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Report

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 EXECUTIVE SUMMARY

This is the third 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 emission commitments under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Convention was aimed at returning greenhouse gas emissions to their 1990 level by 2000, while the Kyoto Protocol requires the EC to reduce greenhouse gas emission by 8% 2008-2012.

This report assesses the impacts of domestic policies and measures reducing emissions only. Any projected shortfall in emission reductions therefore does not take account of future EC and/or international emissions trading, nor does it include reductions that can be achieved by the use of the Flexible Mechanisms Joint Implementation (JI) and Clean Development Mechanism (CDM). The agreements on sinks may allow Member States to potentially benefit from measures providing approximately 1% reduction of greenhouse gases. This report does not include either emission absorption by sinks, a policy option explicitly incorporated in the Marrakech Accords.

Compliance on reporting

The report shows continued progress in Member States' reporting on emission inventories and domestic policies and measures under the EC monitoring mechanism. Data on emissions and removals from land use change and forestry (LUCF) is not included in this progress report yet, because the IPCC Good Practice Guidance for the LUCF sector is still under preparation.

Reporting on actual progress (greenhouse gas inventories) has improved over recent years. Data is now provided in a standardised format and data gaps for all greenhouse gases are becoming smaller. However, data provision on fluorinated gases (HFCs, PFCs, SF_6) is still insufficient and needs further improving. In addition, the timely submission of data is still a problem for some Member States.

Reporting on projected progress improved compared to last year's progress report. Data on policies and measures became more comprehensive, including more consistent data on the type of measures taken and the status of implementation. However, quantification of individual policies and measures as well as information on methodologies used for projections is still incomplete requiring further efforts by Member States in the future in particular regarding the application of the existing monitoring mechanism guidelines to their full extent.

Actual progress of the EC

The EC as a whole has met its greenhouse gas stabilisation-target in 2000 under the UNFCCC and emissions for that year are in line with the Kyoto target path for 2008-12. Overall greenhouse gas emissions in 2000 decreased by 3.5 % compared to 1990 slightly less than in 1999 (-4%). CO_2 emissions were 0.5% below 1990 levels while CH_4 and N_2O emissions decreased by 16 % and 20 % respectively. GHG emissions per capita for the EU-15 fell slightly between 1990 and 2000.

Contrary to developments between 1990 and 2000 EC emissions of CO_2 and other greenhouse gases from 1999-2000 rose with an increase of CO_2 by 0.5% and overall greenhouse gas emissions by 0.3%. It is too early to interpret this as a reversed trend as it rather should be seen as a slight deviation in an overall downward trend of emissions.

The generally positive situation in the EC is largely due to considerable emission reductions in Germany and the UK. However, other Member States such as Finland, Sweden, and France could improve their situation and now belong to the group of Member States that are well below their Kyoto target paths in 2000. Despite progress in these Member States others have done less well. More than half of the Member States are still well above their Kyoto target paths. Of these, six Member States even increased the distance to the target path between 2000 and 1999.

Emission trends in the transport sector remain of particular concern. All Member States, except Finland, show large increases in transport emissions. The sector has seen the biggest increase of actual greenhouse gas emissions between 1990 and 2000, in particular of CO2 and N2O. Further projections of GHG emissions from the transport sector indicate under a 'business-as-usual' scenario (with existing measures) a rise of about 28 % by 2010, compared to 1990. This, however, would be considerably lower than previous projections before undertaking the Kyoto commitments. This achievement can be seen as an indication that actions undertaken meanwhile, such as the agreement of car manufacturers on a reduction of CO2 emissions from fleet renewal, are starting to deliver.

Projected progress of the EU

Progress based on Member States' projections

Aggregate Member States' projections suggest that existing policies and measures will not be sufficient to reach the Kyoto target. The 'business-as-usual' scenario (with existing measures) suggest that in 2010 EC emissions will have decreased by only 4.7 % leaving a gap of 3.3% to the Kyoto target. The projected decrease is due to reductions of CO_2 (-2%), CH_4 (-38%) and N_2O (-23%), that more than compensate for increases in the fluorinated gases (+72%) and include emission reductions beyond their respective Burden-Sharing target (over-delivery) by some Member States. While the Kyoto target of –8% will not be reached, the projected gap of 3.3% is still an improvement over last year where a mere stabilisation of emissions at 1990 level had been projected.

All Member States except three have identified additional policies and measures to achieve their respective Burden Sharing target. In a model scenario that incorporate such additional measures seven Member States would exceed their 'Burden-sharing' target by 2010, some of them to a considerable extent. At EC level this 'over-delivery' by a number of Member States would result in emission reductions of –12% below 1990 levels, thereby surpassing the Kyoto target by 4%.

It must be emphasised that projections are subject to considerable uncertainties in relation to the methodologies used and the real effect of policies and measures. It is important to recognise that many of these policies and measures are in the early stage of development – sometimes these have not yet reached the final decision phase.

Uncertainty is also related to the extent of real implementation, while it takes considerable time before emission reductions materialise. In addition four Member States have not yet adequately identified or assessed additional policies and measures. Therefore, concern about the accuracy of all projections must be expressed and caution in the interpretation of results is required

Deviations from the individual Member States targets are without implications for compliance with the commitments under the Kyoto Protocol as long as the overall EU target is achieved. However, the EU Decision (2002/358/EC) on the ratification of the Kyoto Protocol clearly obliges individual Member States – together with the European community – to take the necessary measures to comply with their respective Burden Sharing targets. The aggregated deficit of those Member States, which might fail to meet their Burden Sharing target represent about 7.4% or 6% of the 1990 emissions, depending on whether a scenario without or with additional measures is considered. One can therefore conclude that a majority of Member States will have to undertake considerable efforts to achieve their respective 'Burden-sharing' target (either through improved and extended policies and measures including trading under a future EC scheme and/or the use of the flexible mechanisms as set out under the Kyoto Protocol).

This year's comparisons between EC-wide and aggregated Member State projections have faced difficulties due to a difference in data sets available especially in the energy sector. Indications that projections of energy-related CO2 emissions are decreasing under the Member States' scenarios while they are increasing under the model covering the whole European energy market need to be further investigated. This will require further verification of the models used and clarification with Member States.

Candidate Countries

Candidate Countries are not part of the burden sharing agreement laid down under Council Decision 2002/358/EC. Instead they are subject to individual –8 % targets except Hungary and Poland, which both have a reduction commitment of –6%. In 1999 actual emissions of nine of the ten Candidate Countries suggest that they are on track to meet their Kyoto target. Six Candidate Countries provided projections on existing policies and measures. All of them project emissions in 2010 to be lower than their Kyoto commitments under a 'business-as-usual' scenario.

Common and co-ordinated policies and measures

Common and Co-ordinated Policies and Measures of the European Community are integral parts of the European Unions' effort to achieve the common target. Progress has been made in developing and adopting measures in the field of energy, transport and industry as agreed under the first phase of the European Climate Change Programme. Further measures in the area of agriculture and forestry are under consideration and the Commission will come forward with a general progress report of the ECCP in 2003.

2 EC MONITORING MECHANISM AND PURPOSE OF THE REPORT

2.1 The EC Monitoring Mechanism

The Monitoring Mechanism[1] 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, in line with the guidelines under the Decision.

For the purpose of facilitation and harmonisation of collection, reporting and evaluation of data the Monitoring Committee, established under Council Decision 1999/296/EC, developed a set of guidelines[2] covering both the collection and evaluation of emission inventories and national programmes. The information that Member States provided for this report already includes many of the elements in the guidelines, but often to a limited extent. In support of this work the EEA prepared a report comparing national (MS) projections with projections using EC-wide models (EEA, 2002b).

Reporting under the Monitoring Mechanism is voluntary for Candidate Countries, but will be mandatory once they have joined the EC. The Central and Eastern European candidate countries are however required to report greenhouse gas emissions and national programmes to the UNFCCC and this report includes such information.

2.2 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 fulfilling the Community's commitments under the UNFCCC and the Kyoto Protocol. The report is prepared on the basis of two reports compiled by EEA, *Greenhouse gas emission trends in Europe 1990-2000* (EEA, 2002a) and *Greenhouse gas emission projections for Europe* (EEA, 2002b).

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

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1 The Monitoring Mechanism for anthropogenic CO_2 and other greenhouse gases was established in June 1993, following the adoption of Council Decision 93/389/EEC. This was revised in Council Decision 99/296/EC to allow for the updating of the monitoring process in line with the inventory requirements. Member States are required by 31 December each year to submit inventory data for the two previous years and any updates of previous years (including the base year 1990 and for some Member States 1995 for fluorinated gases) and their most recent projected emissions for the years 2005, 2010, 2015 and 2020. 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.

2 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.

Community. The EC and its 15 Member States ratified the Kyoto Protocol in 2002 thus committing itself to reduce greenhouse gas emissions by 8 % by 2008-2012, from 1990 levels. According to Council Decision 2002/358/EC[3], in 2002, the EC and its Member States agreed on different emission limitation and/or reduction targets for each Member State according to economic circumstances. The overall target of –8% has been distributed on a differentiated basis to individual Member States under an 'EC burden sharing' according to Council Decision 2002/358/EC. The targets range from a relative reduction of –28% (Luxembourg) to permitted, limited increases of GHG emissions of +27% (Portugal). The agreed targets are shown in Table 2.2.1. Moreover, the European Commission[4] has acknowledged the need for further future emission reductions by proposing an EC target to reduce emissions by an average of an additional 1% per year (as of 2012) up to 2020 and a global target of a 20-40% reduction from 1990 levels by 2020.

Table 2.2.1 Member States' commitments in accordance with article 4 of the Kyoto Protocol and Council Decision 2002/358/EC [5]

Member State	Commitment (% change in emissions of the six GHG basket for 2008 to 20012 relative to 1990 base year levels)
Austria	**-13**
Belgium	**-7.5**
Denmark	**-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**

3 Council Decision of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder (2002/358/CE), OJ L 130, 15.5.2002

4 *Environment 2010: Our future, our choice,* Communication from the Commission, COM (2001) 31 final. *A sustainable Europe for a better world: A European Union strategy for sustainable development,* Communication from the Commission, COM (2001) 264 final.

5 In the Council decision on the approval by the EC of the Kyoto Protocol the different commitments of the Member States are expressed as percentage change from the base year. In 2006 the respective emission levels shall be expressed in terms of tonnes of carbon dioxide equivalent. In this connection, the Council of Environment Ministers and the Commission have in a joint statement agreed to take into account i.a. the assumptions in Denmark's statement to the Council Conclusions from June 16-17 1998 relating to base year emissions.

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

- **Evaluation of actual progress**

The evaluation of actual progress from 1990 to 2000 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.[6]

- **Evaluation of projected progress**

Projected progress up to 2010 is assessed on the basis of adopted and future (planned, or currently under discussion) policies and measures at both national and Community level. Emission projections are provided by Member States in their National Programmes, National Communications to the UNFCCC and documents specifically produced and submitted under the Monitoring Mechanism. Additional Community-wide projections are taken from the report *Greenhouse gas emission projections for Europe* (EEA, 2002b). 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.

Other issues addressed in this report concern compliance with reporting requirements 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.

The report then summarises the results of the evaluation of trends and projections of Candidate Countries. Annex I provides an overview on actual and projected progress of the EC Member States.

[6] Information is based on the EEA report 'Greenhouse gas emission trends in Europe 1990-2000'(EEA, 2002a). Data exclude emissions and removals from land use change and forestry (LUCF).

3. MEMBER STATES COMPLIANCE WITH REPORTING REQUIREMENTS

3.1 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. Seven MS submitted their GHG inventories to the European Commission on time, i.e. by 31st December 2001. The other Member States reported 2000 inventories by April 2002 and data on national policies and measures even later.

3.2 Compliance with reporting requirements on actual progress[7]

3.2.1 Greenhouse gas emission inventories

The evaluation of actual progress depends upon the availability of the relevant national inventories from which a complete EC inventory covering all 15 Member States is compiled. By 15 April 2002, all Member States reported data for 2000. A data gap-filling procedure was applied in case of missing data (Luxembourg) and for F-gas emissions before 1995 for member states who chose 1995 as the base year for these emissions (Belgium, Portugal). By doing so, the EC was able to compile a complete EC inventory for CO_2, CH_4, N_2O and F-gases emissions for the complete period from 1990 to 2000. Data was provided in accordance with the 1996 Guidelines of the Intergovernmental Panel on Climate Change (IPCC) and, for most Member States, the Common Reporting Formats (CRF) adopted at the 5th Conference of the Parties (COP 5) in 1999. Data gaps result in not fully consistent inventories and further progress is needed to reduce this data gaps.

3.2.2. Data gaps on CO_2, CH_4 and N_2O

For CO_2, CH_4 and N_2O a data gap-filling procedure has been applied for Luxembourg (1991-1993).

