

# Greenhouse gas emission trends and projections in Europe 2005

ISSN 1725-9177





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Luxembourg: Office for Official Publications of the European Communities, 2005

ISBN 92-9167-780-9  
ISSN 1725-9177

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### **Environmental production**

This publication is printed according to high environmental standards.

### **Printed by Scanprint a/s**

- Environment Certificate: ISO 14001
- Quality Certificate: ISO 9001: 2000
- EMAS registered — licence no. DK- S-000015
- Approved for printing with the Nordic Swan environmental label, licence no. 541 055

### **Paper**

- Woodfree matt fine paper, TCF
- The Nordic Swan label

*Printed in Denmark*



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# Acknowledgements

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The European Environment Agency's European Topic Centre for Air and Climate Change (ETC/ACC) provided input to this report. The coordinating input from the ETC was provided by Wolf Garber of Umweltbundesamt, Germany.

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The EEA project manager was André Jol. Other contributing EEA project managers were Jan Karlsson and Etem Karakaya.

EEA acknowledges the comments received on the draft report from the national focal points (NFPs) of EEA member countries and the European Commission (DG Environment), which have been included in the final version of the report as far as practically feasible.

# Key messages

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Greenhouse gas emissions in the pre-2004 EU Member States (EU-15) in 2003 were 1.7 % below base-year level <sup>(1)</sup>. This means the EU-15 was little more than a fifth of the way towards achieving the 8 % emissions reduction from base-year levels required by 2008–2012 under the Kyoto Protocol <sup>(2)</sup>. Latest projections for 2010 show that existing domestic policies and measures by Member States to reduce emissions are not sufficient for the EU-15 to reach its Kyoto target. Even with planned additional domestic policies and measures, the target will not be reached. The target will only be attained when Kyoto mechanisms <sup>(3)</sup> are taken into account.

Existing domestic policies and measures will reduce total EU-15 greenhouse gas emissions by only 1.6 % from base-year levels by 2010. When the additional domestic policies and measures being planned by Member States are taken into account, an EU-15 emissions reduction of 6.8 % is projected. However, this relies on several Member States cutting emissions by more than is required to meet their national targets, which cannot be taken for granted. The projected use of Kyoto mechanisms by nine Member States <sup>(4)</sup> will reduce emissions by 2010 by a further 2.5 %. This would bring emissions down to 9.3 % below the EU-15 base-year level and allow the EU-Kyoto target to be reached.

Sweden and the United Kingdom project that existing domestic policies and measures will be sufficient to meet their burden-sharing targets and

they may even over-deliver. Luxembourg projects that it will meet its target with a combination of domestic policies, and measures, and emission allowances from the use of Kyoto mechanisms.

France, Germany and Greece project that they will reach their targets if currently planned additional policies and measures are implemented. With additional domestic policies and measures, and the use of Kyoto mechanisms Austria, Belgium, Finland and the Netherlands project that they will reach their Kyoto targets.

The other five EU-15 Member States (Denmark, Ireland, Italy, Portugal, Spain), do not project that they will meet their targets, even with additional domestic policies and measures or the use of Kyoto mechanisms.

Nine countries <sup>(5)</sup> have allocated financial resources for using the Kyoto mechanisms with a total amount of about EUR 2 730 million for the whole 5-year Kyoto Protocol commitment period. The same countries and France have started to prepare legal and operational frameworks and bilateral agreements for using the Kyoto mechanisms.

From 1990 to 2003 EU-15 greenhouse gas emissions decreased from most sectors (energy supply, industry, agriculture and waste management). However, emissions from transport increased by nearly 24 % during the same period <sup>(6)</sup>.

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<sup>(1)</sup> Base-year level of greenhouse gas emissions for EU-15 is calculated by using 1990 emissions for carbon dioxide, methane and nitrous oxide from all Member States, and 1990 or 1995 emissions for fluorinated gases depending on which the Member State has chosen.

<sup>(2)</sup> The pre-2004 Member States are covered by the 'EU burden-sharing' agreement which lays down differentiated emission limits for each of these 15 Member States with the aim of ensuring that the EU-15 meets its overall 8 % reduction commitment under the Protocol. Therefore, this report provides the most detailed information on the pre-2004 EU-15 Member States. The new EU Member States keep their individual targets under the Kyoto Protocol, see Chapter 2 of this report. The commitment period 2008–2012 is referred to as the year 2010 in this report.

<sup>(3)</sup> Joint Implementation, Clean Development Mechanism, and Emissions Trading according to the Kyoto Protocol, Art. 6, Art. 12, and Art. 17. These mechanisms allow industrialised countries to invest in emissions-savings projects in third countries and use the resulting emission credits to help meet their Kyoto targets (see also Chapter 7 of this report).

<sup>(4)</sup> Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands and Spain.

<sup>(5)</sup> Austria, Belgium, Denmark, Finland, Germany, Italy, the Netherlands, Spain and Sweden. The funds provided by Germany, Finland and Sweden are for pilot programmes. Finland intends to use Kyoto mechanisms to reach its target but has not yet decided on the total quantity of units to be bought. Germany does not intend to use Kyoto mechanisms for reaching its target; Sweden has not yet taken a final decision.

<sup>(6)</sup> All data in this report on past and projected trends exclude emissions and removals from land use, land use change and forestry (LULUCF), unless explicitly mentioned.

Domestic policies and measures in EU-15 Member States that are projected to contribute most to achieving the targets include the EU emission trading scheme, promotion of electricity from renewable energy, promotion of combined heat and power (CHP), improvements in energy performance of buildings and energy efficiency in large industrial installations, and promotion of the use of energy-efficient appliances. However, current trends suggest that the EU-25 renewable electricity target (21 % of gross electricity consumption) and the indicative EU target for CHP (18 % share in total electricity production) for 2010 are unlikely to be met. Other key policies and measures include promotion of biofuels in transport and reducing the average carbon dioxide emissions of new passenger cars, recovery of gases from landfills and reduction of fluorinated gases.

Emissions have declined substantially in almost all new Member States. In 2003 emissions were 32 % below the base-year level, mainly due to the introduction of market economies and the consequent restructuring or closure of heavily polluting and energy-intensive industries.

Greenhouse gas emissions from transport decreased by 5 % between 1990 and 1995 but increased afterwards. In 2003 they exceeded 1990 levels by 24 %. Seven new Member States project that they will meet or even over-achieve their Kyoto targets by 2010 with existing domestic policies and measures (?). However, in most countries emissions will increase between 2003 and 2010. Slovenia projects that it will meet its Kyoto target with additional policies and measures including CO<sub>2</sub> removals from land use change and forestry.

The EU-25 emissions trading scheme started in January 2005, and has created a market for carbon dioxide allowances. It encourages emission reductions to be made where it is most economically efficient. In the first period of the EU emissions trading scheme from 2005 to 2007, the total number of allowances in EU-25 is 3.5 % above the emissions of the trading sector in 2003. Thus, they allow for some increase in emissions from the trading sector. However, the total number of allowances in EU-25 is as a yearly average of 3.4 % below the projected emissions of the trading sector from 2005 to 2007.

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(?) Cyprus and Malta do not have a target under the Kyoto Protocol.



# 1 Introduction

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This report presents an assessment of the actual (1990 to 2003) and projected progress (by 2010) of the European Community (EC) and its Member States, acceding and candidate countries and EEA countries <sup>(8)</sup> towards achieving the objectives of the UN Framework Convention on Climate Change (UNFCCC) and their emission targets under the Kyoto Protocol.

The report also serves to support and complement the annual evaluation report of the European Commission to the Council and European Parliament, which is required under Council Decision 2004/280/EC concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol.

In this report, the assessment of whether Member States are on track to reach their targets is based mainly on an analysis of domestic policies and measures. The use by Member States of the flexible mechanisms of the Kyoto Protocol to fulfil their commitments is also included. Activities concerning land use, land use change and forestry ('carbon

sinks') are not included, except where explicitly noted. This assessment contains information on 25 EU Member States, but is most detailed for the pre-2004 Member States (EU-15). These are covered by the 'EU burden-sharing agreement' which lays down differentiated emission limits for each of the 15 Member States with the aim of ensuring that the EU-15 meets its overall reduction commitment under the Protocol.

This year (2005) a report on greenhouse gas emission trends and projections is published for the fourth time. The most recent information submitted by Member States under the EU monitoring mechanism up to July 2005 is included. Updates were available on emission inventories by all Member States and on emission projections or national programmes by twelve of the EU-15 Member States and six of the new Member States. Detailed information on national greenhouse gas emission trends, projections, policies and measures and methodologies (including the references) is presented in the annexes available on the EEA web site ([www.eea.eu.int](http://www.eea.eu.int)).

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<sup>(8)</sup> This report covers the EU Member States, EU exceeding countries (Bulgaria and Romania), the EU candidate country Croatia and the additional EEA member countries Norway, Iceland and Liechtenstein. The report does not cover Turkey due to lack of data and because it does not have a target under the Kyoto Protocol. Also Malta and Cyprus do not have targets under the Kyoto Protocol, but the limited available data is presented.

## 2 The Kyoto Protocol targets



The EU, its Member States, all acceding and candidate countries and all additional EEA member countries (except Turkey) have ratified the Kyoto Protocol.



The Kyoto Protocol entered into force on February 16th 2005 — the ninetieth day after at least 55 Parties to the Convention, incorporating Annex I Parties which accounted in total for at least 55 % of the total carbon dioxide emissions in 1990 from that group, deposited their instruments of ratification, acceptance, approval or accession.

Combating climate change and minimising its potential consequences by achieving stabilisation of atmospheric greenhouse gas concentrations and thus avoiding dangerous interference with the climate system are key objectives of the UN Framework Convention on Climate Change (UNFCCC) and represent a high priority for the EU.

This requires substantial reductions in global greenhouse gas emissions. As a first step, Parties to the UNFCCC in 1997 adopted the Kyoto Protocol. The commitment in the protocol for developed countries, as a whole, would have reduced their emissions of a basket of six greenhouse gases to 5.2 % below their levels in a given base-year (1990 in most cases) by the period 2008–2012. Since not all developed countries have ratified the Protocol the total reduction target is lower. The target is about 1.7 % below base-year emissions for all developed countries as a whole. This means that it is about 2.8 % below the 1990 emissions of those countries that have ratified <sup>(9)</sup> <sup>(10)</sup> <sup>(11)</sup>.

For EU-15 the Kyoto Protocol sets the target of an 8 % emissions reduction from the base-year level by the 2008–2012 commitment period. Within this overall target, differentiated emission limitation or reduction targets have been agreed for each of the pre-2004 Member States under an EU accord known as the 'burden-sharing agreement' (Figure 2.1).

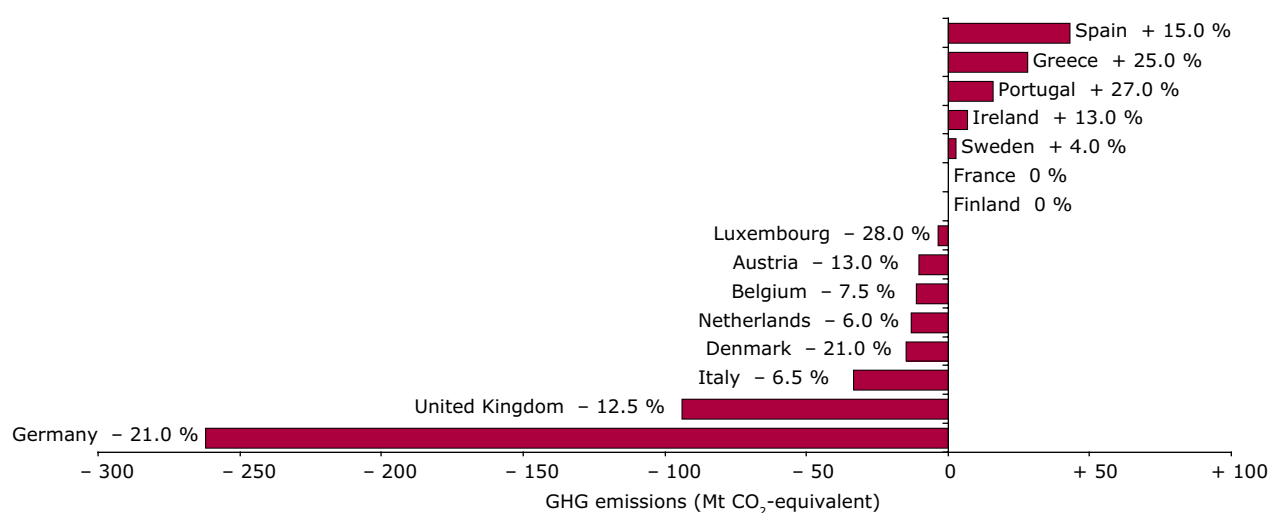
The new Member States have individual targets under the Kyoto Protocol. The Czech Republic, Estonia, Latvia, Lithuania, Slovakia and Slovenia have reduction targets of 8 % from the base-year, while Hungary and Poland have reduction targets of 6 %. Cyprus and Malta have no Kyoto target (Figure 2.2). The acceding countries Bulgaria and Romania have reduction targets of 8 %, the candidate country Croatia has a reduction target of 5 %. The candidate country Turkey has ratified the UNFCCC, but not the Kyoto Protocol. The additional EEA member countries Norway and Iceland are allowed to increase emissions under the Kyoto Protocol, by 1 % and 10 % respectively, from their base-year emissions. Liechtenstein has a reduction target of 8 % (Figure 2.3).

<sup>(9)</sup> European Commission, 2003: Second ECCP progress report — Can we meet our Kyoto targets?

<sup>(10)</sup> EEA Report No 1/2005: Climate change and a European low-carbon energy system.

<sup>(11)</sup> Not all countries use 1990 as the base-year.

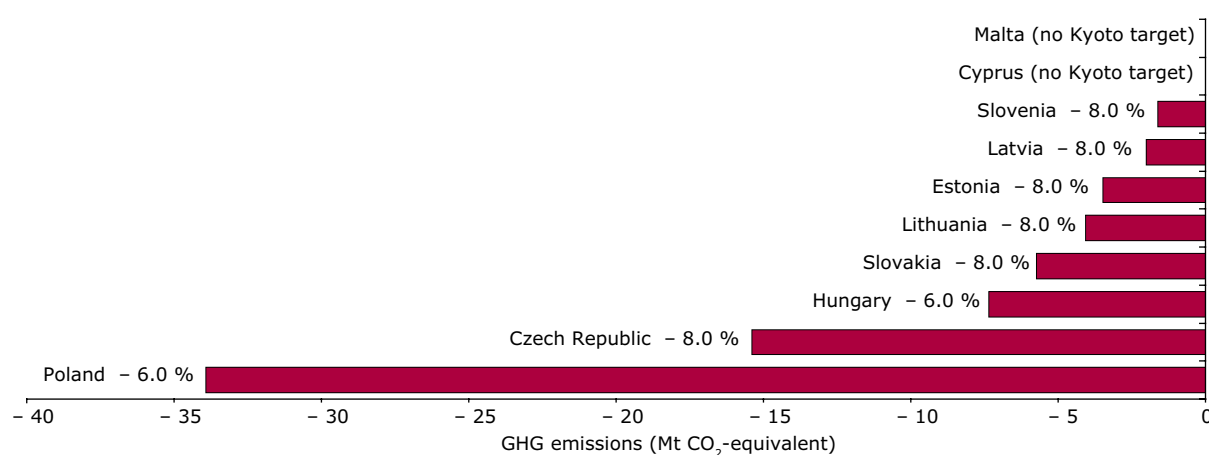
**Figure 2.1 Greenhouse gas emission targets of EU-15 Member States for 2008–2012 relative to base-year emissions under the EU burden-sharing decision <sup>(12)</sup>**



**Note:** The base-year is 1990 for all EU-15 Member States for CO<sub>2</sub>, methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). 1995 is used for fluorinated gases, with the exception of France and Finland where 1990 is used.

**Source:** EEA.

**Figure 2.2 Greenhouse gas emission targets of new EU Member States for 2008–2012 relative to base-year emissions under the Kyoto Protocol**

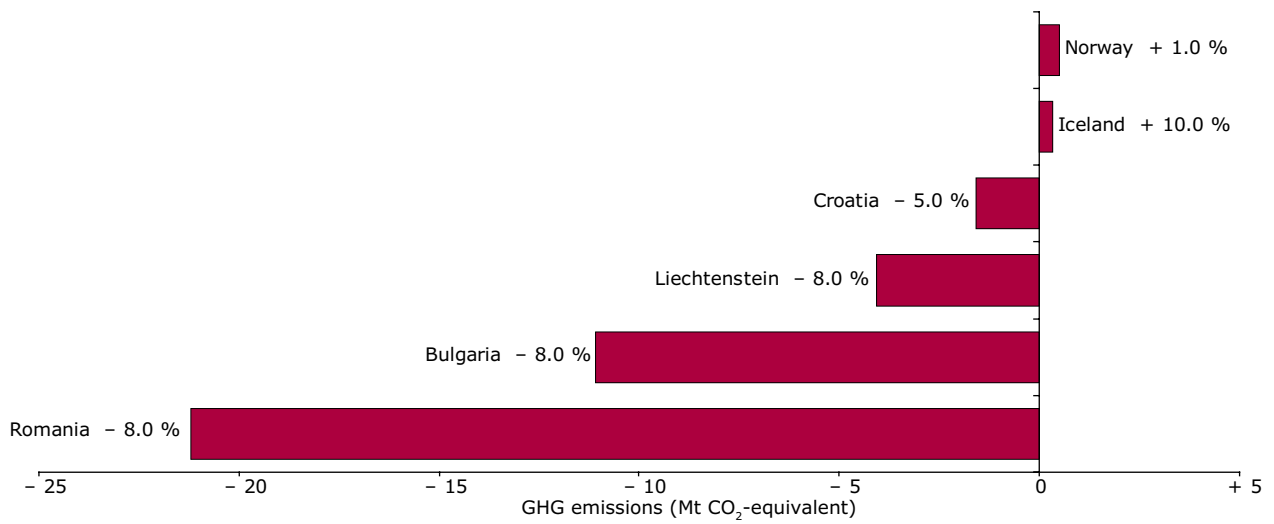


**Note:** Countries with base-years other than 1990 are Hungary (average 1985–1987), Poland (1988) and Slovenia (1986). Cyprus and Malta have no targets.

**Source:** EEA.

<sup>(12)</sup> In the Council decision (2002/358/EC) on the approval by the EU of the Kyoto Protocol the various commitments of the Member States are expressed as percentage changes from the base-year. In 2006 the respective emission levels will be expressed in terms of tonnes of CO<sub>2</sub>-equivalent. In this connection, the Council of Environment Ministers and the Commission have, in a joint statement, agreed to take into account inter alia the assumptions in Denmark's statement to the Council Conclusions of 16–17 June 1998 relating to base-year emissions.

