoint of the Kyoto Protocol target period) for all Kyoto Protocol gases, Figure 5.2.1 shows that the EU was, in 1999, in line with both target paths (for stabilisation by 2000 and for a reduction by 8% by 2008-2012).

Figure 5.2.1 EU15 greenhouse gas emissions compared with targets for 2000 and 2008-2012 (excl LUCF)



Note: the linear target path is not intended as an approximation of future EU emission trends, but is used to evaluate EU greenhouse gas emissions in 1999 compared to the EU targets.

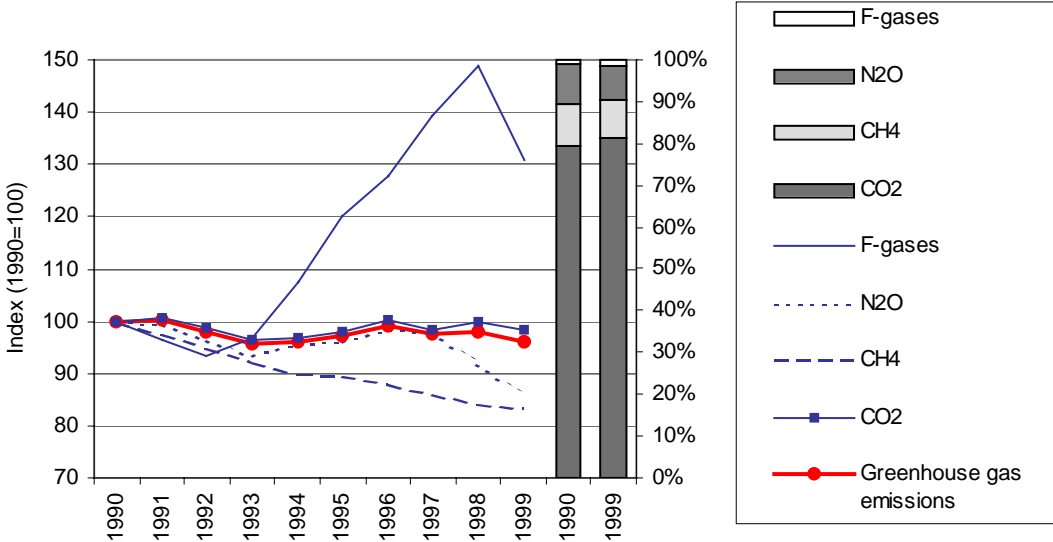
In 1999, total EU15 greenhouse gas emissions were 4030 Mt CO₂ equivalents, which was 2 % below 1998 and 4 % below 1990 levels. The most important reasons for reductions in 1999 compared to 1998 were the continuing fuel shift from coal to gas in electricity production, a relatively mild winter and therefore less need for heating, and one-off measures in the chemical industry.

The trends for the different gases varied considerably. Figure 5.2.2 illustrates that the share of CO₂ and fluorinated-gases in total greenhouse gas emissions increased, whereas the importance of CH₄ and N₂O declined. CO₂ is by far the most important greenhouse gas accounting for 81 % of total GHG emissions in 1999, but emissions were slightly below 1990 levels in 1999 (-1.6 %). Large increases of CO₂ emissions from transport were outweighed by reductions from fossil fuel combustion in energy and manufacturing industries.

CH₄ emissions account for 9 % of total EC greenhouse gas emissions and decreased by 17 % between 1990 and 1999. The main reasons for declining CH₄ emissions were reductions in solid waste disposal on land, the decline of coal mining and falling cattle numbers. N₂O emissions went down by 14 % and are responsible for 8 % of total greenhouse gas emissions. The main reason for N₂O emission cuts were reduction measures in the chemical industry (adipic acid production) in recent years.

Fluorinated-gas emissions show opposing trends: whereas HFC and SF₆ emissions increased sharply between 1990 and 1999 (+66 % and +34 % respectively), PFC emissions reduced by 38 %. Despite the sharp increase of Fluorinated-gas emissions since 1992 (+31 %), they account for only 2 % of total greenhouse gas emissions. The decline of fluorinated-gas emissions in 1999 compared to 1998 is due to large emission reductions of HFCs in the UK.

Figure 5.2.2 Greenhouse gas emissions according to gases (excl. LUCF)



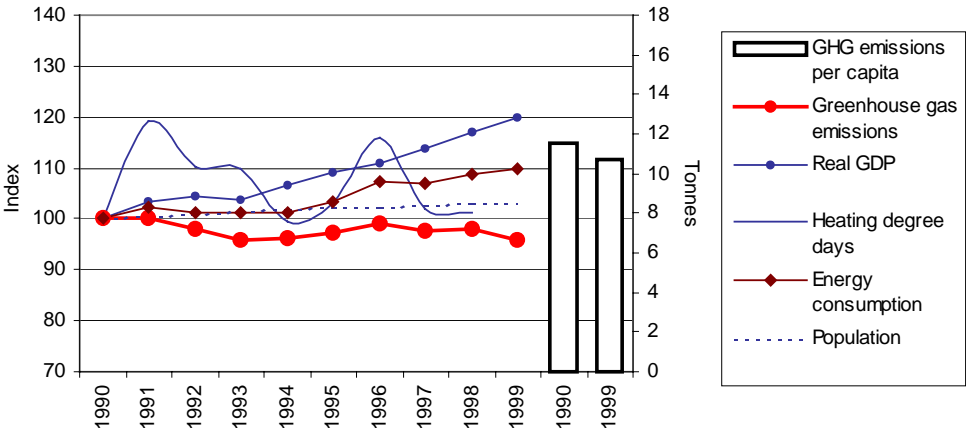
Fluorinated-gases include HFC, PFC and SF₆ emissions.

Source: EEA (2001)

The main driving forces: In 1999, real GDP grew by 2.5 % in the EU, energy use increased by 0.9 %, compared to 1998 (Figure 5.2.3). This compares to decreases of greenhouse gas emissions by 2 % and of CO₂ emissions by 1.4 %. Therefore, in 1999, greenhouse gas emissions de-coupled from economic growth and also from energy use. Over the whole

period from 1990 to 1999, the absolute (total) greenhouse gas emissions de-coupled from GDP growth by 24 index points (percent see Fig. 5.2.3), and from energy use by 14 index points (percent). As the EU population grew by 3.2 % between 1990 and 1999, EU greenhouse gas emissions per capita decreased from 11.5 tonnes in 1990 to 10.7 tonnes in 1999.

Figure 5.2.3. EC greenhouse gas emissions and driving forces (real GDP, heating degree days¹³, gross inland energy consumption, population) and greenhouse gas emissions per capita



Source: EEA (2001) and Eurostat

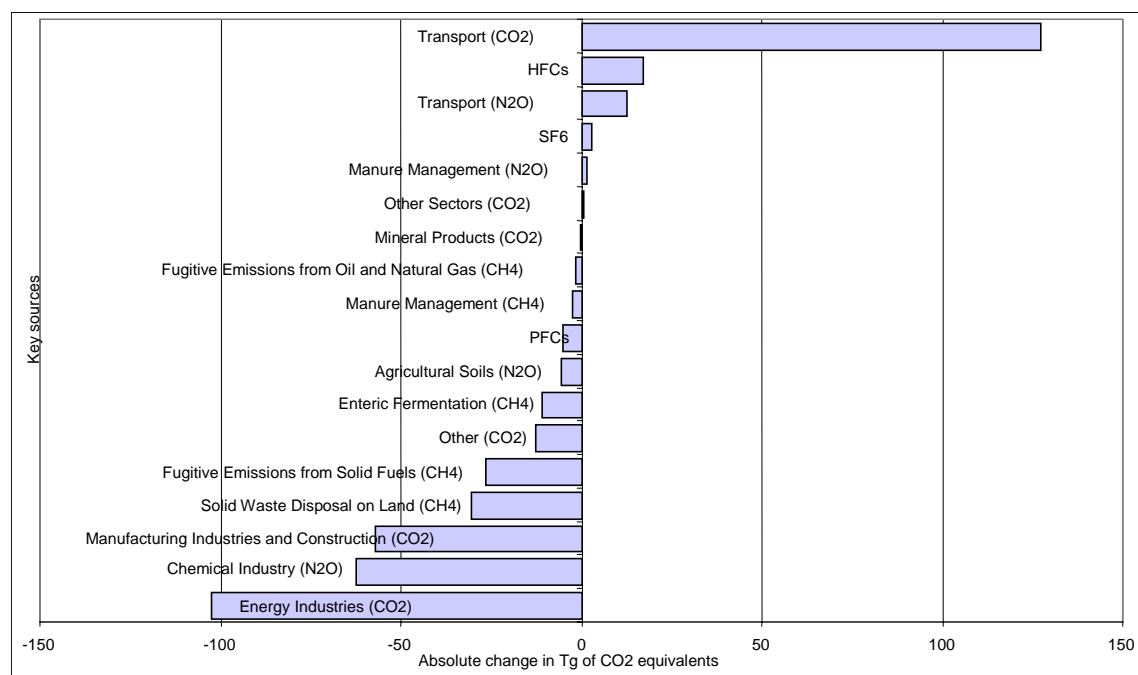
Sectoral analysis: To analyse the sectoral greenhouse gas trends in more detail and to focus on the most important sources, key source indicators are identified on the basis of the IPCC Tier 1 method¹⁴. The aim of the key source analysis is to identify source categories that cover 95 % of GHG and/or show substantial changes in emissions between 1990 and 1999. In a first step, 14 key source categories have been identified covering 95 % of EC GHG emissions. In a second step four categories have been added because of their remarkable trend performance. Therefore, in the analysis 18 key source categories have been identified for the EU covering 96 % of total EC GHG emissions.

