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Greenhouse gas emission trends and projections in Europe 2007

Tracking progress towards Kyoto targets

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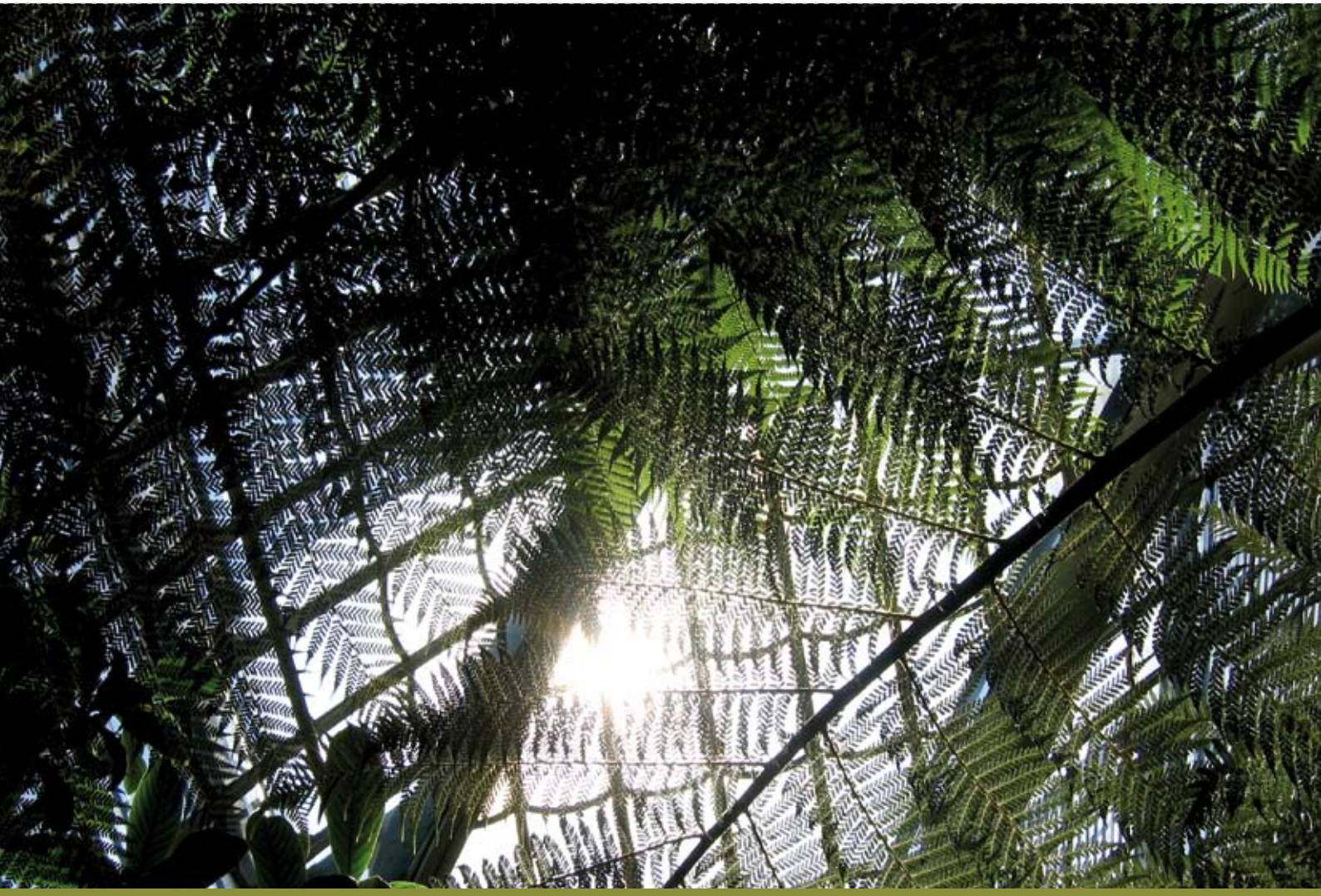

European Environment Agency

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European Environment Agency

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Annexes: Additional information on greenhouse gas trends and projections by sector and by Member State (electronic version only: www.eea.europa.eu)

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Summary

This report presents an assessment of the current progress of EU Member States, EU candidate countries and other EEA member countries towards their respective targets under the Kyoto Protocol. This is based on their past greenhouse gas emissions between 1990 and 2005, and the projected greenhouse gas emissions of these countries by 2010, derived from data and related information they provided before 1 June 2007.

EU-27 greenhouse gas emissions have decreased since 1990 but are projected to rise again

Greenhouse gas emissions in the EU-27 decreased by 7.9 % between 1990 and 2005. With the existing domestic policies and measures in place, EU-27 greenhouse gas emissions are projected to remain approximately at 2005 levels by 2010. Alternatively, if the currently planned additional domestic policies and measures are implemented on time, EU-27 greenhouse gas emissions could decrease from 2005 levels down to 11 % below their 1990 levels by 2010. A first assessment of EU-27 aggregated projections for 2020 shows that, even if the additional measures currently planned by Member States are adopted and fully implemented, greenhouse gas emissions will increase between 2010 and 2020, reaching a level approximately 2 % higher than in 2005, and only 6 % below their 1990 level. This is a significantly higher level than the unilateral commitment of a 20 % reduction, compared to 1990 levels, endorsed by the European Council in March 2007.

Past trends between 1990 and 2005 show that the EU-15 is not on track to meet its Kyoto target, but projections for 2010 indicate that the target will be met if Member States implement existing and additional measures fully and quickly, and make use of carbon sinks and Kyoto mechanisms

Greenhouse gas emissions in the pre-2004 EU Member States (EU-15) decreased by 0.8 % in 2005 compared to 2004. The 2005 emissions were 1.5 % lower than in 1990, although higher than in 2000 and close to 1992 levels.

Under the Kyoto Protocol, the EU-15 must reach an average annual level of greenhouse gas emissions 8 % lower than in the base year (close to 1990), during the whole period 2008–2012. In 2005, a 2 % reduction of EU-15 greenhouse gas emissions compared to base-year levels had been achieved. This past trend indicates that the EU-15 is not currently on track to meet its target under the Kyoto Protocol. However, according to the latest projections from Member States, the EU-15 should achieve the target, since projected 2010 emissions are well below this. The achievement relies, however, on a number of conditions (Figure 1):

- full delivery of emission reductions from existing domestic policies and measures, already implemented by Member States;
- rapid adoption and implementation of additional policies and measures currently under discussion at European and national levels;
- accounting of CO_2 removals from land use, land-use change and forestry;
- use of Kyoto mechanisms to the full extent currently being implemented and planned by Member States;
- substantial overachievement of their individual targets by some Member States, to cover the gap left by those Member States which currently anticipate that they will not achieve their targets;
- achievement of the emission reductions, currently projected for the single year 2010, during each year of the whole five-year commitment period, from 2008 to 2012.

According to national projections, **existing domestic policies and measures**, already implemented by EU-15 Member States, will deliver a reduction of 4 % relative to base-year levels by 2010.

If adopted and fully implemented on time, the **additional domestic policies and measures** currently under discussion could bring a further reduction of 3.9 % relative to the base year.

The use of **Kyoto mechanisms** (clean development mechanism and joint implementation), currently foreseen by 10 countries, would help to reduce emissions by a further 2.5 %.

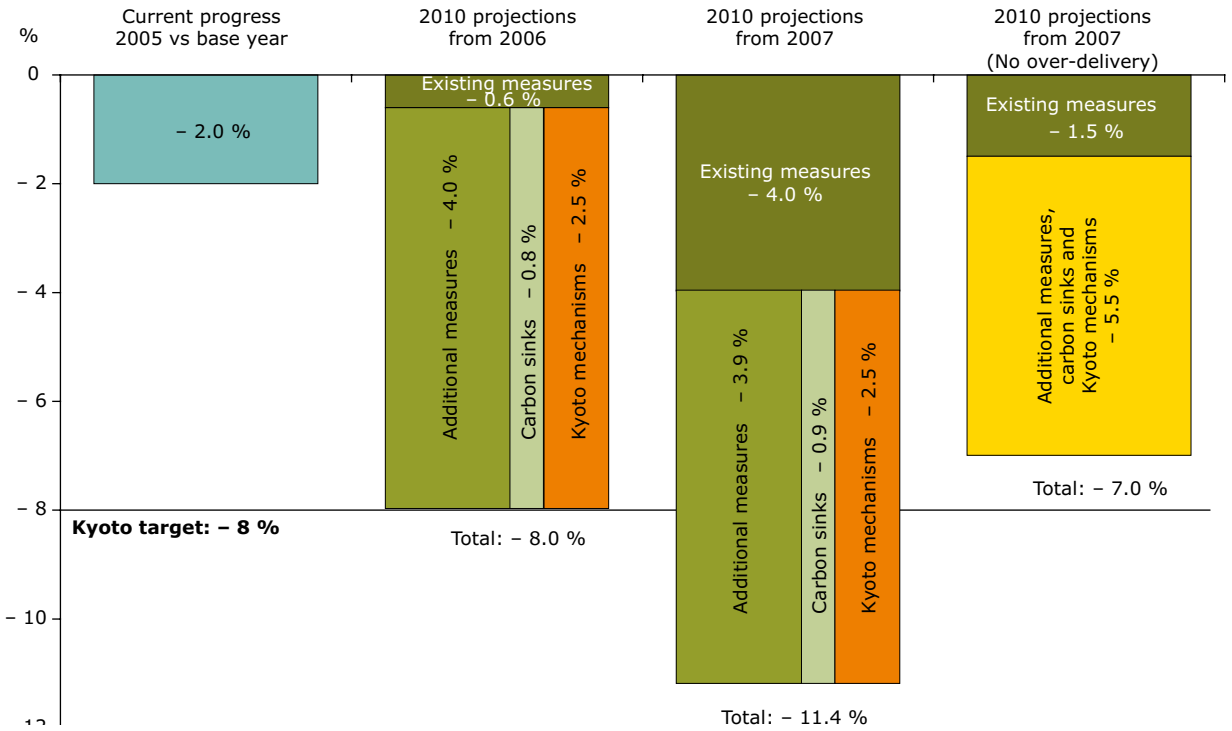
The effect of **carbon sink** activities is estimated to bring an additional 0.8 % reduction.

If all the projected reductions from domestic policies and measures, carbon sinks and Kyoto mechanisms were achieved, the EU-15 could reach a level of emissions 11.4 % lower than base-year emissions, therefore overachieving its – 8 % target by 3.4 percentage points. However, this relies on all Member States achieving during the whole commitment period the full emissions reductions they project. In particular, some Member States will have to exceed substantially their individual target to cover the gap left by the Member States whose projections currently indicate they will not achieve their own target. Furthermore, these over-deliveries would have to remain available to the rest of the EU-15, which cannot be taken for granted.

A separate estimate of the overall effect of the **EU Emission Trading Scheme** based on a comparison between verified emissions in 2005 and 2006, and the European Commission's decisions on proposed national allocation plans (NAPs) for the period 2008–2012, indicates that a further reduction of 1–2 % from base-year emissions could be achieved, in addition to the emission reductions already projected by EU-15 Member States.

Compared to the 2006 analysis, the projected emission reductions from domestic policies and measures in the EU-15 have increased considerably, mostly due to revised projections from Germany and France and to the new availability of projections by some Member States regarding the anticipated effect of the EU ETS.

Figure 1 Summary of EU-15 projections of greenhouse gas emissions reductions by 2010



Note: The column on the right (2010 projections excluding over-delivery) represents the projected EU-15 emission reduction if over-deliveries achieved by some Member States were not available to the rest of the EU-15. The 1.5 % projected reduction with existing measures corresponds to the total reduction obtained from existing measures in the EU-15 if the United Kingdom, Germany and Sweden just reached their target but did not overachieve it with existing measures, as they currently foresee.

Source: EEA, based on EU Member States greenhouse gas inventories and projections.

Twelve EU-15 Member States project they will achieve their individual targets, although only eight are on the right track based on past trends

Based on the progress achieved between 1990 and 2005 towards their individual emission targets, eight Member States are considered on track to meet their burden-sharing target (if the projected use of carbon sinks and Kyoto mechanisms is taken into account). This includes three Member States (Finland, Belgium and Luxembourg) in addition to the five Member States that were already considered on track in 2006 (Sweden, the United Kingdom, Germany, France and the Netherlands).

Based on their national projections for 2010, twelve Member States (the United Kingdom, Germany, Sweden, the Netherlands, Portugal, France, Finland, Belgium, Ireland, Austria, Greece and Luxembourg) expect to meet their 2008–2012 burden-sharing targets through a combination of existing and planned domestic policies and measures, the use of carbon sinks and the use of Kyoto mechanisms. Compared to 2006, this represents an addition of four Member States (Portugal, Belgium, Ireland and Austria) to those that projected in 2006 that they would meet their burden-sharing target. The United Kingdom, Sweden and Germany are the only three EU-15 Member States which anticipate achieving their targets through reductions from existing measures alone.

Projections from three Member States indicate that they will not meet their target. However, gaps between targets and projections are much narrower than last year

As in 2006, Spain, Denmark and Italy are currently not on track to meet their individual targets. Their 2010 projections indicate that they will not meet these targets, despite the use of Kyoto mechanisms and carbon sinks, and the effect of reduced emission caps under the EU ETS. However, the gaps between these Member States projections and their respective targets have been significantly reduced since last year. Furthermore, Spain and Denmark announced recently that they were planning to reach their target through future supplementary action ([1]).

Eleven EU Member States plan to use Kyoto mechanisms to meet their individual targets

Ten EU-15 Member States (Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain) as well as Slovenia have decided to use Kyoto mechanisms in order to meet their targets under the Kyoto Protocol. The use of Kyoto mechanisms by these countries corresponds to approximately 2.5 percentage points of the 8 % emission reduction required for the EU-15. Twelve Member States have allocated financial resources for using the Kyoto mechanisms (Austria, Belgium, Denmark, Finland, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and Sweden) with a total amount of EUR 2.9 billion for the whole five-year commitment period.

Carbon sinks will provide a small further reduction of EU emissions

CO_2 removal due to activities under Articles 3.3 and 3.4 of the Kyoto Protocol during the Kyoto commitment period is estimated to represent a reduction of 0.9 % from EU-15 base-year emissions, or approximately one tenth of the EU-15 target of an 8 % reduction.

Greenhouse gas emissions have been decreasing in most sectors (except transport) and are projected to further decrease (except in industrial processes). For the first time, emissions from transport are projected to stabilise by 2010

From 1990 to 2005, EU-15 greenhouse gas emissions decreased in all sectors, except transport, where they increased significantly (26 %).

EU-15 greenhouse gas emissions from energy supply and use (excluding transport) were 3 % below 1990 levels in 2005, while energy demand increased by 13 % in the same period. These emissions are projected to stay at the 2005 level by 2010 with the existing domestic policies and measures. In 2005, CO_2 emissions from public electricity and heat production decreased for the second consecutive year. However, in the longer term, emissions have

([1]) In July 2007, Spain adopted a Plan of Urgent Measures against Climate Change. Spain plans that these measures will allow it to fulfil its commitments under the Kyoto Protocol. The consideration of these measures in the report was not possible as the data were not submitted in time.
According to Denmark's NAP for the period 2008–2012 and additional information submitted to the Commission, Denmark projects it will reach its target by initiating new national climate initiatives, although these have not yet been identified.

increased by 6 % since 1990, driven by increasing electricity production in thermal power plants (38 % increase between 1990 and 2005). The share of renewable energy use increased between 2004 and 2005, but it is still unlikely that the target of 21 % of gross electricity consumption from renewable energy sources by 2010 will be met. To achieve the new (March 2007) target of a 20 % share of renewable energy in overall EU energy consumption by 2020, significant further efforts in the promotion of renewable energy sources will be required. Further efforts will also be needed to increase the share of combined heat and power by 2010. CO_2 emissions due to energy consumption from households decreased by 1.7 % from 1990 to 2005, while the number of dwellings increased by 18 %. This results from energy-efficiency improvements due to thermal insulation, fuel-switching to natural gas and an increase in district heating.

EU-15 emissions from **transport**, which represent a fifth of all EU-15 greenhouse emissions, increased by 26 % from 1990 to 2005, although they decreased for the first time between 2004 and 2005. For the first time, they are projected to be stabilised at 2005 levels with existing domestic policies and measures by 2010 and could even be reduced if additional policies and measures are implemented on time. This is mainly due to the inclusion of new projections from Germany in the analysis, where the introduction of mandatory biofuel quotas is projected to result in significant emission reductions. However, EU carbon dioxide emissions from international aviation and navigation, excluded from the Kyoto Protocol and therefore not included in these projections, have increased by 96 % and 50 % respectively, between 1990 and 2005.

Greenhouse gas emissions from i**ndustrial processes** (carbon dioxide, nitrous oxide and fluorinated gases) were reduced by 16 % compared to base-year levels but they are projected to increase until 2010 unless additional measures are implemented, in which case they could be roughly stabilised at 2005 levels. These projections give a more positive picture than last year, due to the inclusion of new projections from Germany in the EU-15 analysis. Nitrous oxide emissions from chemical industries decreased by 56 % between the base year and 2005, but hydrofluorocarbon emissions from refrigeration and air conditioning, currently accounting for 1 % of total EU-15 greenhouse gas emissions, increased by a factor of nineteen between the base year and 2005. Furthermore, CO_2 emissions from cement production are increasing and will continue to do so if no decoupling from projected cement production takes place.

Greenhouse gas emissions from **agriculture** fell by 11 % between 1990 and 2005 and are projected to decrease further to 14 % below 1990 levels by 2010, with existing domestic policies and measures.

Methane emissions from the **waste** management sector fell by 38 % between 1990 and 2005. Greenhouse gas emissions from this sector are projected to be approximately 47 % below 1990 levels by 2010.

Between 2005 and 2010, significant reductions of greenhouse gas emissions (in relative terms) can be expected from existing measures in the waste sector and from additional measures in the transport sector.

Domestic policies and measures initiated at EU level deliver large reductions of greenhouse gas emissions in energy and transport

Many of the domestic policies and measures already implemented by Member States to reduce their greenhouse gas emissions are based on EU common coordinated policies and measures (CCPMs). The sectoral CCPMs which are estimated by Member States to deliver the largest (past and future) greenhouse gas emissions reductions are:

- the Directive on the Promotion of Electricity from **Renewable Energy Sources** (2001);
- the **Emissions Trading** Directive (2003);
- the Directive on the Energy Performance on **Buildings** (2002);
- the Directive on **Kyoto** Protocol Project **Mechanisms** (2004);
- the **Cogeneration** Directive (2004);
- the **Biofuels** Directive (2003);
- the Directive on **Energy Taxation** (2003);
- the **voluntary agreements** to reduce per km CO_2 **emissions from new cars** reached with the European, Japanese and Korean automobile industries.

The greatest future emissions reductions (2005–2010) are projected to come from the Directives on emissions trading, the promotion of electricity from renewable energy sources, cogeneration, biofuels and energy performance of buildings.

Through the second phase of the European Climate Change Programme, the European Commission is expected to propose additional domestic policies and measures. Specific areas for which additional emission reductions measures for 2008–2012 have been developed include aviation, and CO_2 and cars. Furthermore, the Commission is developing a regulatory framework and is reviewing the EU ETS for the period after 2012.

The EU Emission Trading Scheme will bring significant emission reductions between 2008 and 2012. Its overall effect could be at least a 3.4 % emissions reduction from base year in the EU-15

In the first two years of the EU Emission Trading Scheme (2005 and 2006), allocated allowances exceeded verified emissions by at least 3 %, mostly in new Member States. As a result, the price of emission allowances for the first trading period (2005–2007) dropped below EUR 1 per tonne of CO_2 in 2007. For the second trading period (2008–2012), the Commission has enforced stricter caps for most Member States, which are well below projected emissions based on existing domestic policies and measures, or about 6.3 % below verified emissions in 2005–2006. The price of allowances for 2008–2012 ranged from EUR 12 to EUR 25 per tonne of CO_2 in 2007. The overall emission reduction due to the EU ETS is estimated to represent at least 3.4 % of EU-15 base-year emissions. Taking into account the estimates of the EU ETS effect already included in projections from 10 Member States, this represents a further reduction of at least 1.3 % to the total of 11.4 % from base year in the EU-15. The total emission reduction in the EU ETS sectors could theoretically be achieved by operators through the use of Kyoto mechanisms only. However, it is expected that the reduction will be achieved by a combination of installation-level measures and use of Kyoto mechanisms.