**Figure 2.3 Greenhouse gas emission targets of acceding and candidate and other EEA countries for 2008–2012 relative to base-year emissions under the Kyoto Protocol**



**Note:** Countries with base-years other than 1990 are Bulgaria (1988) and Romania (1989). Turkey is a Party to UNFCCC, but not to the Kyoto Protocol.

**Source:** EEA.

### 3 Greenhouse gas emissions in EU-25



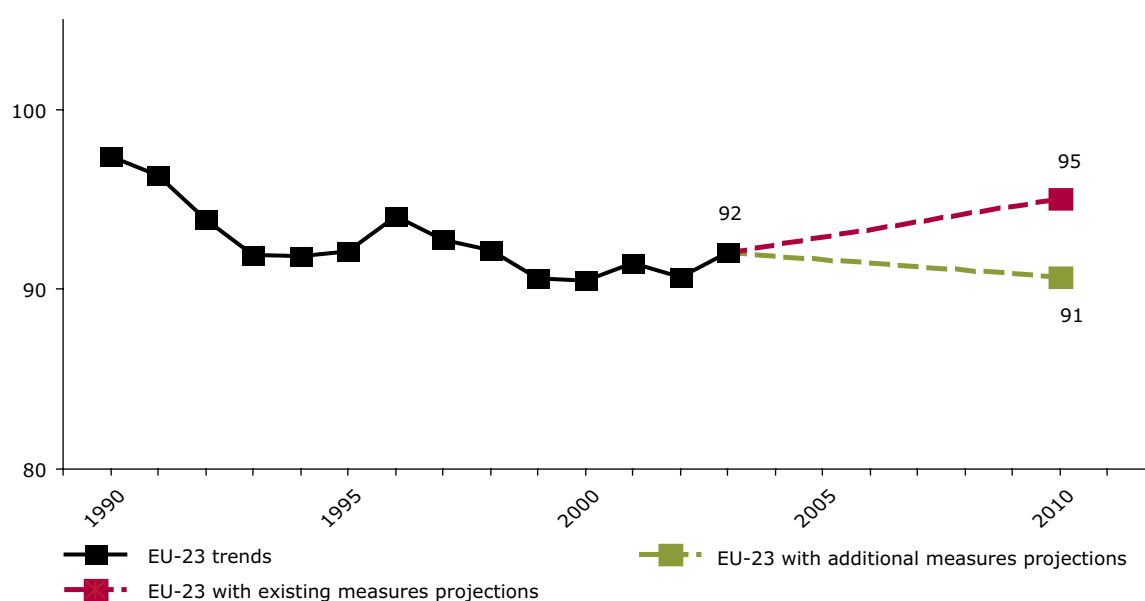
With existing policies and measures, EU-25 greenhouse gas emissions are projected to be about 5 % below theoretical EU-25 base-year levels by 2010. With additional policies and measures greenhouse gas emissions are expected to stabilise at 2002 levels (about 9 % below theoretical EU-25 base-year levels).

Total EU 23<sup>(13)</sup> greenhouse gas emissions rose in 2003 by about 1 % compared to 2002 and were 5 % below 1990 levels and 8 % below the theoretical

EU-23 base-year emissions<sup>(14)</sup>. The new Member States share was 18 % of the total 2003 emissions (Figure 3.1).

**Figure 3.1 Greenhouse gas emission trends and projections for EU-23**

GHG emissions (base year = 100)



**Note:** Data exclude emissions and removals from land use change and forestry. The figure refers to a theoretical EU-23 base-year as 100 in order to allow a consistent analysis of greenhouse gas emission trends and projections. This base-year for EU-23 has no legal status. 1990 is used for most Member States for CO<sub>2</sub>, methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) but 1995 for fluorinated gases, with the following exceptions: The base-year for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O for Hungary is the average of 1985–1987, for Slovenia 1986 and for Poland 1988; 1990 is the base-year for fluorinated gases for France and Finland. This means that the value for 1990 is not exactly 100. Cyprus and Malta are not included due to lack of data and because they do not have targets under the Kyoto Protocol.

**Source:** EEA.

<sup>(13)</sup> As indicated in Chapter 2, not all EU-25 Member States have targets for GHG emission reductions under the EU-15 burden sharing agreement or under the Kyoto Protocol (Malta and Cyprus have no targets). Therefore this chapter mainly analyses EU-23 (excluding Malta and Cyprus).

<sup>(14)</sup> The theoretical EU-23 base-year emission is calculated by adding base-year emissions of all EU-23 Member States included in this report for analytical purposes; it has no legal status.

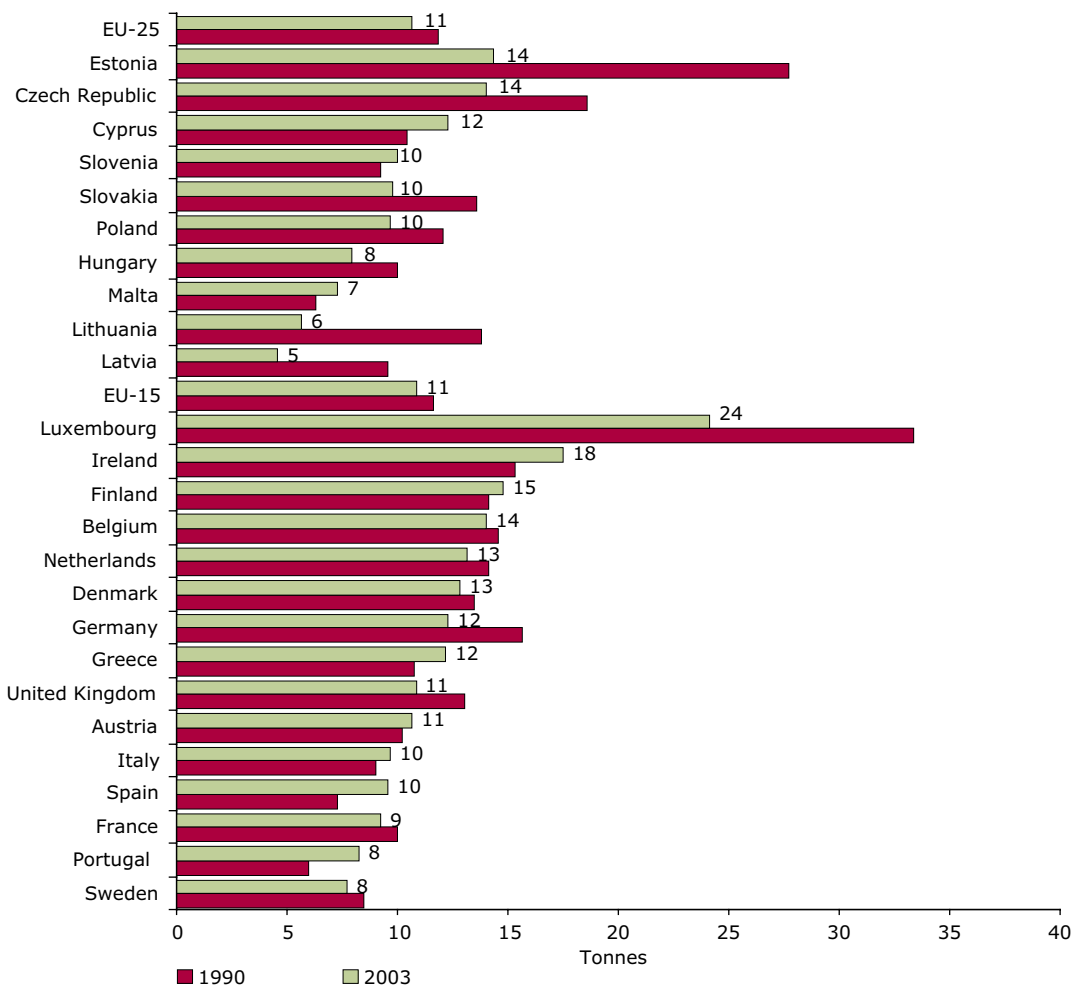
By 2010, total EU-23 greenhouse gas emissions are projected to be about 5 % below the theoretical EU-23 base-year levels. This projection is based on Member States' own estimates which take into account all existing domestic policies and measures. The projected decline is 9 % with additional domestic policies and measures. However, emissions are expected to increase between 2003 and 2010 without additional domestic policies and measures <sup>(15)</sup>.

In the EU-25, greenhouse gas emissions per capita decreased slightly (about 1 %) from 1990 to 2003. In the EU-15 the decrease was about 5 %, largely due to decreases in Germany and the United Kingdom. The new EU Member States have lower per capita emissions on average than the EU-15 Member States. All of the new Member States, except Cyprus,

Malta and Slovenia decreased per capita emissions substantially in the 1990s (Figure 3.2).

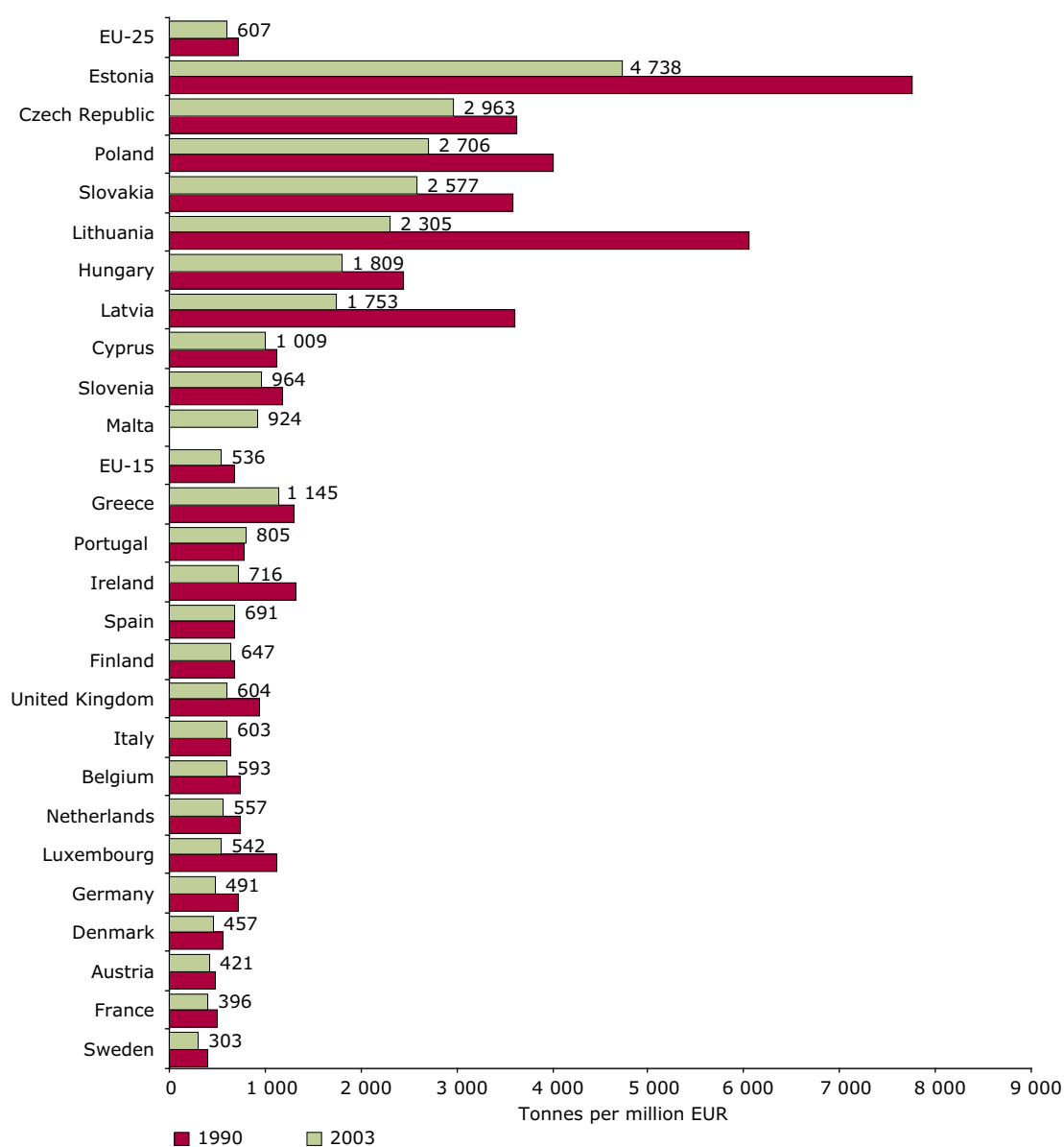
Also greenhouse gas emissions per GDP decreased slightly in EU-25 during the period 1990–2003. For EU-15 it decreased by 23 % during this period. This overall 23 % decrease of greenhouse gas emissions per GDP means either energy intensities of individual countries have declined and/or there is fuel switch from fossil fuels to renewable energy sources and/or from coal to natural gas. Despite substantial decreases between 1990 and 2003, per GDP emissions of the new EU Member States are well above the EU-15 average. Relatively high greenhouse gas emissions per GDP indicate the new EU Member States have still potential to improve in this area and further decrease greenhouse gas emissions (Figure 3.3).

**Figure 3.2 Greenhouse gas emissions per capita of EU-25 Member States for 1990–2003**



Source: EEA, Eurostat.

<sup>(15)</sup> Existin□ or more voluntary agreements have been established; (c) financial resources have been allocated; (d) human resources have been mobilised; (e) an official government decision has been made and there is a clear commitment to proceed with implementation. A□ in time to influence the emissions during the commitment period.




**Figure 3.3 Greenhouse gas emissions per GDP of EU-25 Member States for 1990–2003**

**Note:** Due to lack of data, 1990 values refer to 1995 for the Czech Republic, Estonia, Hungary, Poland, Slovakia, and EU-25.

**Source:** EEA, Eurostat.

## 4 Greenhouse gas emissions in EU-15 Member States

### EU-15 assessment

-  In 2003, greenhouse gas emissions for the EU-15 were 1.7 % below the base-year level, which means that the EU-15 is little more than a fifth of the way towards its 8 % reduction target under the Kyoto Protocol.
-  With existing domestic policies and measures, projections for 2010 show the EU-15 total greenhouse gas emissions decreasing by 1.6 % relative to the base-year. This leaves a target shortfall for the EU-15 of 6.4 %. Savings from additional domestic policies and measures being planned by Member States would result in emission reductions of 6.8 %. However, this would still not be sufficient to meet the EU-15 target.
-  The use of Kyoto mechanisms, currently foreseen by nine countries, would help to reduce emissions by 9.3 % altogether. This would be sufficient to reach the EU-15 Kyoto target. However, it would rely on over-delivery by some Member States.

### Member States assessment (EU-15)

-  Two Member States (Sweden and United Kingdom) were on track to achieve their burden-sharing targets in 2010 using existing domestic policies and measures. This is indicated by 2003 emission trends and 2010 projections.
-  Germany and France were also on track in 2003, and project that they will reach their targets by 2010 using additional domestic policies and measures.
-  Greece was not on track in 2003, but projects that with additional domestic policies and measures it will meet its target.
-  Luxembourg was not on track in 2003, but will reach its target by 2010 through a combination of domestic policies and measures, and the use of the Kyoto mechanisms.
-  Austria <sup>(16)</sup>, Belgium, Finland and the Netherlands were not on track in 2003, but project that they will achieve their targets by 2010 through a combination of additional domestic policies and measures and use of the Kyoto mechanisms.
-  Denmark and Ireland were not on track in 2003 and project that they will not reach their targets with existing domestic policies and measures, not even when Kyoto mechanisms are included. Information on possible additional measures was not available.
-  The other three Member States (Italy, Portugal and Spain) were not on track in 2003 and do not project that they reach their targets with additional domestic policies and measures; for Italy and Spain not even when the use of the Kyoto mechanisms is included.

<sup>(16)</sup> A recent Austrian sectoral projection for waste shows lower emissions for 2010 than projected last year.



In 2003, the aggregate greenhouse gas emissions of EU-15 Member States were 1.7 % below base-year level with an increase of more than 1 % from 2002 to 2003 (Figure 4.1). After the lapse of nearly two thirds of the period between 1990 and the first commitment period (2008–2012) under the Kyoto Protocol, the reduction by 2003 is little more than a fifth of that needed to reach the EU-15 greenhouse gas emission target of an 8 % reduction.

Under the Kyoto Protocol, Member States can use flexible mechanisms (Kyoto mechanisms: Joint Implementation (JI), Clean Development Mechanism (CDM) and international Emission Trading to help meet their targets. Several countries have intentions to use these instruments, but only a few are in an advanced stage of implementing Kyoto mechanisms (see Section 7). In all projections discussed in this report, Kyoto mechanisms are taken into account provided the European Commission has raised no objections against their intended use in the national allocation plans of the EU Emission trading scheme (Directive 2003/87/EC) of the respective Member States. Additional information from the third National communications under UNFCCC and a recent questionnaire under the greenhouse gas monitoring mechanism (Directive 2004/280/EC) are taken into account, if the intended use is substantiated sufficiently (signed contracts or initiated carbon purchase tenders, operational programme, designated national authority, budgetary resources).

Greenhouse gas emission reductions from domestic policies and measures up to 2003 were not sufficient for many EU-15 Member States to be on track to meeting their targets. Greenhouse gas emissions in 2003 of most Member States are well above their hypothetical target paths from their base-year emissions to their 2010 <sup>(17)</sup> targets (Figure 4.2 and note to Figure 4.2).

The emission reductions in the early 1990s were largely a result of increasing efficiency in power and heating plants, the economic restructuring in the five new federal states in Germany, the liberalisation of the energy market and subsequent changes in the choice of fuel used in electricity production from oil and coal to gas in the United Kingdom, and significant reductions in nitrous oxide emissions in the chemical industry in France, Germany and the United Kingdom (see Section 9).

CO<sub>2</sub> emissions from electricity production have increased since 1999 in EU-15. Between 2002 and 2003, only Portugal, Spain, Greece, Denmark and the Netherlands increased their share of renewable energy sources in electricity production and therefore helped to limit the emission increase in that sector (see Section 9). Greenhouse gas emissions from transport have increased every year since 1990 in most Member States. However, transport emissions decreased in 2003 in France and Germany compared to 2002 emissions.

For 2010, the aggregate projections for EU-15 of greenhouse gas emissions based on existing domestic policies and measures are 1.6 % below base-year levels (Figure 4.1). This means that the current emission reduction of 1.7 % achieved by 2003 from the base-year level is projected to increase by 0.1 percentage points by 2010. This development leads to a shortfall of 6.4 %, assuming only existing domestic policies and measures in meeting the EU-15 Kyoto commitment. The use of Kyoto mechanisms are expected to deliver an additional (approximately) 2.5 % emission reduction. Therefore, the combination of domestic policies and the use of Kyoto mechanisms (currently foreseen by nine countries) would lead to a shortfall of 3.9 %. Compared to last year's analysis, the gap between the target and the projection based on existing domestic policies and measures for the EU-15 has narrowed due to updates of projections from several Member States. These updates show that

<sup>(17)</sup> The evaluation of greenhouse gas emissions in this Section is mainly based on domestic policies and measures. Several countries, including Austria, Belgium, Finland Luxembourg and the Netherlands, have put in place measures and financial commitments to make use of the Kyoto mechanisms and thus project they will achieve their burden-sharing targets.