The emission trends of the key source categories vary widely. Figure 5.2.4 shows the ranking of key source categories according to absolute changes between 1990 and 1999.

¹³ Temperature variations can be measured using so-called heating degree days. Heating degree days are the sum of temperature differences between a certain constant indoor temperature and the daily average of outdoor temperature. Therefore, lower average outdoor temperatures lead to higher heating degree days.

¹⁴ The IPCC Tier 1 method is a basic approach to identify key source categories, i.e. source categories which have a significant influence on a country's total greenhouse gas inventory in terms of the absolute level of emissions, the trend in emissions, or both. (see Chapter 7 of IPCC (2000) Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. Intergovernmental Panel on Climate Change).

Figure 5.2.4: Absolute GHG emission trends 1990-1999 in the EC key source categories (million tonnes of CO₂ equivalents)



Source: EEA (2001)

Sectors with increases in emissions: CO₂ emissions from transport are the second largest single source of greenhouse gas emissions in the EU accounting for 20.5 % of total greenhouse gas emissions in 1999. And CO₂ emissions from transport have risen rapidly: between 1990 and 1999 emissions increased by 18 % or 127 million tons in EU15 (mainly CO₂, but also N₂O emissions). Transport includes emissions from fossil fuel combustion in road transportation, national civil aviation, railways, national shipping, and other transportation. The main reason for the strong growth of CO₂ emissions from transport is the increase in road transport volumes and - associated with this - rising road fuel consumption. This occurs in almost all Member States, but in particular in Ireland, Spain, Portugal, Greece, Austria and Luxembourg. N₂O emission increases from transport are mainly due to the increased use of catalytic converters¹⁵.

The second key source category with substantially increasing emissions is HFC emissions from industrial processes. Some HFCs are used as substitutes for ozone depleting CFCs, which have been gradually phased out in the 1990s.

Sectors with reductions in emissions: The largest reductions in absolute terms were achieved in the energy sector (electricity and heat production) mainly due to fuel shifts from coal to gas in several Member States and efficiency improvements (above all in Germany).

The second largest were reductions of N₂O in the chemical industry in the UK, Germany and France mainly due to specific measures in the adipic acid production in these countries.

¹⁵ Catalytic converters reduce air pollution but produce N₂O emissions as a by-product (due to chemical interaction with sulphur in petrol). Improved catalytic converters and low sulphur fuels are expected to reduce these N₂O emissions in the future.

The third largest were reductions of CO₂ emissions from fossil fuel combustion in the manufacturing industries mainly due to economic restructuring and efficiency improvements in the German manufacturing industry after German reunification.

Substantial CH₄ emission reductions were achieved from solid waste disposal on land (landfilling) and fugitive emissions from solid fuels. These reductions are mainly due to the implementation of the landfill directive and related legislation and the decline of coal mining.

Table 5.2.1 provides more quantitative information on the increase or decrease of greenhouse gas emissions for different sectors such as energy industries.

Table 5.2.1 Variations of greenhouse gas emissions 1990-1999 of EU15 and the Member States in percent

	EU15	AT	BE	DK	FI	FR	DE	GR
Greenhouse gases (without LUCF)	-4.0%	+2.6%	+2.8%	+4.0% (-4.6%)	-1.1%	-0.2%	-18.7%	+16.9%
CO ₂ (without LUCF)	-1.6%	+5.9%	+2.6%	+7.4% (-4.0%)	+2.8%	+5.0%	-15.4%	+16.7%
CH ₄	-16.7%	-15.5%	-5.0%	-3.6%	-36.0%	-8.6%	-41.3%	+14.1%
N ₂ O	-14.1%	+12.1%	+8.8%	-12.7%	-7.9%	-17.0%	-33.9%	-1.5%
HFCs	+66.3%	+23489 %	+58.6%	-	+10373 7%	+113.8 %	+82.8%	+300.4 %
PFCs	-38.1%	-97.4%	-100.0%	-	+5262.1 %	-40.1%	-36.6%	-92.3%
SF ₆	+33.7%	+41.0%	-38.3%	+50.6%	-54.5%	+9.8%	+40.5%	-
1.A.1 Energy industries (CO ₂)	-8.9%	-8.1%	-18.2%	+7.7%	+13.6%	-6.3%	-20.1%	+16.0%
1.A.2 Manufacturing industries (CO ₂)	-8.9%	+16.1%	+14.2%	+1.3%	+10.4%	+0.4%	-29.2%	-3.9%
1.A.3 Transport (CO ₂)	+18.2%	+30.0%	+14.9%	+17.4%	+2.1%	+16.5%	+14.7%	+27.0%
1.A.4 Other Sectors (CO ₂) [Small combustion]	0.1%	-2.2%	17.0%	-12.1%	-15.9%	8.3%	-14.3%	48.6%
	IE	IT	LU	NL	PT	ES	SE	UK
Greenhouse gases (without LUCF)	+22.1%	+4.4%	-43.3%	+6.1%	+22.4%	+23.2%	+1.5%	-14.0%
CO ₂ (without LUCF)	+32.7%	+4.3%	-46.3%	+8.0% (+7.1%)	+31.2%	+24.3%	+2.5%	-8.9%
CH ₄	+3.7%	+2.6%	-3.7%	-20.1%	-1.5%	+29.7%	-9.4%	-28.3%
N ₂ O	+11.6%	+0.4%	+13.4%	+14.8%	+12.4%	+6.8%	+1.4%	-35.9%
HFCs	-	+722.0 %	-	+71.8%	-	+216.1 %	+33473 %	-45.4%
PFCs	-	-27.6%	-	+6.7%	-	-16.0%	-25.2%	-70.3%
SF ₆	-	+94.7%	-	-5.5%	-	+188.7 %	+18.5%	+81.5%
1.A.1 Energy industries (CO ₂)	+42.2%	+2.5%	-94.5%	+9.4%	+14.1%	+18.4%	+9.4%	-21.5%
1.A.2 Manufacturing industries (CO ₂)	+10.6%	-7.4%	-66.5%	+4.0%	+17.7%	+12.3%	+3.2%	-6.2%
1.A.3 Transport (CO ₂)	+96.2%	+19.1%	+54.6%	+19.3%	+66.2%	+44.7%	+6.1%	+4.3%
1.A.4 Other Sectors (CO ₂) [Small combustion]	+1.8%	+7.2%	+36.1%	+2.9%	+46.0%	+22.6%	-18.6%	+4.8%

Note (1): “-“ means that 1990 emissions were zero or no data was available.

Note (2): For Denmark and the Netherlands data that reflect adjustments for variations in electricity trade and temperature respectively are given in brackets.

5.2.2. Progress at Member State level

Table 5.2.2 (see also Figure 5.2.5) shows the greenhouse gas emission trends and the distance to target indicator for Member States. The distance-to-target indicator (DTI) is a measure for the deviation of actual emissions in 1999 from a linear target path to the target (as discussed in Section 5.1).

Nine Member States reduced their emissions compared to 1998, but only five Member States were below base year levels in 1999.

The overall EC greenhouse gas emission trend is dominated by the two largest emitters Germany and the UK, accounting for about 40 % of EU greenhouse gas emissions. These two Member States achieved total greenhouse gas emission reductions of 330 million tons of CO₂ equivalents (compared to 1990).

The main reasons for the favourable trend in Germany are efficiency increases in German thermal electricity production and the economic restructuring in the five new Länder after the German reunification. Accordingly, German CO₂ emissions from energy and manufacturing industries declined by 83 and 57 million tons respectively between 1990 and 1999. The reduction of GHG emissions in the UK was primarily the result of the liberalisation of the energy market and the subsequent fuel switches from oil and coal to gas in the electricity production. CO₂ emissions from energy industries declined by 49 million tons between 1990 and 1999 in the UK. In addition, substantial N₂O emission reductions were achieved in the chemical industry (-26 million tons of CO₂ equivalents).

A recent study¹⁶ has analysed exactly the question of what the performance in terms of GHG reduction of both countries (Germany and UK) would be, if these countries had not had these one-off reductions. A diverse set of environment policies, which were increasingly introduced over the past decade in both countries, had a significant impact and account for at least 50 % of the reduction of emissions since 1990. The emission reductions due to the special circumstances in these two countries account for about 34 %¹⁷ of reductions in the EU since 1990.

The third and fourth largest emitters, France (14 %) and Italy (13 %), show opposing trends. Whereas France was slightly below 1990 levels in 1999, Italy's GHG emissions were higher in 1999 compared to 1990. In France, large reductions were achieved in N₂O emissions from the chemical industry, but CO₂ emissions from transport increased considerably. Italian GHG emissions rose between 1990 and 1999 primarily in the transport sector and in electricity production.

Spain as the fifth largest emitter in the EU accounts for 9 % of total EC GHG emissions and increased emissions by more than 20 % between 1990 and 1999. The main sources contributing to the increase are the same as in Italy, i.e. transport and electricity production.

¹⁶ Greenhouse gas reductions in Germany and the UK - Coincidence or policy induced? An analysis for international climate policy (*Fraunhofer Institut für Systemtechnik und Innovationsforschung (ISI), Science Policy and Technology Policy Research (SPRU) Deutsches Institut für Wirtschaftsforschung (DIW) Karlsruhe, Brighton, Berlin; June 2001*).