The new Member States project they will achieve their Kyoto targets although emissions will increase

Based on past trends to 2005, the 10 new EU-27 Member States that have a Kyoto target were on track to meet it. Cyprus and Malta do not have a Kyoto target.

All these Member States except Slovenia project to meet their target with existing measures. Slovenia projects it will reach its target with additional measures, and the use of carbon sinks and Kyoto mechanisms.

In 2005, the aggregated emissions of the 12 new EU Member States were 28 % below 1990 levels. However, by 2010, if no additional measures are implemented, greenhouse gas emissions are projected to increase back to a level 20 % below that of 1990.

Greenhouse gas emissions from transport decreased by 6 % between 1990 and 1995 but increased sharply afterwards. By 2005, these emissions exceeded 1990 levels by 30 %.

A mixed situation in EU candidate countries and other EEA member countries

One of the two EU candidate countries, Croatia, ratified the Kyoto Protocol in May 2007. The other EU candidate country, Turkey, has ratified the United Nations Framework Convention on Climate Change (UNFCCC), but not the Kyoto Protocol and thus has no Kyoto target. This country has the lowest emission *per capita* among all EEA member countries, less than half of the average EU-27 *per capita* emissions.

Croatia, Iceland, Norway and Switzerland project that they will meet their targets, although Iceland and Switzerland were not on track to do so in 2005, based on past trends. Croatia's and Iceland's projections indicate that domestic measures will be sufficient, while Norway and Switzerland plan to use Kyoto mechanisms as well. In addition, Croatia and Switzerland expect further reductions from the implementation of additional policies and measures.

In 2005, Liechtenstein was not on track to meet its target, based on past trends, and projects that it will not meet its Kyoto target with existing measures.

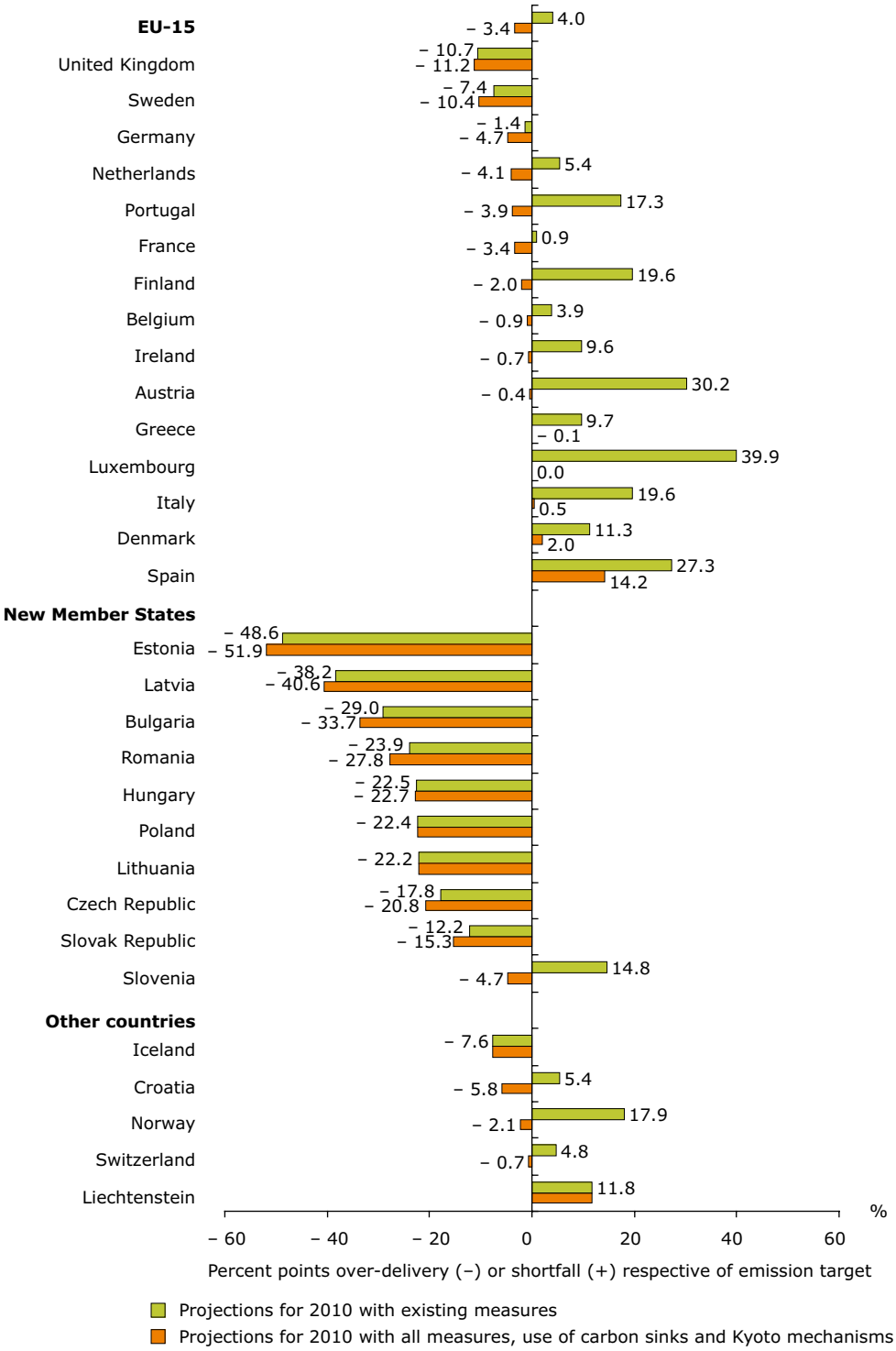
Table 1 Summary of planned measures and progress to targets (by country)

Country	EU burden sharing or Kyoto target (%)	On track towards target based on past trends (1990–2005)?	Planned measures with quantified 2010 reduction projections					Kyoto target projected to be reached?
			Existing policies and measures	Addi-tional policies and measures	Separate estimate of EU ETS included	Use of Kyoto mecha-nisms	Net removal from carbon sinks	
EU-15	– 8.0	No	√	√	√	√	√	Yes
EU-15 Member States								
Austria	– 13.0	No	√	√		√	√	Yes
Belgium	– 7.5	Yes	√			√		Yes
Denmark	– 21.0	No	√		√	√	√	No
Finland	0.0	Yes	√	√		√	√	Yes
France	0.0	Yes	√	√				Yes
Germany	– 21.0	Yes	√	√				Yes
Greece	+ 25.0	No	√	√				Yes
Ireland	+ 13.0	No	√	√		√	√	Yes
Italy	– 6.5	No	√	√		√	√	No
Luxembourg	– 28.0	Yes	√			√		Yes
Netherlands	– 6.0	Yes	√		√	√	√	Yes
Portugal	+ 27.0	No	√	√		√	√	Yes
Spain	+ 15.0	No	√		√	√	√	No
Sweden	+ 4.0	Yes	√		√		√	Yes
United Kingdom	– 12.5	Yes	√		√		√	Yes
New Member States								
Bulgaria	– 8.0	Yes	√	√				Yes
Czech Republic	– 8.0	Yes	√	√				Yes
Cyprus	n.a.	n.a.	√	√		n.a.	n.a.	n.a.
Estonia	– 8.0	Yes	√	√				Yes
Hungary	– 6.0	Yes	√	√				Yes
Latvia	– 8.0	Yes	√	√				Yes
Lithuania	– 8.0	Yes	√					Yes
Malta	n.a.	n.a.	√			n.a.	n.a.	n.a.
Poland	– 6.0	Yes	√					Yes
Romania	– 8.0	Yes	√	√				Yes
Slovak Republic	– 8.0	Yes	√	√				Yes
Slovenia	– 8.0	Yes	√	√		√	√	Yes
EU candidate countries								
Croatia	– 5.0	Yes	√	√	n.a.			Yes
Turkey	n.a.	n.a.	√		n.a.			n.a.
Other EEA member countries								
Iceland	10.0	No	√		n.a.			Yes
Liechtenstein	– 8.0	No	√		n.a.			No
Norway	+ 1.0	Yes	√		n.a.	√		Yes
Switzerland	– 8.0	No	√	√	n.a.	√		Yes

Note: √ = projected; n.a. = not applicable (no Kyoto target).

Source: EEA, based on countries' greenhouse gas inventories and projections.

Figure 2 **Relative gaps between EU Kyoto and burden-sharing targets and projections for 2010 for EU Member States, EU candidate countries and other EEA member countries**



Note: For five Member States (Denmark, the Netherlands, Spain, Sweden and the United Kingdom), the estimated effect of the EU ETS reported separately was re-introduced in the 'with existing measures' projections.

In July 2007, Spain adopted a Plan of Urgent Measures against Climate Change. Spain plans to fulfil its commitment under the Kyoto Protocol through these measures, which will be implemented in 2007. The consideration of these measures in the report was not possible as this information was not submitted in time and the data were not detailed enough.

According to Denmark's NAP for the period 2008–2012 and additional information submitted to the Commission, Denmark plans to reach its target by initiating new national climate initiatives, although these have not been identified yet.

Source: EEA, based on countries' greenhouse gas inventories and projections.

1 Introduction

This sixth annual report presents an assessment of the actual historic (1990 to 2005) and projected future progress (by 2010 and by 2020) of the European Community (EC), its Member States, EU candidate countries as well as other EEA member countries ([2]) 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 progress 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 (GHG) emissions and for implementing the Kyoto Protocol.

In this report, the assessment of whether countries are currently on track towards their individual targets is based on an analysis of:

- their past greenhouse gas emissions from 1990 to 2005;
- their intended accounting of CO_2 removals from land use, land-use change and forestry ('carbon sinks');
- their intended use of the flexible mechanisms of the Kyoto Protocol to fulfil their commitments.

The assessment of whether the countries will reach their targets by 2010 is based on a compilation of the projections by these countries regarding:

- the expected reductions from their existing and planned domestic policies and measures ([3]) by 2010 including, for some countries, mitigatory effects of the EU Emission Trading Scheme;
- their intended use of carbon sinks and of the flexible Kyoto mechanisms.

This assessment contains information on the 27 EU Member States, candidate countries and other EEA member countries, 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 Kyoto Protocol. Cyprus, Malta and Turkey do not have a target under the Kyoto Protocol, but the limited available data are presented here.

The data and analyses presented are mostly based on:

- the Annual European Community GHG inventory report ([4]) submitted to the UNFCCC in 2007 (1990–2005 emissions of the EU and of all Member States);
- the Initial Report of the European Community submitted to the UNFCCC in 2007 ([5]);

([2]) In addition to all 27 EU Member States, the other EEA member countries are Iceland, Liechtenstein, Norway, Switzerland and Turkey. The EU candidate countries are Turkey and Croatia, the latter is also an EEA cooperating country.

([3]) Domestic policies and measures are those taking place within the national boundaries. Existing policies and measures are those for which one or more of the following applies: (a) national legislation is in force; (b) one 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. Additional (planned) policies and measures are options under discussion with a realistic chance of being adopted and implemented in time to influence the emissions during the commitment period.

([4]) See EEA Technical Report No 7/2007: Annual European Community greenhouse gas inventory 1990–2005 and inventory report 2007 — Submission to the UNFCCC Secretariat.

([5]) See EEA Technical Report No 10/2006: The European Community's initial report under the Kyoto Protocol, Report to facilitate the calculation of the assigned amount of the European Community pursuant to Article 3, paragraphs 7 and 8 of the Kyoto Protocol — Submission to the UNFCCC Secretariat.

- the reports submitted by Member States to the European Commission for the assessment of projected progress towards meeting their emission limitation and reduction commitments, with descriptions of policies and measures;

- the second national allocation plans (NAPs), as notified to the European Commission, and the subsequent Commission decisions (mostly reducing the proposed emission caps).

Additional information was obtained from other documents, such as Fourth National Communications submitted to the UNFCCC. All data available up to June 2007 were included.

Except for Cyprus and Malta, all Member States provided updates on emission inventories. Updated emission projections or national programmes were provided by ten of the EU-15 Member States and eight of the new Member States. Updated information on policies and measures was provided by 21 Member States. The reporting of indicators to monitor and evaluate progress with policies and measures improved this year, since 21 Member States now report on indicators. The quality of reporting varies among the Member States. Detailed country information on national greenhouse gas emission trends, projections, policies and measures, and methodologies (including references) is presented as country profiles in the annexes.

2 The Kyoto Protocol targets and further EU commitments

- The EU, its 27 Member States, as well as four of the five additional EEA member countries have ratified the Kyoto Protocol which entered into force on 16 February 2005. Croatia ratified the Kyoto Protocol in May 2007.
- Turkey has ratified the UNFCCC, but not the Kyoto Protocol.
- The European Council decided in March 2007 that the EU should make a firm independent commitment to achieve at least a 20 % reduction of greenhouse gas emissions by 2020 compared to 1990 levels.

2.1 The Kyoto Protocol

Combating climate change and minimising its potential consequences by achieving stabilisation of atmospheric greenhouse gas concentrations are key objectives of the UN Framework Convention on Climate Change (UNFCCC) and represent a high priority for the European Union.

This requires substantial reductions in global greenhouse gas emissions. Under the Convention on Climate Change which entered into force on 21 March 1994, countries with developed economies have committed themselves by limiting their anthropogenic emissions of greenhouse gases. These countries are referred to as Annex I countries. In 1997 Parties to the UNFCCC adopted the Kyoto Protocol. The Protocol has mandatory targets on greenhouse gas emissions for Annex I countries which have accepted it, 'with a view to reducing their overall emissions of such gases by at least five per cent below 1990 levels in the commitment period 2008 to 2012'. However, since not all developed countries have ratified the Protocol, the overall reduction target for those countries that have ratified the Protocol ([6]) is lower and the resulting reduction for all developed countries as a whole amounts to a reduction of approximately 2 % in relation to base-year emissions.

As of 6 June 2007, 174 countries and one regional integration organisation (the European Community) had ratified, accepted, approved or acceded ([7]) to the Kyoto Protocol. This includes 41 Annex I Parties who accounted for 61.6 % of all Annex I CO_2 emissions in 1990. The Kyoto Protocol entered into force on 16 February 2005, following ratification by Russia, which was necessary to represent at least 55 % of the emissions from Annex I countries.

2.2 The EU-15 Kyoto target and the burden-sharing targets

Under the Kyoto Protocol, the EU-15 has taken on a common commitment to reducing emissions by 8 % between 2008–2012 compared to base-year emissions. Within this overall target, differentiated emission limitation or reduction targets have been agreed for each of the 15 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. Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Romania, Slovak Republic 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 2.1).

([6]) EEA Report No 1/2005: Climate change and a European low-carbon energy system.
([7]) Acceptance, approval and accession have the same legal effect as ratification.

Of 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. Switzerland and Liechtenstein have reduction targets of 8 % (Figure 2.1). Turkey is a Party to the UNFCCC, but not to the Kyoto Protocol and therefore has no reduction target.

Croatia, which is an EEA cooperating country and started accession negotiations with the EU in 2005, ratified the Kyoto Protocol in May 2007 and has a reduction target of 5 % (Figure 2.1).

2.3 Base-year emissions

Under the Kyoto Protocol the greenhouse gas emission level in the base year is the relevant starting point for tracking progress.

For most EU Member States, the base year is 1990 for carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), and 1995 for fluorinated gases (SF_6, HFCs and PFCs). Five of the new Member States have base years or periods under the Convention and the Kyoto Protocol that differ from 1990 for CO_2, CH_4 and N_2O, which is possible for economies in transition (Table 2.1).

Base-year emissions data have been subject to several revisions over the past years, due to improved emission estimation methods or improved data. Base-year levels, against which the absolute emission targets for the commitment period 2008–2012 can be calculated, have been fixed recently by the countries in their 'initial reports' pursuant to Article 3, Paragraphs 7 and 8 of the Kyoto Protocol, and submitted to the UNFCCC ([8]). The European Community's initial report under the Kyoto Protocol was submitted to the UNFCCC on 18 December 2006 (updated on 2 February 2007). All initial reports are undergoing a review procedure by the UNFCCC in 2007. They are therefore subject to further change, but these changes are not reflected in this report, as the base year and assigned amounts have not yet been finalised for all EU Member States. The approved and final base-year emissions to be considered for the commitment period will be published in a revision of Commission Decision 2006/944/EC determining the respective emission levels allocated to the Community and each of its Member States under the Kyoto Protocol.

Table 2.1 Base years for the EU-15 and individual countries

EU-15 Member States	**CO_2, CH_4, N_2O**	**HFCs, PFCs, SF_6**
Austria	1990	1990
Belgium	1990	1995
Denmark	1990	1995
Finland	1990	1995
France	1990	1990
Germany	1990	1995
Greece	1990	1995
Ireland	1990	1995
Italy	1990	1990
Luxembourg	1990	1995
Netherlands	1990	1995
Portugal	1990	1995
Spain	1990	1995
Sweden	1990	1995
United Kingdom	1990	1995
EU-15	1990	1990, 1995 *
New Member States	**CO_2, CH_4, N_2O**	**HFCs, PFCs, SF_6**
Bulgaria	1988	1995
Cyprus	Not relevant	Not relevant
Czech Republic	1990	1995
Estonia	1990	1995
Hungary	1985–1987	1995
Latvia	1990	1995
Lithuania	1990	1995
Malta	Not relevant	Not relevant
Poland	1988	1995
Romania	1989	1989
Slovak Republic	1990	1990
Slovenia	1986	1995
Other EEA member and cooperating countries	**CO_2, CH_4, N_2O**	**HFCs, PFCs, SF_6**
Croatia **	1990	1990
Iceland	1990	1990
Liechtenstein	1990	1990
Norway	1990	1990
Turkey	Not relevant	Not relevant

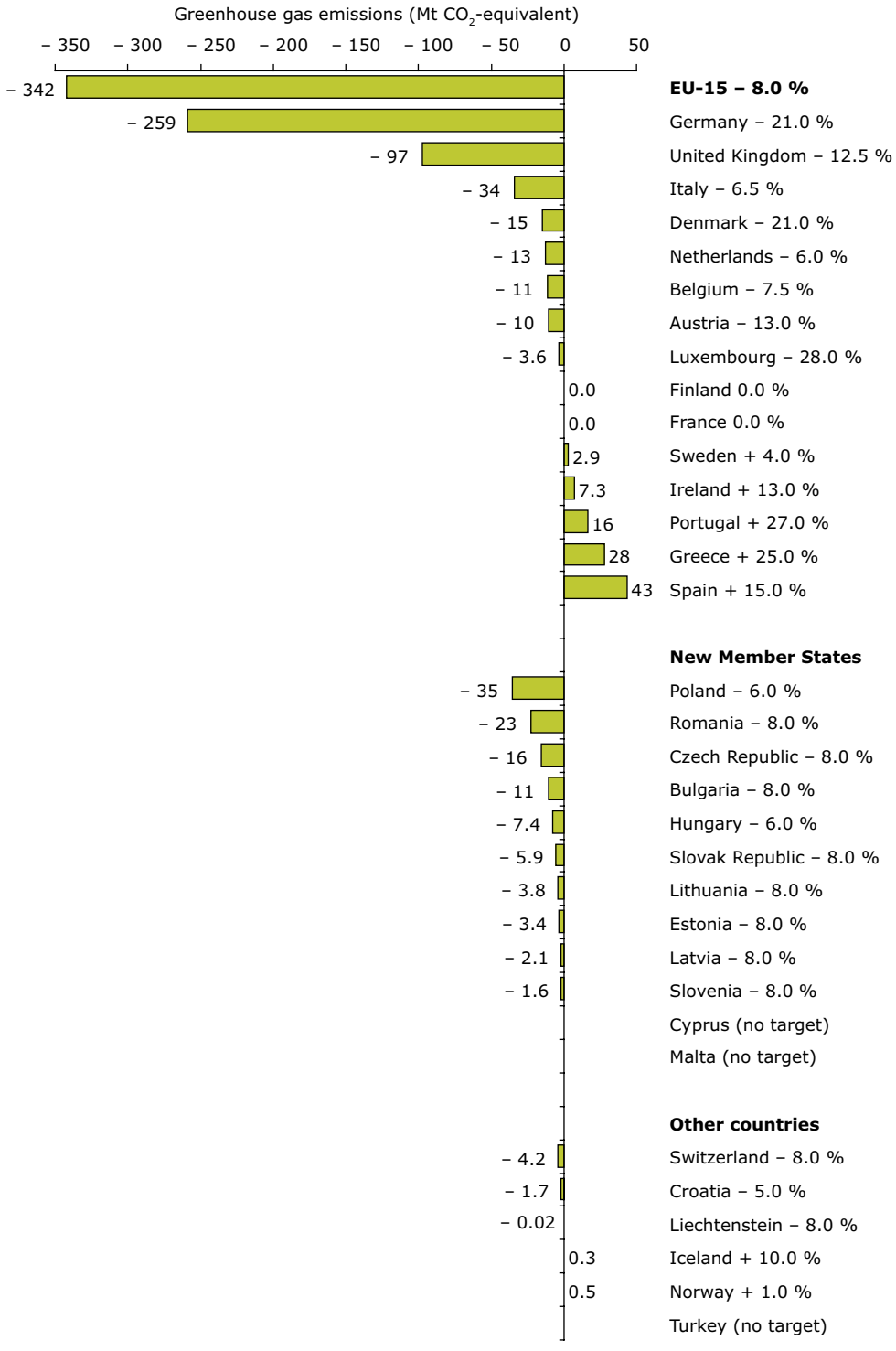
Note: * 1990 (Austria, France, Italy), 1995 (other Member States).