3.2.3. Data gaps on fluorinated gases

Data gaps on the fluorinated greenhouse gases (HFCs, PFCs, SF_6) as reported by Member States by 15 April 2002 are significantly smaller than in previous years. Belgium and Portugal did not report data on F-gas emissions for the years 1990 to 1994 (1995 is the base year for F-gas emissions in these two member states). In order to provide data on F-gas emissions at EC level over the whole period, the level of F-gas emissions in 1995 in Belgium and Portugal was used as a proxy of these emissions from 1990 to 1994 in these countries. For Ireland and Luxembourg no data on F- gas emissions were available.

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[7] The information in this section has been taken from the report *Greenhouse gas emission trends in Europe 1990 – 2000*, prepared by the European Environment Agency and its European Topic Centre on Air and Climate Change (EEA, 2002a).

3.2.4 Data gaps on land use change and forestry (LUCF)

Data on CO_2, CH_4 and N_2O emissions used in this report do not include emissions and removals from land use change and forestry. It is only very recently that outstanding methodological decisions on CO_2 sinks under the Kyoto Protocol have been agreed at COP7 in November 2001 ('Marrakech Accords'). Comprehensive methods for estimating changes of carbon pools (sinks) under the Protocol are currently being developed by IPCC. IPCC Good Practice Guidance for the LUCF sector is to be published in 2003.

Data on carbon sinks were therefore not available and projections for the relevant carbon pool changes during the first commitment period are therefore not yet included in the report. The maximum potential of the contribution of sinks for achieving the target may be significant for some Member States. However, this does not imply that Member States will actually use the maximum potential as possible according to the methodological decisions at COP7 nor that they will be able to do so.

3.3 Compliance with reporting requirements on projected progress[8]

3.3.1 Projections

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.

The quality of reporting for most Member States has improved in 2002 either through the provision of a Third National Communication to the UNFCCC or through improved reports to the Monitoring Mechanism.

Whilst the reporting of projections has progressed, there are still some challenges to overcome. There are a number of inconsistencies and reporting on measures needs to be improved. Desaggregation of projections by gas and sector has improved and consequently more analysis has been possible than in previous years. Reporting of underlying parameters has also improved although only a limited number can be compared between Member States.

3.3.2 Policies and measures

Reporting of policies and measures is more comprehensive, including more consistent data on the type of measure and status of implementation. However, quantification of individual policies and measures for some Member States is still unavailable.

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[8] The information in this section has been taken from the report *Greenhouse gas emission projections for Europe*, prepared by the European Environment Agency and its European Topic Centre on Air and Climate Change (EEA, 2002b).

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.

3.3.3 Uncertainties

A comparison between earlier Member State projections of CO_2 for the year 2000[9] and actual emissions for 2000 shows that approximately half the Member State *with measures projections* underestimated emissions in 2000 while a similar number overestimated emissions. While there were large differences in the Member State emissions projections, for the EC as a whole the previous with measures projection for 2000 (based on Member State projections estimated about 1997-1998) was 1.6 % below the actual emissions for 2000.

According to the monitoring mechanism reporting guidelines countries 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.

A number of Member States have provided information on the sensitivity of the projections to changes in some of the key assumptions in the underlying socio-economic scenarios as well as in the effectiveness of policies and measures. However, at the moment there is not sufficient information from all Member States to draw firm conclusions about the sensitivity to key assumptions in the aggregated EC projections.

4. EVALUATION OF ACTUAL PROGRESS

4.1 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 EEA. 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 2000. An indication of progress towards the Kyoto target is provided using the distance to target indicator (DTI). This compares 1999-2000 greenhouse gas emission data of the EC and its Member States with a hypothetical target based on the assumption of a year on year linear stepped reduction in emissions to achieve the actual target in the period 2008-2012. By calculating the deviations from this hypothetical target path in 2000, an indication of the progress of the EC and its Member States in 2000 is provided. This indicator takes account of actual emission data disregarding planned national policies or projections based on these (i.e. the future use of the flexible mechanisms).

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[9] Previous projections for 2000 have been taken from the EEA Topic report No 8/1999 based on most recent information available in 1999 (typically the latest national programmes and/or Second National Communications to the UNFCCC dating from 1997 or 1998)

4.2 Progress in the European Union

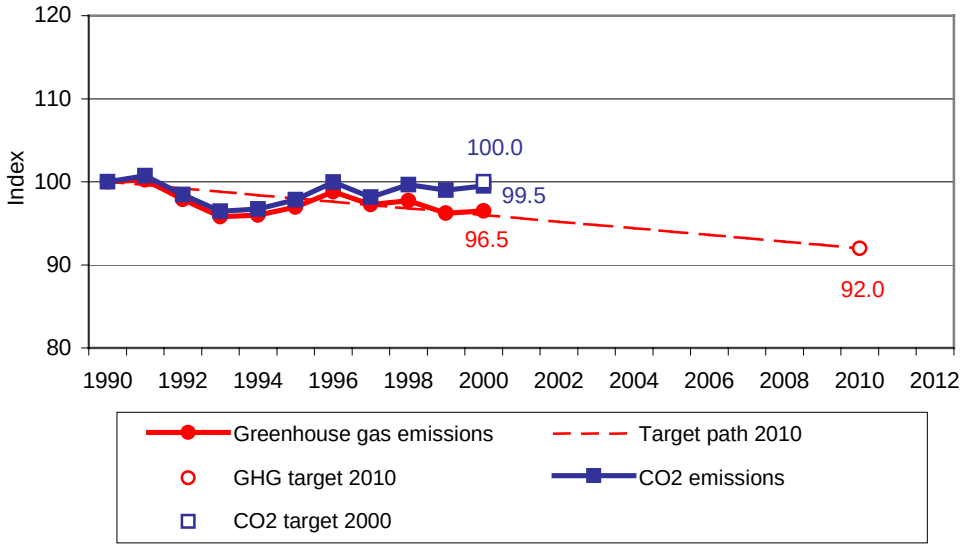
4.2.1 Progress at EC level

Although trends for the different gases varied considerably, total greenhouse gas emissions in the European Community[10] decreased by 3.5% between 1990 and 2000 (Figure 4.2.1). This is nearly half the way towards the EC's GHG emission target of 8% reduction in the period 2008 to 2012.

Assuming a linear target path for 1990 to 2010 (midpoint of the Kyoto Protocol target period) for all Kyoto Protocol gases, total EC greenhouse gas emissions were 0.5 index points (the distance to target indicator) above this target path in 2000 (Figure 4.2.1). After an initial decrease in total greenhouse gas emissions in the early nineties, emissions more or less stabilised in the second half of the nineties/late nineties. In 2000, total EC greenhouse gas emissions were 4059.3 Mt CO_2 equivalents, which was 0.3 % above 1999 and 3.5% below 1990 levels.

The most important reasons for GHG emission rises in 2000 compared to 1999 were the rise in coal use in electricity production and continuing increases in transport related GHG emissions. Strong economic growth in 2000 also led to increased energy use, whereas the relatively mild winter in most EU Member States partially counteracted this development.

Figure 4.2.1 EC 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 EC emission trends, but is used to evaluate EC greenhouse gas emissions in 2000 compared to the EC targets.

Source: EEA (2002a)

[10] Total GHG emissions for the EU are calculated by the aggregation of national GHG emissions reported by Member States (MS) and are referred to as 'EU 15' or 'EC' emissions later in this report.

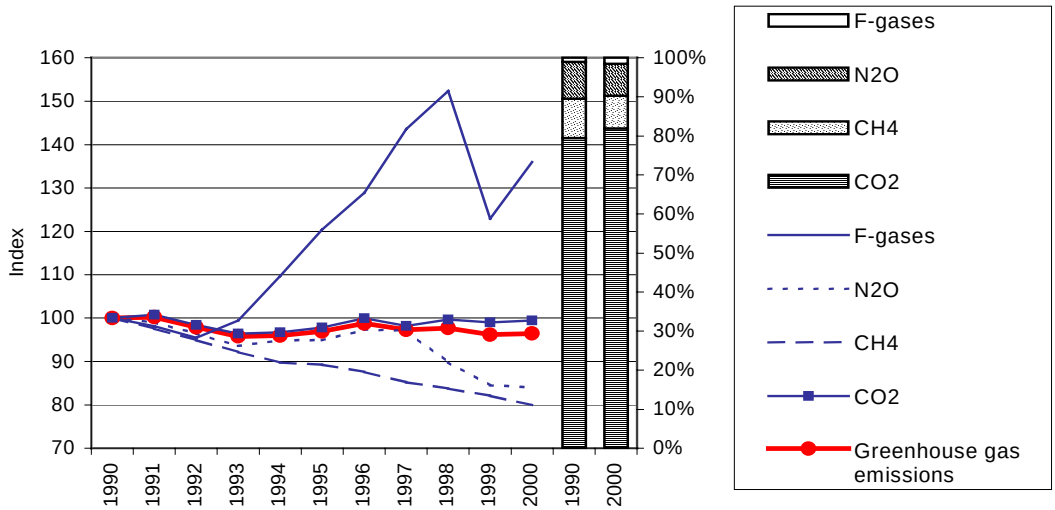
The trends for the different gases varied considerably. The share of CO_2 and fluorinated-gases in total greenhouse gas emissions increased, whereas the importance of CH_4 and N_2O declined (Figure 4.2.2).

CO_2 is by far the most important greenhouse gas in the European Community, accounting for 82 % of total GHG emissions in 2000. In the same year, EC CO_2 emissions rose by 0.5 % from 1999 levels, but the general trend shows slightly decreasing emissions compared to 1990 and $C0_2$ emissions were slightly below 1990 levels (-0.5 %). Large increases of CO_2 emissions from transport were outweighed by reductions from fossil fuel combustion in energy and manufacturing industries. This means that the EC aim of stabilising carbon dioxide emissions at 1990 levels by 2000 was achieved.

CH_4 emissions account for 8 % of total EC greenhouse gas emissions and decreased by 20 % between 1990 and 2000. The main reasons for declining CH_4 emissions were reductions in solid waste disposal on land, the decline of coal mining and falling cattle numbers. N_2O emissions went down by 16 % and are responsible for 8 % of total greenhouse gas emissions. The main reason for N_2O emission cuts were reduction measures in the chemical industry (adipic acid production) in recent years.

Fluorinated-gas emissions show opposing trends: whereas HFC emissions almost doubled between 1990 and 2000 (+94 %), PFC emissions declined by 49 %. SF_6 emissions were 6 % above 1990 levels in 2000. Despite the sharp increase of total Fluorinated-gas emissions, they account for only 2 % of total greenhouse gas emissions in 2000. The recent development 1999 to 2000 shows that HFC emissions increased by 16 %, whereas PFC and SF_6 emissions decreased. The main reason for rapidly growing fluorinated gas emissions in the EC is the phase out of ozone depleting substances such as chlorofluorocarbons under the Montreal Protocol and the replacement of these substances with HFCs. The decline of fluorinated gas emission in 1999 compared to 1998 is due to HFC reduction measures in the HCFC production in the UK and the Netherlands.

Figure 4.2.2 Greenhouse gas emissions according to gases (excl. LUCF)

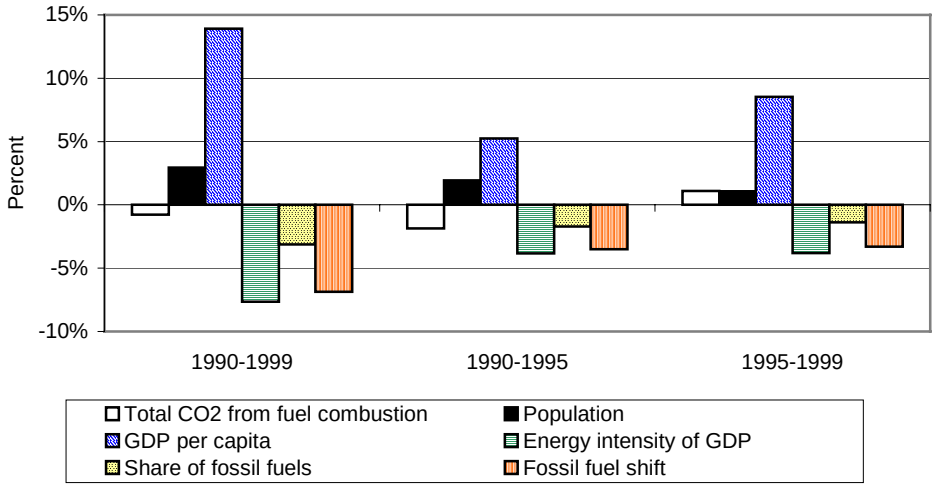


Fluorinated-gases include HFC, PFC and SF6 emissions

Source: EEA (2002a)

The main driving forces of CO_2 emissions: CO_2 emissions from fossil fuel combustion account for 77 % of total EC greenhouse gas emissions. The relationship between CO_2 emissions from fossil fuel combustion and their main driving forces can be demonstrated in a decomposition analysis by decomposing total emissions into five emission shares driven each by one the factors: (1) population, (2) GDP per capita, (3) energy intensity of GDP, (4) the share of fossil fuels in energy consumption, (5) the shift within fossil fuels towards lower carbon fuels.