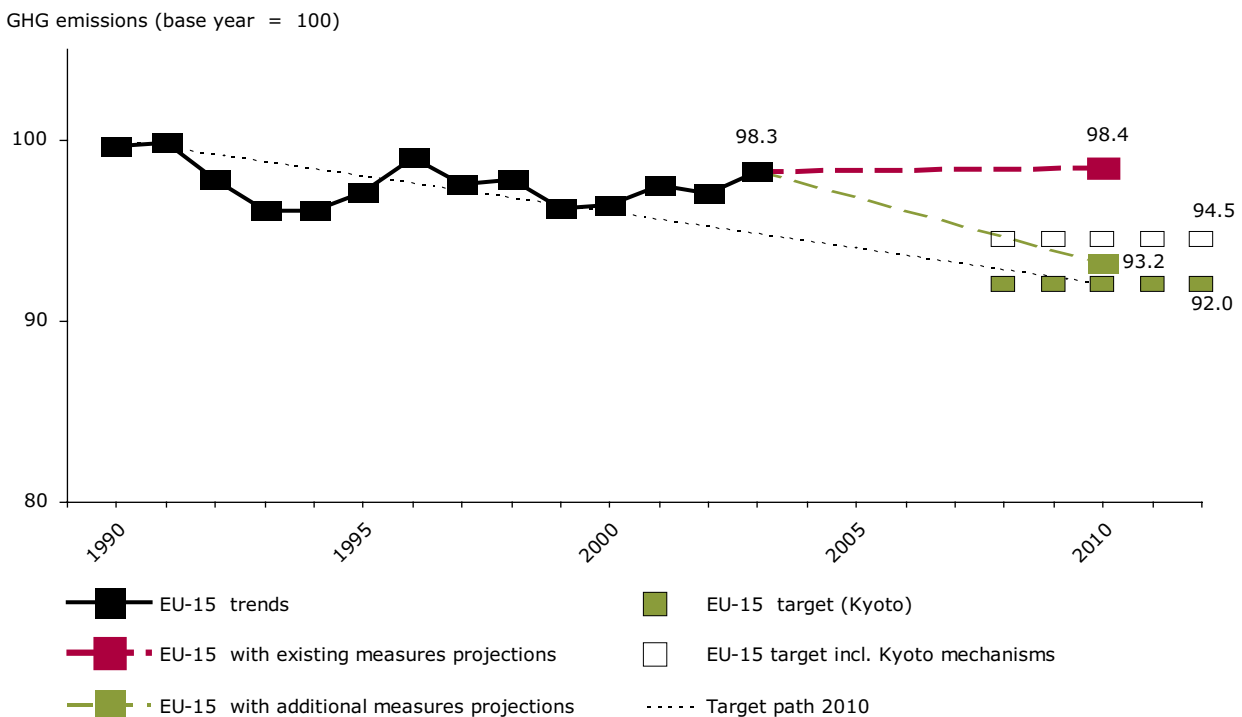
further emission reductions from existing domestic measures are foreseen compared to last year's analysis.

Only two Member States — Sweden and the United Kingdom — expect that existing domestic policies and measures alone will be sufficient to meet or even exceed their burden-sharing targets. All others are projected to be significantly above their commitments with their existing domestic policies and measures.

Luxembourg projects that it will achieve its target with a combination of domestic policies and measures and emission allowances bought through the use of Kyoto mechanisms.

Additional domestic policies and measures planned by several Member States would be sufficient to meet the EU-15 target, but only if Kyoto mechanisms are also included and assuming over-delivery by several Member States (Austria, Belgium, France, Greece, Luxembourg, the Netherlands, Sweden and the United Kingdom) compared to their burden-sharing targets. This over-delivery cannot be taken for granted (Figure 4.3). Key additional policies and measures reported by Member States are measures promoting electricity generation from renewable energy sources, cogeneration policies and energy efficiency policies; Section 9 provides more information on policies and measures.

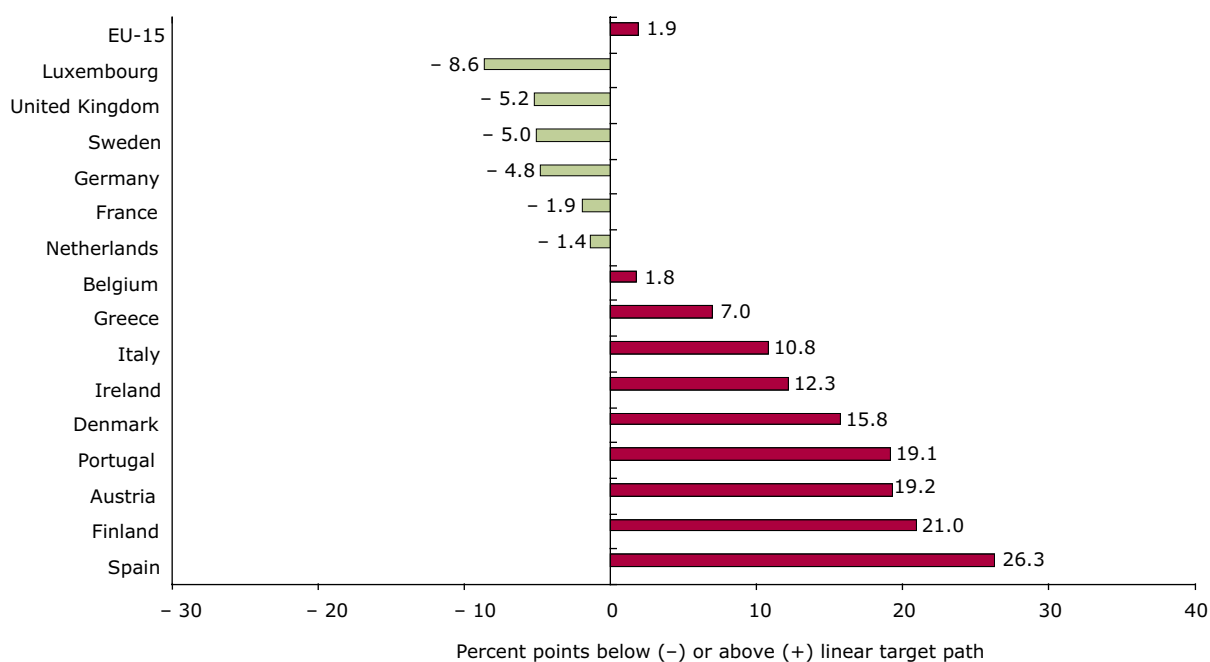
**Figure 4.1 Actual and projected EU-15 greenhouse gas emissions compared with Kyoto target for 2008–2012, including Kyoto mechanisms**



**Note:** Target paths are used to analyse how close 2003 emissions were to a (hypothetical) linear path of emission reductions or allowed increases from the base-year to the Kyoto Protocol target, assuming domestic policies and measures as well as use of Kyoto mechanisms. Data exclude emissions and removals from land use change and forestry. The EU-15 target including Kyoto mechanisms is based on an estimated projected use of Kyoto mechanisms, as reported by Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands and Spain, equal to about 2.5 % of the EU target of 8 %. Thus this (theoretical) target for the EU-15 including Kyoto mechanisms is presented in the graph as 92 + 2.5. For more information on Kyoto mechanisms, see Section 7.

**Source:** EEA.

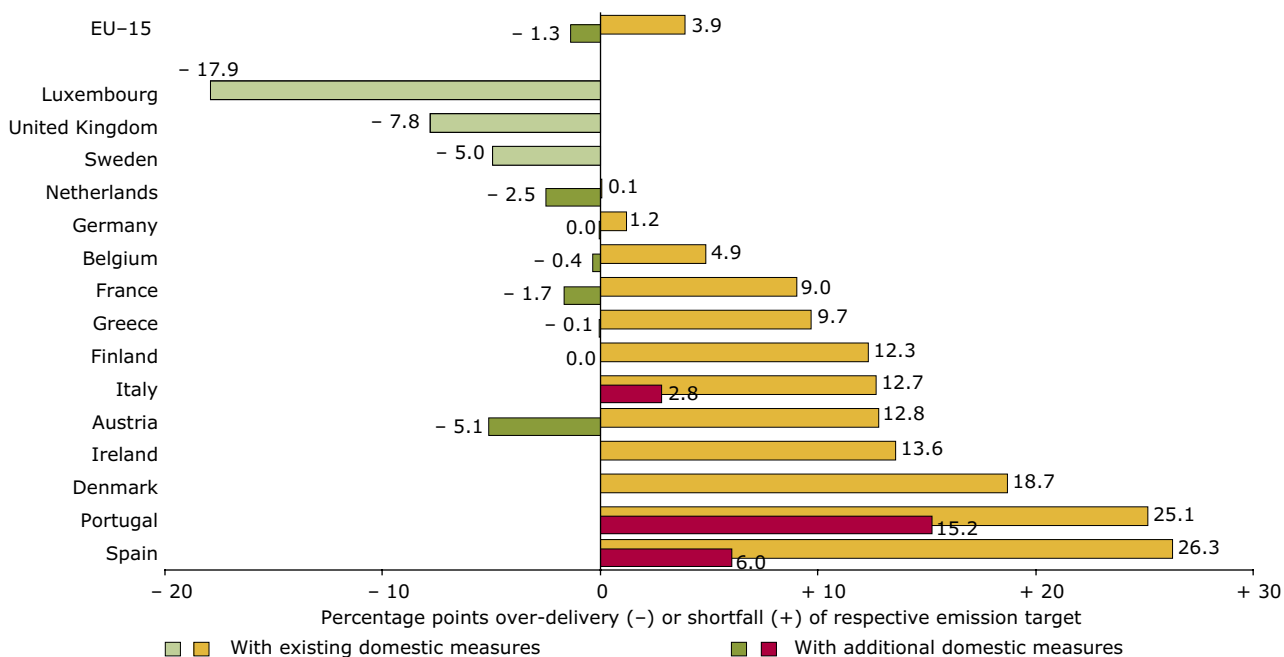
**Figure 4.2 Distance-to-target (burden-sharing targets) for EU-15 Member States in 2003, including Kyoto mechanisms**



**Note:** The distance-to-target indicator (DTI) measures the deviation of actual emissions in 2003 from a (hypothetical) linear path between base-year emissions and the burden-sharing target for 2010. A positive value suggests an under-achievement and a negative value an over-achievement by 2003. The DTI is used as an early indication of progress towards the Kyoto and Member States' burden-sharing targets. For the following Member States the additional effects of the use of Kyoto mechanisms are included: Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands and Spain. For more information on Kyoto mechanisms, see Section 7.

**Source:** EEA.

**Figure 4.3 Relative gap (over-delivery or shortfall) between greenhouse gas projections without LULUCF based on domestic policies and measures and 2010 <sup>(18)</sup> targets for EU-15 Member States, including Kyoto mechanisms**



**Note:** All EU-15 Member States provided projections assuming existing domestic policies and measures. Several countries provided projections with additional domestic policies and measures. For following Member States are the additional effects of the use of Kyoto mechanisms included: Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands and Spain. For EU-15 the effect of use of Kyoto mechanisms is calculated based on information from these nine countries. For more information see Section 7. Projections for Spain are available for CO<sub>2</sub> only.

**Source:** EEA.

<sup>(18)</sup> In the Council decision (2002/358/EC) on the approval by the EU of the Kyoto Protocol the various commitments of the Member States are expressed as percentage changes from the base-year. In 2006 the respective emission levels will be expressed in terms of tonnes of CO<sub>2</sub>-equivalent. In this connection, the Council of Environment Ministers and the Commission have, in a joint statement, agreed to take into account inter alia the assumptions in Denmark's statement to the Council Conclusions of 16-17 June 1998 relating to base-year emissions. Denmark has stated that when the assumptions in Denmark's statement to the Council Conclusions of 16-17 June 1998 relating to base-year emissions are taken into account the percentage point shortfall will change from 18.7 to 11.5.

## 5 Greenhouse gas emissions in new Member States



In 2003 total greenhouse gas emissions in the new Member States were about 32 % below the theoretical base-year level. All new Member States, except Slovenia, are on track in 2003 to meeting their Kyoto targets using existing domestic policies and measures, according to emission trends up till 2003 and 2010 projections. Slovenia projects that it will meet its Kyoto target with additional policies and measures and by including CO<sub>2</sub> removals from land use change and forestry.



Greenhouse gas emissions from transport decreased by 5 % between the base-year level and 1995 but increased afterwards. By 2003 these emissions exceeded base-year levels by 24 %.

All new Member States that joined the EU on 1 May 2004 have to reach their Kyoto targets individually (except Cyprus and Malta, who have no Kyoto targets). This Section shows the overall aggregated trends in the (eight) new Member States with targets to facilitate comparison with the EU-15.

Since 1990 total emissions have declined substantially in almost all new Member States, mainly due to the introduction of market economies and the consequent restructuring or closure of heavily polluting and energy-intensive industries (Figure 5.1). Emissions of almost all new Member States were well below their linear target paths — thus, they were on track to meet their Kyoto targets (Figure 5.2).

Emissions from transport increased in the second half of the 1990s, exceeded the 1990 level in 1999 and were increasing further in 2003. The new Member States seem to be repeating the experience of Ireland, Portugal and Spain. Starting from a relatively low transport level, all these countries experienced strong growth in transport and its greenhouse gas emissions due to high economic growth.

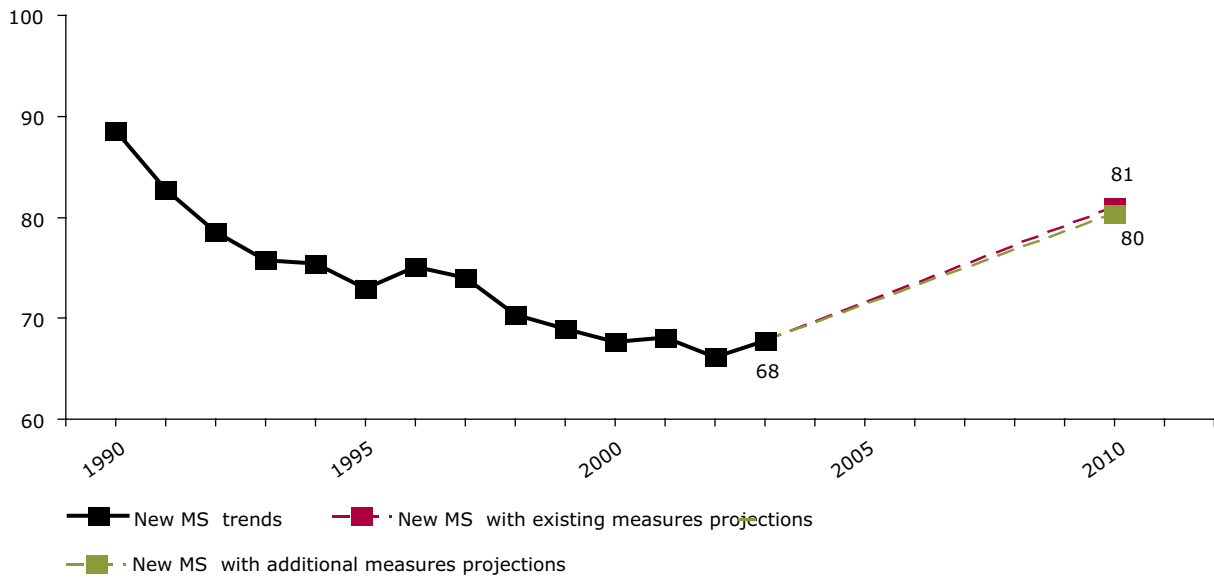
Greenhouse gas emissions in seven new Member States are projected to meet or even over-comply with their Kyoto targets by 2010 using existing domestic policies and measures. Slovenia projects that it will meet its Kyoto target with additional policies and measures and by including carbon dioxide removals from land use change and forestry (Figure 5.3).

Emissions aggregated from all new Member States (excluding Cyprus and Malta for which data were not available) are projected to increase after 2003 but will still be 19 % below the base-year level by 2010. Only the Czech Republic and Estonia project decreasing emissions between 2003 and 2010. In Hungary and Poland greenhouse gas emissions in 2010 are projected to be significantly above 2003 emission levels (see Annex).

All countries have policies and measures in place to reduce greenhouse gas emissions and five countries have identified additional policies and measures.

**Figure 5.1 Actual and projected greenhouse gas emissions aggregated for new Member States**

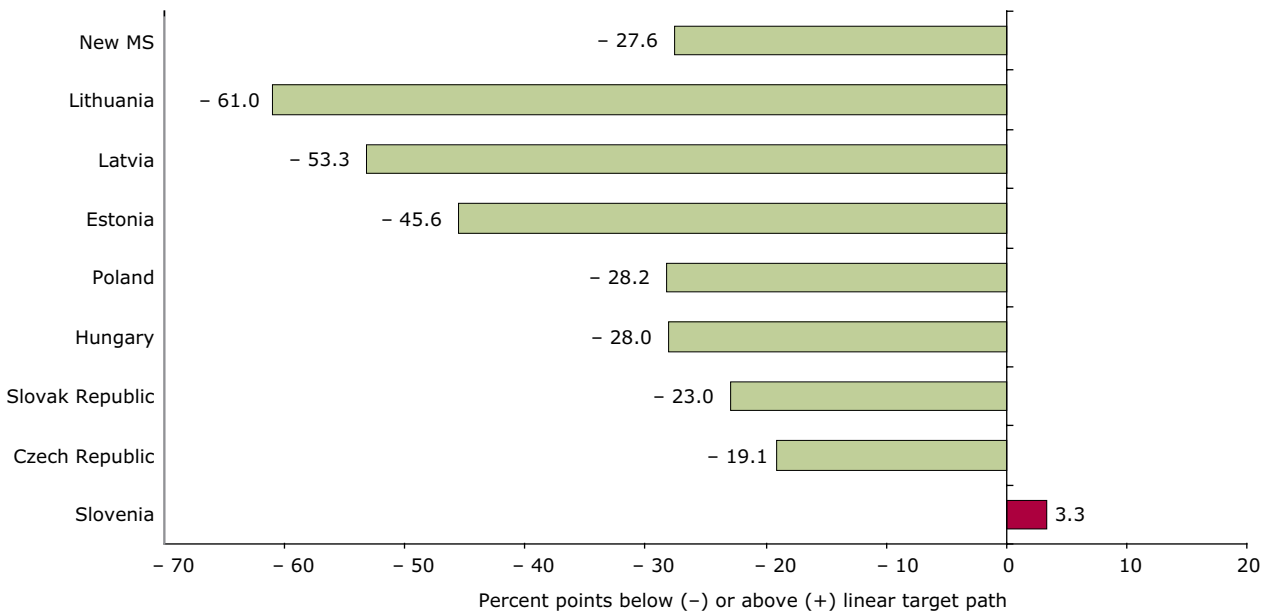
GHG emissions (base year = 100)



**Note:** Data exclude emissions and removals from land use change and forestry. The figure refers to a theoretical 'aggregated new EU Member States base-year' as 100 in order to allow a consistent analysis of greenhouse gas emission trends and projections. This base-year has no legal status. It is 1990 for most Member States for CO<sub>2</sub>, methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) but 1995 for fluorinated gases, with the following exceptions: The base-year for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O for Hungary is the average of 1985–1987, for Slovenia 1986 and for Poland 1988. This means that the value for 1990 is not exactly 100. Due to lack of data, Cyprus and Malta are not included.