** Croatia's base-year emissions include an additional 3.5 Mt CO_2-equivalents, in accordance with Decision 7/CP.12 of the Conference of the Parties under the UNFCCC.

Source: EEA, 2007b.

([8]) See: http://unfccc.int/national_reports/initial_reports_under_the_kyoto_protocol/items/3765.php and http://reports.eea.europa.eu/technical_report_2007_7/en.

Figure 2.1 Greenhouse gas emission targets of all EU-27 Member States, EU candidate and other EEA member countries for 2008–2012 relative to base-year emissions



Note: Base-year emissions are determined in initial reports, submitted in 2006 and undergoing UNFCCC review in 2007. Therefore emission targets presented in this graph are still subject to further change.

In Commission Decision 2006/944/EC determining the respective emission levels allocated to the Community and each of its Member States under the Kyoto Protocol, the respective emission levels were expressed in terms of tonnes of CO_2-equivalents. In connection with Council Decision 2002/358/EC, 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 in 2006. In 2006, it was decided to postpone a decision on this until after all Community and Member State initial reports have been reviewed under the Kyoto Protocol.

Croatia's base-year emissions include an additional 3.5 Mt CO_2-equivalents, in accordance with Decision 7/CP.12 of the Conference of the Parties under the UNFCCC.

Source: EEA, 2007b.

2.4 Reference years used for past trends and for projections

To achieve consistency when assessing progress towards Kyoto targets, the present report uses two types of base years for comparisons:

- Historic emissions (1990–2005) were compared to the base-year emissions (and the derived absolute emission targets) reported in the EC's initial report under the Kyoto Protocol.

- 2010 projections were compared to the base-year emissions used as a reference for making these projections (i.e. base-year emissions reported in the national reports on projections).

In many cases there is a slight difference between the base year reported in the initial report under the Kyoto Protocol and those reported by Member States alongside their projections. These differences are small in the EU-15 (less than 0.1 % for eleven Member States and less than 1 % for the four others), but can be more significant in new Member States (between 1.1 % and 4.7 % for four of them).

In 2007, most Member States reported base-year data alongside their projections. However, Austria and Luxembourg reported only 1990 data for all gases (including fluorinated gases). These reported data have been used in this report.

Cyprus and Malta are non-Annex I Party Signatories to the Kyoto Protocol and Turkey has not ratified the Protocol. These countries do not have emission reduction targets for 2010 and hence they do not have a base year. The 'starting year' against which projections were assessed for the purpose of this report, was taken to be 1990 for Cyprus, 1993 for Malta ([9]) , and for Turkey 1990 for CO_2, CH_4 and N_2O (as for most other countries) and 1996 for fluorinated gases, the first year emissions were reported.

The EU-27 does not have a common base year under the Kyoto Protocol. Hence the progress of the EU-27 is assessed against the sum of 1990 emissions in all EU-27 Member States.

2.5 Further EU commitments by 2020

In March 2007, the Council of the European Union decided that the EU would make a firm independent commitment to achieving at least a 20 % reduction of greenhouse gas emissions by 2020 compared to 1990. The European Council has also endorsed an EU objective of a 30 % reduction in greenhouse gas emissions by 2020 compared to 1990 as its contribution to a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and that economically more advanced developing countries should contribute adequately according to their responsibilities and respective capabilities.

The European Council has also decided that contributions of the Member States need to reflect fairness and transparency as well as take into account national circumstances and the relevant base years for the first commitment period of the Kyoto Protocol. Discussion on 'burden-sharing' of the greenhouse gas emission reductions among Member States towards 2020 targets have commenced in 2007.

([9]) For Malta's assessment projection information was taken from the National Allocation Plan, as the information in Malta's submission is very limited. 1993 is the earliest year of available data so it is taken as the base year for projections.

3 Greenhouse gas emissions in EU-27

- Greenhouse gas emissions in the EU-27 have decreased by 7.9 % compared to 1990.
- With existing policies and measures, EU-27 greenhouse gas emissions are projected to be 7.5 % below the 1990 level by 2010, therefore at a similar level to 2005. With additional policies and measures, emissions are projected to be 11 % below 1990 level.
- A first assessment of EU-27 aggregated 2020 projections shows that, with the implementation by Member States of all reported additional measures, greenhouse gas emissions in 2020 will be approximately 2 % higher than in 2005. Total EU-27 emissions are therefore projected to be only 6 % below 1990 levels by 2020, a significantly higher level than the – 20 % unilateral commitment set by the European Council in March 2007. However, these initial 2020 projections do not tend to include effects from additional policies.

3.1 Historic trend 1990–2005

Total EU-27 greenhouse gas emissions were equal to 5 177 Mt CO_2-equivalents in 2005. This represents a slight decrease (– 0.7 %) compared to 2004, bringing emissions 7.9 % below the 1990 level (Figure 3.1). After the upward trend observed during the recent three-year period 2002–2004, this is positive, although emissions are still higher than the levels prevailing between 1999 and 2002. The EU-15 represents 81 % of the total 2005 emissions (with 79 % of the whole EU-27 population). Section 3.3 explores emissions *per capita* in further detail.

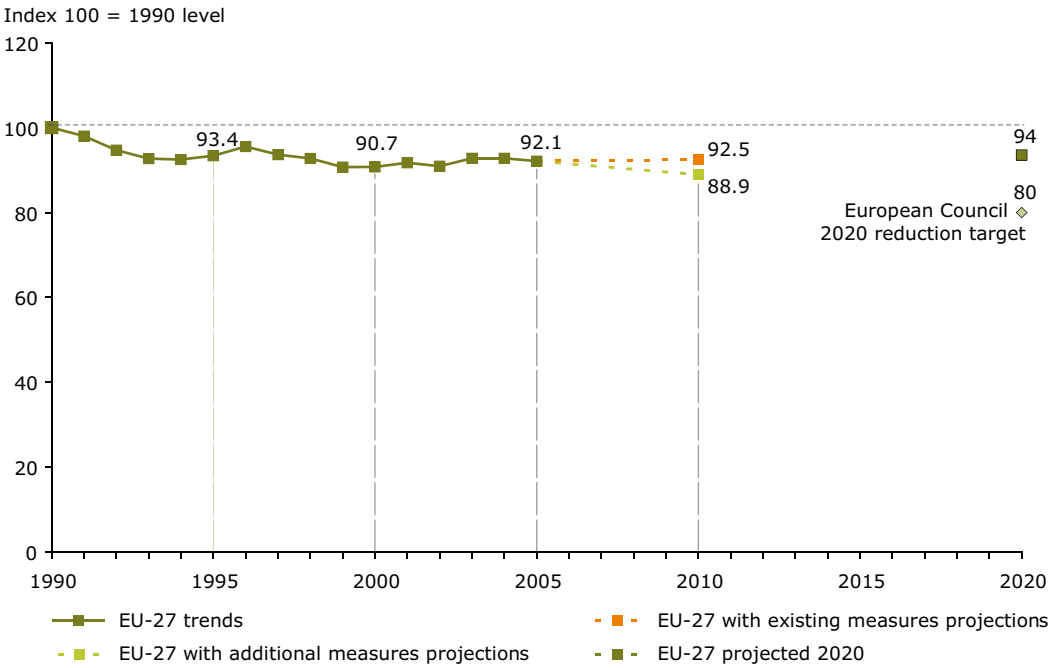
3.2 2010 and 2020 projections

By 2010, total EU-27 greenhouse gas emissions are projected to be 7.5 % lower than in 1990. This projection is based on Member States estimates which take into account all existing domestic policies and measures. The projected decline compared to 1990 is 11 % if additional domestic policies and measures are also taken into account. This implies that EU-27 emissions will not be further reduced between 2005 and 2010 if the additional policies and measures under discussion are not adopted and implemented in time by the Member States.

In the long term, and in the absence of any current global post-Kyoto agreement ([10]), projected emissions by 2020 for the EU-27 can be compared to the commitment target of a 20 % reduction, unilaterally decided by the European Council in March 2007. A first assessment of 2020 projections by Member States indicates that greenhouse gas emissions in the EU-27 can be expected to rise after 2010 and to be 6 % below 1990 levels by 2020, thereby being 2 % higher than in 2005. However, these initial 2020 projections do not tend to include the effects from additional policies.

([10]) International discussions regarding a post-Kyoto framework agreement on climate change are set to begin at the 2007 UNFCCC Conference of Parties (COP) meeting in Bali (Indonesia), with a view to reach a final agreement at the 2009 COP meeting in Copenhagen (Denmark).

Figure 3.1 EU-27 greenhouse gas emission trends and projections to 2020

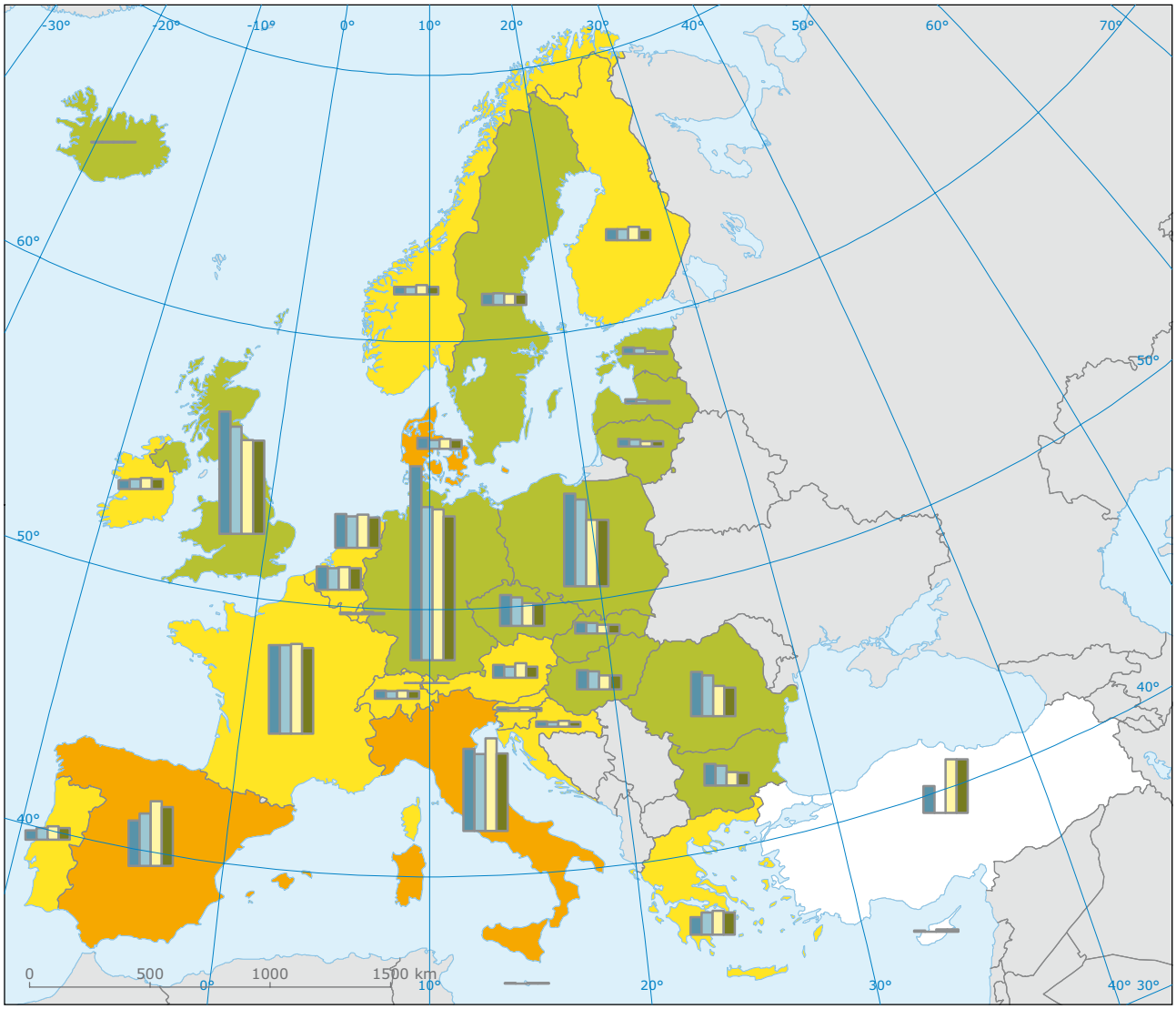


Note: Data exclude emissions and removals from land-use change and forestry.

The following Member States did not report 2015 or 2020 projections: Portugal, Luxembourg, Estonia and Malta. The greenhouse gas projections for the EU-27 are calculated on the basis of projections reported by 23 Member States (EU-23). The 2005–2002 percent variation of the EU-23 was applied to Portugal, Luxembourg, Malta and Estonia to obtain an EU-27 projection for 2020.

Source: EEA, based on EU Member States greenhouse gas inventories and projections.

Figure 3.2 Projections of greenhouse gas emissions in Europe for 2010



Greenhouse gas emissions and projections (with existing measures) in European countries, compared to individual burden-sharing and Kyoto targets

500 Mt CO_2-eq

- Base-year emissions
- Kyoto target
- 2010 projections with existing measures
- 2010 projections with all measures (existing and additional), use of carbon sinks and Kyoto mechanisms

- Country planning to reach its target with existing measures
- Country planning to reach its target with all measures (existing and additional), use of carbon sinks and Kyoto mechanisms
- Country not planning to reach its target
- Country with no emission target
- Outside coverage

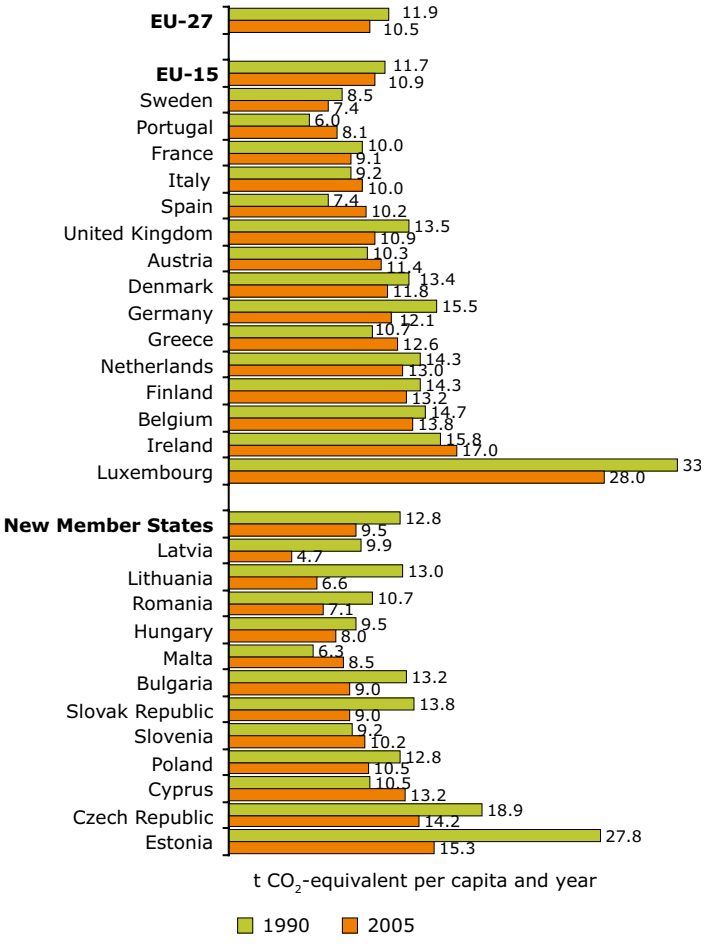
Source: EEA, based on EU Member States greenhouse gas inventories and projections.

3.3 Emissions *per capita*

The greenhouse gas emissions *per capita* show significant differences across the EU Member States. There is a difference of a factor of three between the Member States with lowest emissions *per capita* (Latvia, Lithuania, Portugal and Sweden), and those with highest *per capita* emissions (Luxembourg and Estonia). In Luxembourg, one reason for the high *per capita* emissions could be 'fuel tourism' (fuel bought in Luxembourg by people living in border regions of other countries and truck drivers, because of lower fuel taxes), which the country estimates to be responsible for about 40 % of its total greenhouse gas emissions.

Between 1990 and 2005, EU-27 *per capita* emissions declined by 11.7 % (1.4 tonnes *per capita*). The main decrease occurred particularly in the early 1990s. Between 2000 and 2005, *per capita* emissions showed no overall change within the EU-27 although they decreased slightly in the EU-15 (1.2 %) and increased by 3.4 % in the new Member States. In 1990, *per capita* emissions were on average somewhat higher in the new EU Member States than in the EU-15 (Figure 3.3). They decreased between 1990 and 2005 in both the EU-15 (– 7 %) and the new Member States (25 %). The decrease in the EU-15 was largely due to emission reductions in Germany and the United Kingdom. During the same period, Spain showed an increase of *per capita* emission by about a third, although by 2005 it was still below the EU average. All of the new Member States, except Cyprus, Malta and Slovenia have decreased their *per capita* emissions substantially since 1990.

Figure 3.3 Greenhouse gas emissions *per capita* of EU-27 Member States for 1990 and 2005



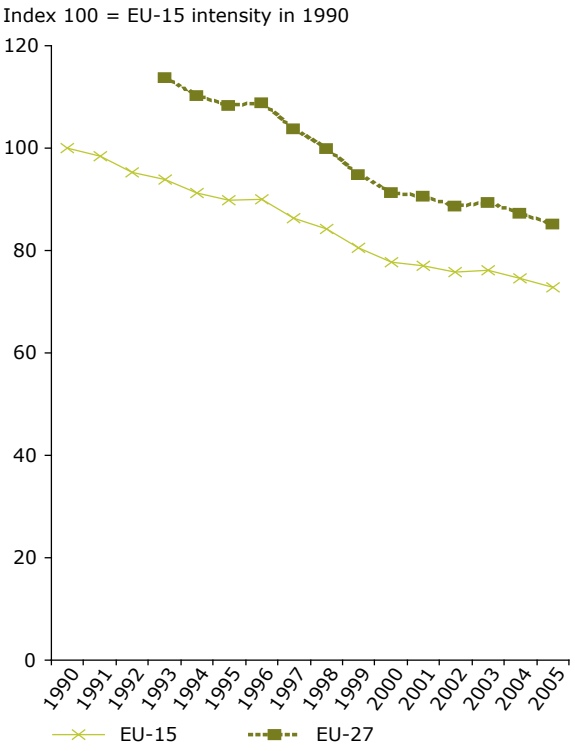
Source: EEA, based on EU Member States greenhouse gas inventories; Eurostat.