¹⁷ Working estimate based on data from the study mentioned above.

In 1999, Germany, Luxembourg and the United Kingdom were well below their Kyoto target paths. France, Finland and Sweden were near to their linear Kyoto target paths. All other Member States were well above their Kyoto target paths (Denmark, Spain, Ireland and Portugal by more than 10 index points = percent).¹⁸

Table 5.2.2 Greenhouse gas emissions in CO₂ equivalents (excl. land-use change and forestry) and Kyoto Protocol targets for 2008-2012

	1990 (MtCO ₂ eq)	1999 (MtCO ₂ eq)	change 1998-1999 (%)	change 1990 - 1999 ¹ (%)	Targets 2008- 2012 under Kyoto Protocol and EU burden sharing (%)	Distance-to- target indicator (DTI) (index points = %)
Austria	76.9	79.2	0.0%	2.6%	-13.0%	8.5
Belgium	136.7	140.4	-3.4%	2.8%	-7.5%	6.1
Denmark ²	70.0	73.0	-4.6%	4% (-4.6%)	-21.0%	13.5 (4.9)
Finland	77.1	76.2	-0.8%	-1.1%	0%	-1.1
France	545.7	544.5	-2.2%	-0.2%	0%	-0.2
Germany	1206.6	982.4	-3.7%	-18.7%	-21%	-9.3
Greece	105.4	123.3	-0.7%	16.9%	25%	5.7
Ireland	53.5	65.4	2.5%	22.1%	13%	16.3
Italy	518.3	541.1	0.9%	4.4%	-6.5%	7.3
Luxembourg	10.8	6.1	4.6%	-43.3%	-28%	-30.7
Netherlands	215.8	230.1	-2.9%	6.1%	-6%	8.8
Portugal	64.6	79.3	2.9%	22.4%	27%	10.2
Spain	305.8	380.2	6.1%	23.2%	15%	16.5
Sweden	69.5	70.7	-2.6%	1.5%	4%	-0.3
United Kingdom	741.9	637.9	-6.5%	-14.0%	-12.5%	-8.4
EU Total	4198.6	4029.8	-2.0%	-4.0%	-8.0%	-0.4

¹⁾ For the fluorinated gases most Member States have selected a base year other than 1990 (namely 1995), as allowed for under the Kyoto Protocol. However, for the analysis of EU emissions trends in this report 1990 emissions data have been used for the base year for all gases, for consistency reasons.

²⁾ For Denmark, data that reflect adjustments for electricity exchange in 1990 are given in brackets. These data are used to monitor progress towards Denmark's national target under the EU burden sharing agreement. For the EU total, non-adjusted Danish emission data have been used, according to the "UNFCCC guidelines on reporting and review" adopted 1999 at CP.5 in decision 3 ((FCCC/CP/1999/7)

Source:EEA (2001)

¹⁸ The Danish distance-to-target indicator is 13.5 index points (percent) for non-adjusted data and 4.9 index points (percent), if Danish greenhouse gas emissions, as requested by Denmark, are adjusted for electricity trade in 1990.

Germany, the UK and Luxembourg were well below their CO₂ targets for 2000 (Table 5.2.3). All other Member States were well above their CO₂ target paths for 2000. Denmark, Ireland, Spain and the Netherlands were 10 index points (percent) or more above their CO₂ emission target paths in 1999.¹⁹ Four Member States do not have targets for CO₂ for 2000.

For most Member States, CO₂ emissions fell between 1998 and 1999 but the general trend is for increasing emissions compared to 1990.

Table 5.2.3 CO₂ emissions in million tons (excl. LUCF)

	1990 (MtCO ₂ eq)	1999 (MtCO ₂ eq)	change 1998- 1999 (%)	change 1990 - 1999 (%)	UNFCCC and national targets (%)	Distance-to- target indicator (DTI) (index points = percent)
Austria	62.1	65.8	0.4%	5.9%	0%	5.9
Belgium	114.0	117.0	-4.1%	2.6%	-5%	7.1
Denmark ¹	53.0	57.0	-5.4%	7.4% (-4.0%)	-5%	11.9 (0.5)
Finland	62.5	64.2	-0.6%	2.8%	no target	no target
France	385.5	404.7	-1.5%	5.0%	no target	no target
Germany	1014.5	858.5	-3.3%	-15.4%	no target	no target
Greece	84.3	98.5	-0.9%	16.7%	15%	3.2
Ireland	31.6	41.9	4.7%	32.7%	20%	14.7
Italy	437.7	456.5	0.5%	4.3%	0%	4.3
Luxembourg	10.2	5.4	5.2%	-46.3%	0%	-46.3
Netherlands ²	161.3	174.1	-3.8%	8.0% (7.1%)	-3%	10.7 (9.8)
Portugal	44.1	57.9	3.8%	31.2%	no target	no target
Spain	226.1	281.1	4.7%	24.3%	12%	13.5
Sweden	55.1	56.5	-2.9%	2.5%	0%	2.5
United Kingdom	583.5	531.5	-2.2%	-8.9%	0%	-8.9
Total	3325.5	3270.5	-1.4%	-1.6%	0%	-1.6

¹⁾ See note 2 in Table 5.2.1

²⁾ For the Netherlands, data that reflect adjustments for temperature variations in 1990-1999 are given in brackets. The Dutch national target takes these adjustments into account.

Source: EEA (2001)

¹⁹ Denmark was only then near its CO₂ emission targets path for 2000 if the adjustments for electricity trade (requested by Denmark) is applied.

Table 5.2.4 illustrates to what extent most Member States reduced CH₄ emissions between 1990 and 1999 (as indicated because of declining solid waste disposal on land, reduced coal mining and falling cattle numbers). Only the cohesion states (Greece, Ireland and Spain) and Italy increased CH₄ emissions. Again, Germany and the UK achieved the bulk of the reductions in absolute terms (-70 million tons of CO₂ equivalents) between 1990 and 1999. In relative terms, Finland, the Netherlands and Austria achieved substantial CH₄ emission cuts (apart from Germany and the UK) mainly in the waste sector (landfill).

Table 5.2.4 CH₄ and N₂O emissions in million tons CO₂ equivalents

MEMBER STATE	CH ₄ emissions			N ₂ O emissions		
	1990	1999	Change 1990-1999	1990	1999	Change 1990-1999
Austria	11,3	9,5	-15,5%	2,0	2,3	12,1%
Belgium	12,9	12,2	-5,0%	9,6	10,5	8,8%
Denmark	5,9	5,6	-3,6%	11,0	9,6	-12,7%
Finland	6,1	3,9	-36,0%	8,4	7,7	-7,9%
France	65,3	59,7	-8,6%	94,8	78,7	-17,0%
Germany	117,0	68,7	-41,3%	66,2	43,7	-33,9%
Greece	9,5	10,8	14,1%	10,4	10,2	-1,5%
Ireland	12,8	13,3	3,7%	9,1	10,1	11,6%
Italy	40,2	41,3	2,6%	39,7	39,9	0,4%
Luxembourg	0,5	0,5	-3,7%	0,2	0,2	13,4%
Netherlands	27,1	21,7	-20,1%	19,8	22,7	14,8%
Portugal	12,9	12,7	-1,5%	7,6	8,6	12,4%
Spain	34,7	45,0	29,7%	41,2	44,0	6,8%
Sweden	6,8	6,2	-9,4%	7,1	7,2	1,4%
United Kingdom	77,1	55,2	-28,3%	66,9	42,9	-35,9%
EU-15	440	366	-16,7%	394	338	-14,1%

Source: EEA (2001)

Spain increased CH₄ emissions by 30 % between 1990 and 1999 (+10 million tons of CO₂ equivalents); CH₄ emissions from solid waste disposal on land increased more than average (+76 %). In Greece and Italy increases of CH₄ emissions in the waste sector played a dominant role, whereas in Ireland the increased CH₄ emissions were mainly from enteric fermentation.

In most Member States, N₂O emissions increased between 1990 and 1999 mainly in the transport sector. The main reason for this was the increasing penetration of catalytic converters in petrol-engined cars. The largest increases of N₂O emissions in absolute terms were in the Netherlands and Spain (+3 million tons of CO₂ equivalents each). In the Netherlands emissions increased mainly in the chemical industries and from agricultural soils, whereas Spanish N₂O emissions occurred mainly from transport and manure management.

The largest cuts in N₂O emissions were achieved in Germany, the UK and France mainly due to emission reduction measures in the adipic acid production. Denmark and Finland reported reduced N₂O emissions mainly in the agricultural sector (agricultural soils).

Fluorinated-gas emissions grew in all Member States except for the UK (Table 5.2.5). The main reason for rapidly growing fluorinated-gas emissions in the EU is the phase out of ozone depleting substances like chlorofluorocarbons under the Montreal Protocol and the replacement of these substances with HFCs (mainly in refrigeration, air conditioning, foam

production and as aerosol propellants). PFC emissions mainly occur in primary aluminium production and the production of semiconductors, but have declined between 1990 and 1999 in most Member States. The main sources of SF₆ emissions which increased in most Member States, are the casting and production of primary and secondary magnesium and the manufacture and use of gas insulated switchgear in the electricity sector.