Figure 4.2.3 Percentage change of CO_2 emissions from fossil fuel combustion and of emission shares caused by their main driving forces (population, GDP per capita, energy intensity of GDP, share of fossil fuels, shift towards lower carbon fuels) in the EC in the 1990s



Note: The figure shows for each period the percentage change of real total CO_2 emissions from fossil fuel combustion (white bar) and the percentage change of fictive CO_2 emissions caused by each driving force in the assumed absence of the other driving forces. The five bars for fictive emission changes from driving forces add up to the bar for total CO_2 emission change (white bar) **Source: EEA (2002a**)

CO_2 emissions from fossil fuel combustion decreased by 0.8 % between 1990 and 1999 (Figure 4.2.3). GDP growth is an important driving force and would have caused substantial emission increases in the absence of the other factors But improvements of energy intensity of GDP and the shift within fossil fuels towards lower carbon fuels offset the emission increasing effect due to GDP growth. In particular, the share of coal declined in favour of less carbon intensive natural gas and the contributions from nuclear and renewable increased.

The comparison between the first and the second half of the 1990s shows that the trend of CO_2 emissions has changed: the reduction of CO_2 emissions from fossil fuel combustion was only achieved in the first half of the 1990s, whereas emissions increased in the second half of the decade. The pattern of driving forces has not changed, but. GDP growth has been a larger driving force in second half of the 1990s which leads to increasing total CO_2 emissions from fossil fuel combustion in that period.

Sectoral analysis: In order to analyse the sectoral greenhouse gas trends in more detail, the most important greenhouse gas source categories (key sources) have been identified. For the EC as a whole, 22 key source categories have been identified

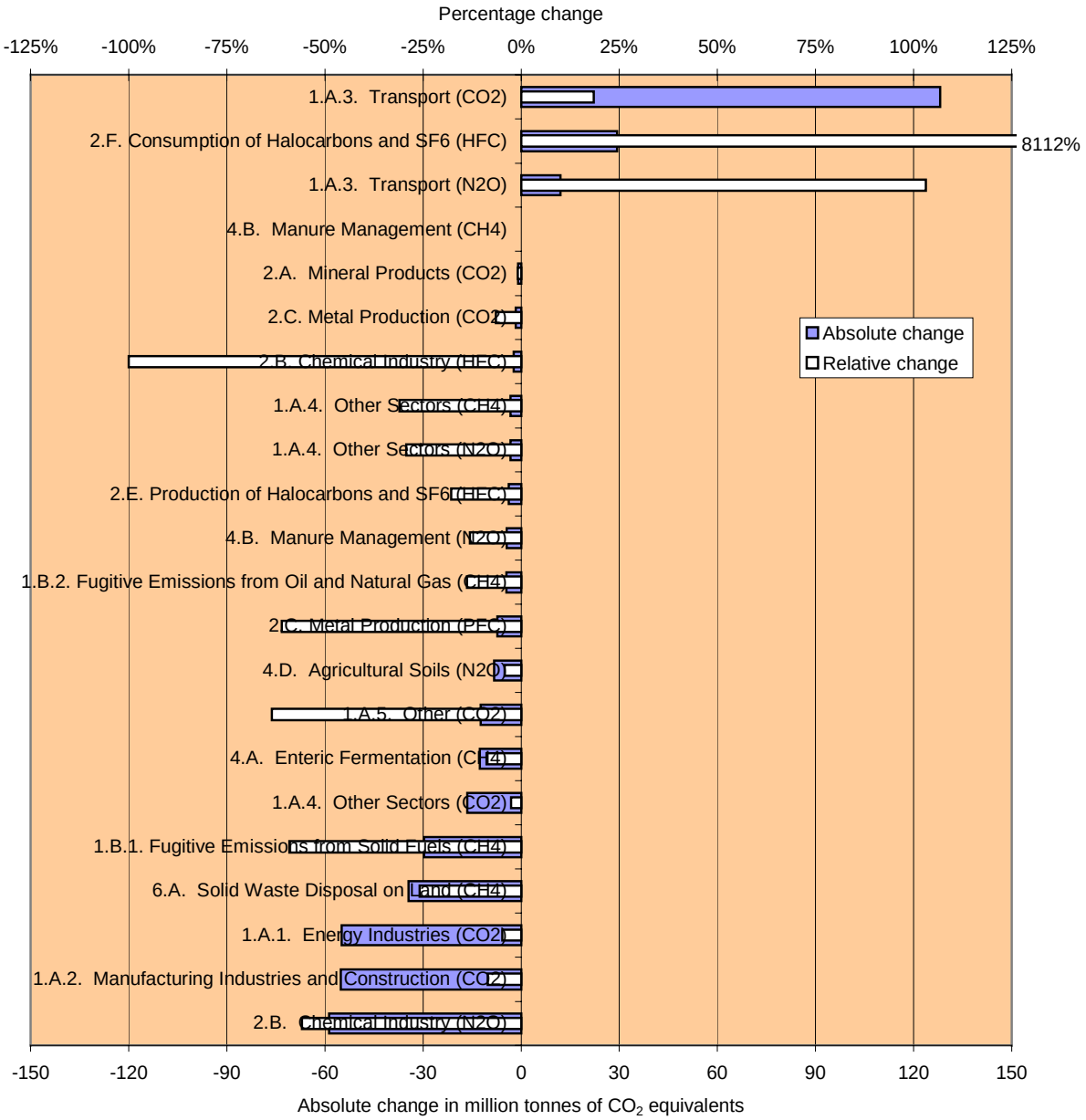
covering 97 % of total EC GHG emissions. The emission trends of the key source categories vary widely.

Figure 4.2.4 shows the ranking of key source categories according to absolute and relative changes between 1990 and 2000.

The most important key sources in 2000 were:

- Energy industries (CO2); share: 27%; change 1990-2000: -5%;
- Transport (CO2); share: 20%; change 1990-2000: +18%
- Small combustion (incl. households) (CO2); share: 15%; change 1990-2000: -8%
- Manufacturing industries and construction (CO2); share:15%; change 1990-2000: -8%

Figure 4.2.4: Absolute and relative change 1990-2000 of EC key source categories (million tonnes of CO2 equivalents and percent)



Source: EEA (2002a)

Sectors with increases in emissions: Emissions (mainly CO_2, but also N_2O emissions) from *transport* are the second largest single source of greenhouse gas emissions in the EC accounting for about 21 % of total greenhouse gas emissions in 2000. Furthermore, emissions from transport have risen rapidly: between 1990 and 2000 CO_2 emissions increased by 18 % or 128 million tons in EC. 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 CO_2 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 the cohesion states Ireland, Spain, Portugal and Greece. Although only responsible for 0.6% of total emissions, N_2O emissions from

transport increased by more than 100% as catalytic converters became standard fittings in cars.[11]

The second key source category with substantially increasing emissions is HFC emissions from the use of halocarbons in industrial processes. This accounts for 1 % of total GHG emissions. HFC emissions increased by a factor of 80 or 29 million tonnes. This is mainly due to the use of some HFCs 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 *nitrous oxide emissions from the chemical industry*, responsible for 1.1% of total GHG emissions, mainly in the UK, Germany and France. This was due to specific measures in adipic acid production in these countries. Emissions decreased by 59 million tonnes or 56%.

Second largest were reductions of *carbon dioxide emissions from fossil fuel combustion in the manufacturing industries*. These account for 15% of total GHG emissions, mainly due to economic restructuring and improved efficiency in the German manufacturing industry following reunification. Emissions decreased by 55 million tonnes or 8%.

Third largest were reductions of *carbon dioxide emissions in the energy sector* (electricity and heat production), accounting for 27% of total GHG emissions. This was largely due to fuel shifts from coal to gas in several Member States (above all in the UK) and improved efficiency (above all in Germany). Emissions decreased by 55 million tonnes or 5%. Furthermore, the increased use of combined heat and power (CHP) generation in several Member States, (particularly Germany) and an increased share of nuclear and renewables in particular wind power generation in Germany, Denmark and Spain were contributing factors.

Substantial reductions in *methane emissions* (26%) were achieved in *solid waste disposal on land (landfilling),* which is responsible for 2.4% of total emissions. This was mainly due to measures related to the implementation of the European Landfill Waste Directive.

Methane fugitive emissions from solid fuels, contributing 0.5% to total emissions, were reduced by almost 60% due to the decline of coal mining after cuts in coal subsidies mainly in the UK, Germany and France.

The reduced emissions of *methane from enteric fermentation* and of nitrous oxide from manure management are due to falling cattle numbers in various EC Member States.

The reduced emissions of nitrous oxide from agricultural soils are the result of the introduction of set aside of agricultural land as a consequence of the CAP reform.

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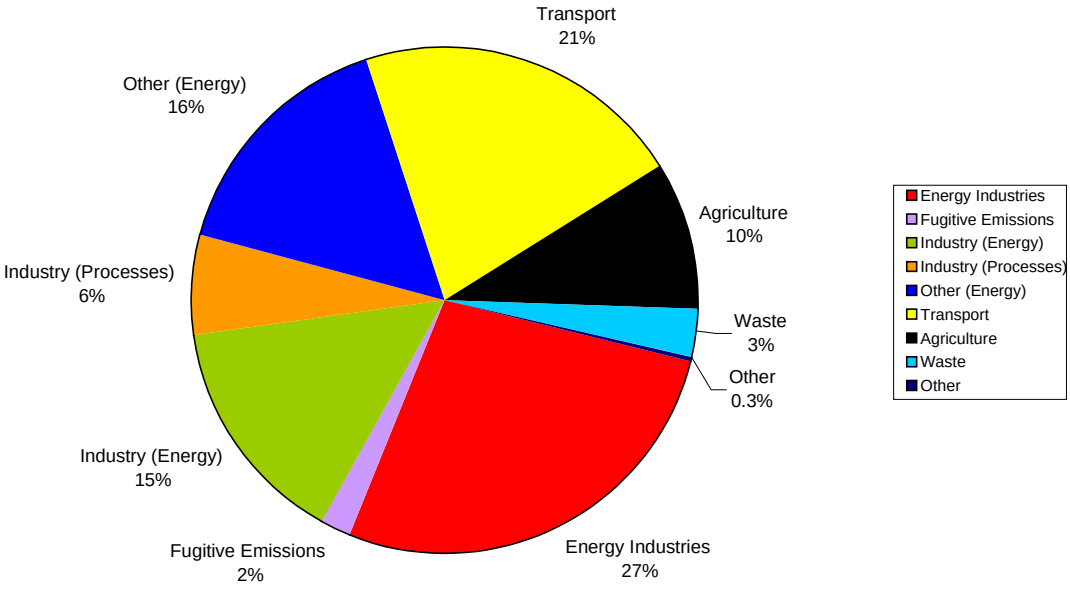
[11] Catalytic converters reduce air pollution but produce N_2O emissions as a by-product (due to chemical interaction with sulphur in petrol). Improved catalytic converters and low sulphur fuels are expected to reduce these N_2O emissions in the future.

Figure 4.2.5: EC Greenhouse gas emissions by sector in 2000 (%)[12]



Source: EEA (2002a), EEA (2002b)

Table 4.2.1 provides more quantitative information by Member States on the increase or decrease of greenhouse gas emissions for different gases and sectors.

12 Energy industries include public electricity and heat production, petroleum refining and the manufacture of solid fuels. Transport includes road transportation, national civil aviation, railways and navigation, and other non-road transportation (excluding emissions from international aviation and navigation). Industry (processes) includes processes in manufacturing industries and construction without fossil fuel combustion. Industry (energy) includes fossil fuel combustion (for heat and electricity) in manufacturing industries and construction (such as iron and steel, non-ferrous metals). Other (energy) includes fossil fuel combustion (for heat and electricity) from small commercial businesses, public institutions, households and agricultural businesses. Fugitive emissions include emissions from production, processing, transmission, storage and use of fuels, in particular coal mining. Waste includes waste management facilities, in particular landfill sites and incineration plants. Agriculture includes domestic livestock (dairy and non-dairy cattle), in particular manure management and enteric fermentation. Other includes an aggregate of sectors which individually constitute less than 1% of the total emission in 2000.