3.4 Emissions intensity of economies

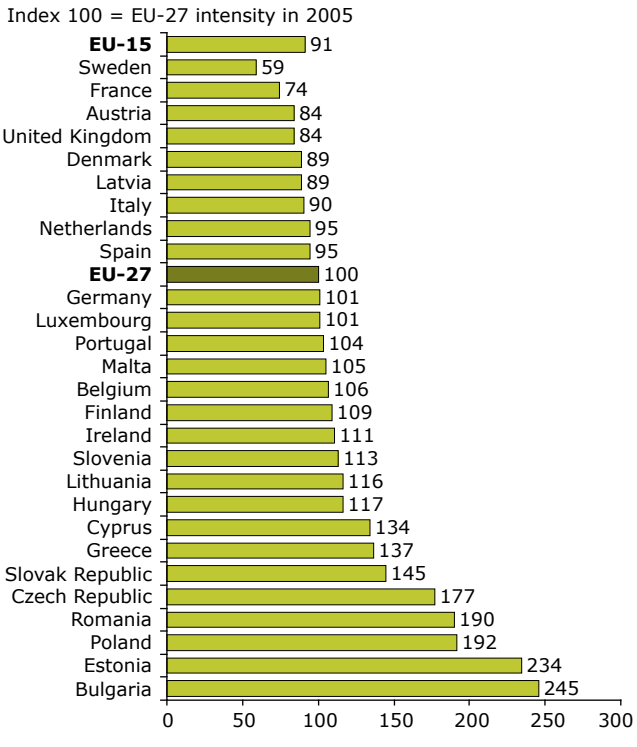
The trend of greenhouse gas emissions relative to GDP is an indicator for assessing possible decoupling between economic development and emissions. Figure 3.4 shows that the emissions intensity trends of the EU-15 and EU-27 economies is decreasing. A relative decoupling took place in the EU-15 from 1990 onwards, and in the EU-27 after 1998. This is due to the economic growth of new Member States in the late 1990s. In most countries, greenhouse gas emissions intensity decreased over the period, but actual intensities are still high and vary widely across countries. In all new Member States except Latvia, the absolute intensity in 2005 is higher than in the EU-27, i.e. either GDP is lower and/or greenhouse gas emissions are higher than the EU-27 average. This indicates some potential in these countries for further economic growth with further reduced greenhouse gas emissions. In 2005, Greece, Ireland, Finland, Belgium, Portugal, Luxembourg and Germany show intensities above the EU-27 average.

Figure 3.4 Greenhouse gas emissions intensity of EU-15 and EU-27 economies and of their Member States

Change in greenhouse gas emissions per GDP in the EU, 1990–2005



Greenhouse gas emissions per GDP in the EU in 2005 relative to EU-27



Note: The chart on the left shows the change in the economic intensity of greenhouse gases (i.e. greenhouse gases divided by GDP) between 1990 and 2005. GDP is measured in constant prices. It is expressed as an index where the intensity in 1990 for the EU-15 equals 100. The EU-27 intensity is relative to the EU-15 and starts in 1993 because of missing data for a few Member States. A trend line below 100 indicates there has been a relative decoupling of greenhouse gases from economic growth.

The chart on the right shows the greenhouse gas economic intensity (i.e. greenhouse gases divided by GDP) for each country in 2005 relative to the EU-27 (index = 100). GDP here is measured in purchasing power standards. These are currency conversion rates that both convert to a common currency and equalise the purchasing power of different currencies. They eliminate the differences in price levels between countries, allowing meaningful volume comparisons of GDP. They are a suitable unit for benchmarking country performance in a particular year.

Source: EEA, based on EU Member States greenhouse gas inventories; Eurostat; Ameco database, European Commission.

4 Greenhouse gas emissions in EU-15 Member States

EU-15 assessment

- Greenhouse gas emissions in the EU-15 decreased by 0.8 % in 2005, reaching a level 1.5 % lower than in 1990, whilst being 1.4 % higher than in 2000 and close to 1992 levels.
- Based on past emissions, the EU-15 is not on track to reach its Kyoto target. Its 2005 emissions stand above a hypothetical line between base year and its target emissions under the Kyoto Protocol. Compared to base-year levels, EU-15 greenhouse gas emissions have been reduced by 2.0 %. This represents only one fourth of the total reduction needed to achieve the 8 % reduction target.
- According to projections from its Member States for 2010, the EU-15 will reach and even overachieve its Kyoto target. However this will not be attained within existing policies and measures alone since these are projected to deliver a reduction of only 4.0 % relative to base-year emissions by 2010. The remaining gap is projected to be filled by a combination of additional measures (– 3.9 %), the use of carbon sinks (– 0.9 %) and the use of Kyoto mechanisms by ten Member States (– 2.5 %). This also relies on the assumption that some Member States will exceed substantially their individual target to cover the gap left by Member States who might not achieve their own target. These over-deliveries will have to remain available to the rest of the EU-15, which cannot be taken for granted.
- Compared to last year's analysis for the EU-15, the projected reduction in emissions from existing domestic policies and measures by 2010 has greatly increased. This is mostly due to revised projections from Germany and France together with the inclusion of projections from some Member States on the expected effect of the EU ETS on their emissions (in particular the United Kingdom and Spain). Savings from additional measures were not significantly affected by new projections.

Member States assessment (EU-15)

- Based on past trends (1990–2005), five Member States are considered on track to meet their burden-sharing target (Sweden, the United Kingdom, Germany, Finland and France). Three additional Member States are also on track when the future use of carbon sinks and Kyoto mechanisms is taken into account (Luxembourg, the Netherlands and Belgium). This represents an additional three Member States (Finland, Belgium and Luxembourg) to the five that were already considered on track in 2006 (Sweden, the United Kingdom, Germany, France and the Netherlands).
- Twelve Member States (the United Kingdom, Sweden, Germany, the Netherlands, Portugal, France, Finland, Belgium, Ireland, Austria, Greece and Luxembourg) project that they will meet their 2010 targets through a combination of current and future domestic policies and measures, as well as the use of carbon sinks and flexible Kyoto mechanisms.
- Spain, Austria, Italy, Ireland, Portugal, Greece and Denmark are currently not on track to meet their individual targets based on past trends, even when the planned use of carbon sinks and Kyoto mechanisms is taken into account. The 2010 projections of Spain, Denmark and Italy indicate that they will not meet their targets, despite the use of Kyoto mechanisms and carbon sinks. However, Denmark and Spain recently reported on supplementary actions they intend to take in order to reach their targets. Furthermore, the effect of the recent Commission decisions on the national allocation plans for the period 2008–2012 of the EU Emission Trading Scheme is not fully accounted for in the present analysis.
- Projections from thirteen of the EU-15 Member States give a more positive picture than last year. In particular, four of the seven Member States which had projected they would miss their targets are now expecting to reach them. For the three remaining Member States which still do not project that they will meet their targets, the gap between projections and targets has been significantly reduced compared to last year.

4.1 Historic trends

4.1.1 2005 emissions and five-year average emissions

Total EU-15 greenhouse gas emissions in 2005 were equal to 4 192 Mt CO_2-equivalents. This is 1.5 % lower than in 1990 and 2.0 % lower than the base-year level (Figure 4.1). Between 2004 and 2005, emissions decreased by 0.8 % (35.2 Mt CO_2-equivalents), mainly due to a decrease in CO_2 emissions by 0.7 % (26 Mt). Despite this recent reduction, 2005 emissions are still higher than in 2000 and are close to 1992 levels.

Since commitments under the Kyoto Protocol relate to emissions during a five-year commitment period (2008–2012), it is also relevant to analyse the trend of a five-year rolling average of EU-15 greenhouse gas emissions (Figure 4.1). The average emissions during the recent five-year period 2001–2005 match exactly the 2005 annual emissions. However, trends are different between annual and averaged emissions: while annual emissions decreased between 2004 and 2005, the five-year rolling average has been increasing since 2002 to reach its highest level in 2005, with peak annual levels reached in 2003 and 2004.

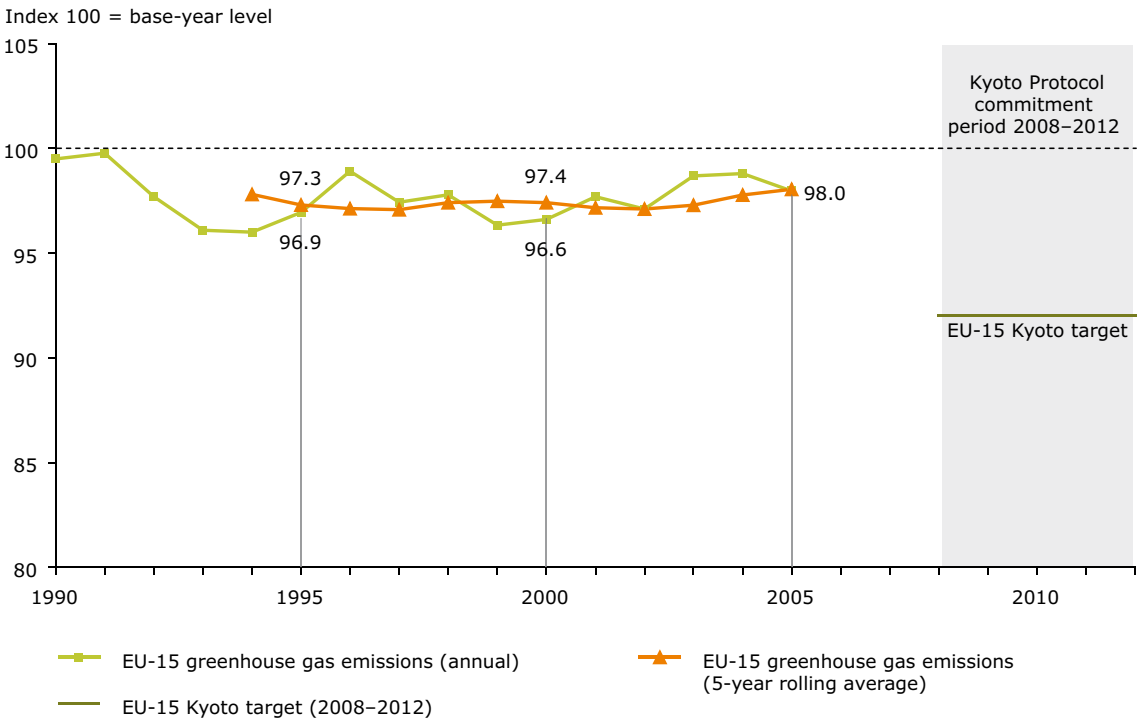
4.1.2 1990–2005 trends

The emission reductions in the early 1990s were largely a result of:

- increasing efficiency in power and heating plants;
- the economic restructuring in eastern 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;
- significant reductions in nitrous oxide emissions in the chemical industry in France, Germany and the United Kingdom (see Chapter 9).

After 1999, emissions show an increasing trend until 2004. This was due to increases resulting from energy supply and use (including transport). Emissions from public electricity and heat production rose due to the increased use of solid and gaseous fuels, whereas liquid fuels were used less. In the transport sector, emissions from all transport modes increased, except for rail. For example, road transport emissions increased by more than 5 %

Figure 4.1 Annual emissions and five-year rolling average of EU-15 greenhouse gas emissions (1990–2005)



Note: The five-year rolling average for a year (Y) corresponds to the average emissions of the five-year period: (Y-4)–(Y).

Source: EEA, based on EU-15 Member States greenhouse gas inventories.

between 1999 and 2004. As a major contributor the use of diesel oil increased by 22 % whereas the use of gasoline decreased by 13 %. Emissions from industrial processes increased by 3 % between 2002 and 2004, which was mainly due to an intense use of halocarbons and SF_6 and resulted in increases of total greenhouse gas emissions by 2004.

4.1.3 2004–2005 trends

The main sectoral contributions to greenhouse gas reductions between 2004 and 2005 in the EU-15 came from public electricity and heat production, households and services, and road transport. In these sectors:

- CO_2 from public electricity and heat production decreased by 0.9 % (9.6 Mt) mainly due to a reduction in the reliance on coal;
- CO_2 from households and services decreased by 1.7 % (7.0 Mt), in particular in Germany, the United Kingdom and the Netherlands, where the milder winter compared to the previous year, was a factor;
- CO_2 from road transport decreased (for the first time) by 0.8 % (6 Mt), mainly due to reduced specific fuel consumption in Germany, through increasing volumes of diesel-powered cars, the effects of the eco-tax and the purchase of fuel from outside Germany (fuel tourism in neighbouring Member States).

Germany, Finland and the Netherlands contributed most to the EU-15 reduction. In this way, lowering of CO_2 emissions drove the overall decrease of greenhouse gas emissions in these Member States.

- Germany reduced emissions by 2.3 % or 23.5 Mt CO_2-equivalents, mainly due to a shift from coal to gas in the production of public electricity and heat. In addition, emissions from road transportation and from households and services declined substantially.
- Finland reduced emissions by 14.6 % or 11.9 Mt CO_2-equivalents, mainly due to electricity imports which led to a substantial decrease in the use of fossil fuels in the production of public electricity and heat. Coal use, in particular, decreased.
- The Netherlands reduced emissions by 2.9 % or 6.3 Mt CO_2-equivalents, with less fossil fuel being used for the production of public electricity and heat. The household and service sector also used less fuel due to a warmer winter.

Emissions similarly decreased between 2004 and 2005 in Belgium, Denmark, France, Luxembourg, Sweden and the United Kingdom.

In absolute terms, Spain increased greenhouse gas emissions the most between 2004 and 2005. In Spain, the increase in greenhouse gas emissions by 3.6 % or 15.4 Mt CO_2-equivalents came mainly from public electricity and heat production. This was due to a rise in electricity generation from fossil fuel thermal power stations (17 %) and a decrease in electricity generation from hydropower plants (– 33 %).

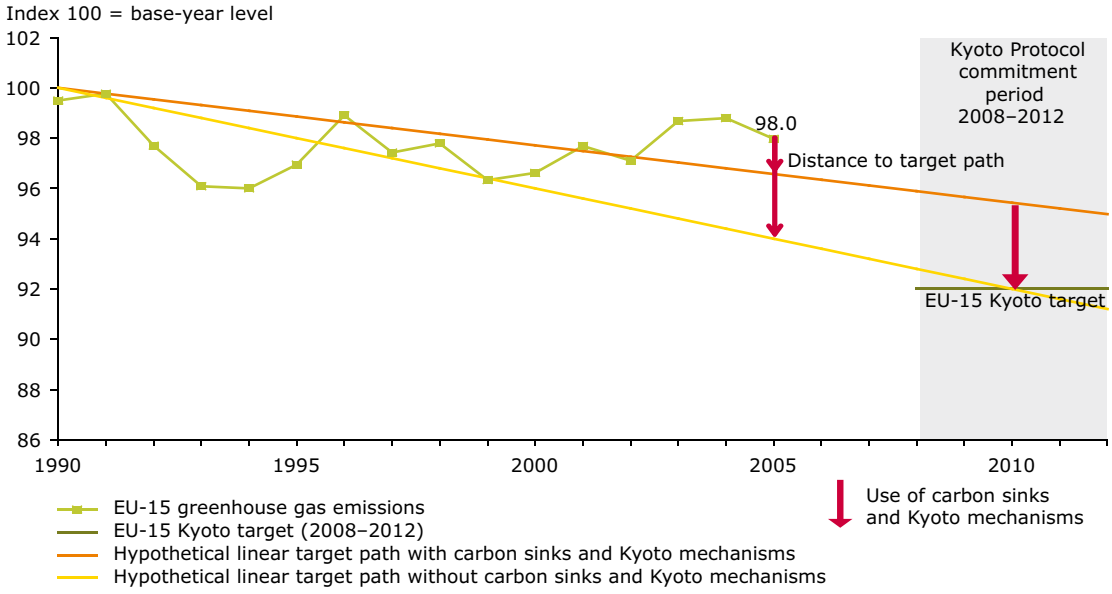
Emissions also increased between 2004 and 2005 in Austria, Greece, Ireland, Italy and Portugal.

4.2 Current progress towards Kyoto and burden-sharing targets

At 2.0 % below base-year level, 2005 greenhouse gas emissions in the EU-15 are slightly higher than 1992 emissions. The reduction achieved in 2005 represents one quarter of the 8 % reduction needed to reach the EU-15 greenhouse gas emission target during the first commitment period (2008–2010).

Current progress towards the Kyoto and burden-sharing targets is assessed by comparing 2005 greenhouse gas emissions with a hypothetical line (target path) between base-year emissions in 1990 and the emission target for 2010. Based on this analysis, Figure 4.2 shows that despite the decrease between 2004 and 2005, total greenhouse gas emissions in the EU-15 are still above their target path, even when the further expected reductions due to the use of carbon sinks and Kyoto mechanisms (see Section 4.3 below) are taken into account. This means that based on past trends, the EU-15 is not considered on track in 2005 to meet its Kyoto target (Figures 4.2 and 4.3), and that further significant efforts should be made to bring emissions back to the right track to meet the EU-15 Kyoto target.

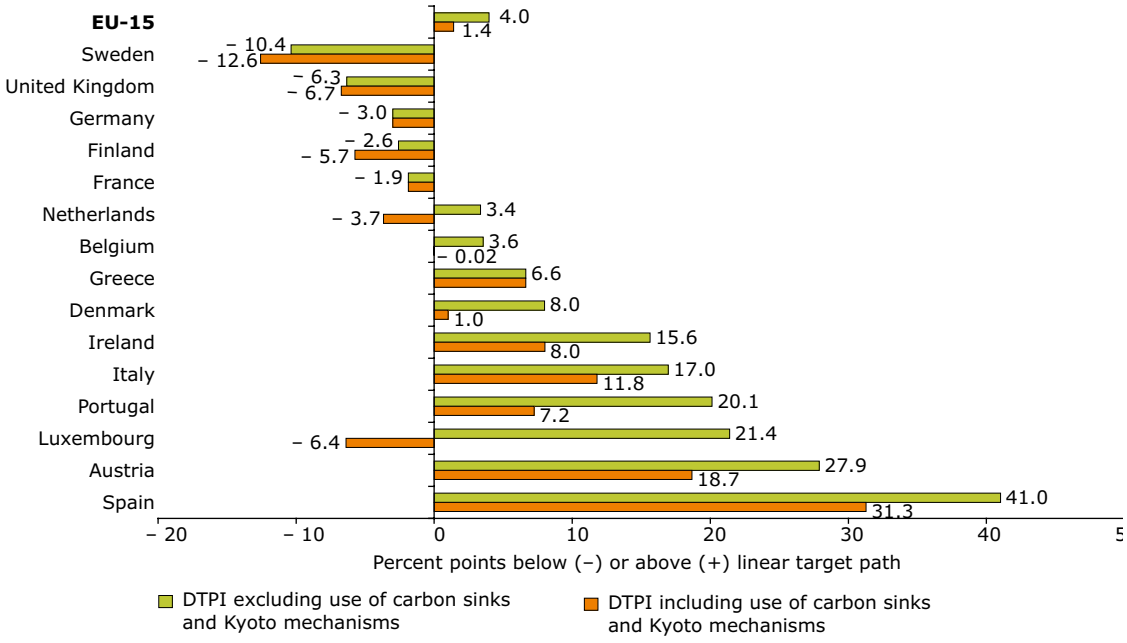
Figure 4.2 Comparison of 2005 EU-15 emissions with hypothetical target paths towards the EU-15 Kyoto target



Note: The Kyoto mechanisms are projected to account for 2.5 % of the EU-target of an 8 % reduction, and the carbon sink activities are projected to contribute to an additional 0.9 %. Thus, both hypothetical linear target paths presented here start at 100 in 1990, but in 2010 one reaches 92.0 while the other reaches 92.0 + 3.4. For more information on Kyoto mechanisms and carbon sinks, see Chapters 7 and 9.

Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections.

Figure 4.3 Distance-to-target-path indicator for EU-15 Member States in 2005



Note: The distance-to-target-path indicator (DTPI) measures the deviation in percentage points of actual emissions in 2005 from a (hypothetical) linear path between base-year emissions and the burden-sharing target for 2010. A positive value suggests an underachievement and a negative value an overachievement by 2005. The DTPI is used as an early indication of progress towards the Kyoto and Member States burden-sharing targets.

Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections.