Table 5.2.5 HFC, PFC and SF₆ emissions as reported by Member States by 1 April 2001 in Gg (=thousand tons) of CO₂ equivalents

EC Member State		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Austria	HFC	4	6	9	12	17	546	625	718	816	870
	PFC	963	974	576	48	54	16	15	18	21	25
	SF ₆	518	683	725	823	1033	1175	1246	1148	955	730
Belgium	HFC	332	332	332	332	332	332	418	527	527	527
	PFC	63	63	63	63	63	63	63	63	0	0
	SF ₆	335	335	335	335	335	206	206	239	206	206
Denmark	HFC	0	0	3	30	58	126	278	344	503	621
	PFC	0	0	0	0	0	0	0	4	14	30
	SF ₆	43	61	89	135	122	107	61	73	59	65
Finland	HFC	0	0	0	0	7	30	78	168	246	317
	PFC	1	1	1	1	1	1	1	1	1	29
	SF ₆	71	48	32	26	26	14	14	16	12	32
France	HFC	2253	1514	1061	804	818	1302	2186	3095	3752	4815
	PFC	3195	2469	2147	1650	1390	1350	1410	1471	1661	1915
	SF ₆	2195	2216	2238	2262	2288	2314	2387	2444	2405	2411
Germany	HFC	2340	2340	2470	3750	3980	3130	2580	3450	4278	4278
	PFC	2694	2352	2138	2012	1676	1764	1830	1554	1709	1709
	SF ₆	3896	4350	4876	5401	5784	6238	5808	5688	5473	5473
Greece	HFC	935	1107	908	1607	2144	3253	3746	3960	3744	3744
	PFC	367	315	222	130	82	78	74	64	54	28
	SF ₆	0	0	0	0	0	0	0	0	0	0
Ireland	HFC	-	-	-	-	-	-	-	-	-	-
	PFC	-	-	-	-	-	-	-	-	-	-
	SF ₆	-	-	-	-	-	-	-	-	-	-
Italy	HFC	351	355	359	355	623	919	761	1097	1332	2885
	PFC	237	231	206	204	212	255	161	167	187	172
	SF ₆	198	230	249	272	293	321	327	351	420	386
Luxembourg	HFC	-	-	-	-	-	-	-	-	-	-
	PFC	-	-	-	-	-	-	-	-	-	-
	SF ₆	-	-	-	-	-	-	-	-	-	-
Netherlands	HFC	5144	4863	4594	5107	6449	6724	7524	7884	8695	8836
	PFC	2432	2437	2099	2118	1890	1867	2042	2154	2469	2594
	SF ₆	145	100	106	110	148	174	160	182	132	137
Portugal	HFC	0	0	0	0	0	0	0	0	0	0
	PFC	0	0	0	0	0	157	157	157	157	157
	SF ₆	0	0	0	0	0	1	1	1	1	1
Spain	HFC	2894	2574	2869	2258	3885	5595	6412	6923	7015	9146
	PFC	828	787	782	794	785	790	759	784	750	696
	SF ₆	78	84	86	90	98	118	127	151	175	225
Sweden	HFC	1	3	4	17	47	94	141	239	303	375
	PFC	440	427	414	402	390	389	343	316	306	329
	SF ₆	81	82	82	88	97	115	103	146	92	96
United Kingdom	HFC	11374	11859	12346	12905	13814	15205	16290	18447	20183	6206
	PFC	2281	1790	959	811	980	1094	905	661	652	678
	SF ₆	724	776	833	889	1061	1134	1270	1263	1289	1314
Total	HFC	25,627	24,954	24,957	27,178	32,174	37,256	41,039	46,851	51,394	42,620
	PFC	13,502	11,847	9,606	8,232	7,524	7,825	7,761	7,414	7,979	8,361
	SF₆	8,283	8,965	9,651	10,431	11,284	11,917	11,711	11,701	11,221	11,076

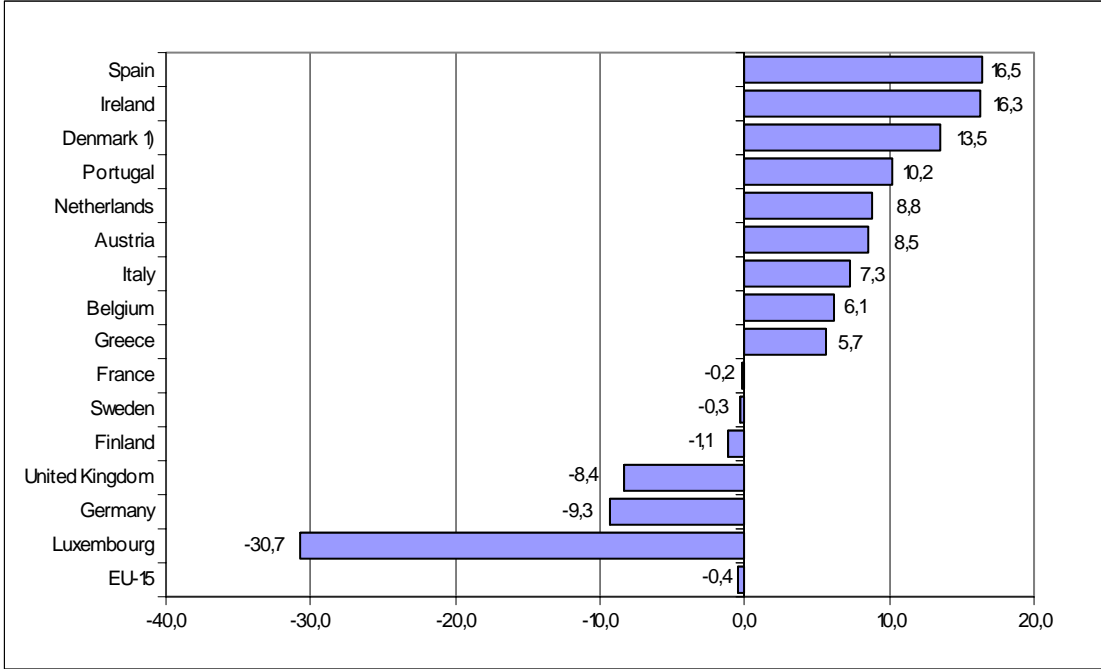
Note (1): For Belgium values are given in italics where emission estimates have been taken from the most recent previous year.

Source: EEA (2001)

More than 80 % of EU Fluorinated-gases are emitted by five Member States (Netherlands, Germany, Spain, France and the UK). There were large increases in absolute terms in Spain (+6 million tons of CO₂ equivalents) and the Netherlands (+4 million tons of CO₂ equivalents), whereas large reductions were achieved by the UK (-6 million tons of CO₂ equivalents) due to emission reduction measures in HCFC production in 1999.

Figure 5.2.5 summarises the results of comparing the greenhouse gas emissions of Member States with their linear target paths for 2008-2012²⁰.

Figure 5.2.5 Distance-to-target indicators (in index points = percent) for the Kyoto Protocol and EU burden sharing targets of EU Member States²¹



¹⁾ The Danish DTI is 4.9 index points (percent), if Danish greenhouse gas emissions are adjusted for electricity trade in 1990.

Source: EEA (2001)

²⁰ Some MS have stressed that during the Kyoto Commitment Period not only domestic policies and measures but also Flexible Mechanism may be used in order to fulfill the commitment. In some MS, activities under the Flexible Mechanisms have already started, but will not appear in the MS inventories.

²¹ Distance to target path in percent, target path is a straight line from base year emission level (1990) to target levels in 2010; the DTI figures in percent (the bars) show the deviations between what should have been achieved and what has been, under the assumption that reductions in percent of 1990 levels would take place linear.

6. EVALUATION OF PROJECTED PROGRESS

6.1. Comparison of Member States projections with the EU burden sharing agreement

This section compares the latest ‘with measures’ projections undertaken by Member States for the year 2010 with their EU burden sharing commitments. This comparison is useful in revealing the ‘gap’ between what current policies and measures are expected to deliver and the Member States and EU’s commitment under the Kyoto Protocol. However, it should be noted that the ‘with measures’ scenarios for different Member States are mostly not comparable as the cut-off date for inclusion of policies is different. Chapter 6.3 compares these projections prepared by the Member States, with the results of the latest Community-wide emission projection analysis.

Table 6.1.1 summarises the present situation, showing the individual Member State commitments and the most recent ‘with measures’ projections for 2010. Also shown is the gap i.e. the difference between the ‘with existing measures’ projections and the Commitment under the burden sharing agreement. Member States’ projections suggest that for the EU as a whole greenhouse gases will be approximately stabilised (-0.5%) at the 1990 level by 2010 with the measures currently implemented. This would result in an expected gap of about 8% (actual figure 7.5 %) between the effects of existing policies and measures and the Kyoto target (318 MtCO₂ equiv. in 2010 in absolute terms). This compares with aggregated projections in the first progress report which gave a 1% fall in emissions and thus an approximate gap of 7 % (actual figure 6.6 %) to the Kyoto target.

However, a more detailed analysis shows that the contribution of existing policies and measures to national targets varies significantly across Member States, reflecting the different degree of policy development between countries. The UK and Germany make a large contribution to the overall savings²² with the UK showing an expected over delivery with measures that have been introduced since the Kyoto Protocol was agreed (1997), but other countries such as Austria, Ireland, Spain or Portugal still require significant effort to meet their targets.