**Source:** EEA.

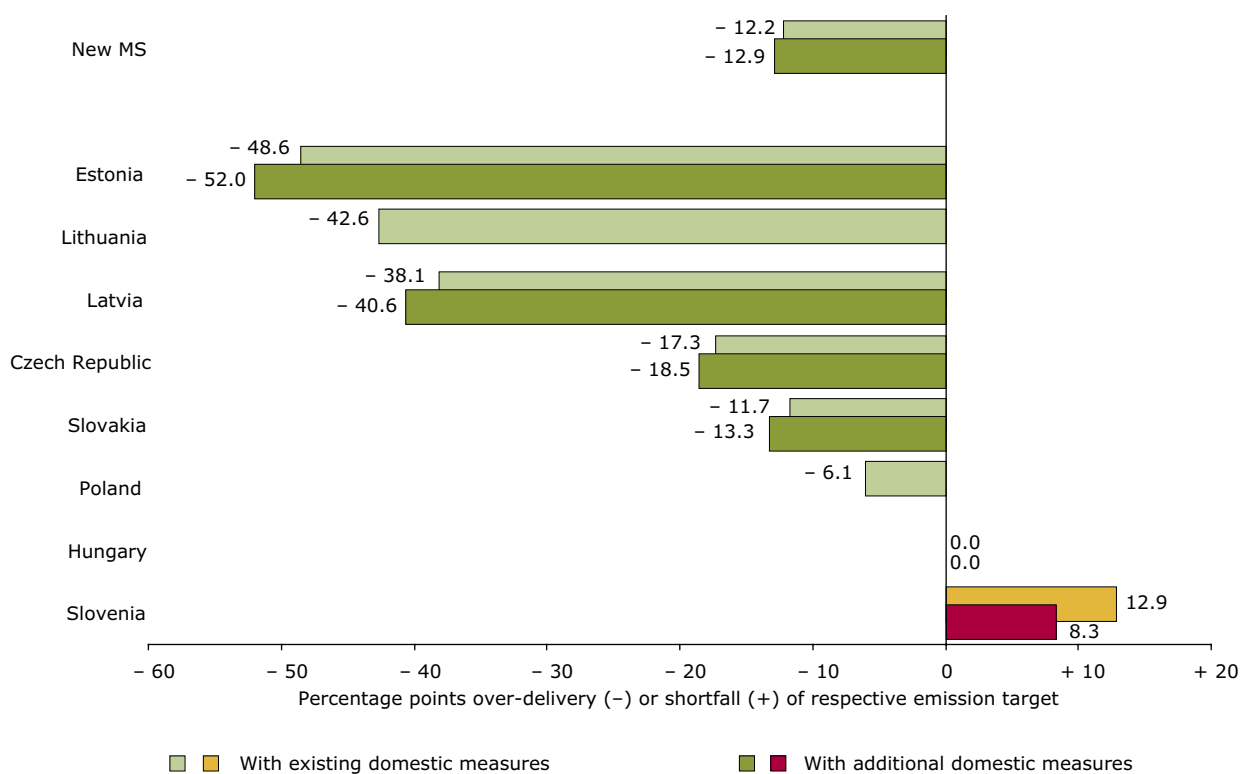
**Figure 5.2 Distance-to-target (Kyoto Protocol) for new Member States countries in 2003**



**Note:** The distance-to-target indicator (DTI) measures the deviation of actual emissions in 2003 from a (hypothetical) linear target path between 1990 and 2010. A positive value suggests an under-achievement by 2003 and a negative value represents an over-achievement by 2003. The DTI is used as an early indication of progress towards the Kyoto targets. It assumes that the countries meet their targets entirely on the basis of domestic policies and measures. Countries with base-years other than 1990 are Hungary (average 1985–1987), Poland (1988) and Slovenia (1986).

**Source:** EEA.

**Figure 5.3 Relative gap (over-delivery or shortfall) between projections and targets for 2010 for new Member States**



**Note:** Projections for Poland consist only of projections for CO<sub>2</sub> and N<sub>2</sub>O.

**Source:** EEA.

## 6 Greenhouse gas emissions in EU acceding and candidate countries and EEA member countries

- 😊 All EU acceding and candidate countries and Iceland were on track to meet or even over-achieve their Kyoto targets.
- 😊 Bulgaria and Romania will further over-achieve their targets using additional policies and measures.
- 😞 Norway and Liechtenstein project that they will fall short of their Kyoto targets with existing policies and measures. Information on possible additional measures was not available.

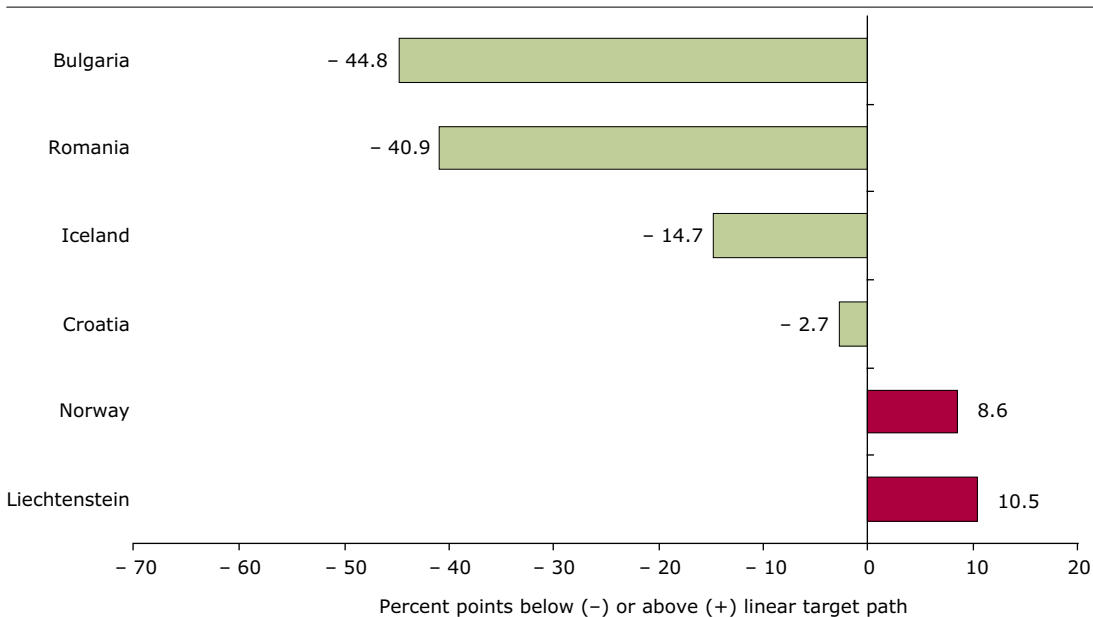
Analyses for Bulgaria, and Romania (EU acceding countries), Croatia (EU candidate country), and Iceland, Liechtenstein and Norway, which are members of the European Environment Agency, are presented in this Section. The analysis does not cover Turkey because Turkey has not ratified the Kyoto Protocol.

In 2003, greenhouse gas emissions for Bulgaria, Croatia and Romania were well below their linear target paths meaning that they were on track to meet their Kyoto targets (Figure 6.1). Iceland

was on track to achieve its emission limitation of + 10 % under the Kyoto Protocol. Liechtenstein and Norway fall short of their Kyoto targets of – 8 % and + 1 % according to their distance to target emissions indicator in 2003.

For 2010, projections taking into account domestic policies and measures show that Bulgaria, Romania and Iceland will over-achieve their Kyoto targets while Norway and Liechtenstein will fall short using existing domestic policies and measures (Figure 6.2). No projections were available for Croatia.

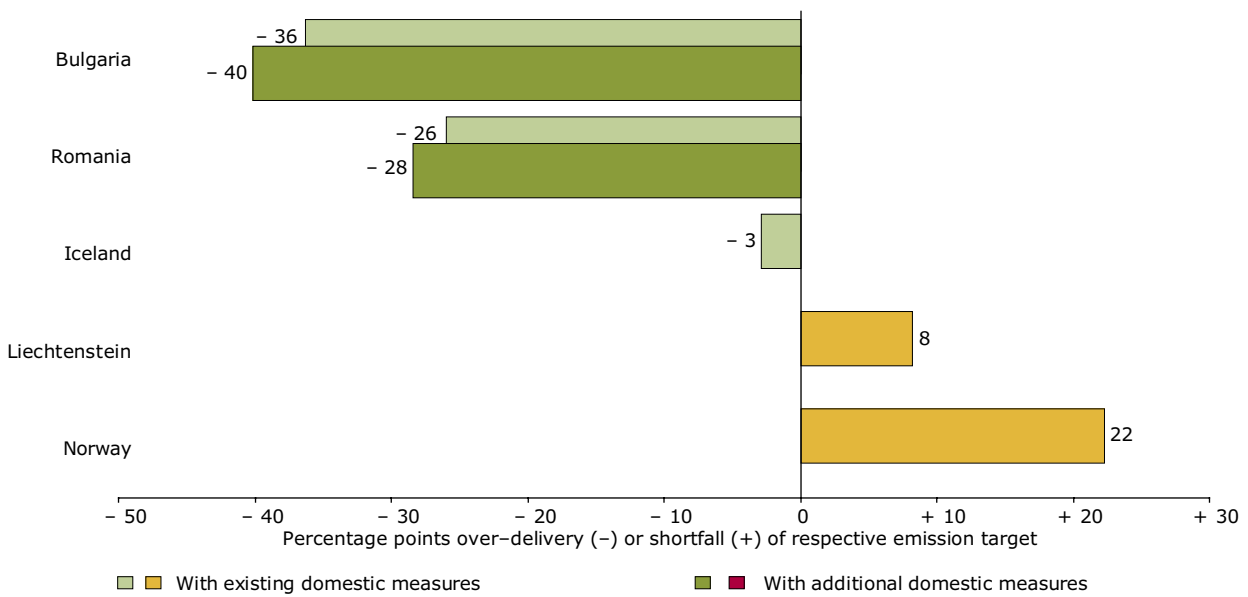
**Figure 6.1 Distance to target (Kyoto Protocol) for acceding and candidate and other EEA countries in 2003**



Source: EEA.



**Figure 6.2 Relative gap (over-delivery or shortfall) between projections and targets for 2010 for acceding and candidate and other EEA countries**



**Note:** The projection for Liechtenstein excludes fluorinated gases.

**Source:** EEA.

## 7 Use of Kyoto mechanisms



The projected use of Kyoto mechanisms by Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands and Spain to help achieve the EU-15 target has increased substantially compared to previous years' projections. It amounts to 106.8 Mt CO<sub>2</sub>-equivalents per year of the commitment period or about 2.5 percentage points of the EU target of 8 %.



Nine countries have allocated financial resources for using the Kyoto mechanisms (Austria, Belgium, Denmark, Finland, Germany, Italy, the Netherlands, Spain and Sweden) with a total amount of about EUR 2 730 million for the whole 5-year commitment period <sup>(19)</sup>. The same countries as well as France have started to prepare legal and operational frameworks and bilateral agreements for using the Kyoto mechanisms.

Seventeen Member States — Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, Slovenia, Spain, Sweden and the United Kingdom — have provided information on their intended use of the flexible mechanisms of the Kyoto Protocol (Kyoto mechanisms: Joint Implementation (JI), Clean Development Mechanism (CDM)) and international Emissions Trading to achieve their targets for the commitment period 2008–2012. JI enables developed countries to work together to meet their emission targets by means of project activities. The CDM enables a developed country to meet its target, while project activities must be hosted by a developing country. International Emission Trading allows countries that have achieved emissions reductions over and above those required by their Kyoto targets to sell the excess to countries finding it more difficult or expensive to meet their commitments. In this way, it seeks to lower the costs of compliance for all concerned. European Union internal emission trading is covered in the next chapter.

Member States provided information on the intended use of Kyoto mechanisms through a questionnaire under the greenhouse gas monitoring mechanism (Directive 2004/280/EC),

the third National communications under UNFCCC and national allocation plans of the EU Emission trading scheme (Directive 2003/87/EC). During the assessment of the national allocation plans the European Commission evaluated the state of advancement of financial and institutional preparations for the use of Kyoto mechanisms and found that only some Member States substantiated it sufficiently in their national allocation plans. However, in additional letters the authorities of most of those Member States notified the European Commission of further commitments which substantiate the intended use of Kyoto mechanisms, such as establishing designated national authorities and allocation of financial resources in the budgets for 2005. Taking into account these commitments, together with a lowering of the total quantity of allowances, the European Commission has raised no objections against the intended use of Kyoto mechanisms in the national allocation plans of Austria, Belgium, Denmark, Ireland, Italy, Luxembourg, the Netherlands and Spain.

The national allocation plans and the updated information provided by Belgium, Denmark Finland and Sweden in the 2005 questionnaire show that the Kyoto mechanisms will contribute

<sup>(19)</sup> The funds provided by Germany, Finland and Sweden are for pilot programmes. Finland intends to use Kyoto mechanisms to reach its target but has not yet decided on the total quantity of units to be bought. Germany does not intend to use Kyoto mechanisms to reach its target; Sweden has not yet taken a final decision.

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substantially to the closure of the gap between GHG projections and 2010 targets. For the EU-15, the intended use of Kyoto mechanisms amounts to 106.8 million tonnes of CO<sub>2</sub>-equivalents per year of the commitment period <sup>(20)</sup>. This amount corresponds to over 30 % of the total required emission reduction for the EU 15 of about 340 million tonnes CO<sub>2</sub>-equivalents per year during the first commitment period or 2.5 percentage points of the EU-15 Kyoto target of – 8 %.

Of the EU-15, Germany, Sweden and the United Kingdom indicate that they will reach their

burden-sharing targets without using the Kyoto mechanisms.

Nine Member States have already allocated resources for the use of Kyoto mechanisms (Austria, Belgium, Denmark, Finland, Germany, Italy, the Netherlands, Spain and Sweden). Austria, Italy, the Netherlands and Spain allocated the largest budgets (EUR 288 million, EUR 1 320 million, EUR 606 million and EUR 200 million for the five-year commitment period). The total budget allocated by the nine Member States amounts to about EUR 2 730 million.

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<sup>(20)</sup> Additionally, Sweden estimates that it will buy around 1 million tonnes of CO<sub>2</sub>-equivalents per year through a pilot programme. This is not included in the EU total as Sweden has not yet decided whether flexible mechanisms will be used for reaching its Kyoto target.

## 8 Emissions trading in the EU



For the first period of the EU emissions trading scheme (2005–2007), the total number of allowances in the EU-25 Member States, agreed by the European Commission, is as a yearly average 3.5 % above the emissions of the trading sector in 2003.



However, the total number of allowances in EU-25 is as a yearly average 3.4 % below the projected emissions of the trading sector from 2005 to 2007.

The EU emissions trading scheme, established by Directive 2003/87/EC <sup>(21)</sup>, started on 1 January 2005. The directive covers — so far — CO<sub>2</sub> emissions from large stationary sources including the power and heat generators, oil refineries, ferrous metals, cement, lime, glass and ceramic materials, and pulp and paper (see Annex I to the directive).

On 20 June 2005, the European Commission accepted the last of the 25 national allocation plans, finishing the allocation process for more than 11 400 installations <sup>(22)</sup>. Almost 80 % of the installations covered are located in EU-15 Member States.

The emissions trading sector accounts for more than half (52 %) of the total CO<sub>2</sub> emissions in the EU. The coverage varies substantially between Member States: In Luxembourg, Sweden, and France the emissions trading sector accounts for only two fifths or less of the total CO<sub>2</sub> emissions during the Member State specific base period. In some of the new Member States, however, more than two thirds of the total CO<sub>2</sub> emissions can be traded (Estonia, Malta, Czech Republic and Poland). On average, the level of coverage in the new Member States is substantially higher (67 %) than in EU-15 (50 %).

The European Commission has approved the allocation of about 2.19 billion allowances per year in the trading period 2005 to 2007. Almost 80 % of these allowances are allocated to installations in the EU-15 Member States. The European Commission has demanded cuts in the number of allowances to be allocated in 14 of the 25 national allocation plans. These cuts amount to about 4 % of the notified number of allowances <sup>(23)</sup>.

Figure 8.1 shows a comparison of the approved allocation and the calculated emissions of the trading sector in 2003, assuming that the share of the trading sector in total CO<sub>2</sub> emissions will remain constant over time. In a few countries, the total number of allowances allocated is smaller than the CO<sub>2</sub> emissions of the trading sector in the year 2003 (Austria, Belgium, Denmark, Germany, Hungary, Italy, Slovenia and the United Kingdom). However, in total, the allocation is above the 2003 CO<sub>2</sub> emission by 26 million tonnes in the EU-15 Member States (+ 1.5 %) and by 48 million tonnes in the new Member States (+ 11.9 %), or by 74 million tonnes for the EU-25 (+ 3.5 %).

However, the total number of allowances in EU-25 is as a yearly average 3.4 % (or 77 million tonnes) below the projected emissions of the trading sector from 2005 to 2007 for the EU as a whole <sup>(24)</sup>.