Table 4.2.1: Variations of greenhouse gas emissions 1990-2000 of EC and the Member States in percent

	EC15	AT	BE	DK [2]	FI	FR	DE	GR
Greenhouse gases (without LUCF) [1]	-3.5%	+2.7%	+6.3%	-1.7% (-9.8%)	-4.1%	-1.7%	-19.1%	+21.2%
CO_2 (without LUCF)	-0.5%	+6.1%	+7.7%	+0.4% (-10.3%)	-0.3%	+2.0%	-15.4%	+23.0%
CH_4 (without LUCF)	-20.0%	-16.8%	-4.9%	-1.6%	-36.0%	-9.8%	-45.3%	+22.0%
N_2O (without LUCF)	-15.9%	+9.0%	+1.7%	-16.2%	-14.6%	-16.7%	-32.2%	+3.5%
HFCs [1]	+93.6%	+89.2%	+142.1%	+208.3%	+164305.7%	209.6%	+146.0%	+27.1%
PFCs [1]	-49.5%	+61.0%	-	+2894.6%	+4064.5%	-47.6%	-3.1%	+78.8%
SF_6 [1]	+6.1%	-42.4%	-100.0%	-44.8%	-76.5%	+3.8%	-44.9%	-
1.A.1 Energy industries (CO_2)	-4.8%	-15.7%	-4.3%	-3.6%	+7.0%	-8.1%	-18.3%	+27.1%
1.A.2 Manufacturing industries (CO_2)	-8.5%	+25.5%	-2.1%	+3.9%	+11.1%	-4.5%	-29.0%	+6.4%
1.A.3 Transport (CO_2)	+18.5%	+41.8%	+22.4%	+15.9%	-0.8%	+15.6%	+12.7%	+20.2%
1.A.4 Other Sectors (CO_2) [Small combustion]	-2.6%	-1.9%	+8.6%	-16.5%	-23.4%	+3.1%	-16.4%	+59.7%
	IE	**IT**	**LU**	**NL**	**PT**	**ES**	**SE**	**UK**
Greenhouse gases (without LUCF) [1]	+24.0%	+3.9%	-45.1%	+2.6%	+30.1%	+33.7%	-1.9%	-12.9%
CO_2 (without LUCF)	+39.1%	+4.7%	-46.8%	+8.7%	+43.2%	+34.9%	-0.4%	-7.0%
CH_4 (without LUCF)	-0.3%	-4.0%	-4.0%	-24.0%	+1.8%	+29.4%	-13.8%	-33.4%
N_2O (without LUCF)	+6.3%	+2.0%	-60.9%	+2.8%	+4.1%	+16.1%	-3.6%	-35.4%
HFCs [1]	-	+91.5%	-	-34.5%	-	+112.6%	+198.7%	-38.7%
PFCs [1]	-	-23.1%	-	-18.0%	0.0%	-48.3%	-31.6%	-38.9%
SF_6 [1]	-	-30.2%	-	-9.4%	+10.8%	+122.9%	-35.8%	+35.9%
1.A.1 Energy industries (CO_2)	+44.8%	+6.4%	-80.0%	+14.7%	+40.9%	+35.0%	+5.2%	-16.3%
1.A.2 Manufacturing industries (CO_2)	+23.7%	-5.5%	-67.0%	+2.7%	+14.3%	+30.7%	+6.6%	-8.1%
1.A.3 Transport (CO_2)	+103.9%	+19.1%	+66.7%	+20.7%	+75.0%	+47.6%	+4.4%	+5.5%
1.A.4 Other Sectors (CO_2) [Small combustion]	+6.6%	+0.4%	-0.8%	-4.9%	+39.2%	+32.7%	-28.5%	+5.1%

[1] The percentage change in this line refers to the change base year - 2000. For the fluorinated gases most Member States have reported F-gas data with a base year other than 1990 (namely 1995), as allowed for under the Protocol. As the EU as a whole has not yet chosen a base year for the F-Gases, the analysis of EC15 emission trends in this report assumes 1990 as the base year for all gases for the EU.

[2] For Denmark data that reflect adjustments for variations in electricity trade in 1990 are given in brackets.

Note: "-" means that base year emissions were zero or no data was available.

4.2.2 Progress at Member State level

In 2000, six Member States (Finland, France, Germany, Luxembourg, Sweden and, the United Kingdom) were on track towards reaching their Kyoto-targets, i.e. they were below their Kyoto target paths. Nine Member States were well above their Kyoto target paths (Spain, Ireland and Portugal by more than 10 index points). Six Member States even increased the distance to the target path in 2000 compared to 1999 and only two (Netherlands and Denmark) reduced this distance. The following countries were heading towards overshooting their burden sharing target in 2000: Austria, Belgium, Denmark, Greece, Ireland, Italy, the Netherlands, Portugal and Spain (Table 4.2.2 and Figure 4.2.6).

In 2000, only eight Member States reduced total greenhouse gas emissions compared to 1999. Sweden joint in 2000 the other six Member States that reduced emissions below their base year levels.

The favourable situation for the EC emissions in 2000 was largely a result of considerable cuts in emissions in Germany and the UK, which together accounted for around 40% of total EC greenhouse gas emissions. In 2000, these two Member States achieved total greenhouse gas emission reductions of 325 million tons of CO_2 equivalents (compared to 1990). Main reasons for the favourable trend in Germany are increasing efficiency in German thermal electricity production and the economic restructuring in the five new Länder after the German reunification. Accordingly, German CO_2 emissions from energy and manufacturing industries declined by 18 % and 29 % respectively between 1990 and 2000. The reduction of greenhouse gas emissions in the UK was partly the result of the liberalisation of the energy market and subsequent changes in the choice of fuel used in electricity production from oil and coal to gas, and partly due to significant reductions in emissions of non-CO2 greenhouse gas emissions including implementation of N_2O abatement measures in the chemical industry. In both Member States the special circumstances mentioned above account for about 50 % of emission reductions for all six greenhouse gases, whilst specific policies and measures account for the remaining 50 %.[13]

In 2000, there was a further slight decrease in greenhouse gas emissions in Germany, whereas in the UK there was a small increase due to a rise in coal use for power production.

Italy and France are the third and fourth largest emitters with a share of 13 % each. In 2000, Italy's greenhouse gas emissions were 0.7 % above 1999 and 4 % above 1990 levels with increases primarily in the transport sector and electricity production. France reduced greenhouse gas emissions by 1.1 % in 2000, compared to 1999 levels, and was 2 % below 1990 levels. France also achieved large reductions in N_2O emissions from the chemical industry, but CO_2 emissions from transport increased considerably between 1990 and 2000.

The fifth largest emitter in the EU, Spain accounts for 10 % of total EC greenhouse gas emissions. Between 1990 and 2000, emissions rose by 34 % and in 2000, they

[13] Fraunhofer Institut für Systemtechnik und Innovationsforschung (ISI), Science Policy and Technology Policy Research (SPRU) Deutsches Institut für Wirtschaftsforschung (DIW), 2001

were 4 % higher than in 1999. As in Italy, the main causes of these increases are transport and electricity production.

Figure 4.2.6 gives an overview of Member States greenhouse gas emissions in relation to their linear target paths for 2008-2012[14].

Table 4.2.2: Greenhouse gas emissions in CO_2 equivalents (excl. land-use change and forestry) and Kyoto Protocol targets for 2008-2012

MEMBER STATE	1990 (million tonnes)	2000 (million tonnes)	Change 1999–2000 (%)	Change 1990–2000[1] (%)	Targets 2008–12 under Kyoto Protocol and EU "burden sharing" (%)	Distance-to-target indicator (DTI) (index points)
Austria	77.4	79.8	0.0%	2.7%	-13.0%	9.2
Belgium	143.1	151.9	0.5%	6.3%	-7.5%	10.0
Denmark	69.4	68.5	-6.0%	-1.7% (-9.8%)	-21.0%	8.8 (0.7)
Finland	77.1	74.0	-2.9%	-4.1%	0.0%	-4.1
France	551.8	542.3	-1.1%	-1.7%	0.0%	-1.7
Germany	1222.8	991.4	-0.2%	-19.1%	-21.0%	-8.6
Greece	104.8	129.7	4.8%	21.2%	25.0%	8.7
Ireland	53.4	66.3	1.5%	24.0%	13.0%	17.5
Italy	522.1	543.5	0.7%	3.9%	-6.5%	7.2
Luxembourg	10.8	5.9	-0.6%	-45.1%	-28.0%	-31.1
Netherlands	210.3	216.9	-0.4%	2.6%	-6.0%	5.6
Portugal	65.1	84.7	-1.1%	30.1%	27.0%	16.6
Spain	286.4	386.0	4.1%	33.7%	15.0%	26.2
Sweden	70.6	69.4	-1.6%	-1.7%	4.0%	-3.9
United Kingdom	742.5	649.1	0.4%	-12.9%	-12.5%	-6.7
EU-15	**4207.6**	**4059.3**	**0.3%**	**-3.5%**	**-8.0%**	**0.5**

[1] The percentage change in this column and the analysis of the MS refer to the change base year - 2000. For the fluorinated gases most Member States have reported F-gas data with a base year other than 1990 (namely 1995), as allowed for under the Protocol. As the EU as a whole has not yet chosen a base year, the analysis of EC15 emission trends in this report assumes 1990 as the base year for all gases for the EU.

Source: EEA (2002a)

Luxembourg, Sweden and the United Kingdom were below their CO_2 targets for 2000 (Table 4.2.3).[15] All other Member States were well above their CO_2 target paths for 2000 (Belgium, Ireland, the Netherlands and Spain by more than 10 index points (percent)). Four Member States do not have targets for CO_2 for 2000.

14 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 fulfil the commitment. In some MS, activities under the Flexible Mechanisms have already started, but effects of these do not appear in the MS greenhouse gas inventories.

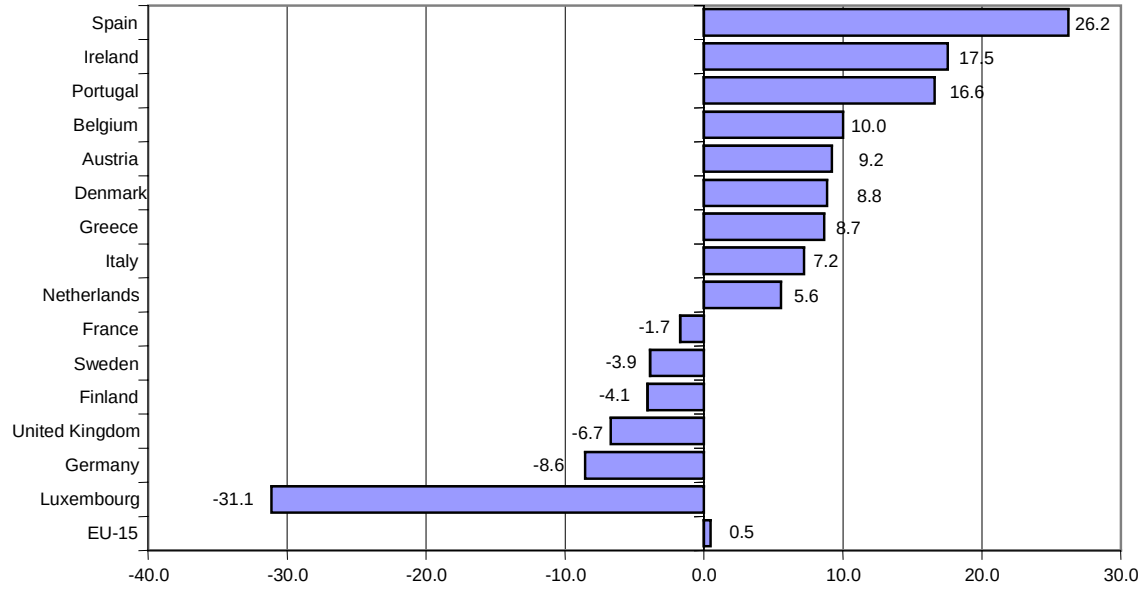
15 In addition, Denmark achieved its target, if adjustments for electricity trade are taken into account.

Table 4.2.3: CO_2 emissions in million tons (excl. LUCF) and targets for 2000

MEMBER STATE	1990 (million tonnes)	2000 (million tonnes)	Change 1999–2000 (%)	Change 1990–2000 (%)	UNFCCC and national targets for 2000 (%)	Distance-to-target indicator (DTI) (index points)	Target reached in 2000
Austria	62.3	66.1	0.1%	6.1%	0.0%	6.1	no
Belgium	118.0	127.0	1.1%	7.7%	-5.0%	12.7	no
Denmark	52.6	52.9	-7.7%	0.4 (-10.3%)	-5.0%	5.4 (-5.3%)	no (yes)
Finland	62.5	62.3	-2.8%	-0.3%	No target	No target	No target
France	394.1	401.9	-1.2%	2.0%	No target	No target	No target
Germany	1014.5	857.9	-0.2%	-15.4%	No target	No target	No target
Greece	84.3	103.7	5.2%	23.0%	15.0%	8.0	no
Ireland	31.5	43.8	4.8%	39.1%	20.0%	19.1	no
Italy	441.1	461.8	0.6%	4.7%	0.0%	4.7	no
Luxembourg	10.2	5.4	-0.6%	-46.8%	0.0%	-46.8	yes
Netherlands	159.6	173.5	0.9%	8.7%	-3.0%	11.7	no
Portugal	44.1	63.2	-1.4%	43.2%	No target	No target	No target
Spain	227.2	306.6	3.9%	34.9%	12.0%	22.9	no
Sweden	56.1	55.9	-1.1%	-0.4%	0.0%	-0.4	yes
United Kingdom	583.7	542.7	1.2%	-7.0%	0.0%	-7.0	yes
EU-15	**3341.8**	**3324.8**	**0.5%**	**-0.5%**	**0.0%**	**-0.5**	yes

Source: EEA (2002a)

Figure 4.2.6: Distance-to-target indicators (in index points = percent) for the Kyoto Protocol and burden sharing targets of EU Member States



Note: The distance-to-target indicator (DTI) measures the deviation of actual emissions in 2000 from the (hypothetical) linear target path between 1990 and 2010. Distance to target in percent (the bars) show the deviations between a hypothetical target (in 2000) and what actually has been achieved (in 2000), under the assumption that reductions in percent of 1990 levels would take place linear. The DTI gives an indication on progress towards the Kyoto and Member States' sharing targets. It assumes that the Member States meet their target entirely on the basis of domestic measures. See Section 5.1 and Annex II for explanations of the DTI.