These projections are subject to considerable uncertainty arising from both uncertainty in the assumptions made in the projections and in the degree to which the policies and measures will finally deliver the assumed reductions. For some Member States this uncertainty has been discussed in their national programmes/information, but for most the information is not sufficient to provide any quantification of the uncertainty. Overall the unequal contribution by MS towards their burden sharing commitments and the degree of uncertainty related to the projections as such raises concerns over the accuracy of the identified 8% gap between the projected emissions and the Kyoto target.

²²

For a discussion of these savings see “Greenhouse gas reductions in Germany and the UK - Coincidence or policy induced? An analysis for international climate policy” (*Fraunhofer Institut für Systemtechnik und Innovationsforschung (ISI), Science Policy and Technology Policy Research (SPRU) Deutsches Institut für Wirtschaftsforschung (DIW) Karlsruhe, Brighton, Berlin; April 2001*).

Table 6.1.1 Comparison of Member States' 'with measures' total emissions projections (excluding LUCF) compared with the Kyoto commitments

	Base year from projection (MtCO ₂) ²³	Base year from EEA report (2001) (MtCO ₂)	EU Burden sharing	Commitment implied by burden sharing (MtCO ₂)	Scenario with existing p&ms (MtCO ₂) in 2010	Scenario with existing p&ms % change in 2010	Gap (MtCO ₂) ²⁴	gap (in % of 1990)
Austria ²⁵	77.0	76.9	-13%	-10.0	7.6	9.9%	-17.6	-22.9%
Belgium ²⁶	114.6	136.7	-8%	-8.6	15.5	13.6%	-24.1	-21.1%
Denmark ²⁷	76.4	70.0	-21%	-16.1	-14.2	-18.6%	-1.8	-2.5%
Finland	77.1	77.1	0%	0.0	12.8	16.6%	-12.8	-16.6%
France	526.1	545.7	0%	0.0	59.1	11.2%	-59.1	-11.2%
Germany	1208.4	1206.6	-21%	-253.8	-234.4	-19.4%	-19.4	-1.6%
Greece	99.3	105.4	25%	24.8	28.8	29.0%	-4.0	-4.0%
Ireland	53.7	53.5	13%	7.0	21.0	39.1%	-14.0	-26.1%
Italy	543.0	518.3	-7%	-35.3	44.0	8.1%	-79.3	-14.6%
Luxembourg	12.4	10.8	-28%	-3.5	-2.9	-23.4%	-0.6	-4.6%
Netherlands	219.0	215.8	-6%	-13.1	39.8	18.2%	-52.9	-24.2%
Portugal	60.0	64.6	27%	16.2	35.4	58.9%	-19.2	-31.9%
Spain	309.7	305.8	15%	46.5	69.3	22.4%	-22.8	-7.4%
Sweden	70.9	69.5	4%	2.8	12.1	17.1%	-9.3	-13.0%
UK ²⁸	776.2	741.9	-12.5%	-97.0	-115.5	-14.9%	18.5	2.4%
Total EU	4223.7	4198.6	-8%	-340.1	-21.6	-0.5%	-318.4	-7.5%

Table 6.1.2 shows the results of the 'with existing measures' projection, broken down by greenhouse gas. This reveals that for the EU as a whole, CO₂ emissions are expected to increase by 3.1 % between 1990 and 2010, while emissions of methane and nitrous oxide are both projected to fall substantially, -31 % and -17% respectively. Information for the fluorinated gases is less comprehensive and so it is difficult to draw firm conclusions. However, for those countries that have provided data, an increase of 37 Mt CO₂ equivalent or 66% is projected by 2010 compared to the base year²⁹.

²³ Base year emissions are those quoted in Member States' projections. In view of the annual inventory updates, the base year values used in the projections quoted often do not match the most recent 1990 estimates, which are also shown in the table and in 5.2.2. Base year estimates may change due to enhanced methodology, which aim at more accurate and more complete inventory data.

²⁴ This is the gap between the commitments under the EU burden sharing agreement and the projected emissions in 2010 and is calculated using the base year emissions from the projections to maintain consistency.

²⁵ The projection figures for Austria do not include fluorinated gases and are from the draft climate change strategy.

²⁶ Base year emissions taken from Belgium's information on emissions projections includes only emissions from fossil fuels.

²⁷ For Denmark, the base year emissions from the projections take account of adjustments for electricity trade in 1990, because the Danish target refers to adjusted data. The figures given in the table for the Netherlands, Sweden and Belgium are all uncorrected for temperature.

²⁸ The UK 'with measures' projections include estimates of the impact of some major new policies introduced since Kyoto. These policies are expected to save about 24 MtCO₂ in 2010.

²⁹ Community-wide projections for fluorinated gases are discussed in Chapter 6.3.

Table 6.1.2 Member State ‘with measures’ projections split by greenhouse gas

	Change in emissions between Base Year and 2010 (MtCO ₂ equivalent)				Change in emissions between Base Year and 2010 (%)			
	CO ₂	CH ₄	N ₂ O	Fluorinated gases	CO ₂	CH ₄	N ₂ O	Fluorinated gases
Austria	10.5	-2.9	0		17%	-26%	0%	
Belgium	14.4	0	1.1		13%		52%	
Denmark ³⁰	-11.5	-1.0	-2.4	0.7	-19%	-17%	-22%	283%
Finland	13.9	-2.6	-0.1	1.6	17%	-39%	-1%	1000%
France	71.2	-11.7	-13.8	13.4	19%	-25%	-15%	170%
Germany	-158.7	-61.8	-25.1	16.3	-16%	-53%	-37%	150%
Greece	28.8				34%			
Ireland	19.8	-0.7	0.6	1.0	63%	-5%	7%	400%
Italy	10.4	-9.8	-2.4		2%	-20%	-5%	
Luxembourg	-3	0	0	0.1	-26%	9%	12%	550%
Netherlands	46	-14	1	3.3	29%	-52%	5%	30%
Portugal	29.8	1.7	2.8	1.9	69%	12%	44%	1000%
Spain	55.6	4.6	-3.3		25%	10%	-11%	
Sweden	10.6	-1	0.9	1.6	19%	-17%	11%	100%
UK	-33.5	-34.3	-23	-3.2	-6%	-45%	-35%	-20%
Total EU	104.4	-133.5	-63.7	36.7	3.1%	-30.9%	-16.9%	65.7%

6.2. Summary of additional policies and measures for the member states

The previous section has suggested existing measures identified by Member States will stabilise emissions at 1990 levels which leaves a gap of close to 8% to the EU’s target under the Kyoto Protocol. The objective of Member States’ current climate change programmes is to close this gap through the development and future implementation of additional policies and measures.

Table 6.2.1 compares the required emissions reduction in order to reach the Kyoto target with the savings to be expected from additional policies and measures (where these have been quantified). The table shows that only nine Member States have provided quantification of their additional measures. Six Member States (Belgium, Greece, Luxembourg, Portugal, Spain and Sweden) did not provide quantification of these measures.

³⁰ Change between base year and 2008-2012.

In all Member States the savings from additional measures are expected to amount to about 402 million tonnes of CO₂ equivalent. This includes a remarkably large contribution from Germany. If Germany and the UK were to go as far as to meet, but not exceed as predicted, their commitments under the EU burden sharing agreement, the savings from additional measures would total only 209 Mt CO₂³¹. This would result in a shortfall of 111 Mt CO₂ eq between the ‘with additional measures’ projection at 2010 and the EU’s Kyoto commitment, which would have to be met by further, as yet unquantified, additional measures in most Member States and/or for the EU as a whole.

For those countries that have identified additional savings by greenhouse gas, most of these savings are expected to come from further reductions in CO₂. In many countries, the additional policies and measures are in the early stages of development and are subject to a larger degree of uncertainty than those discussed in the previous section (where the policies and measures discussed have already been adopted and/or implemented).

Table 6.2.1 Comparison of the gap between Member States³² ‘with measures’ projections and their Kyoto commitments and the identified additional measures

	Gap between with measures and burden sharing obligations (MtCO ₂)	Total additional measures (MtCO ₂)	Additional measures (MtCO ₂) ³³			
			CO ₂	CH ₄	N ₂ O	Fluorinated gases
Austria	17.6	13.9	11.6	2.2	0.1	
Denmark	1.8	1.9	1.9			0.8
Finland	12.8	14.1	11.7	0.7	0.9	0.8
France	59.1	59.6	48.9	-2	5.3	7.3
Germany	19.4	150				
Ireland	14.0	14.7	11.1	2.11	0.9	0.5
Italy	79.3	31.7	28.1	3.6		
Netherlands	52.94	50 ³⁴	17		0.5	7.7
UK	-18.5 ³⁵	65	65			
Total EU	318.4	401	195	7	8	17

³¹ This assumption is reached using a value for savings equal to the gap which Germany’s additional measures would fill and a value of zero for the UK given that the latter is projected to surpass its burden sharing agreement obligation on the basis of existing measures alone.

³² Only the nine Member States shown in the table have provided quantification of their additional measures.

³³ This includes additional measures, i.e. those which are already implemented but not effective or where there is a firm implementation plan, and proposed measures without firm implementation plans.

³⁴ 25MtCO₂ equivalent is planned to come through the use of the Kyoto Mechanisms

³⁵ The UK ‘with measures’ projection surpasses its burden sharing obligation

6.3. Community wide projections

The previous analysis in this report used scenarios and emission projections as prepared and submitted by Member States to assess the projected progress of the Member States and the EU towards meeting their commitments under the Kyoto Protocol. An alternative approach is to use Community-wide projections which provide a common basis for all countries and can capture the EU-wide and international dimensions of energy systems and markets.