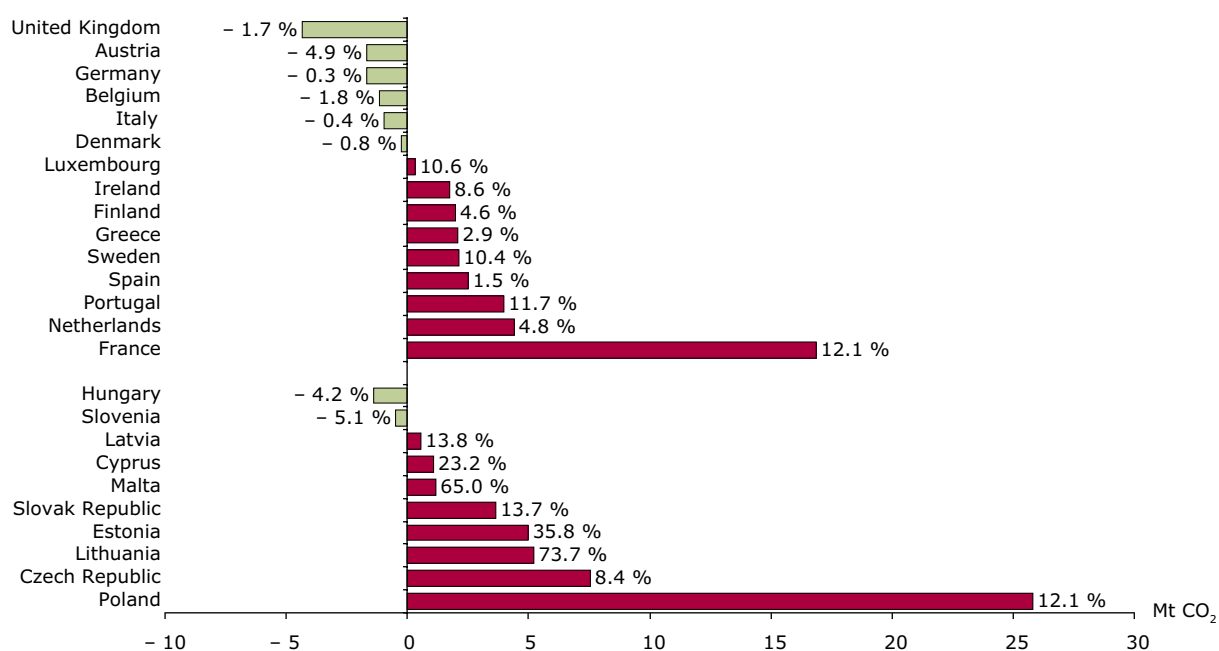
<sup>(21)</sup> OJ L 275, 25.10.2005, pp. 32–46.

<sup>(22)</sup> Norway, an EEA country, has also established an emissions trading scheme from 1 January 2005 which is rather similar to the EU approach. The Norwegian scheme covers 51 installations. In average, 6.8 million allowances are made to these installations for the three year commitment period from 2005–2007.

<sup>(23)</sup> European Commission, 2005 (IP/05/762).

<sup>(24)</sup> Not all Member States have provided emission projections for the trading sector. In these cases, the trading sector's projection was derived from the overall GHG projection assuming that the trading sector's share in total emissions will remain constant over time.

**Figure 8.1** Yearly allowance allocations for the period 2005 to 2007 compared to CO<sub>2</sub> emissions of the trading sector in 2003, and relative emission change in 2005–2007 compared to 2003



**Note:** The CO<sub>2</sub> emissions of the trading sector were calculated on the assumption that the share of the trading sector in the Member States total CO<sub>2</sub> emissions will not change until 2007. A negative figure (green) indicates that the allocation is lower than the emissions of the trading sector in 2003 whereas a positive value (red) indicates that a Member State has allocated more allowances than the trading sector has emitted in 2003.

**Source:** European Commission, EEA.

## 9 Effects of domestic sectoral policies and measures in the EU

### Overview of national and common EU policies and measures



Many of the domestic policies and measures already implemented are based on EU common coordinated policies and measures (CCPMs). In some countries national policies and measures were in force before CCPMs were adopted or national policies and measures were reinforced by CCPMs. The European Commission, through the second phase of the European Climate Change Programme, is expected to propose additional domestic policies and measures to contribute to meeting the EU Kyoto target.

In June 2001, the European Commission reported on a coordinated programme — the European Climate Change Programme (ECCP) in which it identified a number of EU-wide common and coordinated policies and measures (CCPMs). A few CCPMs had already been adopted before the ECCP started. The potential for greenhouse gas emission reduction of ECCP measures has been estimated to be about 300 Mt CO<sub>2</sub>-equivalents in 2010, which is of a similar magnitude to the reduction needed to achieve the EU-15 Kyoto target. However, this early estimate is uncertain and the actual effects of policies and measures after their implementation must be evaluated. A second report on the progress of the ECCP was published in May 2003. A second phase of the ECCP starts end of 2005 and is expected to review the first phase including a re-evaluation of the effects of CCPMs and to propose additional CCPMs, if needed.

A number of the CCPMs have been adopted or are at an advanced stage of preparation. Many are included in the Member States' reporting on policies and measures. In several Member States similar national policies and measures were already in place. EU-wide policies and measures enhance these. Furthermore, many Member States have specific national policies and measures in place, which are not directly related to the EU-wide common and coordinated policies and measures. These national policies and measures are presented in detail in the annex.

Here a summary is provided of the most important common and coordinated policies and measures. All of them have been agreed already, but most of them will only start to deliver substantial emission reductions in future years.

#### *Energy supply and use (energy industries, industry and households):*

- EU CO<sub>2</sub> emissions trading scheme (Directive 2003/87/EC, adopted by the Council and the Parliament in October 2003, started 1 January 2005);
- Directive linking the EU CO<sub>2</sub> emissions trading scheme with the Kyoto mechanisms (COM (2003) 403 final, adopted by the Council and the Parliament in October 2003, to be transposed by Member States by November 2005);
- Directive on the promotion of electricity from renewable energy sources (2001/77/EC, adopted by Council and Parliament in 2001, transposed by Member States by October 2003);
- Directive on Combined Heat and Power to promote high efficiency cogeneration (2004/8/EC, adopted by Council and Parliament in February 2004, to be transposed by Member States by February 2006);
- Directive on the Energy Performance of Buildings (2002/91/EC, adopted by Council and Parliament January 2003, to be transposed by Member States by January 2006);

- Directive restructuring the Community framework for the taxation of energy products and electricity (2003/96/EC, adopted by Council October 2003, to be transposed by Member States by 2005);
- Directive on establishing a framework for the setting of ecodesign requirements for energy-using products (2005/32, adopted by Council and Parliament July 2005, to be transposed by Member States by 2007).

#### **Transport:**

- Reduction in the average CO<sub>2</sub> emissions of new passenger cars (voluntary commitment by car manufacturers in EU, Japan and Korea; 1998/1999);
- Directive on use of biofuels in transport (2003/30/EC, adopted by Council and Parliament May 2003, to be transposed by Member States by 2005).

#### **Agriculture:**

- Common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers (carbon credit for energy crops) (Regulation 1782/2003).

#### **Waste management:**

- Recovery of methane from biodegradable waste in landfills (Landfill Directive 1999/31/EC, transposed by Member States July 2001).

Further proposals are currently under development targeting energy efficiency improvements, infrastructure use and charging in transport, and emissions reductions of certain fluorinated gases.

The emissions trading directive (see also Section 8) created a market for CO<sub>2</sub> allowances and will encourage that emission reductions take place where they are most economically efficient. The linking of the EU emissions trading scheme to the Kyoto mechanisms is aimed at reducing costs for

those companies participating and at promoting the transfer of environmentally sound technology to countries with economies in transition (e.g. Russia) and to developing countries.

There is a strong link between national policies and measures (PAM) and EU common and coordinated policies and measures (CCPMs). CCPMs demonstrate the collective determination of the EU-25 to take action on climate change and they help to deal with competitiveness concerns of Member States. In the following, the implementation of CCPMs at a national level is described and linkages concerning whether the national policy was in place before or after the transposing of the CCPM are shown.

Member States have supplied information on their CCPMs by returning a questionnaire drafted by the European Commission. The questionnaire required Member States to report on the linkages of national policies and measures to CCPMs, using the three categories:

- New national policies and measures implemented after CCPM was adopted;
- National policies and measures already in force but re-enforced by a CCPM;
- National policies and measures already in force before CCPM was adopted.

In addition, Member States were asked to provide the name of national policies and measures which implemented the CCPM and the quantitative effect on emission reduction of the measures. This process aimed to improve the transparency of national policy making. Only a limited number of Member States quantified emission savings, so the overall effects of CCPMs could not be assessed. There was a good level of information provided on the linkages of national policies and measures to CCPMs. This is summarised in the matrix below. Fourteen Member States out the EU-15 provided information on policy linkages.

Based on responses by the EU-15, the most important CCPMs are the promotion of electricity

from renewable energy sources, the emissions trading directive, the landfill directive and the biofuels directive. All reporting Member States are implementing these CCPMs. The emissions trading directive caused new national measures to be imposed in all Member States with virtually no Member State having similar schemes before this CCPM was introduced. The EU-15 was most active in promoting electricity generation from renewables before the corresponding directive was introduced. Many Member States either took sufficient action before the directive or had existing measures re-enforced by the directive.

For the new Member States, Latvia and Slovenia supplied information on their CCPM linkages. Slovenia had implemented 10 CCPMs and Latvia had implemented 14 out of a total of 16 CCPMs. In the majority of cases a new national policy and measure was implemented after the CCPM was adopted for both countries. The remaining eight Member States did not provide information on their CCPMs, or are yet to provide an English translation. Transfer of good practice and CCPM implementation experience between old and new Member States will help to facilitate implementation of CCPMs in the new Member States.

**Table 9.1 Linkages between CCPMs and national policies and measures of the EU-15 (25)**

CCPM	Austria	Belgium	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain	Sweden	United Kingdom
Taxation of energy products 2003/96/EC	N		B	B	B	B		B	R		B	N		R	B
Emissions trading 2003/87/EC	N	N	N	N	N	N	N	N	N		N	N	N	N	R
Promotion of electricity from RE sources 2001/77/EC	N	N	B	R	R	B	R	R	N		R	R	R	B	N
Promotion of cogeneration 2004/8/EC		B	R	R	B	B	R	N	N		B	B		B	N
Directives on energy labelling of appliances	N		B	N	N	N	N	N	R		N	N	N	N	N
Motor challenge, voluntary EC programme			N			R		N			N			N	
Energy performance of buildings 2002/91/EC	N	N	R	N	N	R	R	N	N		B	R		N	N
Eco-management & audit scheme (EMAS) EC 761/2001	N		N	N	N	N	R				B	N	N	B	
Efficiency of hot water boilers 92/42/EEC	N		B		N	R	B	N			B	N	N	N	N
Transport modal shift to rail 2001/12/EC etc.	N	N	R	N	B			N	N		B		N	R	N
Promotion of biofuels for transport 2003/30/EC	N	N	N	N	R	R	N	N	N		N	N	N	R	N
Consumer information on cars 1999/94/EC	N	N	R		N	N		N			N	N	N	N	N
Agreement with car manufacturers ACEA etc.	N	N			R	R	R		B		N	N		N	R
Support under CAP (1782/2003)	N	B	N	N	R	N		N			N		N	N	N
Support under CAP — ammendment (1783/2003)		B	N	N	R			N			N			N	N
Landfill directive 1999/31/EC	B	B	B	B	B	B	R	N	N		B	N	R	B	N





N	New national PAM implemented after CCPM was adopted
R	Existing national PAM <b>re-enforced</b> by CCPM
B	National PAM already in force <b>before</b> CCPM was adopted
	Not reported/not implemented

Source: EEA.

(25) Germany's CCPM status is preliminary — the descriptions of policies implementing the CCPMs have not been submitted to date.



## Sectoral EU-15 <sup>(26)</sup> emission trends and projections

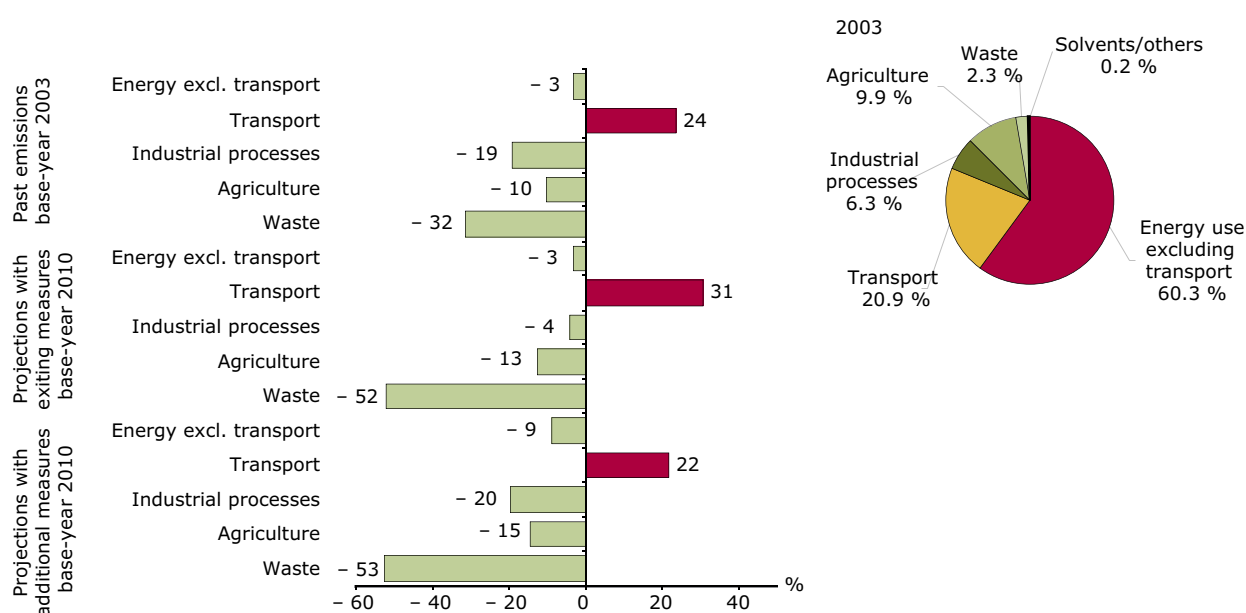
-  From 1990 to 2003, EU-15 greenhouse gas emissions decreased in most sectors (This occurred mostly in waste management, industrial processes and agriculture, and least in energy supply and use, excluding transport).
-  EU-15 greenhouse gas emissions from transport increased by nearly 24 % in the same period and are projected to increase further to 31 % above 1990 levels by 2010 using only existing policies and measures.
-  EU-15 greenhouse gas emissions from energy supply and use excluding transport were 3 % below 1990 levels in 2003 and are projected to stay at the same level by 2010 (3 % below 1990) using only existing policies and measures.
-  EU-15 greenhouse gas emissions in most sectors are projected to decline further by 2010 compared to 2003 levels using additional domestic policies and measures. Transport emissions however are expected to decline slightly at best.

For EU-15 the emission shares and changes for the main sectors are presented in Figure 9.1.

The most important gases and main emission sources are:

- energy supply and use excluding transport: CO<sub>2</sub> from fossil fuel combustion in electricity and heat production, refineries, manufacturing industries, households and services;
- transport: CO<sub>2</sub> from fossil fuel combustion, but also N<sub>2</sub>O from catalytic converters;
- agriculture: CH<sub>4</sub> from enteric fermentation and manure management, and N<sub>2</sub>O from soils and manure management;
- industrial processes: CO<sub>2</sub> from cement production, N<sub>2</sub>O from chemical industry, HFCs from replacing CFCs in cooling appliances and from production of thermal insulation foams;
- waste management: CH<sub>4</sub> from waste disposal sites.

**Figure 9.1 Changes in EU-15 greenhouse gas emissions by sector between the base-year and 2003 and projected for 1990–2010 with existing and additional domestic policies and measures and contribution of sectors in 2003**








**Note:** Several Member States did not report projections for all sectors/scenarios. Therefore, the information on projections has to be interpreted with care.

**Source:** EEA.

<sup>(26)</sup> This section is about EU-15, unless stated differently (e.g. the section on renewable energy analyses and presents information on EU-25).

## Energy supply and use, excluding transport

-  Between 1990 and 2003, CO<sub>2</sub> emissions from electricity and heat production increased by 6 % due to an increase of more than 30 % in electricity production in thermal power plants.
-  Almost all Member States decoupled greenhouse gas emissions from energy consumption. The only exception was Finland, where emissions grew more rapidly than energy consumption <sup>(27)</sup>.
-  On current trends, renewable energy targets for the EU-15 (22 % of gross electricity consumption), EU-25 (21 % of gross electricity consumption) and for the Member States for 2010 are unlikely to be met. In order to meet the target large increases in renewable energy are therefore required.
-  In the EU-15, the share of combined heat and power (CHP) in total electricity production declined between 2000 and 2002 to 9 %. This share is not sufficient to achieve the indicative (previous) EU-15 target of 18 % by 2010 <sup>(28)</sup>.
-  CO<sub>2</sub> emissions from households increased by 5 % from 1990 to 2003, while the number of dwellings increased by 12 % up till 2000. Thus, this shows some decoupling.

The main sectors covered by energy supply and use, excluding transport, are public electricity and heat production, refineries, manufacturing industries and households. The decline of greenhouse gas emissions in the early 1990s was primarily the result of reductions in Germany (efficiency improvements in electricity and heat production and restructuring of the industry) and the United Kingdom (fuel switch in electricity and heat production). By 2003, greenhouse gas emissions had decreased by 3.3 % relative to 1990 while energy demand increased by 11.9 % in the same period (Figure 9.2). Five Member States achieved emission reductions between 1990 and 2003 (France, Germany, Luxembourg, Sweden, and the United Kingdom, see Figure 9.2). Almost all EU-15 Member States decoupled greenhouse gas emissions from energy consumption at least to a certain extent; only in Finland did emissions grow more rapidly than energy consumption.

On the supply side public electricity and heat production is the most important source of greenhouse gas emissions, mainly CO<sub>2</sub>. Increasing CO<sub>2</sub> emissions in recent years have more than offset an 8 % reduction achieved in the 1990s and result in emissions 6 % above 1990 levels in 2003 (Figure 9.3).

The share of renewable energy (wind energy, solar energy, biomass and hydropower) in the EU-25's electricity consumption grew slightly from 12.2 %

to 12.8 % between 1990 and 2003. For the EU-15 the share of renewable energy grew slightly less, from 13.4 % to 13.7 %. In 2003, Austria and Sweden were the largest users of renewables for their national electricity production with shares of about 56 % and 40 %, respectively. Portugal's share of renewable energy in electricity consumption grew by 16 % from 2002 to 36 % in 2003. This trend lies in contrast to that of Austria which saw a 10 % drop in the share of production. Of the new Member States, Latvia has the highest share of electricity from renewable sources at 35 % in 2003.