Source: EEA (2002a)

5 EVALUATION OF PROJECTED PROGRESS

5.1 Comparison of Member States with existing measures projections with the EC burden sharing agreement

This section compares the latest 'with measures' projections undertaken by Member States for the year 2010 with their EC burden sharing commitments.

Table 5.1.1: Comparison of Member States' 'with measures' total emissions projections (excluding LUCF) compared with the Kyoto commitments[16]

	Base year from projection ($MtCO_2$)[17]	Base year from EEA report (2002) ($MtCO_2$)	EC Burden sharing[18]	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 ($MtCO_2$) [19]	gap (in % of 1990)
Austria	77.2	77.4	-13.0%	-10.0	8.9	11.5%	-18.9	-24.5%
Belgium	145.0	143.1	-7.5%	-10.9	22.4	15.4%	-33.3	-22.9%
Denmark	76.0	69.4	-21.0%	-16.0	-13.4	-17.6%	-2.6	-3.4%
Finland	77.1	77.1	0,0%	0.0	12.8	16.6%	-12.,8	-16.6%
France	545.0	551.8	0.0%	0.0	49.3	9.0%	-49.3	-9.0%
Germany	1225.0	1222.8	-21.0%	-257.2	-412.9	-33.7%	+155.6	+12.7%
Greece	99.3	104.8	25.0%	24.8	28.7	28.9%	-3.9	-3.9%
Ireland	53.8	53.4	13.0%	7.0	21.4	39.8%	-14.4	-26.8%
Italy	543.0	522.1	-6.5%	-35.3	44.0	8.1%	-79.3	-14.6%
Luxembourg	12.4	10.8	-28.0%	-3.5	-2.8	-22.9%	-0.6	-5.1%
Netherlands	212.0	210.3	-6.0%	-12.7	13.0	6.1%	-25.7	-12.1%
Portugal	64.8	65.1	27.0%	17.5	37.6	58.1%	-20.1	-31.1%
Spain	207.0	286.4	15.0%	31.1	100.0	48.3%	-69.0	-33.3%
Sweden	70.4	70.6	4.0%	2.8	0,5	0.7%	+2.3	+3.3%
UK	744.7	742.5	-12.5%	-93.1	-103.8	-13.9%	+10.7	+1.4%
Total EC	**4152.6**	**4207.6**	**-8.0%**	**-355.8**	**-194.2**	**-4.7%**	**-161.6**	**-3.3%**

This comparison is useful in revealing the 'gap' between what current domestic policies and measures are expected to deliver and the Member States and EC's commitment under the Kyoto Protocol.

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16 The 'with measures' scenarios for some Member States might be different because the cut-off date for inclusion of policies varies.

17 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. Base year estimates may change due to enhanced methodology, which aim at more accurate and more complete inventory data.

18 The EU Burden sharing target of -8.0 % is used although calculations of Member States summed-up account for –8.6%.

19 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. Minus figures signify that the commitment is not achieved, plus figures mean an projected 'over-delivery'.

The contribution of *existing policies and measures* to national targets varies significantly across Member States, reflecting the different degree of policy development between countries. Germany, Sweden and the UK in particular make a large contribution to the overall savings[20] and project themselves to achieve their burden sharing targets. Moreover, these countries expect in their projections an *'over delivery'* with measures that have been introduced since the Kyoto Protocol was agreed in 1997 (See plus figures of the gap in Table 5.1.1). 'Over-delivery' by some Member States, however, will not prevent other Member States from being in breach of their commitments under Decision 2002/358/EC which requires them to take the necessary measures to meet their Burden Sharing targets.

CO_2 is projected to decrease only slightly by 2 % (mainly because reductions in most sectors are compensated due to increases in the transport sector) (Table 5.1.3). Further decreases are projected for CH_4 and N_2O by 38 % and 23 % respectively over the period 1990 to 2010. 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, a significant increase of 34.3 Mt CO_2 equivalent or 72 % is projected by 2010 compared to the base year.

Compared to last year's EC with measures projections for 2010 which gave a half percent point fall in emissions the assessment for the EC based on this year's projections from the Member States presents no actual improvement**.** Belgium, France and Spain assessed their projected emissions for 2010 significantly higher recently than in their last year's reports, but Germany, Netherlands, Sweden and UK assessed lower projected emissions.

[20] 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).

The EC, as a whole, would achieve 4.7% GHG reductions below 1990 levels *with existing measures* projections . This leads to a shortfall of 3.3% (161.6 $MtCO_2$) by 2010. 2002/358/EC. These projections indicate that the aggregated deficit of Member States, failing to meet their Burden Sharing target represents about 7.4% of the 1990 emissions.

The 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. Due to the continuing uncertainty related to the implementation of policies and the methodologies used, concern about the accuracy of the figures mentioned above must be expressed. 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 3.3 % gap between the projected emissions and the Kyoto target.

Table 5.1.3: 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_2O	Fluorinated gases	CO_2	CH_4	N_2O	Fluorinated gases
Austria	10.4	-2.8	0.0	1.2	17%	-25%	0%	72%
Belgium	21.7	-3.6	2.2	2.1	18%	-26%	18%	420%
Denmark[21]	-10.7	-0.9	-2.2	0.6	-18%	-16%	-21%	161%
Finland	13.9	-2.6	-0.1	1.6	22%	-43%	-1%	2294%
France	59.2	-16.6	-11.7	18.4	15%	-26%	-13%	242%
Germany	-320.5	-65.2	-43.4	16.2	-32%	-59%	-49%	146%
Greece	28.7	0.0	0.0	0.0	29%	0%	0%	0%
Ireland	19.8	-0.7	0.6	1.6	63%	-5%	7%	636%
Italy	10,4	-9.8	-5.9	0.0	2%	-20%	-12%	0%
Luxembourg	-3.0	0.0	0.0	0.1	-26%	9%	12%	547%
Netherlands	32.0	-13.0	-2.0	-3.0	20%	-48%	-12%	-38%
Portugal	31,1	1.9	2.7	0.0	71%	15%	35%	1%
Spain	80.9	0.0	0.0	0,0	36%	0%	0%	0%
Sweden	1.8	-2.1	0.2	0.5	3%	-31%	3%	103%
UK	-40.3	-34.5	-23.8	-5.1	-7%	-45%	-36%	-30%
Total EC	**-64.6**	**-149.8**	**-83.4**	**34.3**	**-2%**	**-38%**	**-23%**	**72%**

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

The previous section has suggested existing measures identified by Member States will decrease emissions by 0.6% in 2010 compared to 1990 levels which leaves a gap of 7.4% to the EC'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.

[21] Change between base year and 2008-2012

Table 5.2.1: Comparison of the gap between Member States[22] '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 ($MtCO_2$) and remaining gap (-) or 'over-delivery' (+) in brackets[23]	Additional measures ($MtCO_2$)[24]			
			CO_2	CH_4	N_2O	Fluorinated gases
Austria	-18.9	14.5 (-4,4)	11.6	1.3	0.1	1.4
Belgium	-33.3	13.8 (-19.5)	13.8	0.0	0.0	0.0
Denmark	-2.6	1.9 (-0.7)	1.9	0.0	0.0	0.0
Finland	-12.8	14.1 (+1.3)	11.7	0.7	0.9	0.8
France	-49.3	58.3 (+9.0)	29.2	0.1	14.1	14.9
Germany	+155.6	12.5 (+168.1)	0.0	0.0	0.0	12.5
Greece	-3.9	0.0 (-3.9)				
Ireland	-14.4	14.6 (+0.2)	11.1	2.1	0.9	0.5
Italy	-79.3	81.0 (+1.7)				
Luxembourg	-0.6	0.0 (-0.6)				
Netherlands	-25.7	3.0 (-22.7)				
Portugal	-20.1	0.0 (-20.1)				
Spain	-69.0	42.0 (-27.0)	42.0	0.0	0.0	0.0
Sweden	+2.3	0.0 (+2.3)				
UK	+10.7	63.6 (+74.3)	63.6	0.0	0.0	0.0
Total EC	**-161.6[25]**	**319.3 (+157.7)**	**215.0**	**7.8**	**16.0**	**30.1**

Eleven Member States have provided quantification of their *additional policies and measures* (Table 5.2.1). Four Member States (Portugal, Greece, Luxembourg and Sweden) did not provide quantification of these measures. Sweden projects existing policies and measures to be sufficient. For those countries that have identified additional savings by greenhouse gas, most of these savings are expected to come from further reductions in CO_2.

With additional measures Finland, France, Germany, Ireland, Italy, Sweden and the UK project to achieve their burden sharing targets. For the EC as a whole, the achievement of targets by these Member States and the remaining gaps by the other

22 Only the eleven Member States have provided quantification of their additional measures.

23 This over delivery is based on the total of with measures and with additional measures

24 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

25 The EU Burden sharing target of -8.0 % is used although calculations of Member States summed-up account for –8.6%.

Member States (See minus figures of the remaining gap in Table 5.2.1) result in a 6.0 % GHG reduction in *with additional policies and measures* projections which means a shortfall of around 2% (1,8%) (99 $MtCO_2$) by 2010.

Several Member States, project 'over-delivery' above their burden sharing target. (See plus figures of the remaining gap in Table 5.2.1). Emission reductions would amount to about 319 Mt CO_2-equivalents by 2010. This would result in EC GHG emission reductions of about 12% by 2010 compared to 1990 levels (Table 5.2.2) and would exceed the Kyoto target of –8% by 4%. 'Over-delivery' by some Member States will not prevent other Member States from being in breach of their commitments under Decision 2002/358/EC.

It should also be noted that in many countries the additional policies and measures are in the early stages of development and are subject to a larger degree of uncertainty.

Table 5.2.2: Accounting for the EC of GHG emission savings and gap according to Member States' 'with additional measures' emission projections

	Mt CO_2			
Base year emissions of EC	4152,6			
Kyoto commitment of EC	-8%			
Emission target implied by burden sharing of MS	3796,8			
Savings to be achieved	-355,8			
	as reported by MS		**Calculated results without over delivery**	
Savings from *existing measures* of MS	-194,2	(-4,7%)	**-25,6**	**(-0,6%)**
Savings from *additional measures* of MS	-319,3	(-7,7%)	**-231,0**	**(-5,6%)**
Savings total	-513,5	(-12,4%)	**-256,6**	**(-6,2%)**
Over delivery / Gap	+157,7	(+4,4%)	**-99,2**	**(-1,8%)**

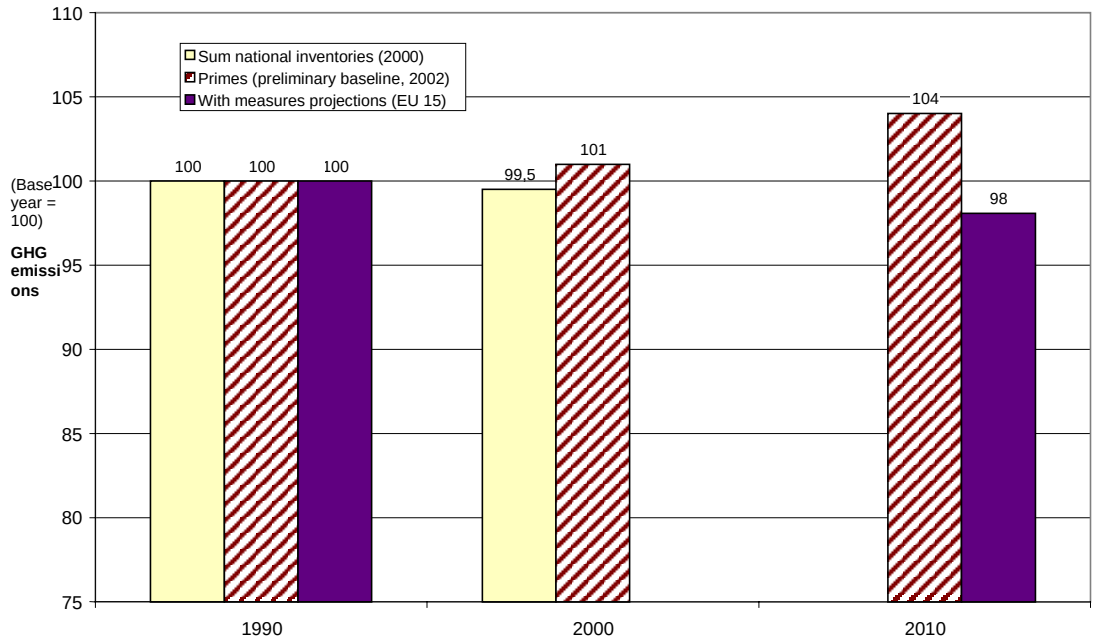
5.3 Community wide model based projections for the energy sector (Primes)

Model based projections for 2010 (*Primes model*) from the forthcoming EC-wide study on the energy baseline scenario (= EC wide 'with measures' projection of the energy sector only incl. Transport) show a considerably different picture of the future emissions[26]. The new *Primes* baseline for the EC project an increase in energy related CO_2 emissions of 4 % between 1990 and the year 2010 These projections are based on updated assumptions (e.g. energy import prices, GDP, industrial production by branch) and also take into account the most recent statistical data. On the other hand, the aggregate 'with measures' projections result in a decline of CO_2 emissions (including those not related to energy) by 2 %.