This section examines projected progress towards the Kyoto emissions commitment using the latest Community-wide greenhouse gas emissions projections taken from *Economic Evaluation of Sectoral Emission Reduction Objectives for Climate Change*³⁶. The energy related CO₂ emissions were projected using the energy system model PRIMES³⁷, while other emissions are projected on the basis of activity and emissions factors.

³⁶ “Economic Evaluation of Sectoral Emission Reduction Objectives for Climate Change: Summary Report for Policy Makers”, K Blok, D de Jager and Chris Hendriks, March 2001 http://europa.eu.int/comm/environment/enveco/climate_change/sectoral_objectives.htm.

³⁷ Used for the Shared Analysis for EU energy scenarios for 2020 (DG Transport and Energy, 1999) (<http://www.shared-analysis.fhg.de>), developed and maintained at the National Technical University of Athens, Greece.

Table 6.3.1 below shows the emissions in 1990/1995, the EU-wide projection for 2010 and the percentage change.

Table 6.3.1 Base year and 2010 emissions for the EU-wide projection

Sector	Base year emissions ^a (MtCO ₂ eq.)	2010 emissions (MtCO ₂ eq.)	Change 1990-2010 (MtCO ₂ eq.)	% change 1990-2010
Energy supply	1190	1206	16	1%
- Energy related CO ₂	1132	1161	29	3%
- Non-CO ₂	58	45	-13	-22%
Fossil fuel extraction ^b	95	61	-34	-36%
Industry	894	759	-135	-15%
Transport ^c	753	984	231	31%
Households	447	445	-2	0%
Services	176	200	24	14%
Agriculture	417	398	-19	-5%
Waste	166	137	-29	-17%
Total	4138	4190	52	1%

^a Emissions are for 1990 for all gases except the fluorinated-gases, where the base year is 1995. The figures shown are from the study and are slightly different from those reported in this Communication.

^b Non-CO₂ greenhouse gas emissions from fossil fuel extraction, transport and distribution

^c Emissions data for international aviation are included in this total as there is not enough data to separate them. Such emissions are not included in the national inventory and projection data elsewhere in this report, because emissions from international transport are not included in the Kyoto Protocol targets.

Source: Sectoral Objectives Study 2001

EU total greenhouse gas emissions are projected to increase by 1% relative to the base year. This is mainly due to increased energy supply to satisfy growing demand in the transport and services sectors. Emissions are decreasing in the other sectors.

Emissions from transport are projected to increase by 31% between the base year and 2010 even with the inclusion of the ACEA³⁸ agreement, due to a strong growth in both road and air transport. The service sector emissions also increase due to a strong growth in building stock. In industry, total emissions are projected to decrease by 15%, due to decreases in CO₂ arising in part from changes in the fuels used by industry and N₂O from process emissions (which is already strongly reduced since 1990). There is a slight increase projected in the fluorinated gases.

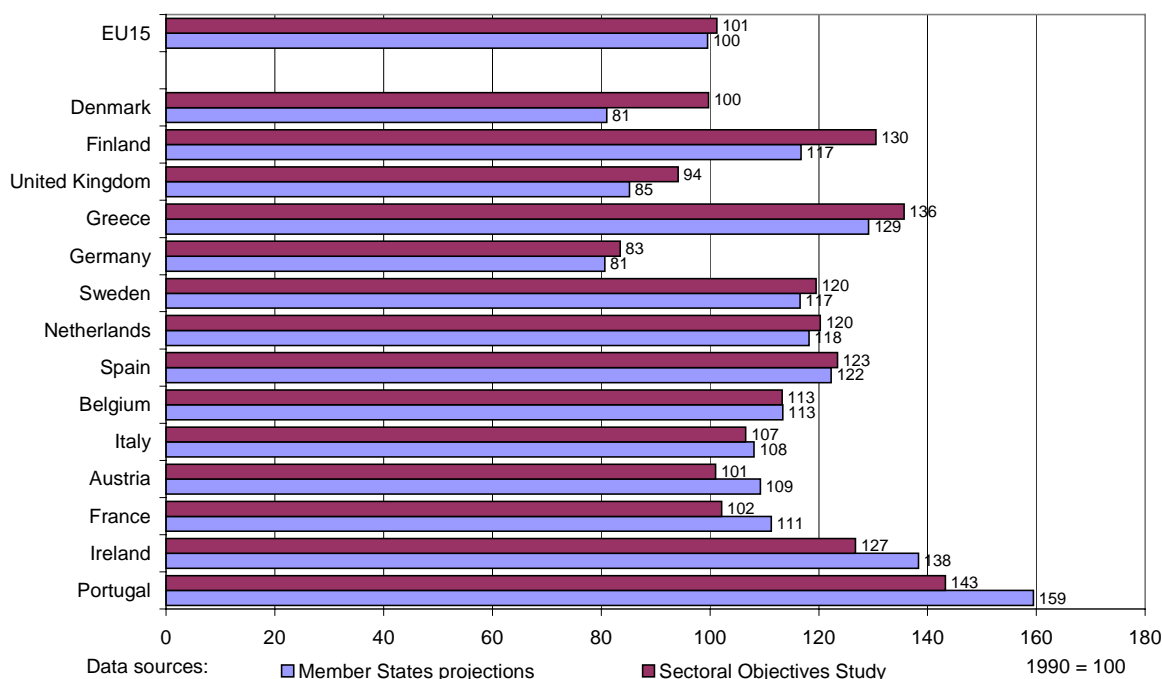
Emissions are projected to remain stable in the household sector despite some growth in housing stock because of improvements in energy efficiency. Agriculture and

³⁸ The Association of European Motor Manufacturers (ACEA) and their Japanese and Korean counterparts, Jama and Kama, have reached an agreement with the EU to reduce the average emissions of CO₂ from new cars to 140 g/km by 2008/9.

waste are both projected to have decreasing emissions due to the effect of existing policies such as Agenda 2000 in agriculture and the Landfill Directive in waste.

The EU-wide projection is close to the results of aggregating the Member States projections although a comparison at the individual Member State level would show some important differences (Figure 6.3.1). The differences range from overestimation (for example Denmark +27 percent points) to underestimation (for example Portugal -16 percent points) of the Sectoral Objectives Study in comparison with the Member States projections.

Figure 6.3.1 Comparison of Member States projections with disaggregated Sectoral Objectives Study projections for total GHG emissions for 2010



A complete sectoral comparison with the Member States projections is not possible because not all Member States present the projections at the sectoral level and the sector definitions used vary. A comparison is being made as part of the EEA work (by the Topic Centre on Air and Climate Change)³⁹ for those sectors where there is most information from the Member States. The aggregate projections from those Member States where the information is available are for a 17% decrease in energy industries (compared to a 1% increase in the Community wide projection), 8% in agriculture (compared to a 5% decrease in EU-wide approach), 38% in waste (compared to 17% EU-wide) and a 25% increase in transport (compared to 31% EU-wide). The Member State projections include the effect of their own policies and measures and in addition some of the common and co-ordinated policies and measures included in the Sectoral Objectives study.

³⁹ Analysis and comparison of national and EU-wide projections of greenhouse gas emissions, EEA Report, Draft July 2001

The ongoing analysis of methodological differences between Member States projections and Community-wide projections shows that more work is needed to 'streamline' forecast methods.

The breakdown by gas for the EU-wide projections is shown in Table 6.3.2. Carbon dioxide and the fluorinated gases are projected to increase, with methane and nitrous oxide decreasing.

Table 6.3.2 Base year, 2010 EU-wide projections by gas and percent change from the aggregate Member States projections

Gas	Base year emissions (MtCO ₂ eq.) ⁴⁰	2010 emissions (MtCO ₂ eq.)	% change 1990-2010	% change from Member States
CO ₂ – energy related	3068	3193	4%	3% ^a
CO ₂ – other	164	183	12%	
Methane	462	380	-18%	-31%
Nitrous oxide	376	317	-16%	-17%
HFCs, PFCs, SF ₆	67	116	73%	66%
Total	4138	4190	1%	0%

Source: Sectoral Objectives Study 2001

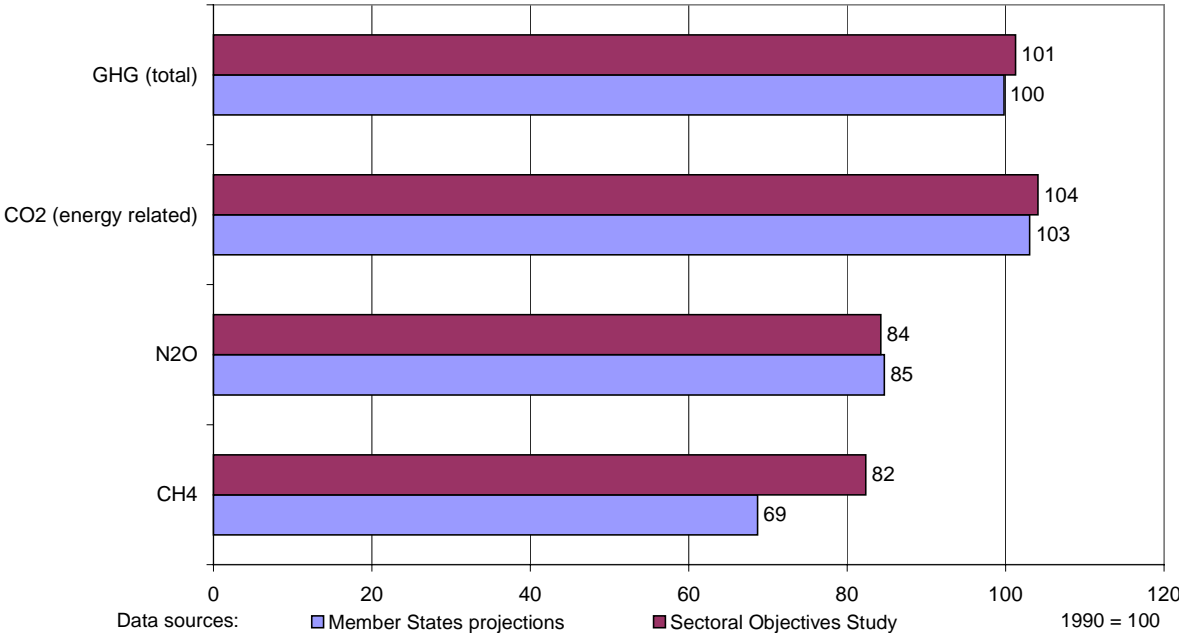
^a For energy related and other CO₂ emissions