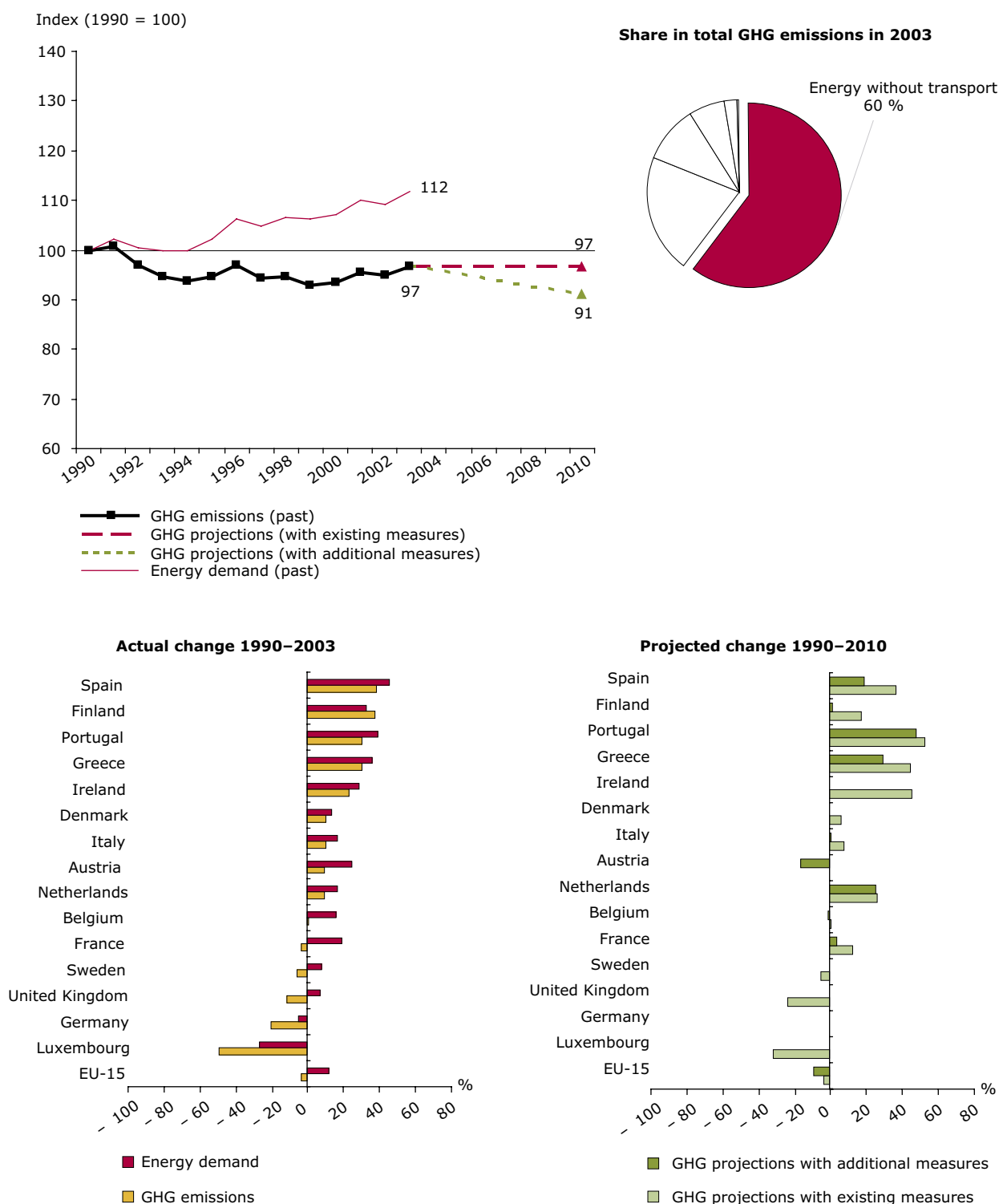
Also in the last year, the EU-15 has experienced a slight increase in the share of electricity produced from renewables. The share in 2002 was 13.6 % compared to 13.7 % in 2003. This increase is due to growth in generation from wind, biomass and waste, which together increased their total share of electricity output by 0.3 % from 2002 to 2003. The combined increased generation from these sources was large enough to counteract the decrease in the share of generation from both large and small hydropower. For the EU-25, eight Member States increased their share of total renewable energy sources in electricity production in 2003.

Increase in wind power (increasing by a factor of 57 in the EU-15 during the period 1990–2003) was driven mostly by Denmark, Germany and Spain,

<sup>(27)</sup> Finland states that this was due to a low hydro power production in Nordic countries in 2003 resulting in high volumes of fossil-based condensing power-export from Finland and Denmark which increased CO<sub>2</sub>-emissions in these countries

<sup>(28)</sup> The 18 % target was set using the old methodology while the numbers reported here are calculated with the new Eurostat methodology.

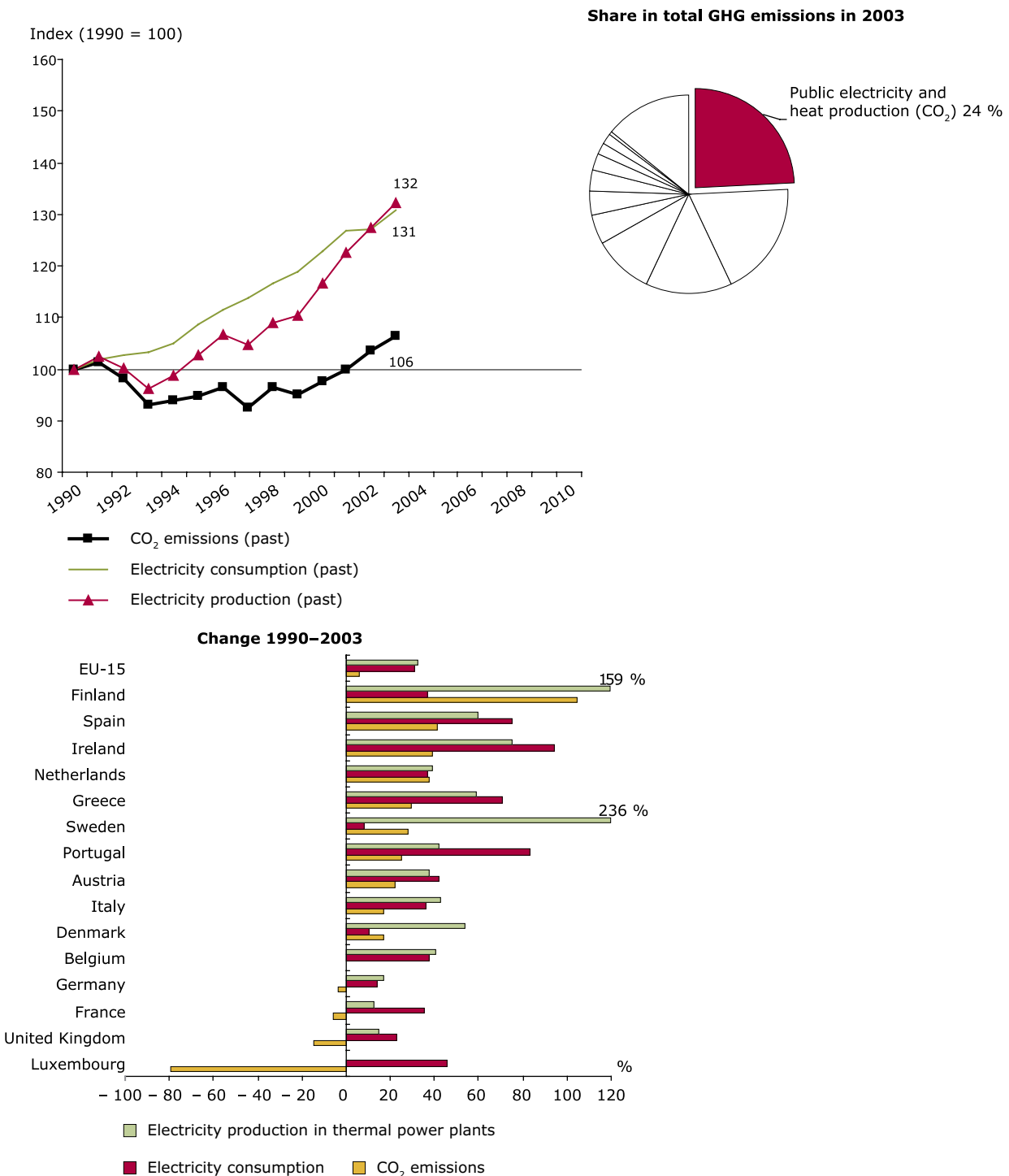
**Figure 9.2 EU-15 greenhouse gas emissions from energy supply and use (excluding transport) compared with energy demand**



**Note:** GHG projections for the EU-15 are calculated on the basis of projections reported by 14 Member States. The percentage change for 2003–2010 of the EU-14 is applied to EU-15. Sectoral emission projections with existing measures are missing for Germany; sectoral emission projections with additional measures were not reported for Denmark, Germany, Ireland, Luxembourg, Sweden, United Kingdom.

**Source:** EEA, Eurostat.

**Figure 9.3 EU-15 CO<sub>2</sub> emissions from public electricity and heat production compared with electricity production in thermal power plants and final electricity consumption**



Source: EEA, Eurostat.

with policies and measures including 'feed-in' arrangements that guarantee a fixed favourable price for renewable electricity producers. Wind generation has also seen rapid growth in the new Member States, with generation increasing 10-fold in just three years, from 2001 to 2003.

Solar (photovoltaic) electricity increase has been driven by Germany and Spain, mainly as a result of a combination of 'feed-in' arrangements and high subsidies. Electricity generation from biomass/waste resources has also expanded rapidly (almost 250 % increase between 1990 and 2003 for the EU-15 and

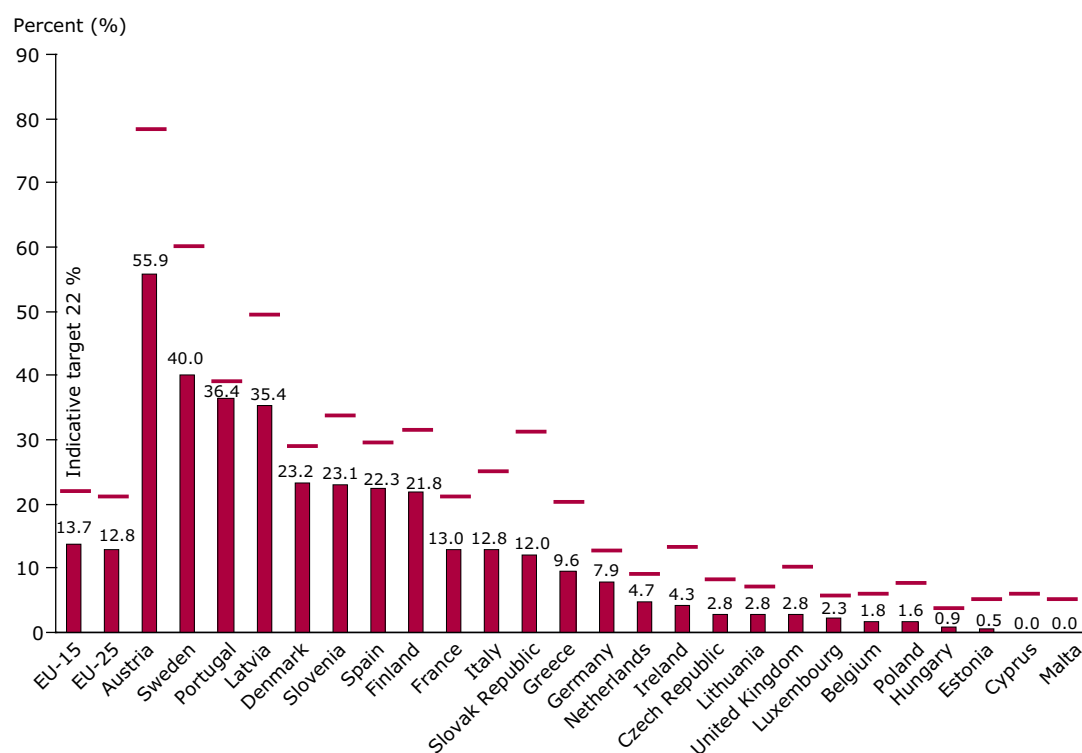
over 350 % increase over the same period for the new Member States). The absolute change from 1990 to 2003 in electricity produced from biomass and waste was largest for the United Kingdom, Germany, Spain and Finland. In absolute values, the amount of electricity produced from wood/waste was highest in Finland, followed by Sweden, for 2003. Both countries provided considerable research and development support and subsidies to the biomass power industry. In Sweden, the introduction of CO<sub>2</sub> and energy taxes from which biomass is exempt also helped the expansion of biomass power plants.

For 2010, the EU has proposed indicative targets for Member States and agreed to an overall indicative target of 22 % for the EU-15 for the contribution of renewable energy sources to gross electricity consumption and 21 % for the EU-25 (Figure 9.4). These targets are unlikely to be met under current trends because renewable electricity was dominated by large hydropower (64 % share of output for the EU-25 in 2003, compared to biomass/waste 15 % and wind power 11 %). Hydropower capacity is not

expected to increase substantially because of concerns about their impact on the environment, i.e. through the loss of land and resulting destruction of natural habitats and ecosystems. To meet the targets large increases in other renewables are therefore required.

Additional policies and measures to support the further expansion of the use of renewables include the EU directive on the use of biofuels in transport. Concerning all policies and measures for the promotion of renewables, Austria, France, Greece Ireland and Italy have reported additional domestic policies and measures. Renewable policies and measures have been assessed quantitatively by the majority of EU-15 countries. Additional measures provide a reduction potential of almost 19 Mt CO<sub>2</sub>-equivalents and more significantly, existing policies and measures contribute about 90 Mt CO<sub>2</sub>-equivalents in the Kyoto commitment period. Germany has recently amended its Renewable energy act<sup>(29)</sup> in order to achieve its 12.5 % target for the share of renewables in electricity consumption under the EU indicative target mentioned above.

**Figure 9.4 Targets for 2010 and share of electricity consumption met by renewable energy sources in 2003 for the EU-25**



**Note:** National indicative targets shown are reference values that Member States agreed to take into account when setting their indicative targets by October 2003, according to the EU renewable electricity directive.

**Source:** Eurostat.

<sup>(29)</sup> Decision of Federal Council of Germany, 9 July 2004, [http://www.bmu.de/de/1024/js/sachthemen/erneuerbar/eeg\\_nov/](http://www.bmu.de/de/1024/js/sachthemen/erneuerbar/eeg_nov/).

Combined heat and power (CHP) technology uses fossil fuels, biomass or waste to supply end-users with heat as well as electricity. In so doing, it avoids much of the waste heat losses associated with normal electricity production: CHP utilises over 85 % of the energy in the fuel rather than the average of about 35 to 45 % in current condensing power plants producing only electricity. CHP schemes are particularly effective for large, dense heat loads for long periods of the year, such as those provided by collective housing schemes in relatively cold climates. The heat generated may also be well suited for use in some industrial processes.

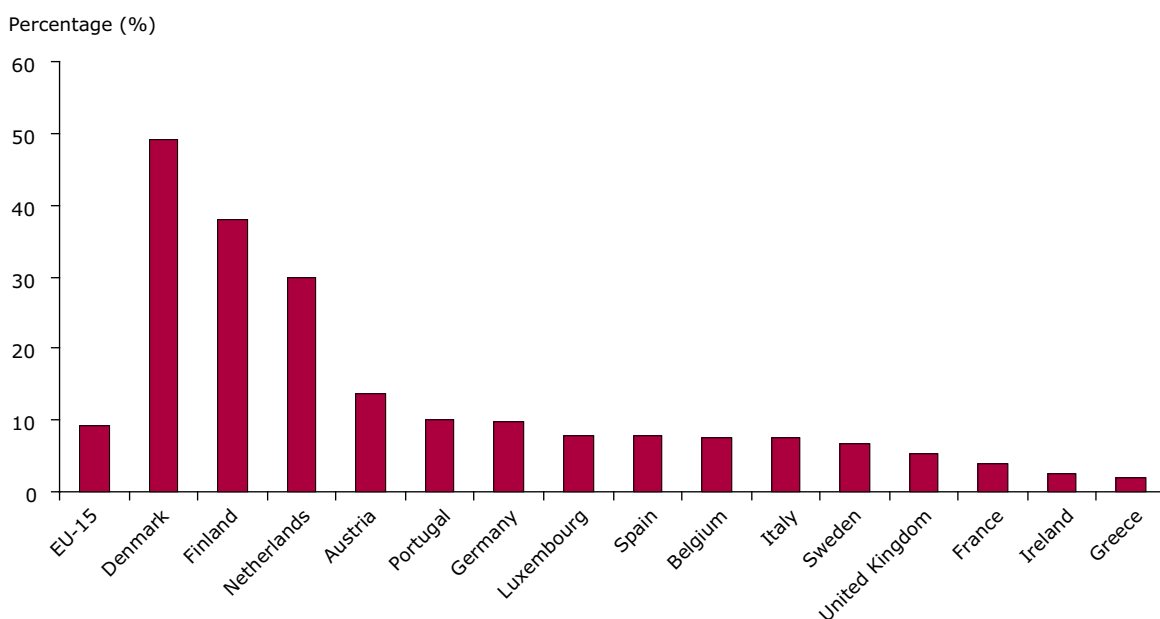
In the EU-15, the share of CHP generation in gross electricity production decreased from 10 % in 2000 to approximately 9 % in 2002 (Figure 9.5). This data includes electricity generated from public supply and autoproducers. The decline in production between 2000 and 2002 is partly due to the fact that the methodology used to calculate the CHP production changed for the first time in 2000 and was then altered in 2002. For the 2000 data, Eurostat adopted a new methodology to calculate the share of CHP in gross electricity production designed to better identify electricity production from combined

heat and power. This revision has resulted in different (lower) figures for some countries.

Although the increase in CHP electricity production has been limited, the share of CHP in electricity production increased between 1994 and 2002 in almost all EU-15 countries. In absolute terms, the largest increases took place in France (+ 14 TWh), Spain (+ 10.8 TWh) and the United Kingdom (8.9 TWh). In relative terms, Belgium and Ireland also showed a large increase, respectively + 153 % and + 141 % since 1994.

Countries with the highest percentage of CHP electricity generation are Denmark, Finland, The Netherlands and Austria. High market penetration of CHP electricity in Denmark was achieved as a result of strong government policy support, providing tax incentives and subsidies. Government support was also an important factor in Austria and the Netherlands. In Finland, the liberalisation of energy markets and the execution of energy policies stimulated investment in CHP. In recent years, however, the growth of CHP has slowed in many Member States, in particular Germany, the Netherlands and the United Kingdom. This is due

**Figure 9.5 EU-15 share of gross electricity production met from combined heat and power production in 2002 <sup>(30)</sup>**



**Source:** CHP Plant statistics project 2002, Statistics on combined heat and power plants in Europe. Final report prepared by ICEDD and CEREN for DG TREN, European Commission.

<sup>(30)</sup> CHP Plant Statistics Project 2002, Statistics on Combined Heat and Power Plants in Europe, Final Report for DGTREN, by ICEDD & CEREN.

for the most part to a decrease in electricity prices which has occurred with the liberalisation of the electricity market.

The CHP Directive on the promotion of cogeneration 2004/8/EC entered into force in 2004 and is expected to start to deliver in 2006. The directive will encourage Member States to promote CHP up-take and help to overcome the current barriers hindering progress. The directive does not include the target, but instead requires Member States to carry out analyses of their potential for high efficiency cogeneration.

Barriers experienced in recent years to CHP development are due to:






- rising natural gas prices and falling electricity prices, which have reduced the cost competitiveness of CHP; gas is the preferred fuel for new CHP;
- uncertainty over the evolution of electricity markets. Companies are becoming reluctant to invest in CHP as liberalisation is progressively extended;
- aggressive pricing, due to large over-capacities in Europe. This strategy has been used by electricity utilities to protect their markets.