[26] Information of CEC DG TREN, September 2002

This means that the latest aggregated Member State projections result in declining CO_2 emissions -6 % percentage points below the results of the new Primes model run. According to a preliminary analysis the reason for this difference lies in different concepts and can be traced back to a major difference in one Member state. Following the concepts of Eurostat energy statistics the PRIMES projections include emissions from international aviation, whereas the sum of national projections excludes these emissions and in particular also those for flights between Member states. The most notable difference between the Primes projections and national emission trajectories concerns the expected cuts of emissions in Germany, while the other Member States combined have only minor differences in their projections to the Primes results, bearing in mind that due to e.g. different coverage of CO2 emissions (energy related vs total CO2), date of establishing the projections, etc. there are also small differences for other Member states. To examine the reasons for these differences further details would be needed (e.g. breakdown of CO2 emissions by sector and underlying assumptions for all Member states). Such data are currently not available for all Member states from their submissions in a format that is comparable with the detailed PRIMES result that will be been published soon.

Figure 5.3.1 Comparison of the aggregated with measures projections for CO_2 emissions with EC-wide model results



Note: 1)There is no disaggregated emissions projection for Greece.
2) PRIMES modelling includes emissions from international aviation according concepts of energy statistics which are excluded in national projections **Source:** EEA (2002b)

The key factors which influence the development of the CO_2 emissions in the new Primes run are plotted as indicators (1990 = 100) in Figure 5.3.2. CO_2 emissions were slightly decreasing until 1995 but started to increase again thereafter and are projected to exceed the 1990 level by 4% in 2010. This result is a product of several overlying trends. All factors that can be influenced by energy or climate policy are projected to improve:

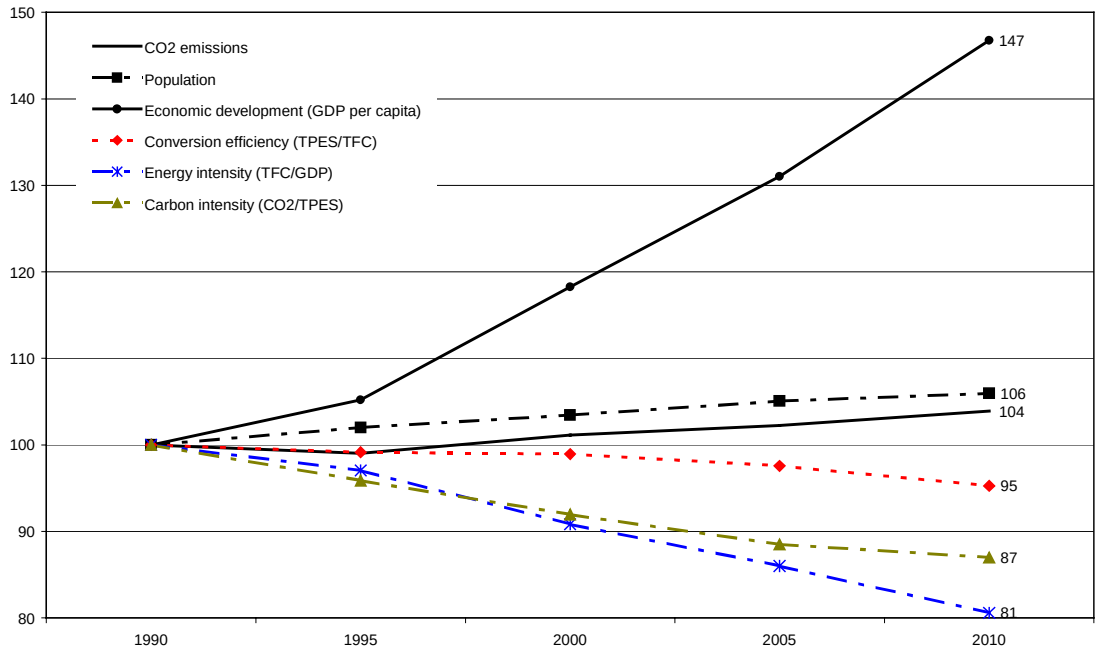
- the carbon intensity will decline by 13 % due to inter alia increasing share of renewable energies;

- the conversion efficiency measured in unit of total primary energy needed for the consumption of one unit of final energy is also projected to improve by 5 % (which can be seen at the declining trend of the respective line);

- the overall energy intensity measured by the units of final energy needed to produce one unit of GDP is projected to improve due to structural change in the economy and efficiency measures in final consumption by 19%.

However, not all of these improvements are result of energy and climate policy because a part of these developments are business as usual that would also occur without policy interventions. Although the business as usual developments can not be separated at this stage it is obvious that energy and climate policy have a substantial effect on the development of CO_2 emissions.

Figure 5.3.2: Driving forces of CO_2 emissions in the new Primes baseline projection (comparable to the "with measures" projections)



Note: The results from the new Primes run are preliminary and may be subject to change **Source:** NTUA 2002

Nevertheless, CO_2 emissions are projected to increase by 4 % until 2010 because, both population and GDP will grow too. Population has grown slightly faster than

energy related CO2 emissions in the 1990s and is expected to grow at the same pace as CO_2 emissions up to 2010, which leads to a stabilisation of per capita CO2 emissions in this decade after a slight decline in the last decade. GDP per person, – according to the new primes run – is expected to be 56 % higher in 2010 than it was in 1990, which represents an average annual growth of 2.2%. This shows the upward pressure for CO2 emissions and the challenge for climate policies. It should not be understood from these results that climate policy is powerless against these developments. In contrast, climate policy has to be as effective as possible to overcompensate the underlying growth trends of CO_2 emission. The latest Primes results show, that under baseline conditions this is not the case yet.

5.4 Key assumptions in Member States' projections

The differences between Member State and the EC-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. However, detailed information on the projected contribution of key parameters such as GDP, international oil price, population and traffic growth was only available from few Member States.

5.5 Common and Co-ordinated Policies and Measures of the EC

This section gives a brief summary of policies and measures at the Community level - common and co-ordinated policies and measures (CCPMs) - since the last progress report in 2001. The CCPMs are complementing actions taken by Member States. Aiming to help identify the most environmentally and cost effective measures to meet the EC target, the European Climate Change Programme (ECCP) was established. This programme dovetails with the 6th EAP and the Strategy for Sustainable Development.

The Communication from the Commission "on the implementation of the first phase of the European Climate Change Programme" highlighted a package of measures, which the Commission intends to bring forward in 2002 and 2003. They are grouped in four sections: crosscutting, energy, transport and industry. Those measures represent a cost-effective reduction potential of some 122 - 178 Mt CO_2 eq.

The ECCP is continuing to support and facilitate the concrete implementation of the priority measures identified in the first phase. The following table gives an overview of the progress in this field, status October 2002.

Table 5.5.1: Progress in Common and Co-ordinated Policies and Measures

Proposed measure	**Status of implementation**
Cross-cutting issues	
Proposal on emission trading	Adopted by the Commission In co-decision
Effective implementation of IPPC (integrated Pollution Prevention and Control Directive)	Work on an IPPC reference document on generic energy efficiency techniques to start in 2003; Ongoing work on various sector-specific BAT reference documents Revision of published BAT reference documents to start in 2003
Linking project based mechanisms to emissions trading	Preparatory work in ECCP working group Proposal envisaged first half 2003
Review of the monitoring mechanism	Proposal envisaged before the end of 2002
Energy	
Directive on taxation of energy products (pre-ECCP)	Under discussion at the Council Adoption envisaged by end of 2002
Directive on energy performance of buildings	In co-decision
Directive on the promotion of electricity from renewable energy sources (pre-ECCP)	Adopted by Council and Parliament
Proposal for Minimum energy efficiency requirements for end-use products	Preparation in progress Proposal envisaged before the end of 2002
Proposal for a Directive on energy demand	Preparation in progress Proposal envisaged first quarter 2003
Proposal for a Directive on combined heat and power	Commission proposal adopted
Initiatives on increased energy efficient public procurement	Preparation in progress
Public awareness campaign and campaign for take-off	Elaboration of the initiative prepared in ECCP WG 3 sub-group; Initiative will be launched in 2003
Transport related	
ACEA/JAMA/KAMA voluntary agreement to reduce fleet average CO2 emissions to 140g/km by 2008/2009 (pre ECCP)	Monitored through yearly report
Shifting the balance between modes of transport	Package of actions, in accordance with the White Paper on a Common Transport Policy

Proposal for improvements in infrastructure use and charging	Working paper in preparation
Promotion of the use of bio-fuels for transport	Commission Communication and proposals for Directives adopted by the Commission
Communication form the Commission regarding taxation of passenger cars	Adopted by the Commission
Proposal on special tax arrangements for diesel fuel used for commercial purposes and on the alignment of excise duties on petrol and diesel fuel	Adopted by the Commission
Proposal on a regulation on the granting of Community financial assistance to improve the environmental performance of the freight transport system	Adopted by the Commission
Industry	
Proposal for legislative action on fluorinated gasses	Preparation in ECCP WG 5 and cost-benefit analysis; Proposal envisaged first half 2003

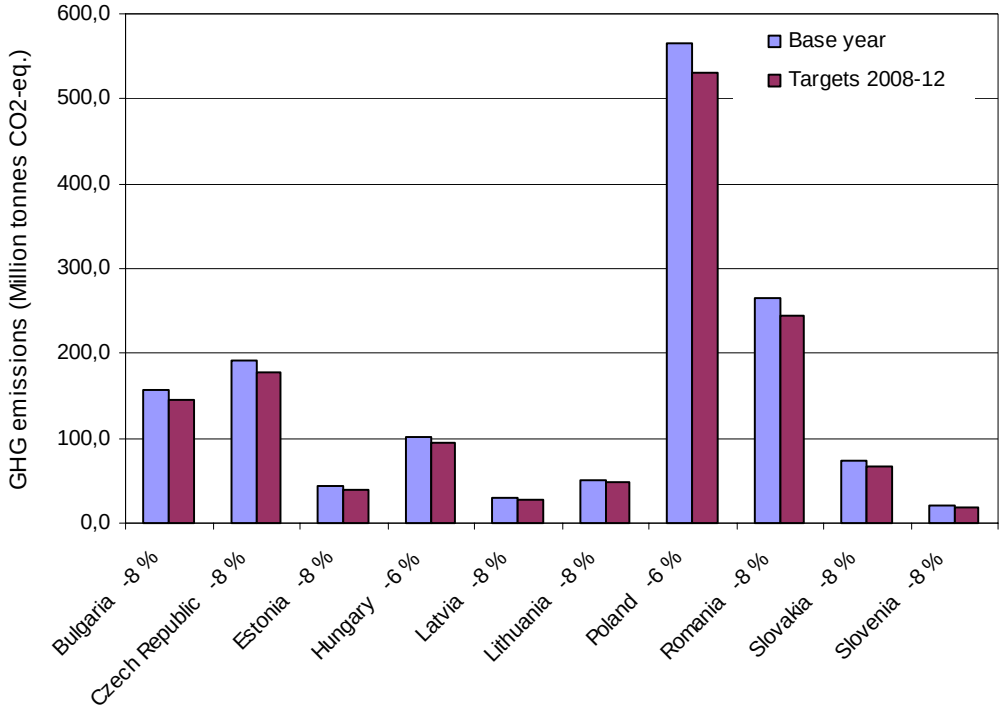
In addition the Commission is further investigating policies and measures to complement Member States' efforts in developing cost-effective measures. Following the Marrakech accords, which comprise concrete rules for the inclusion of sinks under the Kyoto Protocol, two new ECCP working groups have been established, dealing with the enhancement of carbon sequestration in forests and agricultural soils. The new ECCP working groups have been established in close collaboration with Research DG and take into account latest results of EC supported research projects. A number of specific actions, identified under the first phase of the ECCP, that needed further study in terms of emission reduction potential and cost-effectiveness, are being developed (e.g. initiative on RES-heat, E2MAS energy audit and management scheme, Motor Challenge Initiative, fiscal measures for passenger cars). The Commission is planning to present a comprehensive report on ECCP related activities in the first half of 2003.