Comparing the breakdown between greenhouse gases (Figure 6.3.2), the Sectoral Objectives study projects that CO₂ emissions will increase by 4.1%⁴¹, whereas the Member States' project a slightly lower increase of 3%. For CH₄, the Member States project a decrease in emissions of –31% which is larger than that projected from the Sectoral Objectives study. Projections of N₂O, emissions are similar from the two sources.

⁴⁰ These base year emissions are taken from the sectoral objectives study and are the Member States' submissions to the UNFCCC made in 1997. In each country's submission to the UNFCCC, there have been slight changes in the base year estimates due to improvements in data and methodology, hence the difference compared to the current country's estimates.

⁴¹ This figure includes the effect of the environment agreement with vehicle manufacturers CO₂ emissions in 2010 are projected to be have been 6.7% higher than 1990 levels without the agreement.

Figure 6.3.2 Comparison of EU15 GHG emissions for 2010 aggregated from Member States projections and from Sectoral Objectives Study projections



Both sets of projections also expect emissions of the fluorinated gases to increase considerably between 1990 and 2010 (by 73 % in the case of the Sectoral Objectives study and by 66 % according to the Member States), although, as noted in Chapter 6.1, the data for these gases from the Member States is incomplete.

6.4. Additional measures from the Community-wide study

The Sectoral Objectives study identified mainly technical measures to reduce greenhouse gas emissions with their potential (Mt CO₂ eq) and costs (Euro/tonne CO₂ eq abated). A least cost methodology was then used to calculate the mix of measures, which could be implemented to achieve the Kyoto target of -8% at least cost. The study concluded that the Kyoto target could be reached at a marginal cost of 20 Euro/ tonne CO₂ eq abated including the use of an EU wide emission trading scheme. Compliance costs of such a least cost approach would amount to 3.7 billion Euro per year for the period 2008-2012 (0.06% of EU GDP in 2010). This is an upper bound estimate and does not include economic benefits arising from the international use of Flexible Mechanisms (Kyoto Protocol) or the accounting of sinks according to the resumed COP 6 in Bonn.

The implementation of these technical measures will in part be stimulated by the policies and measures identified by the ECCP (Section 6.6). For the additional measures identified by the ECCP as being in an advanced state of preparation, the technical potential for reductions is similar to the potential identified in the Sectoral Objectives study for those sectors. The two approaches are thus consistent.

6.5. Key assumptions in models

The differences between Member State and the EU-wide projections are in part due to different assumptions regarding the policies and measures in force and in part to different parameter assumptions and modelling methodologies. Table 6.5.1 shows key parameters for the Member States projections and Table 6.5.2 compares GDP and population growths assumed by the Member States and in the EU-wide projection. GDP growth assumptions are fairly consistent, with higher growth expected in some countries but around 2% per annum for most. Population growth is also similar but the assumptions on international oil prices are markedly different. This in part probably relates to when the projections were made, as there has been considerable volatility in the oil price recently.

Table 6.5.1 Key parameters for some Member States projections

	GDP growth/yr		International oil price	Population	Traffic growth 2000-2010	
	2000-2005	2005-2010	growth 2000-2010	Growth per year	Passenger	Freight
Austria	2.5%	2.0%				
Belgium	2.5%	2.4%	49%		12%	8%
Denmark	2.4%	1.5%	-26%	0.2%	10%	16%
Finland	2%		27%	0.2%		
France	2.3%		9%	0.4%	50% ^b	70% ^b
Germany	2%	1.8%	14%	0.1%	12%	28%
Italy	2%	2%	15%	-0.1%	13%	22%
Netherlands	3.3%	3.3%		0.4%		
Portugal	3.6%	3.2%	22%	0.1%		
Spain	2.2%		53% ^a	0.1%		
Sweden	2%		-11% ^c	0.1%	25%	26%
UK	3%	2%	0%			

^aFrom 1995 – 2010

^bFrom 1990 – 2010

^cFrom 1997 to 2010

Differences are due to a number of factors including scenarios chosen for global development of the economy. The effects of GDP on projections are dependent on the Member State and could be important in explaining differences in projections, but are unlikely to be the only reason.

Table 6.5.2 Comparison of key parameter assumptions in the Member States and EU-wide projections

	EU-wide GDP growth/yr		MS GDP growth/yr		EU-wide Population	MS Population
	2000-2005	2005-2010	2000-2005	2005-2010	growth per year	Growth per year
Austria	2.2%	2.1%	2.5%	2.0%	0.2%	-
Belgium	2.3%	2.2%	2.5%	2.4%	0.2%	-
Denmark	2.2%	2.1%	2.4%	1.5%	0.3%	0.2%
Finland	2.4%	2.3%	2.0%	0.0%	0.2%	0.2%
France	2.3%	2.2%	2.3%	0.0%	0.4%	0.4%
Germany	2.5%	2.3%	2.0%	1.8%	0.1%	0.1%
Italy	2.2%	2.1%	2.0%	2.0%	0.0%	-0.1%
Netherlands	2.6%	2.5%	3.3%	3.3%	0.5%	0.4%
Portugal	3.8%	3.6%	3.6%	3.2%	0.2%	0.1%
Spain	2.9%	2.8%	2.2%	0.0%	0.2%	0.1%
Sweden	2.2%	2.0%	2.0%	0.0%	0.2%	0.1%
UK	2.6%	2.5%	2.5%	2.3%	0.2%	0.0%

A more detailed comparison of the projections is planned for 2002 in the Monitoring Mechanism using information on the Member States projections in the 3rd National Communications.

6.6. EU level policies and measures

The following sections describe the policy framework and the strategy of the European Union for sustainable development and its implications for climate change. They also give an overview of concrete policies and measures to be initiated in the run-up to the first commitment period 2008-2012. No detailed descriptions are given here since they can be found in the European Community's 3rd National Communication to the UNFCCC⁴².

6.6.1. From Cardiff and Gothenburg to Barcelona

In 1998, the Cardiff European Council started a new initiative to integrate environment and sustainable development more effectively into sectoral policies. The principal idea was to shift responsibilities and control from environmental authorities to the different sectoral policies that prepare and implement measures. Targets, timetables and monitoring procedures with indicators should ensure better prioritisation, transparency and provide additional political momentum.

⁴² 3rd National Communications will be submitted by parties (incl. EC) in November 2001 to the UNFCCC secretariat and be posted on the website: <http://www.unfccc.de/index.html>.

This integration initiative (“the Cardiff process”) has progressed substantially. The Council has so far adopted environmental integration strategies in the areas of energy, transport and agriculture. Council reports have been adopted in the areas of industry, internal market, development, and economic/finance. In addition Council strategies on fisheries and General Affairs Council are currently being developed.

The Gothenburg Council in June 2001 stressed the need for the continuation of the integration process. In addition, the Council approved the EU’s Sustainable Development Strategy (SDS), thereby mutually reinforcing economic, social and environmental policies. At the Barcelona Council in spring 2002 progress in achieving the SDS will form the basis for assessing sustainable development. It will also form part of the EU preparations for the 2002 World Summit on Sustainable Development. Heads of State and Governments confirmed at the Gothenburg summit that combating Climate Change is to be a priority of the EU’s Sustainable Development Strategy and confirmed the EU’s determination to meet its commitment under the Kyoto Protocol.

6.6.2. *Strategy for Sustainable Development⁴³ and the 6th Environmental Action Programme*

The EU’s strategy for sustainable development is based on the Commission's Communication “*A Sustainable Europe for a Better World: A European Union strategy for Sustainable Development*” (SDS) It focuses on a limited number of problems which pose severe or irreversible threats to the future well-being of European society. Climate Change is one of the areas for urgent action.

The 6th Environmental Action Programme⁴⁴ (6th EAP) sets long-term environmental objectives and priorities as an integral part of the European Community’s strategy for sustainable development. Tackling climate change is highlighted as one of four key objectives. Both, the 6th EAP and the SDS stress the importance of a speedy ratification process and entry into force of the Kyoto Protocol by 2002 (Rio+10). They also acknowledge the need for action beyond Kyoto, proposing a mid-term cut of 20-40% of greenhouse gases from 1990 levels by 2020.