Energy use in manufacturing industries consists of fossil fuel combustion for heat and electricity produced for own use. CO<sub>2</sub> emissions from fossil

fuel combustion fell by 11 % between 1990 and 2003. This now represents a 14 % share of total EU-15 greenhouse gas emissions. Most emission reductions were already achieved by 1993, mainly due to efficiency improvements and structural change in Germany after reunification, and the relatively small economic growth in the EU-15. Additionally, a fuel shift from carbon intensive solid fuels to less carbon intensive gaseous fuels took place. Between 1990 and 2003, industrial output — the main driving force for emissions from the industry sector — in terms of gross value added increased by 13 %.

CO<sub>2</sub> emissions from energy use in households accounted for 10 % of total EU-15 greenhouse gas emissions in 2003. From 1990 to 2003, emissions fluctuated mainly in line with outdoor temperature in the winter season. Between 2002 and 2003, CO<sub>2</sub> emissions increased due to colder weather in the first quarter of 2003 to 5 % above 1990 levels. The energy demand of the household sector is mainly driven by the number and size of dwellings, the standard of the building stock and the appliances for heating and warm water production. Over the period 1990–2000 the number of households increased by 12 % while emissions fell to the 1990 level in 2000. The decoupling of emissions from growth in households seen until 2000 results from energy efficiency improvements. These improvements are due to thermal insulation, fuel switching to natural gas and an increase in district heating.

## Transport

-  Between 1990 and 2003, EU-15 greenhouse gas emissions from domestic transport (mainly road) increased by 24 %.
-  EU-15 greenhouse gas emissions from domestic transport are projected to increase by 31 % from 1990 levels by 2010 using existing domestic policies and measures <sup>(31)</sup>.
-  Transport by road, in particular freight transport, increased strongly between 1990 and 2003.
-  The average carbon dioxide emissions of new passenger cars were reduced by about 12 % from 1995 to 2003, but 16 % more cars were sold in the same period. This thereby offset any efficiency gains.
-  EU carbon dioxide emissions from international aviation and navigation (not addressed under the Kyoto Protocol) have increased substantially between 1990 and 2003.

The transport sector presented here consists of road transportation, national civil aviation, railways, national navigation and other transportation. It excludes emissions from international aviation and maritime transport (which are not covered by the Kyoto Protocol or EU policies and measures). Transport caused the largest increase in greenhouse gas emissions between 1990 and 2003 (+ 24 %). Road transport was by far the biggest transport emission source (94 % share). Emissions increased continuously due to high growth in both passenger and freight transport by road (by about 30 % and 50 %, respectively between 1990 and 2003) (Figure 9.6). Only Germany and France showed decreasing transport emissions last year.

For 2010, the current EU-15 emissions increase is projected to continue up to 31 % above 1990 levels with existing domestic policies and measures. Additional policies and measures are projected to stabilise the growth of emissions at about 2003 levels.

Greenhouse gas emissions from transport are mainly carbon dioxide emissions and it accounts for 21 % of total EU-15 carbon dioxide emissions.

Carbon dioxide emissions from international aviation and navigation are growing faster than emissions from other transport modes. They share a combined increase of 49 % from 1990 to 2003. Emissions from international aviation are growing fastest with an increase of 72 % in the same period.

All reporting Member States project growing transport emissions, indicating that existing policies

and measures are not sufficient to decouple emissions from activity growth. Austria, Belgium, Italy, Portugal and Spain expect additional policies and measures to significantly reduce the projected growth in transport emissions.

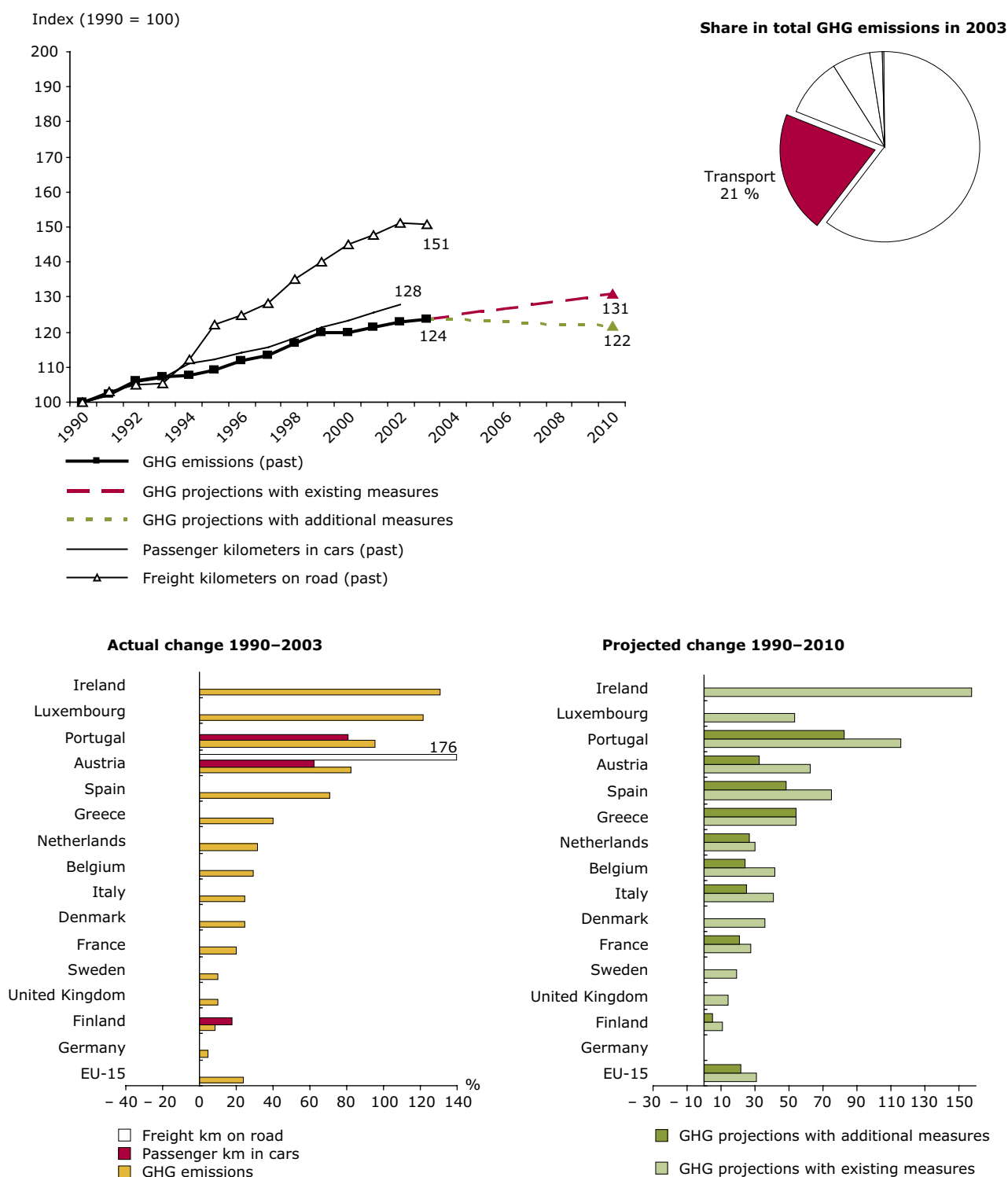
The projected increase of emissions from transport is due to continued growth in transport volumes. This is expected despite policies and measures aimed at achieving the EU objective of shifting traffic from road to rail and inland waterways. A key instrument is the voluntary commitment by the European, Japanese and Korean car industries to reduce average carbon dioxide emissions from new passenger cars, by setting a target of 140 g/km for 2008 (European industries) and 2009 (Japanese and Korean industries). Carbon dioxide emissions were reduced between 1995 and 2003 by about 12 % (Figure 9.7). The main reasons for the reductions since 1995 are fuel efficiency improvements, mainly in diesel-fuelled vehicles, and a shift in fleet composition from petrol to diesel passenger cars. Diesel-fuelled cars are more energy efficient but emit more air pollutants than petrol-fuelled cars. The European Parliament and the Council have expressed as a target to reach an average emission of 120 g/km by 2010 at the latest. According to a Communication to the Council and to the European Parliament (COM(2005) 269 final), the Commission intends to present a proposal around the end of 2005 concerning the achievement of this target.

In spite of more fuel efficient vehicles, the emissions from transport by road will probably increase due to the increase in traffic volumes.

<sup>(31)</sup> EU-15 greenhouse gas emission projections from transport are calculated on basis of projections reported by 14 Member States. Sectoral emission projections are missing for Germany.



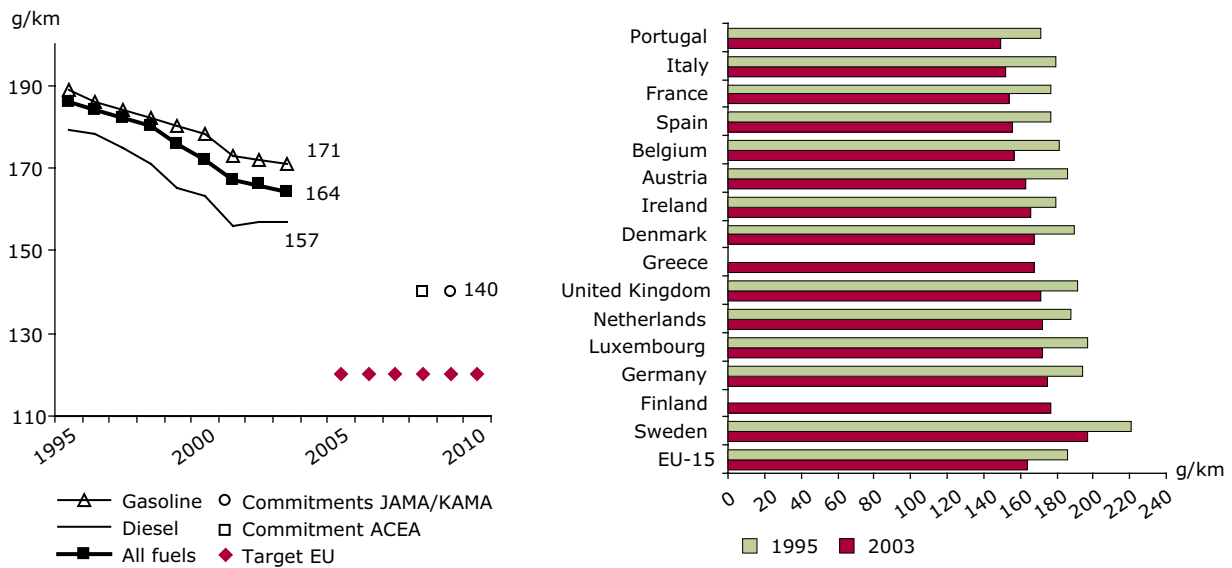
**Figure 9.6 EU-15 greenhouse gas emissions from transport compared with transport volumes (passenger transport by car and freight transport by road)**



**Note:** GHG projections for the EU-15 are calculated on the basis of projections reported by 14 Member States. The percentage change 2003–2010 of these EU-14 Member States is applied to EU-15. Sectoral emission projections with existing measures are missing for Germany; sectoral emission projections with additional measures were not reported for Denmark, Germany, Ireland, Luxembourg, Sweden, the United Kingdom. Past sectoral emissions are complete.

**Source:** EEA, Eurostat.

**Figure 9.7 Average specific CO<sub>2</sub> emissions of new passenger cars per fuel type and targets**



**Note:** The consistency of the time series 1995–2003 is not assured. In 2002, for the first time, official EU CO<sub>2</sub> monitoring data were used for calculating the 2002 figures. For previous years, the associations provided the underlying data.

**Source:** European Commission.

## Agriculture



EU-15 greenhouse gas emissions from agriculture fell by 10 % between 1990 and 2003. Both nitrous oxide emissions from agricultural soils and methane emissions from enteric fermentation (from cattle) fell by 21 %.



Based on existing domestic policies and measures, EU-15 greenhouse gas emissions from agriculture are projected to decrease to 13 % below the 1990 level in 2010 <sup>(32)</sup>.

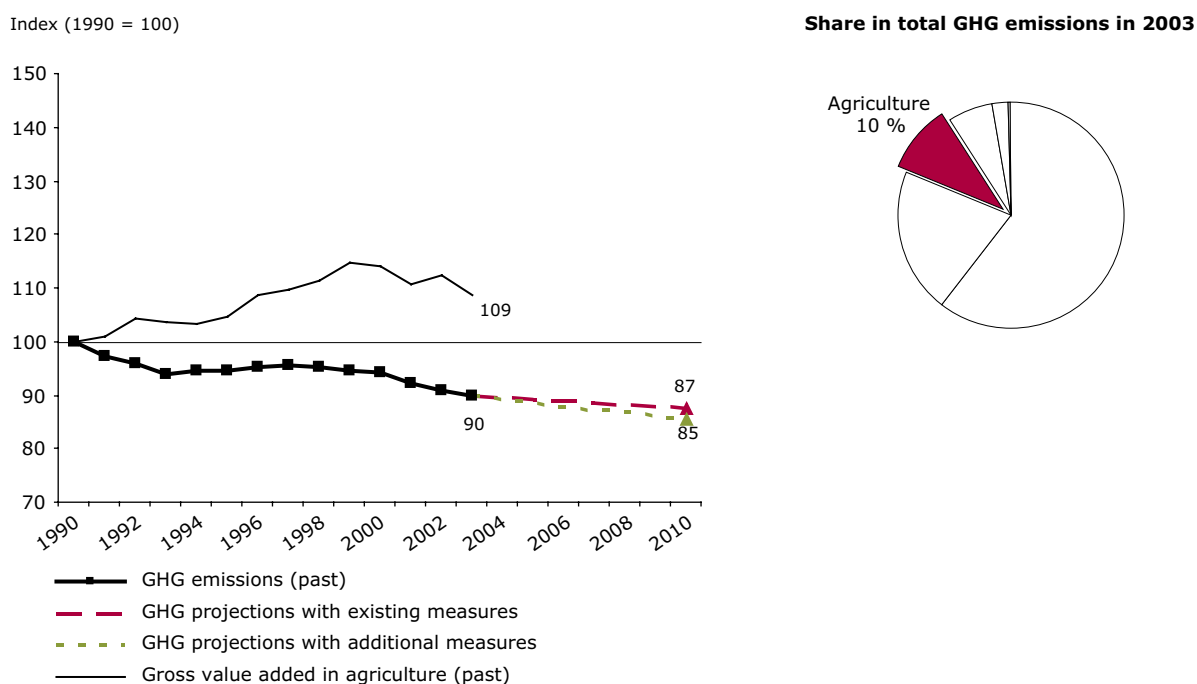
Between 1990 and 2003 nitrous oxide emissions from agricultural soils fell mainly because of a decrease in the use of nitrogen fertiliser and manure. This was to a large extent a consequence of the reform of the EU's common agricultural policy (CAP) and the implementation of the nitrate directive, aimed at reducing water pollution. Methane emissions from enteric fermentation

(by cattle) also fell, mainly due to a drop in the number of cattle. This was also a result of the CAP reform.

For 2010, emissions from agriculture are projected to decrease further (Figure 9.8). This is mainly due to the continuing effect of the CAP reform and the EU nitrate directive.

<sup>(32)</sup> EU-15 greenhouse gas emission projections from agriculture are calculated on basis of projections reported by twelve Member States. Sectoral emission projections are missing for Germany, Luxembourg and Spain.

**Figure 9.8 EU-15 past and projected greenhouse gas emissions from agriculture and gross value added**



**Note:** GHG projections for the EU-15 are calculated on the basis of projections reported by 12 Member States. The percentage change 2003–2010 of the EU-12 is applied to EU-15. Sectoral emission projections with existing measures are missing for Germany, Luxembourg and Spain, sectoral emissions projections with additional measures are missing for Austria, Denmark, Germany, Ireland, Luxembourg, Spain, Sweden and the United Kingdom.

**Source:** EEA, Eurostat.

### Industry (non-energy related)

- 😊 EU-15 nitrous oxide emissions from chemical industries decreased by 57 % between 1990 and 2003.
- 😞 EU-15 hydrofluorocarbon emissions from refrigeration and air conditioning, currently accounting for 1 % of total EU-15 greenhouse gas emissions, increased by more than a factor of seven between 1995 and 2003.
- 😐 EU-15 greenhouse gas emissions from industrial processes (carbon dioxide, nitrous oxide and fluorinated gases) were reduced by 19 % from 1990 to 2003. They are projected to rise again to 4 % below 1990 levels with existing domestic policies and measures, but could fall to 20 % below 1990 levels with additional domestic measures <sup>(33)</sup>.

The trends in emissions in the 1990s show a reduction in carbon dioxide emissions from cement production due to lower economic activity and increased imports in the early 1990s. There was also a reduction in nitrous oxide emissions because of emission reduction measures in the adipic acid production industry in France, Germany and the United Kingdom. In addition, large reductions were

achieved in the United Kingdom due to reduction measures in HCFC (hydrochlorofluorocarbon) production between 1998 and 1999. Very large increases in emissions of hydrofluorocarbons occurred as they replaced chlorofluorocarbons, which have been and will continue to be phased out. This action is being taken because of the damage they cause to the ozone layer.

<sup>(33)</sup> EU-15 greenhouse gas emission projections from industrial processes are calculated on basis of projections reported by twelve Member States. Sectoral emission projections are missing for Germany, Luxembourg and Spain.

In 2003, emissions from cement production were again at the 1990 level. Total greenhouse gas emissions from industrial processes (carbon dioxide, nitrous oxide and fluorinated gases) in 2003 were 19 % below 1990 levels.

For 2010, EU-15 emissions from industrial processes are projected with existing domestic policies and measures to be 4 % below 1990 levels<sup>(34)</sup>. The significant abatement of nitrous oxide emissions in the manufacture of adipic acid in a few Member

States is to a large extent offset by increases in emissions of fluorinated gases. These gases are projected to increase by over 46 % from the base-year to 2010 with existing policies and measures.

With additional domestic regulatory policies and measures, which a few Member States are planning, the actual decline of greenhouse gas emissions from industrial processes is projected to continue further to 20 % below 1990 levels.

### Waste management



EU-15 methane emissions from landfills fell by 36 % between 1990 and 2003.