Based on their emissions trends between 1990 and 2005:

- five EU-15 Member States were on track to meeting their burden-sharing target, even without taking into account the use of carbon sinks and Kyoto mechanisms: Sweden, the United Kingdom, Germany, Finland and France and Belgium (Figure 4.3);
- three other Member States are also considered on track to meet their target when the future use of carbon sinks and Kyoto mechanisms is taken into account (Luxembourg, the Netherlands and Belgium).

This represents three additional Member States now considered on track to meeting their 2010 target (Finland, Belgium and Luxembourg) compared to the 2006 analysis (which was based on 1990–2004 trends). In Belgium and Finland, this new situation is due to the significant emission reductions that occurred between 2004 and 2005. In Luxembourg, it is mainly due to increased projected use of Kyoto mechanisms.

Seven EU-15 Member States are not on track to meeting their targets based on past trends: Spain, Austria, Italy, Ireland, Portugal, Greece and Denmark (Figure 4.3).

4.3 Means to achieve greenhouse gas emission reductions

4.3.1 Existing and additional domestic policies and measures

Domestic policies and measures are those taking place within the national boundaries. Existing policies and measures are those for which one or more of the following apply:

- national legislation is in force;
- one or more voluntary agreements have been established;
- financial resources have been allocated;
- human resources have been mobilised;
- an official government decision has been made and there is a clear commitment to proceed with implementation.

Additional (planned) policies and measures are options under discussion with a realistic chance of being adopted and implemented in time to influence the emissions during the commitment period.

4.3.2 Use of Kyoto mechanisms by Member States governments

Under the Kyoto Protocol, in addition to domestic policies and measures, Member States can use flexible mechanisms to help meeting their targets. The three types of Kyoto mechanisms are joint implementation (JI), the clean development mechanism (CDM) and international emissions trading. The main source of updated information on Kyoto mechanisms is the questionnaire under the greenhouse gas monitoring mechanism (Decision 2004/280/EC, Annex V). Ten EU-15 Member States have intentions to use these instruments, but only some are in an advanced stage of implementing these Kyoto mechanisms (see Chapter 7).

4.3.3 Use of carbon sinks

According to Articles 3.3 and 3.4 of the Kyoto Protocol, additional CO_2 removals from land use, land-use change and forestry (LULUCF) activities (carbon sinks) can be accounted for in reaching the Kyoto targets. While accounting for the activities covered by Article 3.3 (afforestation, reforestation and deforestation) is mandatory, developed countries may elect to take into account Article 3.4 activities (forest management, cropland management, grazing-land management and revegetation). Ten EU-15 Member States provided quantitative projections on their carbon sinks. Overall, the projected use of carbon sinks by EU-15 Member States will deliver a reduction of 0.9 % relative to base-year emissions (see Chapter 9).

4.3.4 Effect of the EU Emission Trading Scheme

Separate estimates of the effect of the EU Emission Trading Scheme on national greenhouse gas emissions were available from ten EU-15 Member States. Half of these Member States included these estimates in their national projections (Austria, Finland, France, Ireland and Luxembourg). The other five (the Netherlands, Spain, the United Kingdom, Sweden and Denmark) provided separate information about the impact of the EU ETS on their accounting under the Kyoto Protocol. These estimates were incorporated as far as possible in this analysis and were considered as part of the national projections on domestic measures. However, the

present assessment does not take into account the effect of the recent Commission decisions on the national allocation plans for the period 2008–2012 of the EU Emission Trading Scheme.

The overall effect of the EU ETS is analysed separately in Chapter 7.

4.4 2010 projections

4.4.1 Member States assessment

Twelve EU-15 Member States project that they will achieve their burden-sharing target by 2010. This includes all eight Member States considered on track to meeting their target in 2005 (Sweden, Luxembourg, the United Kingdom, Finland, the Netherlands, Germany, Belgium and France) and four Member States that are not considered to be on track, based on past trends (Austria, Portugal, Ireland and Greece). These 12 Member States plan to reach their own targets by various combinations of measures or mechanisms, as described below (Figure 4.4).

- The United Kingdom, Sweden and Germany plan to achieve their burden-sharing targets in 2010 with existing domestic policies and measures only.

- France and Greece anticipate reaching their commitment targets by 2010 if planned policies and measures are adopted and implemented on time.

- The Netherlands, Finland, Belgium and Luxembourg expect to reach their targets by implementing additional domestic measures and using Kyoto mechanisms.

- Although not on track in 2005, Portugal, Ireland and Austria project that they will reach their commitment targets by 2010 if additional domestic policies and measures are implemented on time and by making use of Kyoto Mechanisms and accounting of carbon sinks.

- Three Member States (Spain, Italy and Denmark) are not on track based on past trends and their projections indicate that they will not reach their targets, despite the use of carbon sinks and Kyoto mechanisms, or through the implementation of additional domestic policies and measures, in the case of Italy. Spain and Denmark did not mention any additional measures which could be taken into account in this analysis. However, both Member States announced recently that they were planning to reach their target through future supplementary action ([11]).

Greece and Luxembourg project that they will meet their target by a margin lower than 0.1 %.

Compared to the 2006 analysis, four of the seven Member States which projected that they would miss their burden-sharing targets, now plan to meet them (Portugal, Belgium, Ireland and Austria). This is due to submission of new projection data, in particular on existing measures (Belgium and Ireland), additional measures (Austria) or to intensified use of Kyoto mechanisms (especially Portugal).

Figure 4.4 and Figure 4.5 show that 11 Member States anticipate an over-delivery (i.e. that their emissions will be lower than their target), although in some Member States this over-delivery is very small (less than 1 Mt CO_2-equivalent). The United Kingdom, Germany and France project the highest over-delivery in absolute terms, which has a strong influence on the aggregated EU-15 projection. The United Kingdom expects over-delivery through the use of existing measures only, Germany projects to achieve its total over-delivery with both existing and additional measures, while France will over-deliver only if additional measures are implemented.

4.4.2 Effect of domestic policies and measures

Based on Member States projections with existing measures, EU-15 greenhouse gas emissions are projected to be 4.0 % below base-year level by 2010, amounting to 2 % lower than their 2005 level. This means that existing measures will bring the EU-15

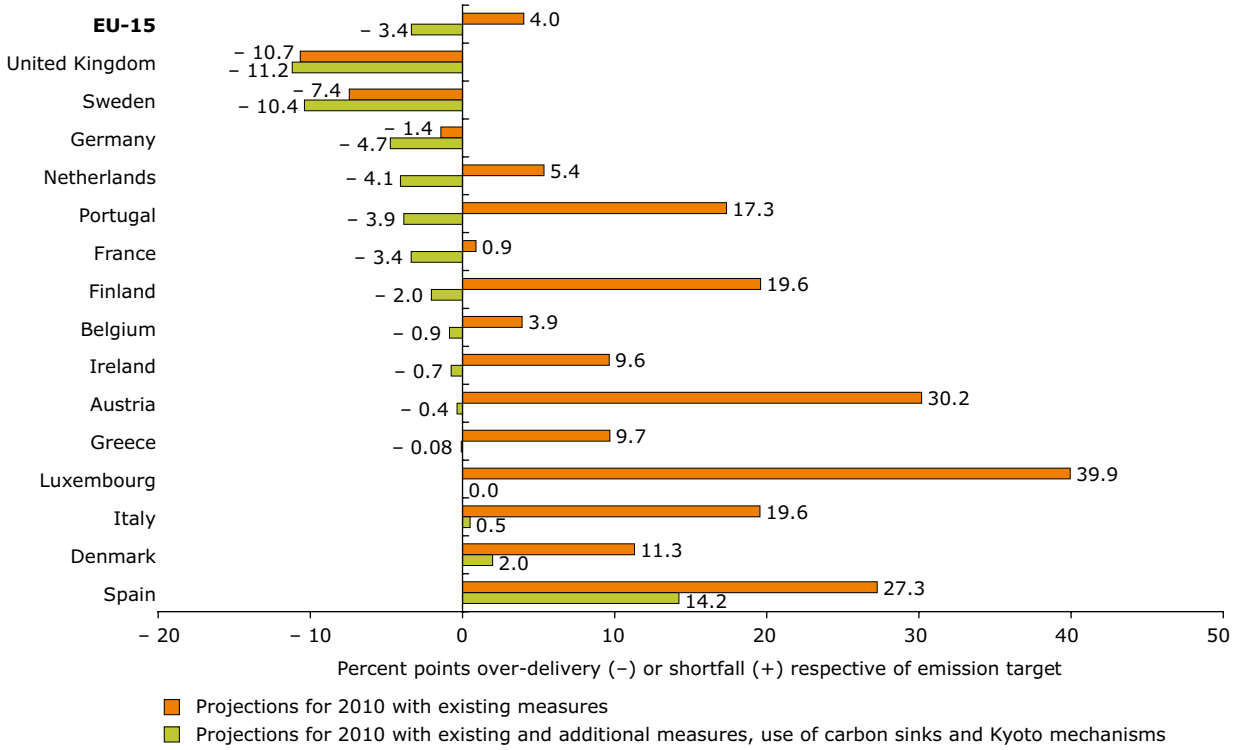
([11]) In July 2007, Spain adopted a Plan of Urgent Measures against Climate Change. Spain intends these measures will allow it to fulfil its commitments under the Kyoto Protocol. The consideration of these measures in the report was not possible as the data were not submitted in time.
According to Denmark's NAP for the period 2008–2012 and additional information submitted to the Commission, Denmark plans to reach its target by initiating new national climate initiatives, although these have not been identified yet.

halfway towards achieving its Kyoto target, with a remaining gap of 4.0 % to be filled.

The projections of Germany and the United Kingdom indicate they will have the most significant emission reductions from already existing policies and measures, whilst Spain, Italy and Greece report that their emissions will increase more than in the other Member States under existing measures (Table 4.1).

The additional measures reported by EU-15 Member States are estimated to deliver a total future reduction of 3.9 % relative to base-year emissions. The largest absolute reductions from additional policies and measures are projected to be delivered by Germany and Italy, by 2.4 and 1.5 percentage points respectively, of the total projected reduction (Table 4.2). Key additional policies and measures reported are, for example, measures promoting electricity generation from renewable energy sources, cogeneration policies and energy efficiency policies (Chapter 10).

Figure 4.4 Relative gaps (over-delivery or shortfall) between greenhouse gas projections and 2010 targets for EU-15 Member States



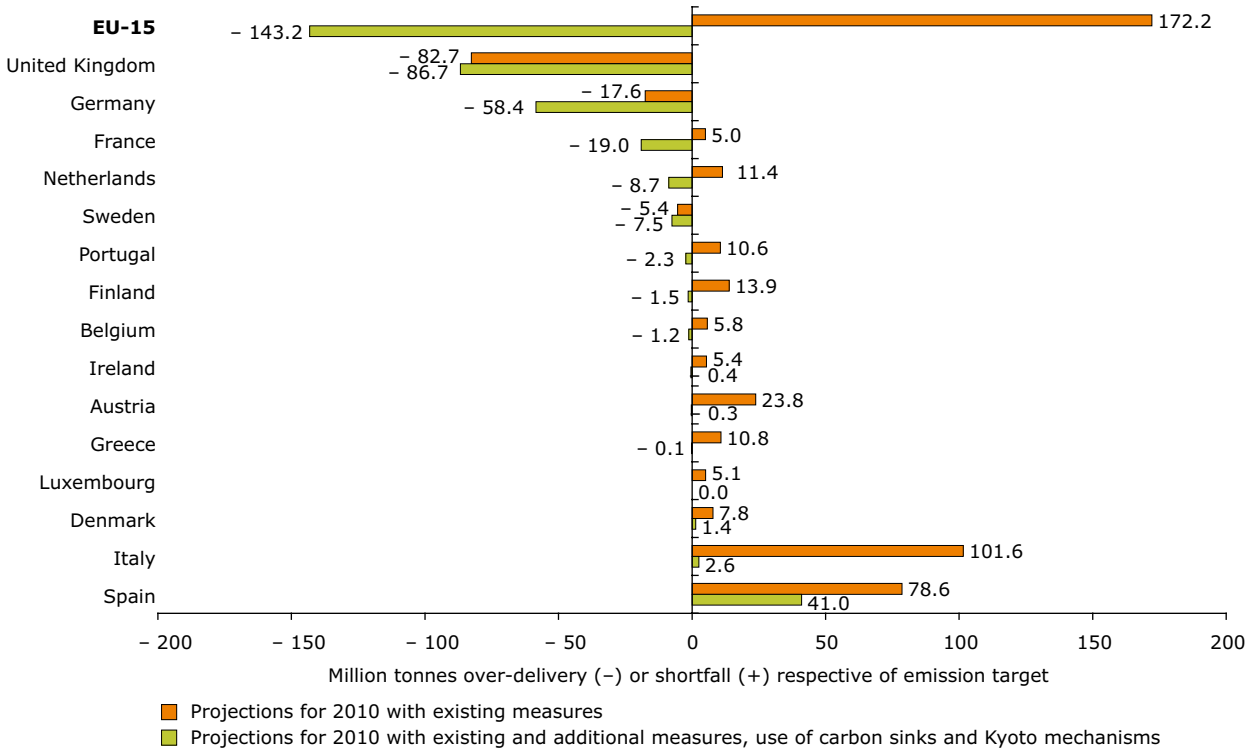
Note: For all EU-15 Member States projections assume existing and additional domestic policies and measures were available, but for some Member States projections did not change compared to last year's, or updates were taken from NAPs. The effect of EU ETS, where available from Member States, was included in WEM projections (see Section 4.3.4). The effect of the Kyoto mechanisms is included for the ten Member States that intend to use them for reaching their target data (see Chapter 7). Data on the net effect of emissions and removals from carbon sinks under Article 3.3 and 3.4 of the Kyoto Protocol were provided by 10 Member States. Adjustments to the base year according to Article 3.7 were performed for Portugal, the United Kingdom and the Netherlands.

In July 2007, Spain adopted a Plan of Urgent Measures against Climate Change. Spain plans to fulfil its commitment under the Kyoto Protocol through these measures, which will be implemented in 2007. The consideration of these measures in the report was not possible as this information was not submitted in time and the data were not detailed enough.

According to Denmark's NAP for the period 2008–2012 and additional information submitted to the Commission, Denmark plans to reach its target by initiating new national climate initiatives, although these have not been identified yet.

Source: EEA, based on EU-15 Member States projections.

Figure 4.5 Absolute gaps (over-delivery or shortfall) between greenhouse gas projections and 2010 targets for EU-15 Member States



Note: In July 2007, Spain adopted a Plan of Urgent Measures against Climate Change. Spain plans to fulfil its commitment under the Kyoto Protocol through these measures, which will be implemented in 2007. The consideration of these measures in the report was not possible as this information was not submitted in time and the data were not detailed enough.

According to Denmark's NAP for the period 2008–2012 and additional information submitted to the Commission, Denmark plans to reach its target by initiating new national climate initiatives, although these have not been identified yet.

Source: EEA, based on EU-15 Member States projections.

Table 4.1 Projected 2010 effects from existing policies and measures compared to base-year emissions

Member State	Projected reductions/increases due to existing measures, relative to EU-15 base-year emissions	
	Mt CO_2-equivalent	% of EU-15 base-year emissions
Germany	– 276.2	– 6.5
United Kingdom	– 179.6 (– 150.3)	– 4.2
Denmark	– 6.7 (– 1.5)	– 0.16
Belgium	– 5.3	– 0.12
Sweden	– 2.5 (– 2.0)	– 0.06
Netherlands	– 1.4 (4.8)	– 0.03
Luxembourg	1.5	0.04
France	5.0	0.12
Ireland	12.6	0.30
Austria	13.6	0.32
Finland	13.9	0.33
Portugal	27.0	0.63
Greece	38.7	0.91
Italy	67.8	1.6
Spain	121.9 (148)	2.9
EU-15 total	**– 169.5 (– 102.2)**	**– 4.0 (– 2.4)**

Note: The numbers in brackets represent the projected reductions from existing measures compared to base-year emissions, excluding the effect of the EU ETS that was reported by five Member States separately from their submission under the Monitoring mechanism.

Source: EEA, based on EU-15 Member States projections.

Table 4.2 Projected 2010 effects from additional policies and measures compared to base-year emissions

Member State	Projected reductions from additional measures relative to EU-15 base-year emissions	
	Mt CO_2-equivalent	% of EU-15 base-year emissions
Italy	– 63.3	– 1.5
Germany	– 40.9	– 1.0
France	– 24.0	– 0.6
Austria	– 14.4	– 0.3
Finland	– 12.4	– 0.3
Greece	– 10.9	– 0.3
Portugal	– 2.5	– 0.06
Luxembourg	– 0.3	– 0.01
Ireland	– 0.1	0.0
Belgium	–	0.0
Denmark	–	0.0
Netherlands	–	0.0
Spain	–	0.0
Sweden	–	0.0
United Kingdom	–	0.0
EU-15	**– 168.8**	**– 3.9**

Note: In July 2007, Spain adopted a plan of urgent measures against climate change. The consideration of these measures in the report was not possible as this information was not submitted in time and the data were not detailed enough.

Denmark plans to reach its target by initiating new national climate initiatives, although these have not been identified yet.

Source: EEA, based on EU-15 Member States projections.

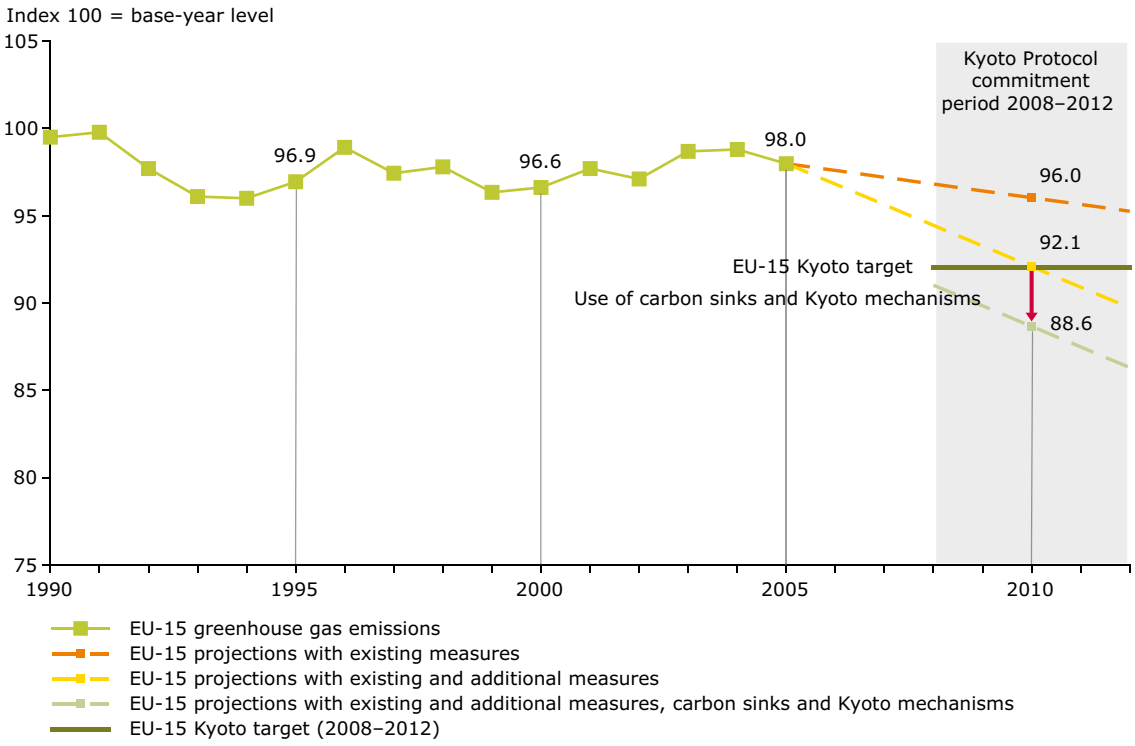
4.4.3 EU-15 assessment

The additional domestic policies and measures reported by Member States have the potential to achieve a further reduction of 3.9 % relative to base-year emissions, bringing the overall reduction from domestic measures to 7.9 % compared to the base year. Thus emission reductions expected to be achieved through existing and additional domestic measures alone will not be sufficient for the EU-15 to reach its Kyoto target (Figure 4.6). The total CO_2 removal from carbon sinks (Article 3.3 and 3.4 activities) in the EU-15 is estimated to correspond to an additional 0.9 % reduction (see Chapter 11). The use of Kyoto mechanisms is projected to deliver an additional 2.5 % emission reduction (see Chapter 10).