6 GHG EMISSION TARGETS AND REDUCTIONS OF CANDIDATE COUNTRIES

6.1 Targets

The accession of several European countries to the European Union is expected in near future. For a frictionless integration of these countries into the EC Climate Change policy, it is of interest to learn about their progress towards GHG emission reductions. Nevertheless, Candidate Countries have individual targets under the Kyoto Protocol and are not grouped together with the EC 15. Candidate Countries belong, within UNFCCC, to the group of countries undergoing the process of transition to a market economy, but are also Annex I parties. A preliminary assessment has been carried out for the Central and Eastern European Candidate Countries. Malta, Cyprus and Turkey were not included mainly because of a lack of data. The 10 Middle and Eastern European Candidate Countries have different targets under the Kyoto Protocol. Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Romania, Slovakia and Slovenia have a target of an 8% reduction from the base year,[27] while Hungary and Poland have a target of a 6% reduction (Figure 6.1.1).

Figure 6.1.1 Kyoto Protocol targets for Candidate Countries



Source: EEA (2002a), EEA (2002b)

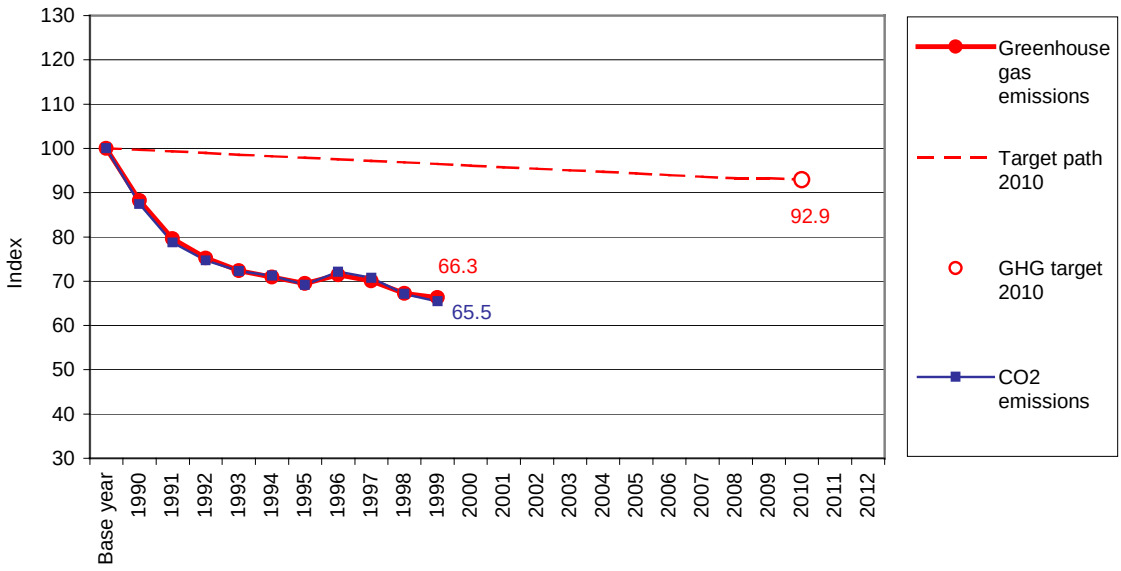
[27] Countries with base years other than 1990 are Bulgaria (1988), Hungary (average 1985-1987) and Poland (1988).

6.2 GHG emission trends in Candidate Countries

The Candidate Countries (CC) do not have a common target for emission reductions. Each country has to reach its targets individually as defined in the Kyoto Protocol. However, an aggregate analysis has been performed in this section for information purposes so that overall trends in the CC 10 can be compared with the trends in the EC.

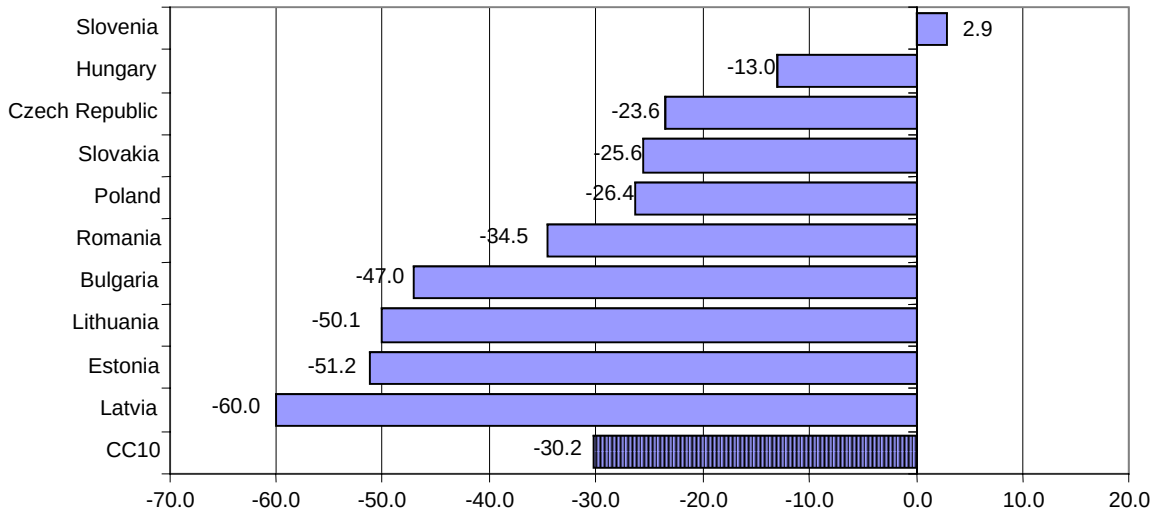
All candidate countries aimed to stabilise emissions by 2000 within UNFCCC (Figure 6.2.1). Total greenhouse gas emissions for the ten Candidate Countries declined by 32 % between the base year and 1999. The base year for this group of countries was assumed to be the average of the base years of the individual candidate countries. In 1999, the distance-to-target indicator for the whole region was -30.2 index points. The performance of the Candidate Countries, however, varies considerably (Figure 6.2.2). Nine countries were below their Kyoto target path, with distance-to target indicators ranging from -13 index points in Hungary to -59.7 in Latvia. Only Slovenia was above its target path, with +2.9 index points.

Figure 6.2.1: Candidate countries greenhouse gas emissions compared with Kyoto target for 2008-2012 (excl. fluorinated gases and LUCF)



Source: EEA (2002a), EEA (2002b)

Figure 6.2.2: Distance-to-target indicators (in index points) for the Kyoto Protocol of candidate countries



Note: see section 5.1 for an explanation of the distance to target indicator.

Source: EEA (2002a), EEA (2002b)

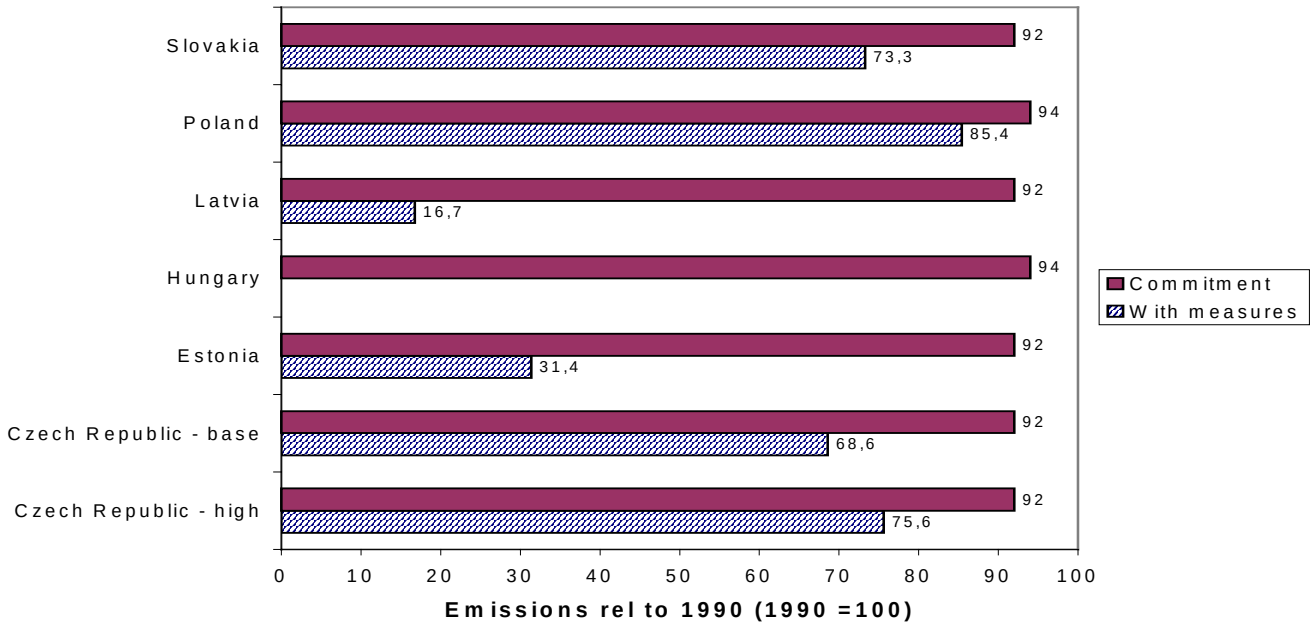
6.3 GHG emission projections in Candidate Countries

Candidate Countries do not report formally to the monitoring mechanism, so the discussion in this section is based on third National Communications under the UNFCCC. Six countries (Czech Republic, Estonia, Hungary, Latvia, Poland and Slovakia) had submitted 3rd National Communications by August 2002.

The Czech Republic presented two projections, a reference scenario (labelled low in the figure above) and a scenario assuming high economic growth. All *with existing policies and measures* projections project emissions in 2010 to be lower than the Kyoto commitments (Figure 6.3.1). For Latvia and Estonia, the emissions are projected to be significantly lower than in 1990.

In part, the projected reductions are the result of the economic restructuring that has already occurred in these countries. However, all countries have policies and measures in place to reduce greenhouse gas emissions. These measures are primarily aimed at energy use and waste but there are a limited number of measures in other sectors. The whole range of types of measures is used, although the use of voluntary agreements is limited. *Additional policies and measures* have also been identified in five countries although *existing policies and measures* are projected to be sufficient.

Figure 6.3.1: With measures projections for Accession Countries (2010 relative to 1990



Annex I: Contributions of Member States to GHG emission reduction

In the following figures on emission trends and projections domestic measures are taken into account only. The use of Kyoto Flexible Mechanisms is not yet included in the Monitoring Mechanism and "carbon sinks" are not taken into account.