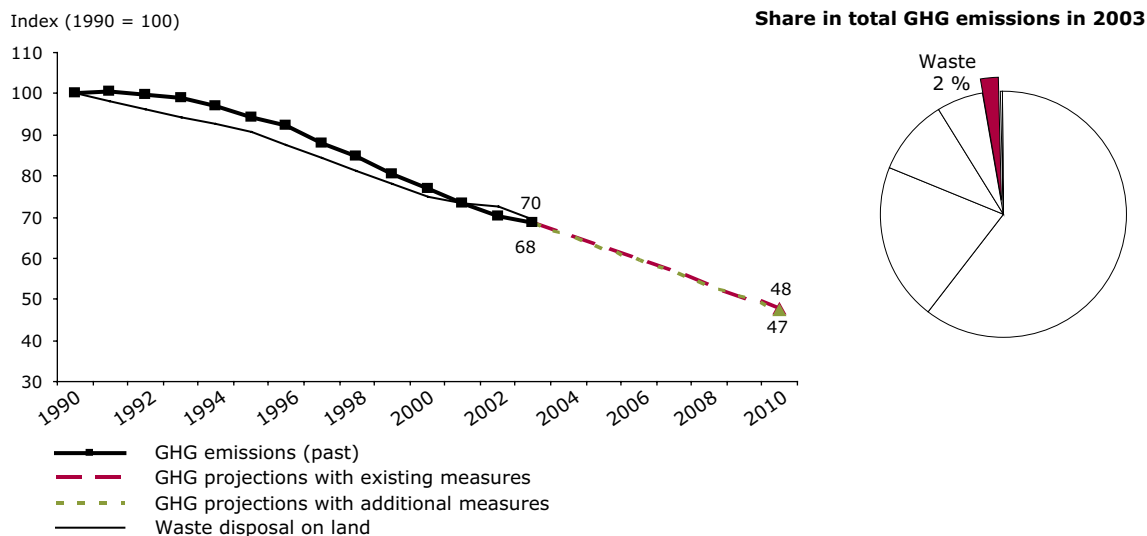
EU-15 greenhouse gas emissions from the waste sector are projected to be more than 50 % below 1990 levels by 2010 (with existing policies and measures)<sup>(35)</sup>.

Since 1990 methane emissions from landfills have fallen. The decrease is mainly due to the (early) implementation of the landfill waste directive and similar national legislation intended to reduce the amount of untreated biodegradable waste disposed

of in landfills, and to ensure the installation of landfill gas recovery at all new sites.

EU-15 greenhouse gas emissions from the waste sector are projected to decrease further up to 2010, mainly due to further implementation of the landfill directive.

**Figure 9.9 EU-15 past and projected greenhouse gas emissions from waste**



**Note:** GHG projections for the EU-15 are calculated on the basis of projections reported by twelve Member States. The percentage change 2003–2010 of the EU-12 is applied to the EU-15. Sectoral emission projections with existing measures are missing for Germany, Luxembourg and Spain, sectoral emission projections with additional measures were not reported by Austria, Denmark, Germany, Ireland, Luxembourg, Spain, Sweden and the United Kingdom.

**Source:** EEA.

<sup>(34)</sup> EU-15 greenhouse gas emission projections from industrial processes are calculated on basis of projections reported by twelve Member States. Sectoral emission projections are missing for Germany, Luxembourg and Spain.

<sup>(35)</sup> EU-15 greenhouse gas emission projections from waste management are calculated on basis of projections reported by twelve Member States. Sectoral emission projections are missing for Germany, Luxembourg and Spain.

## 10 Use of carbon sinks



The projected use of carbon sinks for achieving the EU-15 Kyoto target is so far relatively small. The estimated removal by forestry and agricultural activities is 31 and 0.8 Mt CO<sub>2</sub> per year respectively or in total about 0.7 % in relation to the EU-15 target of – 8 %.

In addition to policies and measures addressing various sources of greenhouse gas emissions (see Section 9), Member States can make use of CO<sub>2</sub> removals by land use change and forestry activities (carbon sinks). Ten Member States have provided preliminary estimates of their intended use of carbon sinks to achieve their burden-sharing targets (Austria, Denmark, Finland, Ireland, Italy, the Netherlands, Portugal, Slovenia, Spain and the United Kingdom). This limited information shows for EU-15 that so far there are plans to remove around 31 million tonnes CO<sub>2</sub> per year through forestry activities by 2008–2012<sup>(36)</sup>. Additionally, Slovenia expects a net removal of about 0.4 million tonnes CO<sub>2</sub>-equivalent per year. Only Portugal and

Slovenia have already decided to account for forest management leading to an additional sequestration of around 0.8 and 1.3 million tonnes CO<sub>2</sub> per year<sup>(37)</sup>. Excluding Slovenia, these total removal estimates represent 9 % of the total EU-15 reduction required. This means that 0.7 % percentage points of the EU-15 target could be achieved by using carbon sinks, which helps close the gap of 6.4 % between projected greenhouse gas emissions with existing domestic policies and measures and the EU-15-target (see Section 4). The European climate change programme estimates that potentially 93–103 million tonnes CO<sub>2</sub> could be sequestered through the enhancement of sink activities in the agricultural and forestry sectors.

<sup>(36)</sup> Afforestation, reforestation and deforestation under Article 3.3 of the Kyoto Protocol

<sup>(37)</sup> Only forest management; no data available for other activities under Article 3.4 (cropland management, grazing land management and revegetation).

# 11 The reporting scheme



Under the EU monitoring mechanism all EU-15 Member States provided greenhouse gas inventory data for 1990 to 2003 for all gases. Three Member States have gaps for either a few years or gases (Greece, Ireland, Luxembourg).



Most new Member States provided greenhouse gas inventory data for 1990 to 2003. For many, gaps exist in reporting on fluorinated gases.



The quality of emission projections and policies and measures has improved for those Member States that reported this information under the Monitoring Mechanism or through National Communications under UNFCCC.



Further improvements in the reporting of inventories, projections, policies and measures are still needed.

Reporting of greenhouse gas inventories has improved, but needs to be further improved and include all gases, especially for new Member States. Reporting on additional information required under the Kyoto Protocol, including information on emissions and removals from land use change and forestry, has taken a small step forward but is still only available for eleven Member States. In

many cases this information remains incomplete. The quality of reporting of emission projections, policies and measures has improved, but further improvements are needed regarding completeness, comparability, consistency, transparency, and timeliness. Information on the use of flexible mechanisms under the Kyoto Protocol was available in substantial detail for nine Member States.

# 12 Glossary

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ACEA	European Automobile Manufacturers Association (EU-wide agreement with ACEA and similarly also with Japanese (JAMA) and Korean (KAMA) automobile manufacturing industries)
CCPMs	common and coordinated policies and measures at EU level
CDM	clean development mechanism as defined in the Kyoto Protocol, Article 12, meaning projects on the reduction of GHG emissions between industrialised countries and developing countries
CFCs	chlorofluorocarbons
CHP	combined heat and power
CH <sub>4</sub>	methane
CO <sub>2</sub>	carbon dioxide
COP	Conference of the Parties
CRF	common reporting format
DTI	distance-to-target indicator
ECCP	European climate change programme
EEA	European Environment Agency
ETC/ACC	European Topic Centre on Air and Climate Change
GDP	gross domestic product
GHG	greenhouse gases
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
IPPC	integrated pollution prevention and control
JAMA	Japanese Automobile Manufacturers Association
JI	Joint implementation as defined in the Kyoto Protocol, Article 6, meaning projects on the reduction of GHG emissions between industrialised countries and countries in transition
KAMA	Korean Automobile Manufacturers Association
KP	Kyoto Protocol
LULUCF	land use, land use change and forestry
Mt	Mega (million) tonnes
N <sub>2</sub> O	nitrous oxide
PFCs	perfluorocarbons
RES	renewable energy sources
SF <sub>6</sub>	sulphur hexafluoride
UNFCCC	United Nations Framework Convention on Climate Change

# **Annexes: Additional information on GHG trends and projections by sector and by Member State**

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## **Annexes**

**A1 Use of Kyoto mechanisms in EU-15 Member States**

**A2 Key domestic policies and measures**

**A3 Sectoral emission trends and projections in the EU-15**

**A4 Accounting of carbon sinks by EU Member States**

**A5 The reporting scheme**

**A6 Summary of EU-25 greenhouse gas emission trends and projections**

**A7 Indicators on actual and projected greenhouse gas emissions for each individual EU Member State**

**A8 Information on national policies and measures and projections for each individual EU Member State**

Only annex A6 is available in printed form, all other annexes are published on the EEA web site ([www.eea.eu.int](http://www.eea.eu.int)).



## Annex 6: Summary of EU-25 greenhouse gas emission trends and projections

**Table 10 EU and Member States' greenhouse gas emission trends and targets (burden-sharing) for 2008–2012 <sup>(38)</sup>**

	Base-year (Mt CO <sub>2</sub> )	GHG emissions 2003 (Mt CO <sub>2</sub> )	Change 2002–2003 (in %)	Change 2003 relative to base-year (in %)	EU burden- sharing and Kyoto targets (in %)	Distance to target indicator (index points)
Austria	78.5	91.6	+ 5.9 %	+ 16.6 %	- 13.0 %	+ 19.2 (+ 25.0)
Belgium	146.8	147.7	+ 1.6 %	+ 0.6 %	- 7.5 %	+ 1.8 (+ 5.5)
Cyprus	6.0	9.2	+ 5.3 %	+ 52.8 %	no target	no target
Czech Republik	192.1	145.4	+ 1.8 %	- 24.3 %	- 8.0 %	- 19.1
Denmark	69.6	74.0	+ 7.3 %	+ 6.3 %	- 21.0 %	+ 15.8 (+ 20.0)
Estonia	43.5	21.4	+ 9.7 %	- 50.8 %	- 8.0 %	- 45.6
Finland	70.4	85.5	+ 10.8 %	+ 21.5 %	0.0 %	+ 21.0 (+ 21.5)
France	568.0	557.2	+ 0.7 %	- 1.9 %	0.0 %	- 1.9
Germany	1 248.3	1 017.5	+ 0.2 %	- 18.5 %	- 21.0 %	- 4.8
Greece	111.7	137.6	+ 3.1 %	+ 23.2 %	+ 25.0 %	+ 7.0
Hungary	122.2	83.2	+ 3.0 %	- 31.9 %	- 6.0 %	- 28.0
Ireland	54.0	67.6	- 2.6 %	+ 25.2 %	+ 13.0 %	+ 12.3 (+ 16.7)
Italy	510.3	569.8	+ 2.7 %	+ 11.6 %	- 6.5 %	+ 10.8 (+ 15.9)
Latvia	25.4	10.5	- 0.9 %	- 58.5 %	- 8.0 %	- 53.3
Lithuania	50.9	17.2	- 12.1 %	- 66.2 %	- 8.0 %	- 61.0
Luxembourg	12.7	11.3	+ 4.3 %	- 11.5 %	- 28.0 %	- 8.6 (+ 6.7)
Malta	2.2	2.9	- 0.5 %	+ 29.1 %	no target	no target
Netherlands	213.1	214.8	+ 0.6 %	+ 0.8 %	- 6.0 %	- 1.4 (+ 4.7)
Poland	565.3	384.0	+ 3.7 %	- 32.1 %	- 6.0 %	- 28.2
Portugal	59.4	81.2	- 5.3 %	+ 36.7 %	+ 27.0 %	+ 19.1
Slovakia	72.0	51.7	- 1.3 %	- 28.2 %	- 8.0 %	- 23.0
Slovenia	20.2	19.8	- 1.2 %	- 1.9 %	- 8.0 %	+ 3.3
Spain	286.1	402.3	+ 0.9 %	+ 40.6 %	+ 15.0 %	+ 26.3 (+ 30.9)
Sweden	72.3	70.6	+ 1.5 %	- 2.4 %	+ 4.0 %	- 5.0
United Kingdom	751.4	651.1	+ 1.1 %	- 13.3 %	- 12.5 %	- 5.2
<b>EU-15</b>	<b>4 252.4</b>	<b>4179.6</b>	<b>+ 1.3 %</b>	<b>- 1.7 %</b>	<b>- 8.0 %</b>	<b>+ 1.9 (+ 3.5)</b>
<b>EU-10</b>	<b>1 099.8</b>	<b>745.5</b>	<b>+ 2.7 %</b>	<b>- 32.2 %</b>	<b>- 6.7 %</b>	<b>- 28.4</b>
<b>EU-25</b>	<b>5 352.2</b>	<b>4925.1</b>	<b>+ 1.5 %</b>	<b>- 8.0 %</b>	<b>- 7.7 %</b>	<b>- 4.2 (- 2.9)</b>

**Note:** For the fluorinated gases, the EU-15 base-year emission is the sum of 15 Member States' base-year emissions. A total of 13 Member States have indicated to select 1995 as base-year under the Kyoto Protocol; Finland and France indicate to use 1990. Therefore, the EU-15 base-year estimates for fluorinated gas emissions are the sum of 1995 emissions for 13 Member States and 1990 emissions for Finland and France. For Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands, Spain and the EU-15, the distance to the target indicator excluding Kyoto mechanisms is included in brackets.

**Source:** EEA.

<sup>(38)</sup> In the Council decision (2002/358/EC) on the approval by the EU of the Kyoto Protocol the various commitments of the Member States are expressed as percentage changes from the base-year. In 2006 the respective emission levels will be expressed in terms of tonnes of CO<sub>2</sub>-equivalent. In this connection, the Council of Environment Ministers and the Commission have, in a joint statement, agreed to take into account inter alia the assumptions in Denmark's statement to the Council Conclusions of 16–17 June 1998 relating to base-year emissions.

**Table 11 EU-25 and Member States' Kyoto Protocol (burden-sharing) targets for 2008–2012, compared with emission projections based on existing and additional domestic policies and measures**

	GHG emissions for base-year	EC burden sharing and Kyoto target		With existing policies and measures				With additional policies and measures			
		Commitment	Emissions limit	Projections for 2010		Gap between projections and target		Projections for 2010		Gap between projections and target	
				in % of base-year	Mt CO <sub>2</sub> (derived from base-year)	Mt CO <sub>2</sub>	in % of base-year	Mt CO <sub>2</sub>	in % of base-year	Mt CO <sub>2</sub>	in % of base-year
Austria	77.6	- 13.0	67.5	84.4	+ 8.7	+ 16.9	+ 21.7	70.5	- 9.2	3.0	+ 3.8
Belgium	144.0	- 7.5	133.2	148.4	+ 3.1	+ 15.2	+ 10.6	140.9	- 2.2	7.7	+ 5.3
Czech Republik	192.1	- 8.0	176.8	143.6	- 25.3	- 33.2	- 17.3	141.2	- 26.5	- 35.6	- 18.5
Denmark	69.6	- 21.0	55.0	72.5	+ 4.2	+ 17.5	+ 25.2	no data	no data	no data	no data
Estonia	43.5	- 8.0	40.0	18.9	- 56.6	- 21.1	- 48.6	17.4	- 60.0	- 22.6	- 52.0
Finland	70.5	0.0	70.5	79.7	+ 13.2	+ 9.3	+ 13.2	71.1	+ 0.9	0.6	+ 0.9
France	545.0	0.0	545.0	594.3	+ 9.0	+ 49.3	+ 9.0	536.0	- 1.7	- 9.0	- 1.7
Germany	1 248.3	- 21.0	986.2	1 000.9	- 19.8	+ 14.7	+ 1.2	985.7	- 21.0	- 0.5	- 0.0
Greece	111.7	+ 25.0	139.6	150.4	+ 34.7	+ 10.8	+ 9.7	139.5	+ 24.9	- 0.1	- 0.1
Hungary	101.7	- 6.0	95.6	95.6	- 6.0	+ 0.0	+ 0.0	95.6	- 6.0	0.0	+ 0.0
Ireland	53.4	+ 13.0	60.4	71.3	+ 33.4	+ 10.9	+ 20.4	no data	no data	no data	no data
Italy	509.4	- 6.5	476.3	580.4	+ 13.9	+ 104.1	+ 20.4	530.1	+ 4.1	53.8	+ 10.6
Latvia	25.3	- 8.0	23.3	13.7	- 46.1	- 9.7	- 38.1	13.0	- 48.6	- 10.3	- 40.6
Lithuania	51.0	- 8.0	46.9	25.2	- 50.6	- 21.7	- 42.6	no data	no data	no data	no data
Luxembourg	12.7	- 28.0	9.2	9.9	- 22.4	+ 0.7	+ 5.6	no data	no data	no data	no data
Netherlands	212.9	- 6.0	200.1	220.3	+ 3.5	+ 20.2	+ 9.5	214.8	+ 0.9	14.6	+ 6.9
Poland	498.5	- 6.0	468.6	438.4	- 12.1	- 30.2	- 6.1	438.4	- 12.1	- 30.2	- 6.1
Portugal	59.4	+ 27.0	75.5	90.4	+ 52.1	+ 14.9	+ 25.1	84.5	+ 42.2	9.0	+ 15.2
Slovakia	72.1	- 8.0	66.3	57.9	- 19.7	- 8.4	- 11.7	56.8	- 21.3	- 9.6	- 13.3
Slovenia	20.2	- 8.0	18.6	21.2	+ 4.9	+ 2.6	+ 12.9	20.3	+ 0.3	1.7	+ 8.3
Spain	207.0	+ 15.0	238.1	307.0	+ 48.3	+ 69.0	+ 33.3	265.0	+ 28.0	27.0	+ 13.0
Sweden	72.2	+ 4.0	75.1	71.5	- 1.0	- 3.6	- 5.0	no data	no data	no data	no data
United Kingdom	751.7	- 12.5	657.7	598.8	- 20.3	- 58.9	- 7.8	no data	no data	no data	no data
<b>EU-15</b>	<b>4 145.4</b>	<b>- 8.0</b>	<b>3 813.8</b>	<b>4 080.2</b>	<b>- 1.6</b>	<b>+ 266.5</b>	<b>+ 6.4</b>	<b>3 862.0</b>	<b>- 6.8</b>	<b>48.2</b>	<b>+ 1.2</b>
<b>EU-8</b>	<b>1 004.4</b>	<b>- 6.8</b>	<b>936.1</b>	<b>814.3</b>	<b>- 18.9</b>	<b>- 121.7</b>	<b>- 12.1</b>	<b>807.8</b>	<b>- 19.6</b>	<b>- 128.3</b>	<b>- 12.8</b>
<b>EU-23</b>	<b>5 149.8</b>	<b>- 7.8</b>	<b>4 749.8</b>	<b>4 894.6</b>	<b>- 5.0</b>	<b>144.8</b>	<b>2.8</b>	<b>4 669.8</b>	<b>- 9.3</b>	<b>- 80.1</b>	<b>- 1.6</b>

**Note:** For projected emissions, positive figures signify that the target is not met; negative figures mean a projected over-delivery of emissions. Base-year emissions used for projections assessment differ to base-year emissions from the emission inventories in Table 10 for some countries. Gaps for total EU in terms of million tonnes of CO<sub>2</sub> equivalent are not equal to the sum of Member States' gaps due to slight inconsistency between the Member States' burden-sharing targets and the EU's Kyoto target in terms of percentages. In order to calculate EU emission 'with additional measures' projections, 'with existing measures' projections are taken for those Member States for which additional measures projections are not available.

**Source:** EEA.

European Environment Agency

**Greenhouse gas emission trends and  
projections in Europe 2005**

2005 — 48 pp. — 21 x 29.7 cm

ISBN 92-9167-780-9

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