Adding all the projected emission reductions from existing measures, additional measures, the use of carbon sinks and the use of Kyoto mechanisms would lead to a total reduction of 11.4 % compared to base-year emissions. This would rely on the hypothesis that all projected reductions will be fully achieved. The EU-15 Kyoto target will not be met if substantial areas of the additional measures are not implemented (Table 4.3).

An EU-15 over-delivery to the extent shown in Figures 4.5 and 4.6 is unlikely to be achieved, since a surplus reduction achieved by some Member States might not automatically be available to the rest of the EU-15. In particular, the UK Government has mentioned that it reserves the right to retain or cancel surplus units (currently projected to represent almost half of the total EU-15 over-delivery) in order to meet domestic policy commitments. If this were the case, the over-delivery from the other Member States meeting their burden-sharing target — in particular Germany — could still theoretically compensate for the remaining gap between targets and actual emissions in those

Figure 4.6 Past and projected EU-15 greenhouse gas emissions compared with Kyoto target for 2008–2012



Note: The EU-15 target including Kyoto mechanisms and sinks is based on an estimated projected use of Kyoto mechanisms and activities under Articles 3.3 and 3.4 (carbon sinks). The Kyoto mechanisms account for 2.5 % of the EU target of 8 %, and activities under Articles 3.3 and 3.4 contribute an additional 0.9 %. For more information on Kyoto mechanisms and carbon sinks, see Chapters 7 and 9.

This relies on the optimistic assumption that decreasing trends between 2005 and 2010 are maintained until 2012 and on the fact that the amount of emissions over-delivered by some Member States is not used for international emissions trading outside the EU-15.

Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections.

Table 4.3 Effect of additional domestic measures for the achievement of the EU-15 Kyoto target

Effect of existing domestic measures	Effect of additional domestic measures	Use of carbon sinks	Use of Kyoto mechanisms	Total reduction including over-delivery	Total reduction excluding over-delivery
– 4.0 %	– 3.9 %	– 0.9 %	– 2.5 %	**– 11.4 %**	**– 7.0 %**
– 4.0 %		– 0.9 %	– 2.5 %	**– 7.4 %**	**– 4.5 %**

Source: EEA, based on EU-15 Member States greenhouse gas projections.

Member States not reaching their targets. If all or part of the over-deliveries achieved by some Member States were not available to the EU-15, all Member States would need to fully achieve their own burden-sharing targets for the EU-15 to meet its Kyoto commitment (Table 4.3).

Therefore, the EU-15 will meet and even overachieve its Kyoto target if:

1. existing measures deliver their full potential of emission reductions;

2. the additional domestic policies and measures currently under discussion at European and national levels are rapidly adopted and fully implemented;

3. accounting of carbon sinks is considered to further help Member States to meet their target;

4. Kyoto mechanisms are used to their full extent as currently planned by Member States — such mechanisms could also be used as a means to achieve further emission reductions under the ETS;

5. some Member States exceed substantially their individual target to cover the gap left by the Member States which currently project that they will not achieve their target;

6. the emission reductions currently planned for 2010 are in fact achieved for every year of the five-year commitment period, which extends from 2008 until 2012.

4.4.4 Comparison between 2006 and 2007 assessments

The overall projections from EU-15 Member States in 2007 give a more positive picture than in the analysis carried out in 2006 since the total projected reduction for the EU-15 is 11.4 % in 2007 compared to 8.0 % in 2006. In particular, the projected emission reductions from all domestic policies and measures in the EU-15 have increased by 139 Mt CO_2-equivalents due to a significant increase in projected emission reductions from existing measures (Table 4.4). This increase is due to revised projections from some Member States and to the inclusion in the assessment of projections by five Member States concerning the effect of the EU ETS.

The base year for projections was changed in almost all EU-15 Member States to a minor extent (less than 1 % change for 12 Member States). Overall, the aggregated EU-15 base year used for projections did not change.

All EU-15 Member States submitted new projections on the effects of their existing and additional policies and measures, except Greece and Spain. In addition, Portugal did not revise their 'with existing measures' projections, and Denmark and Sweden did not revise the projected effect of their additional policies and measures. The most significant revisions of the projected effects of domestic measures occurred in Germany, France and the United Kingdom:

- Revised projections from France and Germany on existing measures led to a further reduction of 77 Mt CO_2-equivalents compared to last year.

- Revised projections from Germany on additional measures provided a further reduction of 26 Mt CO_2-equivalents, which offset to a large extent the revised and somewhat lower effects of additional measures projected by the United Kingdom (reduction of 34 Mt CO_2-equivalents), compared to last year.

Furthermore, taking into account the effect of the EU ETS reported by five Member States (the Netherlands, the United Kingdom, Sweden, Denmark and Spain), in addition to their submissions under the Monitoring Mechanism, leads to a further reduction of projected emissions by 67 Mt CO_2-equivalents. This is particularly due to the estimates from the United Kingdom and Spain, which together account for over 80 % of that reduction.

Overall, total projections on the use of Kyoto mechanisms did not change significantly, although Italy has reduced its intended use of Kyoto mechanisms by 21 Mt CO_2-equivalents, while Spain has increased its projected use by 12 Mt CO_2-equivalents.

Lastly, the change in the projected use of carbon sinks is mainly due to revised projections from Italy.

Table 4.4 Comparison between 2006 and 2007 projections in the EU-15

Type of projections	2006	2007	Difference 2006–2007	
	Mt CO_2-eq	Mt CO_2-eq	Mt CO_2-eq	%
Effect of existing measures, including additional projections from five Member States on the effect of the EU ETS: (2010 WEM projections)–(base-year emissions)	– 28	– 170	– 142	510 %
Effect of additional measures: (2010 WAM projections)–(2010 WEM projections)	– 172	– 169	3	– 2 %
Use of Kyoto mechanisms	– 111	– 108	3	– 3 %
Use of carbon sinks	– 33	– 39	– 6	20 %
Total (incl. additional projections from five Member States on the effect of the EU ETS)	**– 343**	**– 485**	**– 142**	**42 %**

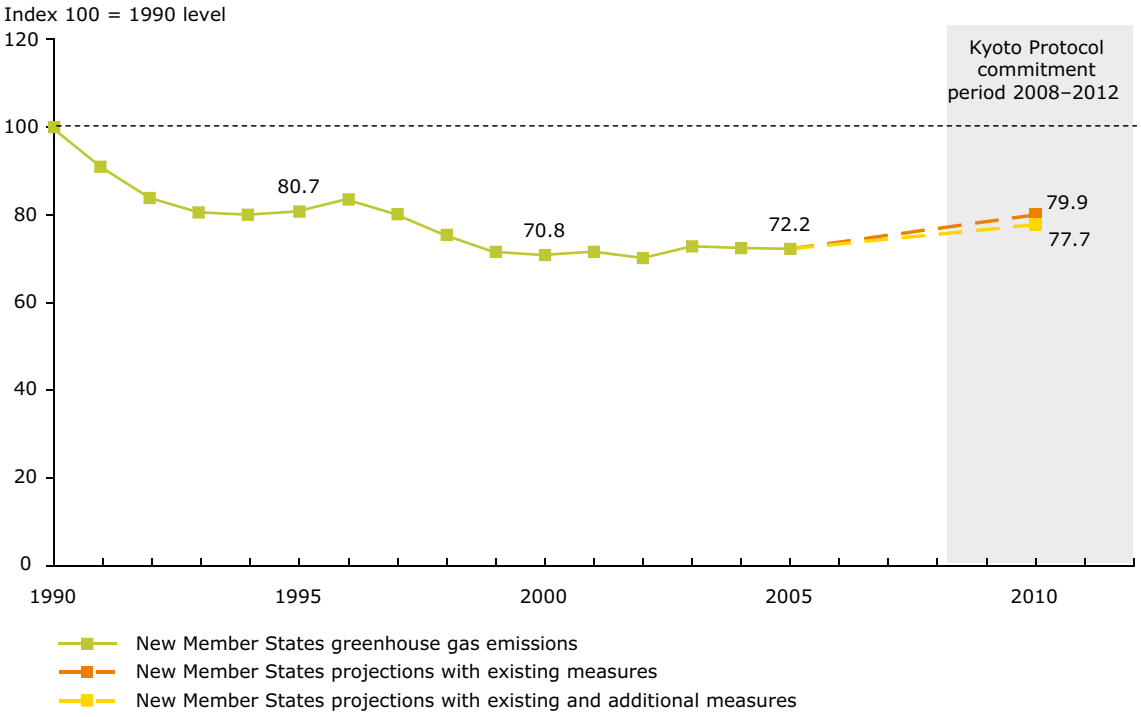
Note: Of the ten Member States which quantified projected reductions due to the EU ETS, five already included these estimates their WEM projections. For the five others (Denmark, the Netherlands, Spain, Sweden and the United Kingdom), these estimates were reintroduced in the WEM projections.

Source: EEA, based on EU-15 Member States greenhouse gas projections.

5 Greenhouse gas emissions in new EU Member States

- In 2005, based on past trends, the ten new EU Member States with a Kyoto target were on track to meeting their Kyoto targets using existing domestic policies and measures.
- Nine of these Member States project to meet their target with existing measures. Slovenia projects to reach its target with additional measures, and the use of carbon sinks and Kyoto mechanisms.
- The aggregated emissions of all twelve new EU Member States were 28 % below 1990 level in 2005. However, despite the implementation of all additional measures, greenhouse gas emissions are projected to increase from 2005 levels by 8 percentage points until 2010, back to a level 20 % below that of 1990.
- Greenhouse gas emissions from transport decreased by 6 % between 1990 and 1995 but increased sharply afterwards. By 2005 these emissions exceeded 1990 levels by 30 %.

Figure 5.1 Past and projected greenhouse gas emissions aggregated for the 12 new Member States



Note: For Estonia, Hungary and Latvia, the projections used in last year's report are used here as no new data were available. Malta provided only projections for CO_2.

Source: EEA, based on new Member States greenhouse gas inventories and projections.

All new Member States that joined the EU on 1 May 2004, as well Romania and Bulgaria who joined on 1 January 2007, have to reach their Kyoto targets individually (except Cyprus and Malta, which have no Kyoto targets). This section shows the overall aggregated trends in the ten new Member States with their targets to facilitate comparison with the EU-15.

5.1 Historic trends 1990–2005

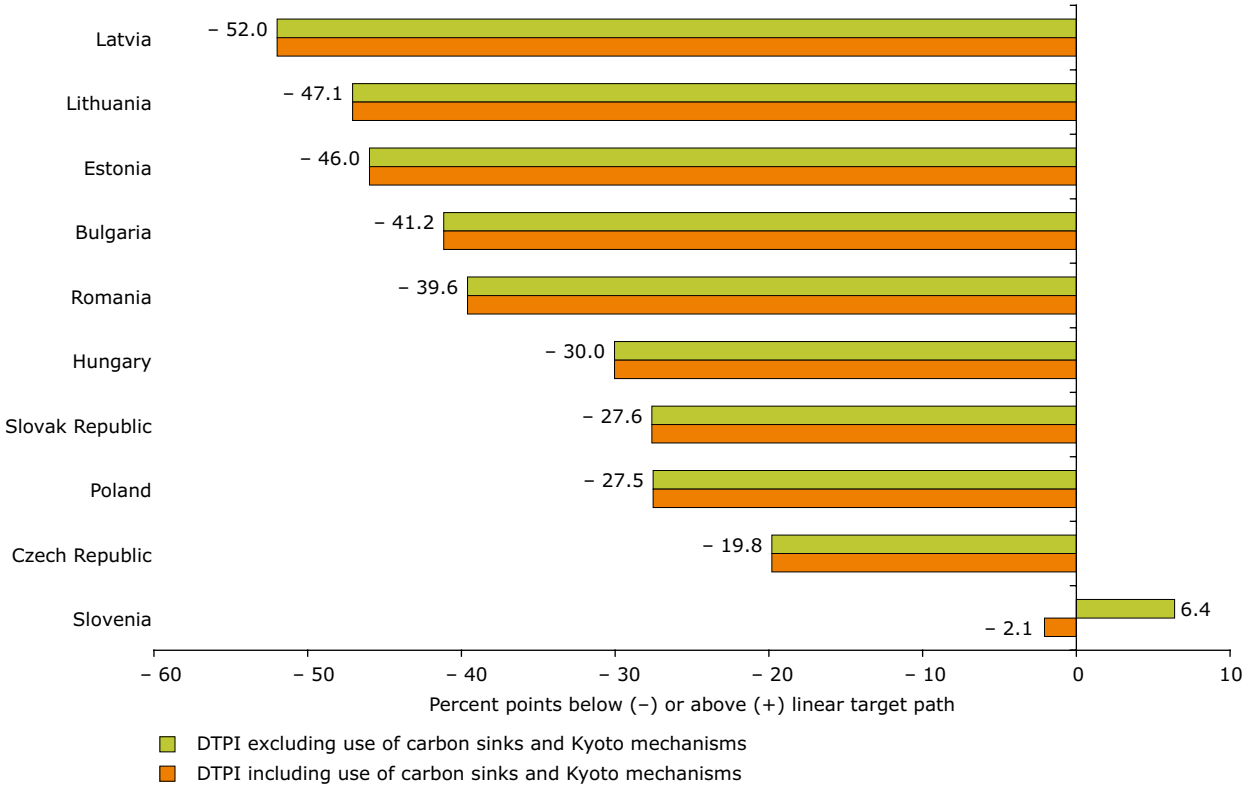
In 2005, the aggregated emissions of new Member States were 28 % below 1990 levels. During the 1990s total emissions have declined substantially in almost all new Member States, mainly due to the introduction of market economies and the consequent restructuring or closure of heavily polluting and energy-intensive industries (Figure 5.1). However, since 2000 the emissions have levelled off or even slightly increased, due to enhanced economic development.

After a decrease in the first half of the 1990s, emissions from transport have been increasing since 1995. They exceeded the 1990 level in 1999. In terms of emissions from transport, the new Member States seem to be repeating the experience of Ireland, Portugal and Spain; starting from a relatively low transport level, all these Member States experienced high economic growth which resulted in strong growth in transport and related greenhouse gas emissions.

5.2 Current progress towards Kyoto targets

Emissions of all new Member States were well below the linear target path between their base-year emissions and 2010 Kyoto targets. Thus, they were on track to meet their Kyoto targets based on past trends (Figure 5.2). Slovenia is also considered on track if the projected CO_2 removals from land-use change and forestry (carbon sinks) and use of Kyoto mechanisms are taken into account.

Figure 5.2 Distance-to-target-path indicator for new Member States in 2005



Note: The distance-to-target-path indicator (DTPI) measures the deviation of actual emissions in 2005 from a (hypothetical) linear target path between base-year emissions and 2010 Kyoto targets. A positive value suggests an underachievement by 2005 and a negative value represents an overachievement by 2005. The DTPI is used as an early indication of progress towards the Kyoto targets. Member States with base years other than 1990 are Bulgaria, Hungary, Poland, Romania and Slovenia (see Table 2.1). For Slovenia, the effect of carbon sinks and Kyoto mechanisms was also considered.

Source: EEA, based on new Member States greenhouse gas inventories.

5.3 2010 projections

Nine new Member States project that they will meet or even over-deliver on their Kyoto targets by 2010 using only existing domestic policies and measures. Slovenia indicates that it will meet its Kyoto target through adoption and implementation of planned policies and measures, and by using Kyoto mechanisms and including CO_2 removals from land-use change and forestry (Figures 5.3 and 5.4).

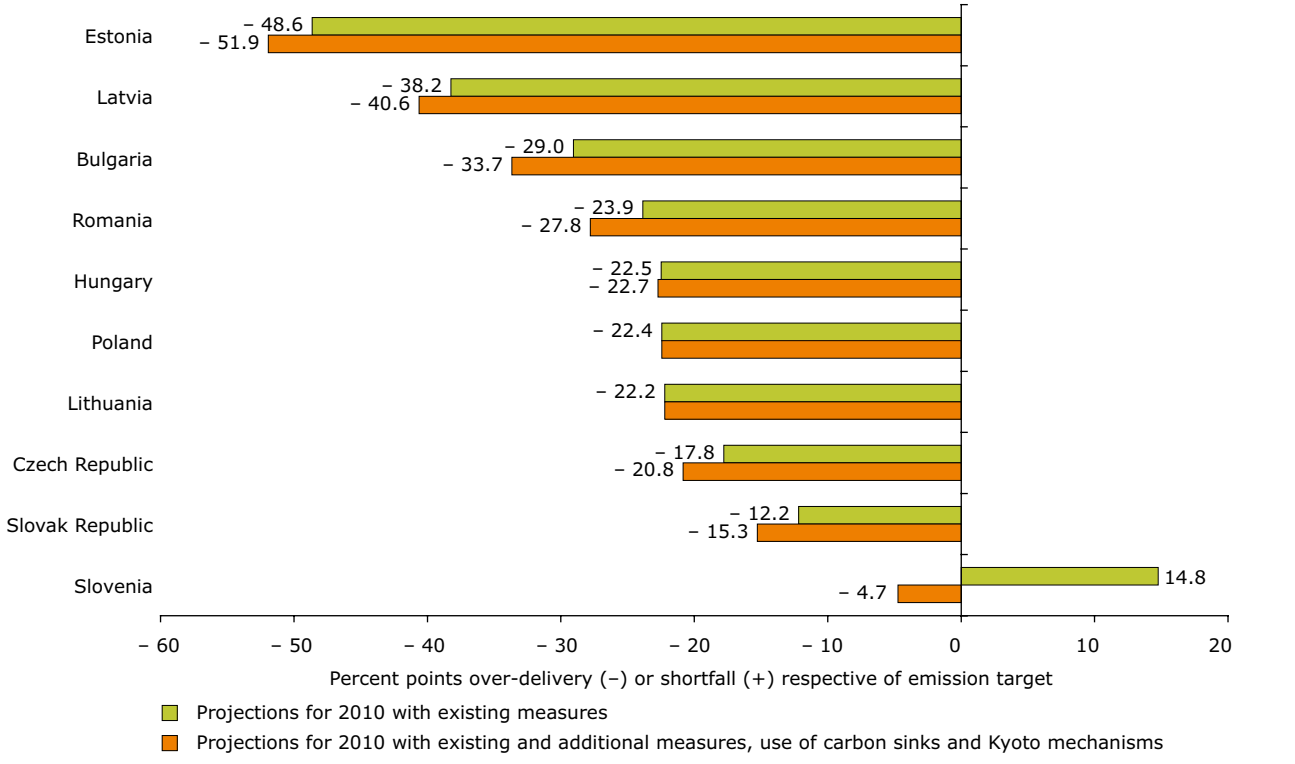
Aggregated emissions from all 12 new Member States are projected to increase after 2005. All Member States have policies and measures in place to reduce greenhouse gas emissions and additional policies and measures were also identified for eight Member States. Of all new Member States, only Estonia and Malta are projecting decreasing emissions between 2005 and 2010 with existing measures. Slovenia also anticipates a slight decrease due to the effects of additional measures. The other nine Member States anticipate significant increases above 2005 emission levels (see annex for further details).

Within existing measures, aggregated emissions from the 10 Member States having a Kyoto target are estimated to be 20.1 % below 1990 levels by 2010 (Figure 5.1). With additional measures, emissions are projected to be further reduced by 2.2 %, thus achieving a level 22 % below that of 1990.

Slovenia is the only new Member State that intends to use Kyoto mechanisms as an investor country and to include carbon sinks, although it has not yet decided on their contribution to its Kyoto target. For eight Member States, the NAPs submitted to the Commission have been revised and the cap reduced, but these effects are not taken into account in this report.

The most significant change in data between the 2006 and the 2007 analyses comes from Poland, for which the base year estimate has been increased substantially (+ 21 Mt CO_2-equivalents), while reported projections decreased by 18 Mt CO_2-equivalents. As a result, the projections from Poland in 2007 suggest a much larger over-delivery of its Kyoto target than in the 2006 analysis.