Figure A.1 and A2: GHG emission trends and projections for Austria and Belgium

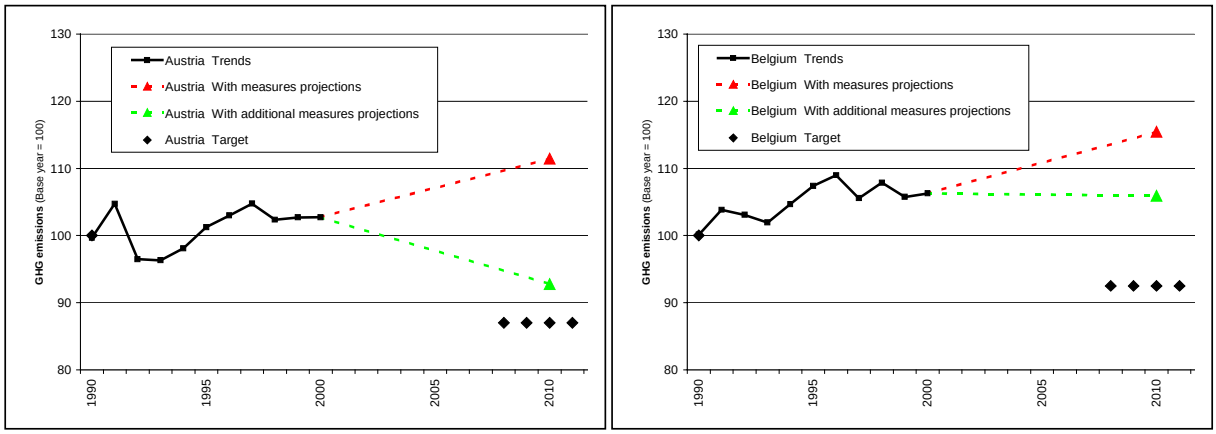


Figure A.3 and A.4: GHG emission trends and projections for Denmark and Finland

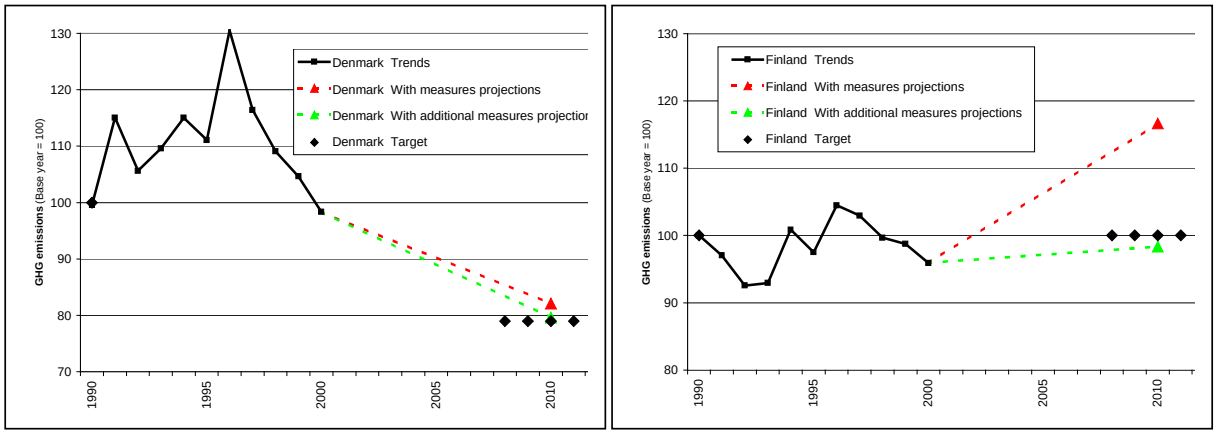
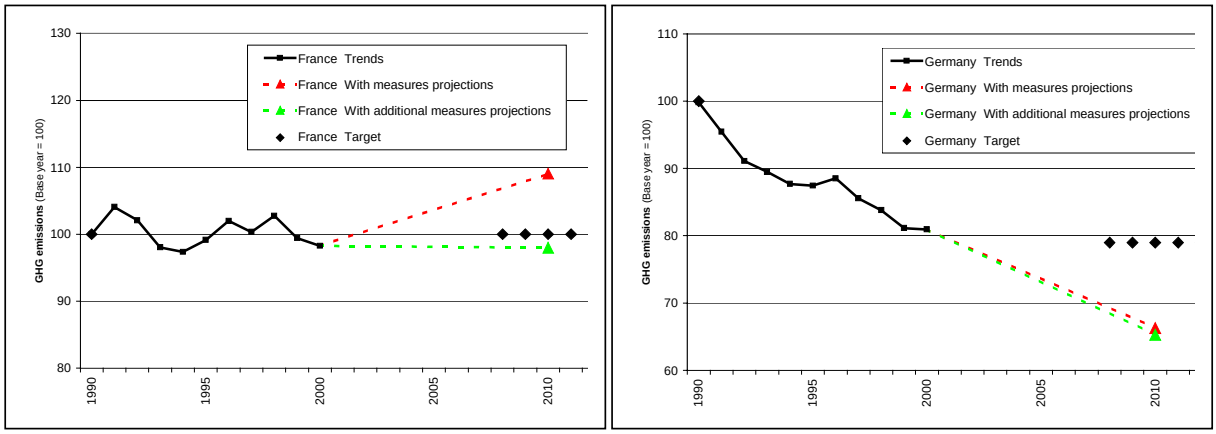


Figure A.5 and A.6: GHG emission trends and projections for France and Germany



Source: EEA (2002a), EEA (2002b)

Figure A.7 and A.8: GHG emission trends and projections for Greece and Ireland

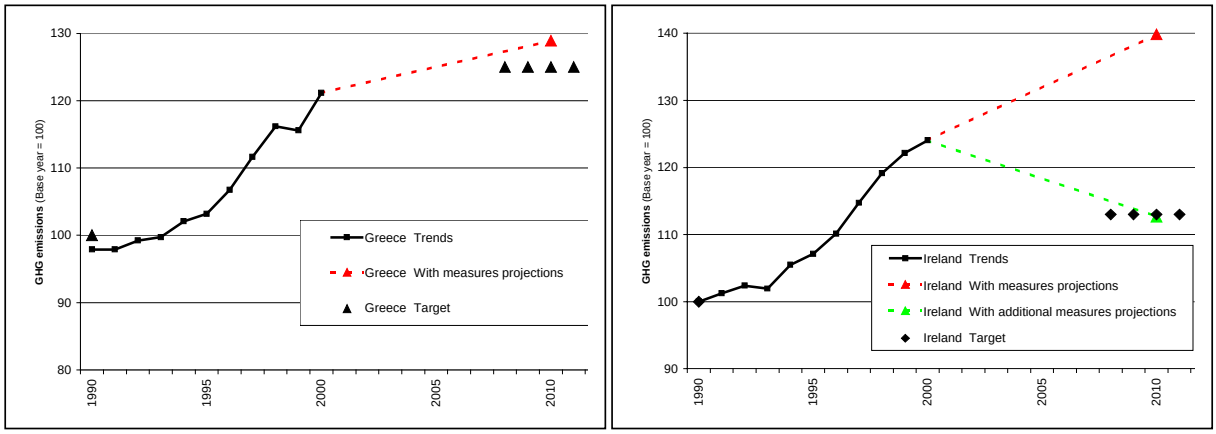


Figure A.9 and A.10:GHG emission trends and projections for Italy and Luxembourg

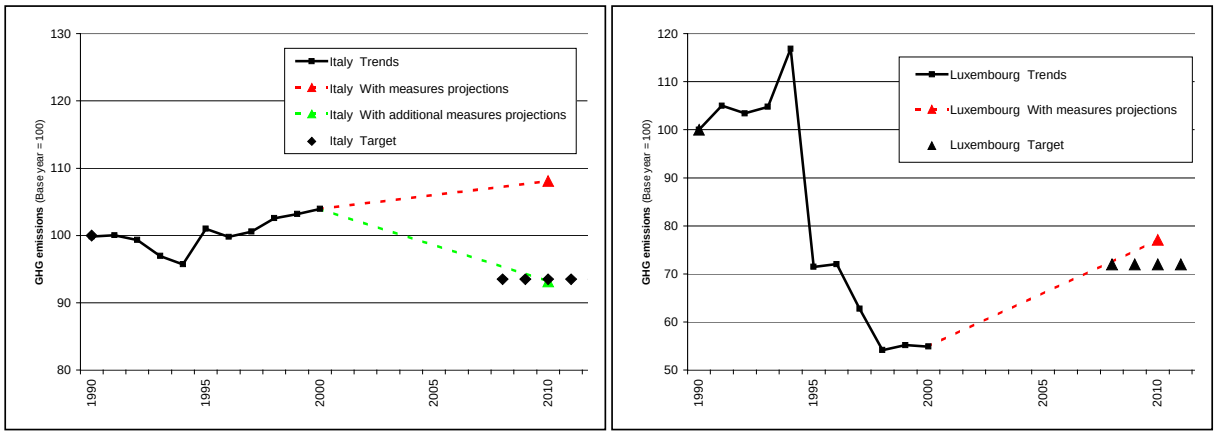
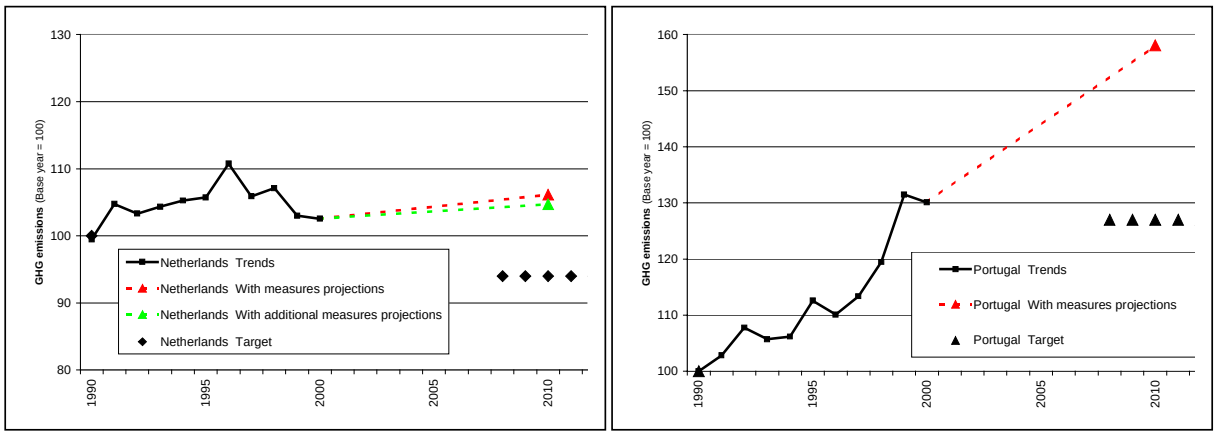
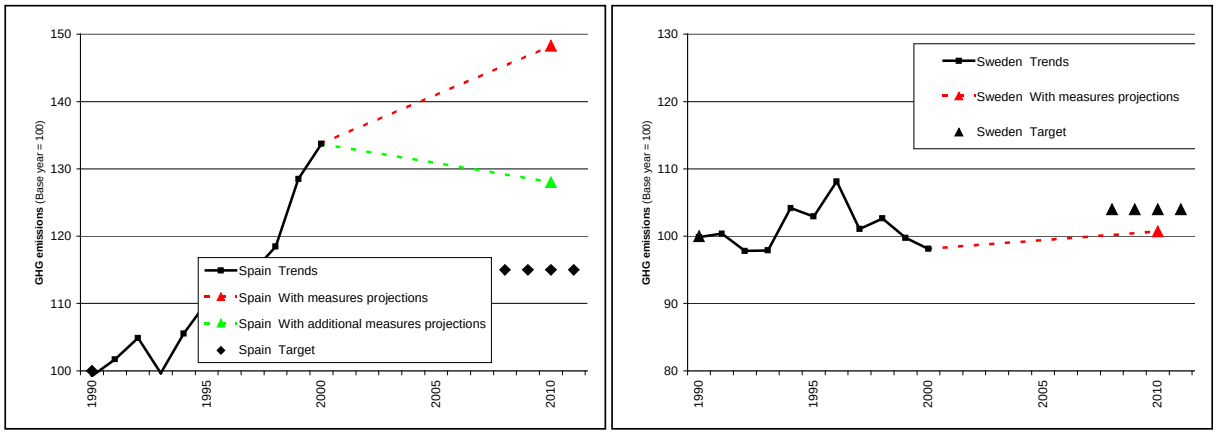


Figure A.11 and A.12: GHG emission trends and projections for The Netherlands and Portugal



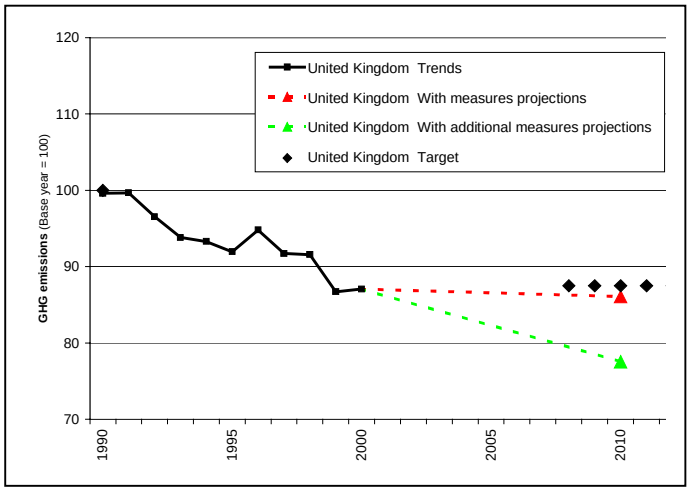
Source: EEA (2002a), EEA (2002b)

Figure A.13 and A.14: GHG emission trends and projections for Spain and Sweden



Source: EEA (2002a), EEA (2002b)

Figure A.15: GHG emission trends and projections for United Kingdom



Source: EEA (2002a), EEA (2002b)

Annex II: Glossary and abbreviations

Actual progress	Actual progress is assessed by the comparison of base year inventories with the latest available inventories to establish actual trends of emissions and by a comparison with emission objectives at Member State and Community level. The evaluation is based on emission inventories of Member States and the Community.
Projected progress	Projected progress is assessed by the evaluation of adopted (current) and further additional (planned, or currently in discussion) policies and measures at both national and Community level and by a comparison of projected emissions in 2010 with emission objectives at Member State 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
EC 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 been distributed on a differentiated basis to individual Member States under an 'EC burden sharing' mechanism according to Council Decision 2002/358/EC.
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 European Community/ Union level
CHP	Combined Heat and Power
COP	Conference of the Parties of UNFCCC
CRF	Common Reporting Format for greenhouse gas inventories

DTI	Distance to target indicator; the target path is a straight line from base year emission level (1990) to burden sharing target levels in 2008-2012, under the assumption that reductions in percent of 1990 levels would take place linear and accounting for domestic measures only; the DTI figures in percent show the deviations between this hypothetical target in a recent year (what should have been achieved) and the emission level in the same year (what has been reached).
EEA	European Environment Agency
GDP	Gross Domestic Production
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
LUCF	Land Use Change and Forestry
P&Ms	Policies and Measures
UNFCCC	United Nations Framework Convention on Climate Change
TPES	Total primary energy supply
TFC	Total final consumption The difference of TPES and TFC equals energy use in energy industry