Areas for policy action at EU and Member State level include:

- To set more ambitious environmental targets for energy taxation aiming at the full internalisation of external costs;
- Encouraging the use of renewable energy sources, including the use of incentives, with a view to meeting the indicative target of 12% of total energy use by 2010.
- Introducing incentives to increase Combined Heat and Power and implement measures aiming at doubling the overall share of Combined Heat and Power in the Community as a whole to 18% of the total gross electricity generation.
- Prevent and reduce methane emissions from energy production and distribution.

⁴³ <http://europa.eu.int/comm/environment/eussd/index.htm>.

⁴⁴ The Sixth Environmental Action Programme of the European Community – “Environment 2010: Our future, our choice” Communication COM (2001) 31 final, 2001.

- Identifying and undertaking specific actions to reduce greenhouse gas emissions from aviation if no such action is agreed within the International Civil Aviation Organisation by 2002.
- Encouraging a switch to more efficient and cleaner forms of transport including better organisation and logistics.
- Promoting the development and use of alternative fuels with the aim of substantially and continually increasing their share and of low fuel consuming vehicles.
- Promote measures to reflect the full environmental costs in the price of transport.
- Encouraging the development of more environmentally sound and technically feasible alternatives aiming at reducing emissions, phasing out the production where appropriate and feasible and reducing the use of industrial fluorinated gases HFCs (hydrofluorocarbons), PFCs (Perfluorocarbons) and SF₆ (sulphur hexafluoride).
- Establishment of a Community framework for the development of an effective CO₂ emissions trading scheme;
- Improving the monitoring of greenhouse gases and of progress towards delivering Member States commitments made under the Internal Burden Sharing Agreement.
- Undertaking as soon as possible an inventory and review of subsidies that counteract an efficient and sustainable use of energy with a view to gradually phasing them out.

6.6.3. *European Climate Change Programme (ECCP)*

The European Climate Change Programme (ECCP) was established to help identify the most environmentally and cost effective measures to meet the EU target. The ECCP has been set-up as a multi-stakeholder consultative process that focussed on energy, transport, industry, research and agriculture and on the issue of emissions trading within the EU. A major part of the ECCP has now been finalised (European Climate Change Programme Report, June 2001)⁴⁵. The programme dovetails with the 6th EAP and the EU Strategy for Sustainable Development.

The ECCP investigated more than 40 measures in total using selection criteria such as cost effectiveness and the timing for their implementation. Eight measures were identified as being at an advanced stage of preparation:

- Framework Directive for a Community Greenhouse Gases Emissions Trading Scheme
- Bio-fuel Directive
- Directive for Promotion of Renewable Energy Sources, RES-E

⁴⁵ <http://europa.eu.int/comm/environment/climat/eccp.htm>.

- Directive on the Energy Performance of Buildings
- Directive on Energy Efficient Public Procurement
- Amended Save Directive 93/76/EEC
- Campaign for take off and Public Awareness Campaign for Energy Efficiency
- Framework Directive on Fluorinated Gases.

These measures together have an estimated cost-effective emission reduction potential of about 240 MtCO₂ eq, which may be realised by 2010. The realisation of the ECCP potential depends on a number of factors including political agreement on the measure, the timeframe within which the measures are implemented, public acceptance and overlaps between these measures and Member State policies. For some of the other measures, which are at an earlier stage of development, most of the technical potential is likely to be realised over slightly longer time-scales. If the potential for the eight measures is realised before 2010, it would contribute about 5% of the 8% Kyoto target, thereby supporting Member State domestic policies and measures.

This list has to be situated against the background of efforts the Commission is currently undertaking to integrate the environment into other policy areas. Recent initiatives include: a Directive on further liberalisation of the electricity and natural gas markets in the EU⁴⁶, an Action Plan for Improved Energy Efficiency in the Community⁴⁷, a Green Paper on the Security of Energy Supply⁴⁸, the revision of the guidelines on state aid for environmental protection⁴⁹ and a White Paper on a Common Transport Policy⁵⁰. The Commission's Green Paper on the security of energy supply gives the fight against global warming a high priority. It identifies packages of measures to increase the energy efficiency on supply and demand side and to develop new and renewable energies. The Commission's White Paper on a common transport policy sets out the need for integration of transport in sustainable development. It lists packages of measures aimed at shifting the balance between modes of transport, in particular from road and aviation to the more environmentally friendly modes of rail and waterway transport. This should allow curbing the growth of greenhouse gas emissions from the most important contributors in the transport sector. An older but still highly relevant proposal on Energy Product Taxation has been revived in Council, and the Commission remains firmly committed to the approach outlined in it.

The Commission initiative for establishing the European Research Area and the new Framework Programme have given prominent place to research and technology development relevant to climate change. In addition, the Global Monitoring for Environment and Security (GMES) initiative can help among others in the proper implementation of the climate policies in Europe.

⁴⁶ Commission Communication *Completing the Internal Energy Market*.

⁴⁷ Action plan for improving energy efficiency in the European Community, COM(2000)247 final.

⁴⁸ Green Paper *Towards a European strategy for the security of energy supply*, COM(2000)769 final.

⁴⁹ Community guidelines on state aid for environmental protection, 2001/C37/03, OJ C 37, 03/02/2001, p .3.

⁵⁰ European Transport Policy for 2010 (COM (2001)370).

6.6.4. *The way forward*

The resumed 6th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP-6) in July 2001 delivered a major success in reaching a political agreement on the outstanding issues concerning the implementation of the Kyoto Protocol. It is envisaged that the 7th Conference in Marrakech in November 2001 will finalise the translation of this successful agreement into legal text.

The EU's leadership at the resumed COP-6 was a determining factor in the successful outcome. The success affirmed the multilateral approach to global environmental threats. It is of major importance to maintain this momentum and to demonstrate determination along the lines set out by the Heads of State and Government in Gothenburg.

The Commission has recently adopted a package of measures that is destined to maintain this momentum and leadership. They are:

- (1) A proposal for a Council Decision on the ratification, on behalf of the European Community, of the Kyoto Protocol; COM (2001)579.
- (2) A proposal for a Directive on greenhouse gas emissions trading within the EU; COM(2001)581.
- (3) A Communication that outlines the concrete set of implementation measures to be addressed in the coming 24 months that constitute the basis for fulfilling the Community's commitments under the Kyoto Protocol, COM(2001)580.

An important element of this set of implementation measures is a Proposal for a Review of the Monitoring Mechanism under Council Decision 93/389/EEC as amended by Decision 99/296/EC. This will have to take account of progress made with the assessment of policies and measures under the current system and some new elements that are envisaged under the Kyoto Protocol for which the rules and procedures are currently being developed. Issues that will have to be addressed under a future revision relate to additional monitoring and reporting requirements, in particular those for an EU Emissions Trading Scheme. Discussions on these issues have started in the Monitoring Mechanism Committee.

Glossary, Abbreviations and Units

Actual progress	Actual progress is based on emission inventories of Member States and the Community and includes the comparison of base year inventories with the latest available inventories to establish actual trends of emissions and a comparison with emission objectives at Member State and Community level
Projected progress	Projected progress is assessed by the collection and evaluation of adopted and further (planned, or currently in discussion) policies and measures at both national and Community level. This evaluation is based on emission projections of Member States and the Community
ECCP	European Climate Change Programme, a programme whose goal is to identify and develop all the necessary elements of an EU strategy to implement the Kyoto Protocol
Emissions	Means the release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time
EU burden sharing	The Kyoto Protocol to the UNFCCC sets different binding emission targets for a number of Parties including the European Community (EC). The EC agreed to reduce its greenhouse gas emissions by 8 % by 2008-2012, from 1990 levels. This overall target has since been distributed on a differentiated basis to individual Member States under an 'EU burden sharing' mechanism agreed upon by the Council of Ministers in June 1998
Greenhouse gases	Means those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation
Industrial fluorinated-gases	HFCs, PFCs, SF ₆
IPCC Tier 1 method	The IPCC Tier 1 method is a basic approach to identify key source categories, i.e. source categories that have a significant influence on a country's total greenhouse gas inventory in terms of the absolute level of emissions, the trend in emissions, or both. (see Chapter 7 of IPCC (2000) Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. Intergovernmental Panel on Climate Change)
Kyoto Protocol	see: EU burden sharing

Monitoring mechanism	The monitoring mechanism is an instrument to assess accurately and regularly the extent of progress being made towards the Community's commitments under the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol
Sink	Means any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere
Source	Means any process or activity which releases a greenhouse gas, an aerosol or a precursor of a greenhouse gas into the atmosphere
CCPMs	Common and Co-ordinated Policies and Measures at Community level
CH4	Methane
CHP	Combined Heat and Power
CO2	Carbon dioxide
COP	Conference of the Parties
CRF	Common Reporting Format
DTI	Distance to target path in percent; target path is a straight line from base year emission level (1990) to target levels in 2010; the DTI figures in percent show the deviations between what should have been achieved and what has been, under the assumption that reductions in percent of 1990 levels would take place linear.
EEA	European Environment Agency
GDP	Gross Domestic Production
GHG	Greenhouse gas
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
LUCF	Land Use Change and Forestry
N2 O	Nitrous oxide
PFCs	Perfluorocarbons
P&Ms	Policies and Measures

SF6

Sulphur hexafluoride

UNFCCC

United Nations Framework Convention on
Climate Change

t 1 ton (metric) = 1 megagram (Mg) = 10^6 g

Mg 1 megagram = 10^6 g = 1 ton (t)

Mt 1 megaton (Mt) = 10^{12} g = 1 teragram