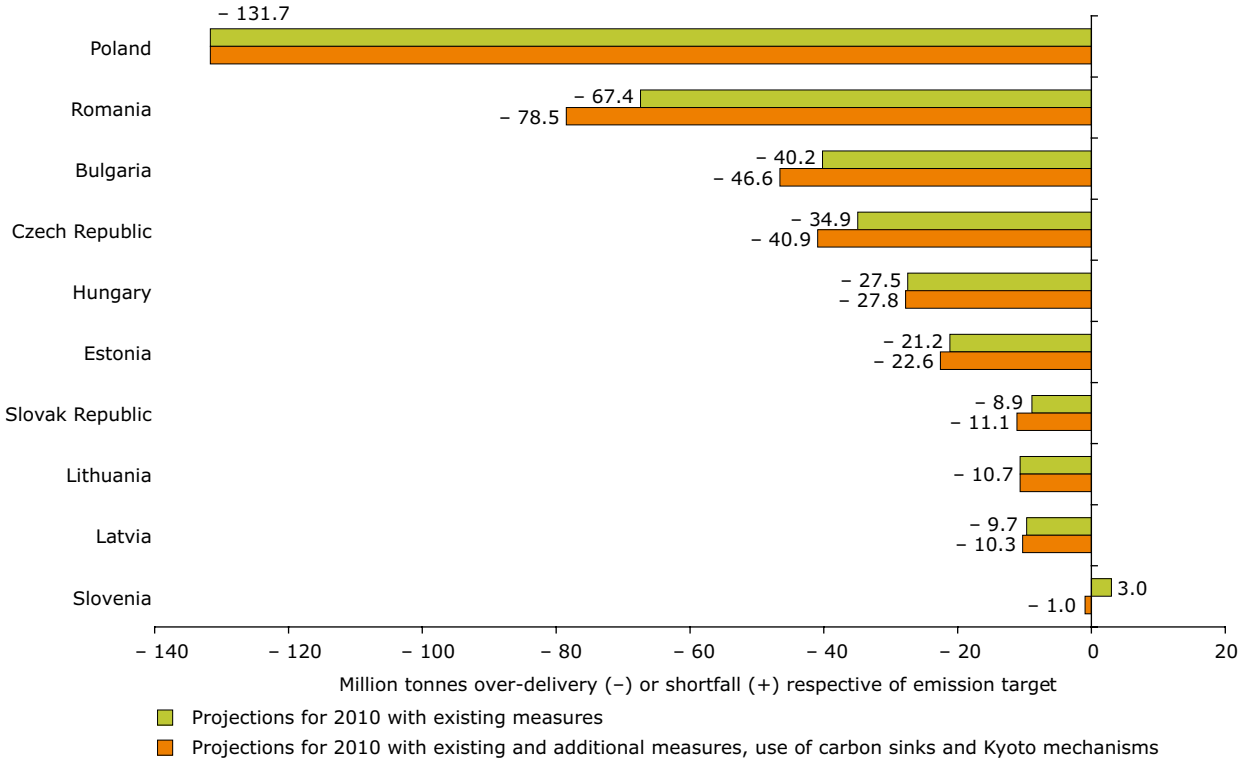
Figure 5.3 Relative gaps (over-delivery or shortfall) between greenhouse gas projections and 2010 targets for new Member States



Note: For Estonia, Hungary and Latvia the projections used in last year's report are used as no new data were available. Cyprus and Malta do not have a Kyoto target.

Source: EEA, based on new Member States greenhouse gas projections.

Figure 5.4 Absolute gaps (over-delivery or shortfall) between greenhouse gas projections and 2010 targets for new Member States



Note: For Estonia, Hungary and Latvia the projections used in last year's report are used as no new data were available. Cyprus and Malta do not have a Kyoto target.

Source: EEA, based on new Member States greenhouse gas projections.

6 Greenhouse gas emissions in new EU candidate countries and other EEA member countries

- Croatia ratified the Kyoto Protocol in May 2007, with a reduction target of 5 % compared to base-year emissions.
- Turkey has ratified the UNFCCC, but not the Kyoto Protocol. This country has the lowest *per capita* emissions among all EEA member countries being less than half of the average EU-27 *per capita* emissions.
- Croatia and Norway were on track to meet their Kyoto targets in 2005. Croatia indicates that it will meet its Kyoto target by implementing additional policies and measures. Norway projects that it will meet its target with current policies and measures together with the use of Kyoto mechanisms.
- Although not on track in 2005, Iceland and Switzerland plan to meet their Kyoto targets either with existing measures only (Iceland) or with the implementation of additional measures and the use of Kyoto mechanisms (Switzerland).
- Liechtenstein was not on track in 2005 and indicates that it will not meet its Kyoto target with existing measures.

Analyses for Croatia and Turkey (in accession negotiations with the EU), as well as Iceland, Liechtenstein, Norway and Switzerland (member countries of the European Environment Agency) are presented in this section. The target assessment in this chapter does not cover Turkey as this country has not ratified the Kyoto Protocol.

6.1 Current progress towards Kyoto targets

In 2005, greenhouse gas emissions for Croatia and Norway were well below their linear target path between base-year emissions and 2010 Kyoto targets, meaning that they were on track to meet their Kyoto targets (Figure 6.1). Based on past emissions trends, Iceland, Switzerland and Liechtenstein were not on track to reach their targets of + 10 %, – 8 % and – 8 % respectively, according to their distance-to-target-path indicator in 2005. According to last year's assessment, Iceland was on track but this situation changed due to major recalculations of past emissions.

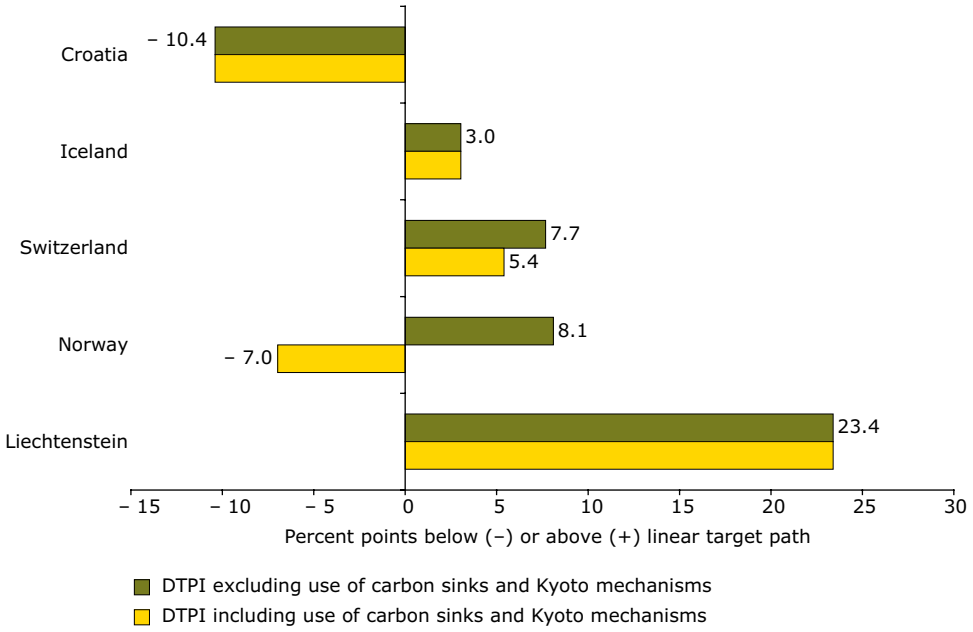
6.2 2010 projections

For 2010, projections taking into account domestic policies and measures show that Iceland will overachieve its Kyoto targets with existing measures and Croatia will overachieve its target by implementing additional policies and measures. The other countries will fall short using existing domestic policies and measures only (Figure 6.2). However, Norway and Switzerland plan to invest in Kyoto mechanisms to close or reduce their gaps. Switzerland plans to reach its target by implementing additional domestic measures ([12]) and using Kyoto mechanisms. The government of Norway has made the commitment that Norway would overachieve its Kyoto target (+ 1 %) by 10 %. It intends to achieve this by using Kyoto mechanisms and carbon sinks (forest management under Article 3.4).

Liechtenstein does not project to reach its target with existing measures and is not planning any additional measure to achieve further reductions. It is currently examining its level of engagement and participation in Kyoto mechanisms to reach its target.

([12]) The most important reported additional measure is the introduction of a CO_2 levy on heating fuels.

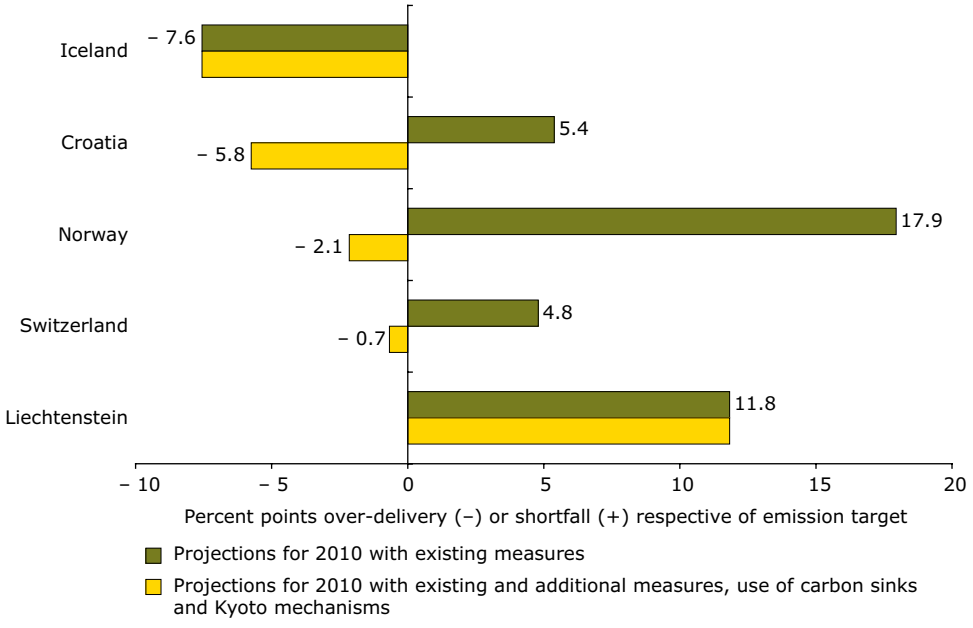
Figure 6.1 Distance-to-target-path indicator for EU candidate countries and other EEA member countries in 2005



Note: The distance-to-target-path indicator (DTPI) measures the deviation of actual emissions in 2005 from a (hypothetical) linear target path between 1990 and 2010. A positive value suggests an underachievement and a negative value an overachievement by 2005. The DTPI is used as an early indication of progress towards the Kyoto targets. Croatia's base year includes an additional 3.5 Mt CO_2-equivalents, in accordance with Decision 7/CP.12 of the Conference of the Parties under the UNFCCC.

Source: EEA, based on candidate countries and other EEA member countries' projections.

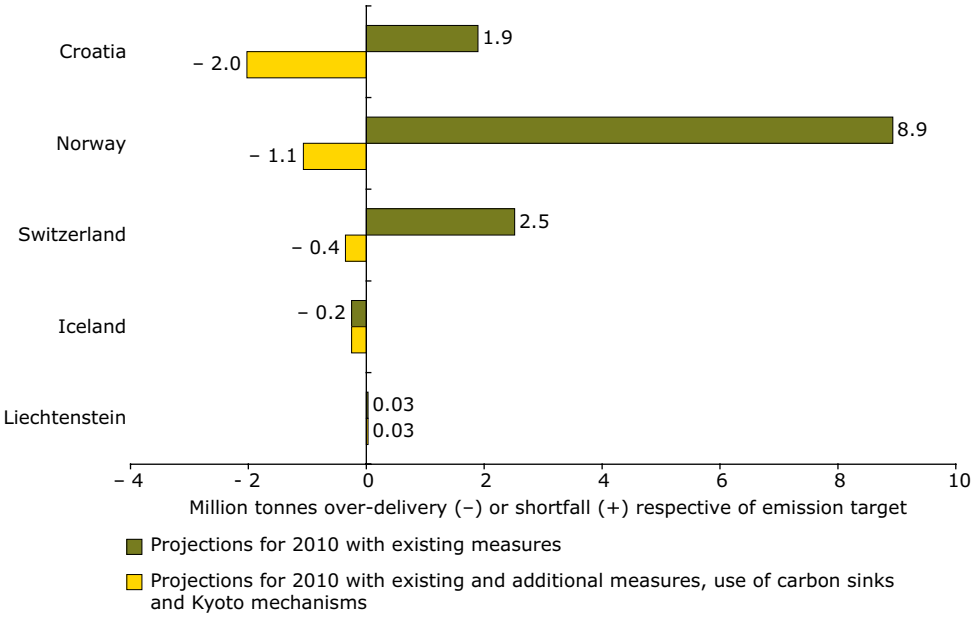
Figure 6.2 Relative gaps (over-delivery or shortfall) between projections and targets for 2010 for EU candidate countries and other EEA member countries



Note: Except for Switzerland and Norway, the use of Kyoto mechanisms is not accounted for in this figure. In their fourth national communications to the UNFCCC, Norway, Switzerland and Liechtenstein indicate that they will make use of Kyoto mechanisms to reach their targets. Since the information available on the use of flexible mechanisms or carbon sinks for the non-EU countries was not detailed (except for Switzerland and Norway), these were not taken into account here. The projection for Liechtenstein excludes fluorinated gases. The gap assessment for Croatia takes into account that Croatia is allowed to add 3.5 Mt CO_2-equivalents to its 1990 emissions in accordance with Decision 7/CP.12 of the Conference of the Parties under the UNFCCC.

Source: EEA, based on EU candidate countries and other EEA member countries' projections.

Figure 6.3 Absolute gaps (over-delivery or shortfall) between greenhouse gas projections and 2010 targets for EU candidate countries and other EEA member countries



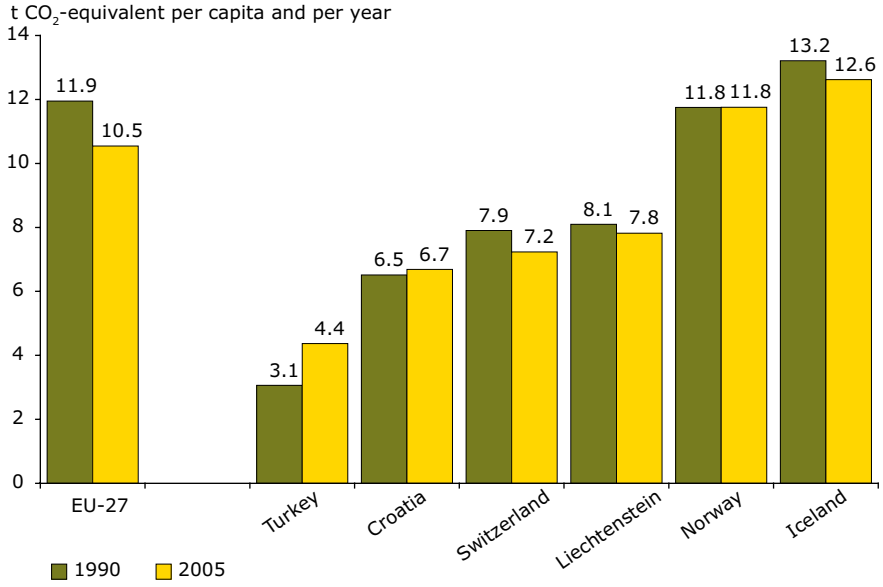
Note: Except for Switzerland and Norway, the use of Kyoto mechanisms is not accounted for in this figure. In their fourth national communications to the UNFCCC, Norway, Switzerland and Liechtenstein indicate that they will make use of Kyoto mechanisms to reach their targets. Since the information available on the use of flexible mechanisms or carbon sinks for the non-EU countries was not detailed (except for Switzerland and Norway), these were not taken into account here. The projection for Liechtenstein excludes fluorinated gases. The gap assessment for Croatia takes into account that Croatia is allowed to add 3.5 Mt CO_2-equivalents to its 1990 emissions in accordance with Decision 7/CP.12 of the Conference of the Parties under the UNFCCC.

6.3 Emissions *per capita* and emissions intensity of economies

Per capita greenhouse gas emissions declined in all countries from 1990 to 2005 except in Croatia and Turkey, although the decline was relatively small (about 1 %). Turkey shows a significant rise in *per capita* emissions (Figure 6.4) from 3.1 to 4.4 tonnes per year between 1990 and 2005, although Turkey still has the lowest emission *per capita* among all EEA members, less than half of the average EU-27 *per capita* emissions.

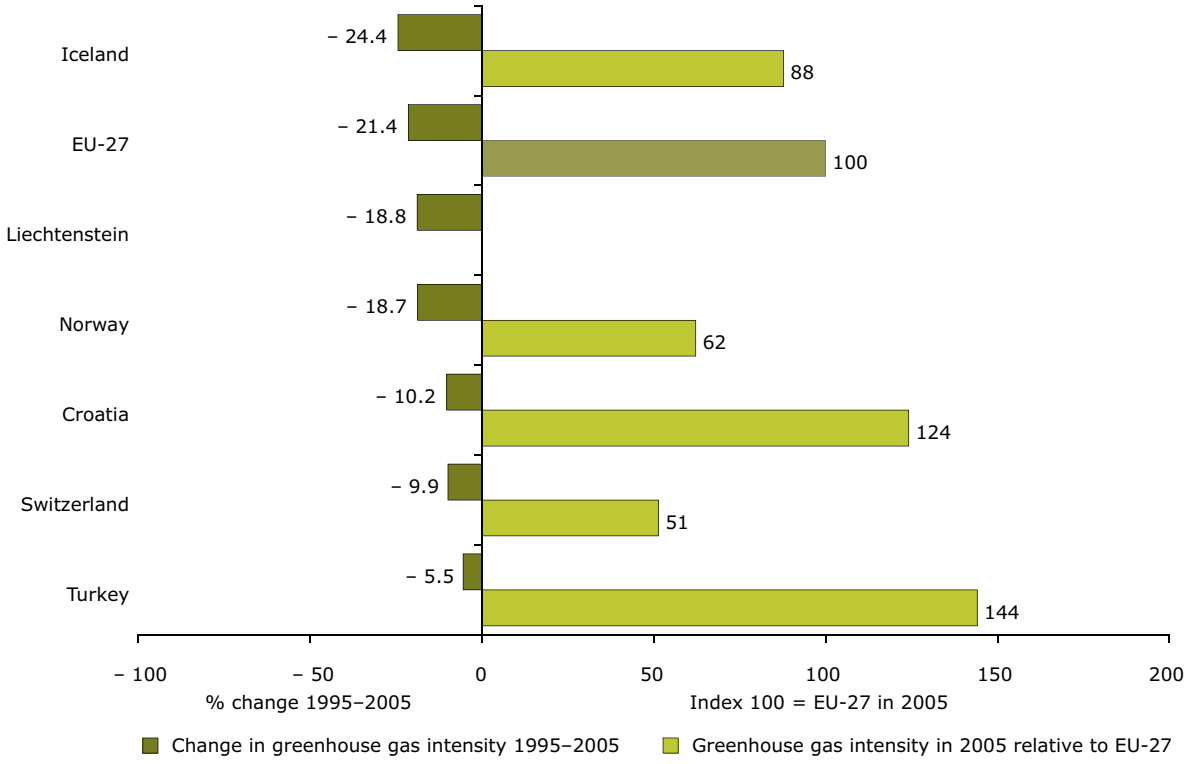
The emission level per GDP has declined in all countries from 1995 to 2005, indicating that economic growth and resource consumption have been somewhat decoupled (Figure 6.5). The greenhouse gas intensity in Switzerland, Norway and Iceland by contrast, is much lower than the EU average, due to large shares of hydropower.

Figure 6.4 Greenhouse gas emissions *per capita* for the EU candidate countries and other EEA member countries



Source: EEA, based on EU candidate countries and other EEA member countries' greenhouse gas inventories.

Figure 6.5 Greenhouse gas emissions per GDP in the EU candidate countries and other EEA member countries



Note: The analysis of the change in greenhouse gas intensity was based on GDP data at constant prices (1995 level). The intra-EU analysis of greenhouse gas intensity in 2005 was performed using GDP data in purchasing power standards (pps) in order to allow for a meaningful comparison between countries with different price levels. No GDP data in pps were available for Liechtenstein.

Source: EEA, based on EU candidate countries and other EEA member countries' greenhouse gas inventories; Eurostat; United Nations Statistics Division.

7 The European Union Emission Trading Scheme

- In the first two years of the European Union Emission Trading Scheme (2005 and 2006), allocated allowances substantially exceeded verified emissions by at least 3 %, mostly in new Member States. As a result, the price of emission allowances for the trading period (2005–2007) has dropped below EUR 1 per tonne of CO_2 in 2007.
- For the second trading period (2008–2012) the Commission has enforced stricter limits, which are below emission projections including existing domestic measures for the period 2008–2012, or about 6.3 % below verified emissions in 2005/2006. The price of allowances for 2008–2012 ranges between EUR 12 and EUR 25 per tonne of CO_2 in 2007.
- The EU ETS could reduce EU-15 emissions by around 150 Mt CO_2 per year during the commitment period, which corresponds to 3.4 % of base-year emissions. Taking into account the estimates of the EU ETS effect already included in projections from ten Member States, this could represent a further reduction of at least 1.3 percentage points from the overall 11.4 % emission reduction projected for the EU-15.
- The total emission reduction in the EU ETS sectors could theoretically be achieved by operators through the use of Kyoto mechanisms only. However, it is expected that the reduction will be achieved by a combination of measures at installation level and the use of Kyoto mechanisms.

7.1 The EU ETS

The EU Emission Trading Scheme (ETS) was established by Directive 2003/87/EC ([13]). It covers CO_2 emissions from large stationary sources including power and heat generators, oil refineries and installations for the production of ferrous metals, cement, lime, glass and ceramic materials, and pulp and paper. Together these sectors account for approximately 40 % of EU's total greenhouse gas emissions; other sectors (e.g. transport, agriculture and waste) or greenhouse gases (CH_4, N_2O and F-gases) are not covered by the current scheme. Under the ETS, operators receive emission allowances from their government which have to be surrendered at the end of each year, according to the actual verified emissions of their installations during that year. Operators holding more allowances than verified emissions may sell unneeded allowances to other operators in the EU in need of more allowances, or keep them for future years. The linking Directive ([14]) allows operators to buy credits from joint implementation (JI) or clean development mechanism (CDM) projects and bring them into the EU ETS to fulfil their obligations.

Under the EU ETS Directive, Member States prepare national allocation plans (NAP) for each trading period which have to be accepted by the Commission. The allocation plans include the total quantity of allowances which will be available during a trading period along with the rules for allocating these allowances to operators, amongst others. By June 2005, the Commission had accepted all 25 NAPs for the first trading period (2005–2007). The assessment process of the second NAPs for the trading period 2008–2012 started in 2006 and was finalised on 26 October 2007 with the Commission decisions on the NAPs of Bulgaria and Romania. These two Member States, which joined the EU on 1 January 2007, had to prepare NAPs for both 2007 and the subsequent period 2008–2012.

([13]) OJ L 275, 25.10.2003, p. 32.
([14]) OJ L 338, 13.11.2004, p. 18.

7.2 First trading period (2005–2007)

An overview of the sectors and installations covered during the first trading period, based on the verified emission reports of all EU-25 Member States for 2005 and 2006 is given in Table 7.1 and Figure 7.1.

On average 10 800 installations participated in the first two years of the trading scheme. These installations received emission rights for 2 080 Mt CO_2 per year and on average emitted 3 % less (2 020 Mt CO_2 per year, representing about 41 % of total EU-25 greenhouse gas emissions in 2005). Two thirds of all installations are classified as combustion installations ([15]) and these are responsible for 72 % of overall emissions. The next largest sectors are mineral oil refineries, iron and steel plus cement clinker or lime production units which are each responsible for 8–9 % of total emissions. The other six sectors are together responsible for the remaining 5 % of the emissions.

Table 7.1 Key figures of the Emission Trading Scheme for 2005 to 2007

EU-25 type of installations		Average 2005/2006				
		Number of installations	Allocated allowances (1 000 EUA) (*)	Verified emissions (kt CO_2)	Differences between allocation and verified emissions	
					(1 000 EUA)	(%)
1	Combustion installations	7 093	1 455 735	1 461 660	– 5 925	0 %
2	Mineral oil refineries	156	159 463	149 921	9 542	6 %
3	Coke ovens	20	22 789	20 247	2 542	11 %
4	Metal ore roasting or sintering	12	8 679	7 885	794	9 %
5	Production of pig iron or steel	233	167 087	136 481	30 606	18 %
6	Production of cement clinker or lime	518	188 224	178 594	9 830	5 %
7	Manufacture of glass incl. glass fibre	406	22 291	19 834	2 457	11 %
8	Manufacture of ceramic products	1 116	18 050	14 772	3 278	18 %
9	Production of pulp, paper and board	809	37 035	30 092	6 943	19 %
99	Other activity opted in	437	427	293	134	31 %
All installations		**10 800**	**2 079 781**	**2 019 572**	**60 209**	**3 %**

Note: Exact numbers vary slightly continuously, due to new entrants, closures, corrections and other reasons.

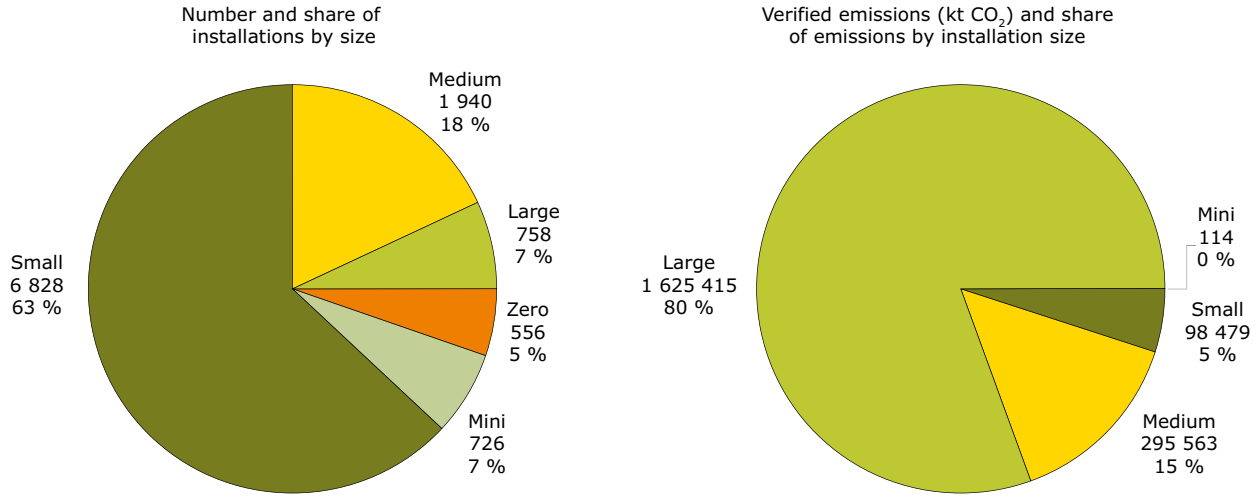
(*) European Union Allowance.

Source: Community independent transaction log (CITL) (5 July 2007); ETC/ACC, 2007.

Of all installations covered by the scheme, 70 % emit less than 50 kt CO_2 per year while their share of overall emissions is 5 %. Furthermore, even though only 758 installations (7 %) fall into the group of installations emitting over 500 kt CO_2 per year, they are responsible for 80 % of total emissions (Figure 7.1).

([15]) The 'combustion installations' sector contains units installations for the public supply of heat and electricity as well as installations in various industrial sectors. Depending on Member States and individual circumstances combustion installations belonging to the industrial sector (e.g. a heat plant in a paper mill) are either included in the sector 'combustion installations' or in the respective industrial sector (e.g. 'production of pulp and paper').

Figure 7.1 Share of number of installations and emissions by size of installation



Notes: Zero: emitters with verified zero emissions;
Mini: emitters below 0.5 kt CO_2/year;
Small: emitters of 0.5 to 50 kt CO_2/year;
Medium: emitters of 50 to 500 kt CO_2/year;
Large: emitters over 500 kt CO_2/year.

Source: CITL (5 July 2007); ETC/ACC, 2007.

On average, allocation of emission allowances to operators exceeded verified emissions by approximately 60 Mt CO_2 per year, or 3 % of the total allocation. This figure only takes into account the free allocation to existing installations. Allowances which remain in Member States new entrants' reserves and allowances which were auctioned are not included. The quantity of excess allowances in the system during the first trading period is therefore even higher.

For 94 % of all installations the difference between allocation and verified emissions was less than 100 kt CO_2 per year (Figure 7.2). Within these:

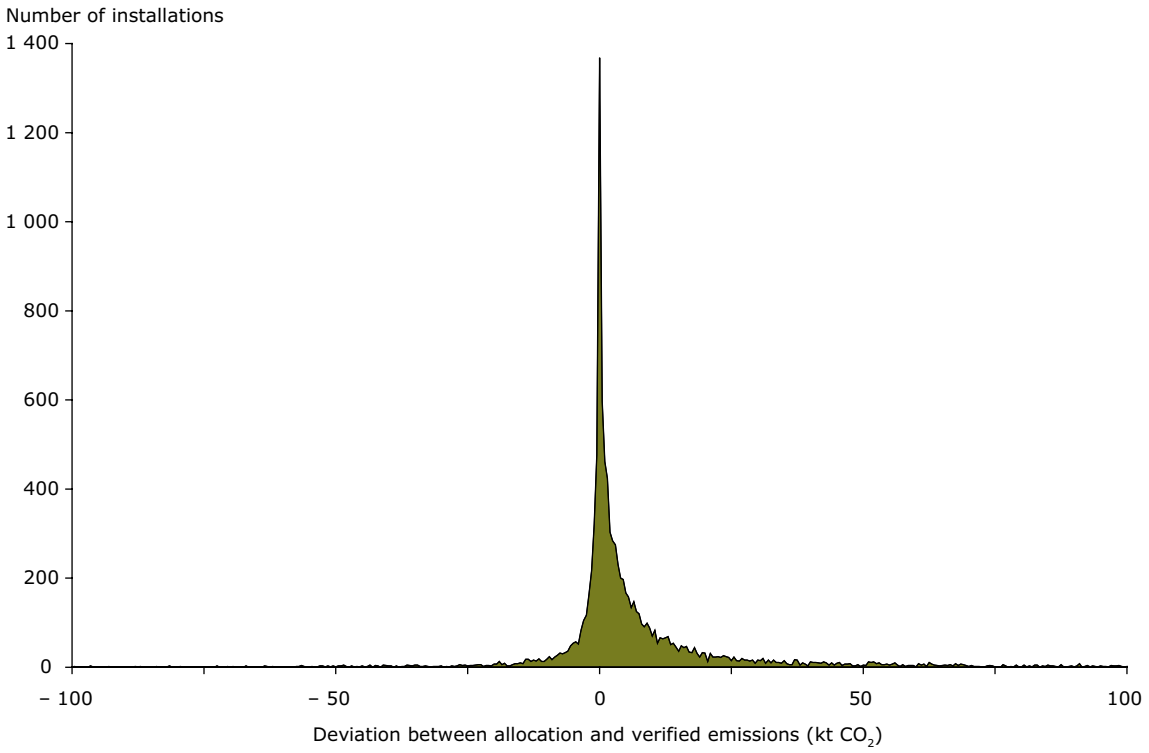
- 18 % of all installations received the necessary quantity of emission allowances;
- 20 % of installations were up to 100 kt CO_2 per year short of the allowances needed;
- 56 % of installations had up to 100 kt CO_2 per year excess emission allowances.

Most of the long installations ([16]) received less than 25 kt CO_2 per year of excess allowances. Despite this relatively small quantity, these installations contributed greatly to the overall excess allocation during 2005 and 2006.

A more detailed analysis shows that there are large differences amongst sectors and Member States (Table 7.2). Verified emissions were higher than allocations in only five Member States (Austria, Ireland, Italy, Spain and the United Kingdom); in contrast allocations exceeded verified emissions by more than 10 % in eleven Member States, of which eight are new Member States. There is a clear difference between EU-15 and new Member States. EU-15 operators are, on average, 0.4 % short whereas in the EU-10 operators are, on average, 15 % long. These country groups themselves are not homogeneous, for example Luxembourg allocated 18 % more than was needed, while emissions in Slovenia were only 1 % below allocation.

([16]) Long installations are installations which emitted less than the quantity of allowances they received. Short installations are installations which emitted more than the quantity of allowances they received.

Figure 7.2 Number of long or short installations by the difference between allocation and verified emissions (average for 2005–2006)



Source: CITL (5 July 2007); ETC/ACC, 2007.

The EU totals show that the allocation rules in the first set of national allocation plans tended to favour industrial sectors amongst which the most favoured were installations producing iron and steel (18 % long), manufacturing ceramics (18 % long) or producing pulp, paper and board (19 % long). The combustion installation sector is the only short sector (0.4 %) in the EU-25.

Despite these general trends, there are large sectoral differences between Member States, for example, installations for the production of iron and steel were short by 9 % in Slovenia and long by 54 % in Poland. In total, 15 sectors in nine Member States received at least 3 Mt CO_2 per year more than the amount they actually emitted including:

- the 'combustion installations' sector in eight Member States (Czech Republic, Estonia, Finland, France, Germany, Lithuania, Poland and Slovak Republic);
- the 'production of iron and steel' sector in five Member States (Belgium, the Netherlands, Poland, Spain and Sweden);
- the 'production of cement clinker or lime' sector in two Member States (Germany and Poland).

In many ways, the first trading period from 1 January 2005 until 31 December 2007 can be seen as a trial phase, taking into account that the EU ETS is the first multinational emissions trading scheme of this magnitude. There was only limited information available on historic emissions for individual installations during the drafting and assessment of the first national allocation plans. Some Member States included special allocation rules in their NAPs, which led to substantial distribution effects. In addition, the set up of the scheme with national allocation plans led to a situation where national governments were under strong pressure from business associations to draft NAPs that were favourable for business. The limited knowledge about the new market was also visible in the volatile price development for EU allowances (EUA). The price for one tonne of carbon dioxide started at around EUR 7 per EUA, rose to a maximum of approximately EUR 30 per EUA and dropped sharply after the publication of the first verified emissions in April 2006 to below EUR 10 per EUA. The warm winter of 2006–2007 confirmed that overall emissions would be less than allocations and the EU carbon market for the period 2005–2007 would remain long; as a result the price dropped to below EUR 1 per EUA in spring 2007.

Table 7.2 Allowances compared with verified emissions (average 2005–2006) by sector and by Member State (%)

Member State	Combustion installations	Mineral oil refineries	Coke ovens	Metal ore roasting or sintering	Pig iron or steel	Cement clinker or lime	Manufacture of glass	Manufacture of ceramics	Pulp, paper and board	Other activity opted in	Total
Austria	– 10	– 4	4	12	– 22	1	1	8	13		– 1.1
Belgium	– 15 (3)	15			37 (5)	11	1	10	14	67	6.9
Cyprus	6					5		25			6.7
Czech Republic	14	23			17	16	4	15	38		14.3
Denmark	6	18				10	17	6	– 7		6.8
Estonia	29					43	9	9	37		29.
Finland	13	11			9	15	6	4	19	37	13.0
France	23	9	34	28	5	1	8	23	33	25	15.3
Germany	2	1	15		7	11	16	26	27		3.8
Greece	1	– 16		– 5	51	3	45	4	7		0.7
Hungary	12	4	8	6	44	14	5	27	18		14.1
Ireland	– 19	1				– 5	27	14	90		– 15.8
Italy	– 13	6			– 1	– 6	1	13	– 3		– 8.2
Latvia	33				2	8	55	58	– 8	25	28.7
Lithuania	54	25				25	60	39	45		45.4
Luxembourg	13				32	16	15				17.7
Malta											
Netherlands	3	14			39	24	1	– 1	15		9.1
Poland	9	6	37		56	23	32	27	17		13.3
Portugal	5	8			26	3	5	27	14		5.8
Slovak Republic	30	2			0	11	27	49	73		16.5
Slovenia	2				– 9	– 4	5	– 6	11		1.5
Spain	– 18	– 2	16	– 6	29	2	13	13	9		– 7.5
Sweden	– 32 (11)	13		0	45 (13)	2	– 4	40	26	32	12.3
United Kingdom	– 27	7	3		1	– 3	– 7	24	31		– 20.0
EU-25	**0**	**6**	**11**	**9**	**18**	**5**	**11**	**18**	**19**	**31**	**3**
EU-15	**– 5**	**6**	**6**	**9**	**16**	**3**	**8**	**16**	**18**	**32**	**0**
EU-10	**13**	**11**	**35**	**6**	**30**	**17**	**24**	**25**	**28**	**25**	**15**

Note: A positive sign indicates that verified emissions (2005/2006 average) were lower than allowances (i.e. the sector was 'long'). A negative sign indicates a short sector.

In Belgium and Sweden, installations belonging to the iron and steel sector transferred blast furnace gas to installations in the combustion installations sector. The values in brackets indicate how long or short the sectors would be if this transfer of emissions from one sector to another was taken into account. The same applies to the Netherlands, but no figures were provided.

Malta is the only Member State which has not yet set up its national registry and for which no information is available in the CITL. Bulgaria and Romania only entered the EU ETS in 2007.

Source: CITL (5 July 2007); ETC/ACC, 2007.

Table 7.3 Overview of second national allocation plans and Commission decisions

Member State	First period cap	Verified emissions (average 2005–2006)	Proposed cap 2008–2012	Cap allowed 2008–2012	Emissions from additional installations in 2008–2112 (A)	Difference between cap allowed 2008–2012 and verified emissions (average 2005–2006)	
		(a)		(b)	(c)	(d) = (b)-(a)-(c)	(d)/(a)
	(Million EU allowance/ year)	(Mt CO_2/ year)	(Million EU allowance/ year)	(Million EU allowance/ year)	(Mt CO_2/ year)	(Mt CO_2/ year)	%
Austria	33.0	32.9	32.8	30.7	0.3	– 2.5	– 7.5
Belgium	62.1	55.1	63.3	58.5	5.0	– 1.5	– 2.8
Bulgaria	42.3	40.6 (B)	67.6	42.3	n.a.	1.7	4.1
Cyprus	5.7	5.2	7.1	5.5	n.a.	0.3	6.0
Czech Republic	97.6	83.0	101.9	86.8	n.a.	3.8	4.6
Denmark	33.5	30.3	24.5	24.5	0.0	– 5.8	– 19.2
Estonia	19.0	12.4	24.4	12.7	0.3	0.0	0.3
Finland	45.5	38.9	39.6	37.6	0.4	– 1.7	– 4.4
France	156.5	127.3	132.8	132.8	5.1	0.3	0.3
Germany	499.0	476.1	482.0	453.1	11.0	– 34.0	– 7.2
Greece	74.4	70.6	75.5	69.1	n.a.	– 1.5	– 2.2
Hungary	31.3	25.9	30.7	26.9	1.4	– 0.5	– 1.8
Ireland	22.3	22.1	22.6	22.3	n.a.	0.3	1.2
Italy	223.1	226.5	209.0	195.7	n.k. (D)	– 30.8	– 13.6
Latvia	4.6	2.9	7.8	3.4	n.a.	0.5	18.3
Lithuania	12.3	6.6	16.6	8.9	0.1	2.2	34.0
Luxembourg	3.4	2.7	4.0	2.5	n.a.	– 0.2	– 6.4
Malta	2.9	2.0 (C)	3.0	2.1	n.a.	0.2	8.2
Netherlands	95.3	78.5	90.4	85.8	4.0	3.3	4.2
Poland	239.1	205.7	284.6	208.5	6.3	– 3.5	– 1.7
Portugal	38.9	34.8	35.9	34.8	0.8	– 0.7	– 2.1
Romania	74.8	70.8 (B)	95.7	75.9	n.a.	5.1	7.3
Slovak Republic	30.5	25.4	41.3	30.9	1.7	3.8	14.9
Slovenia	8.8	8.8	8.3	8.3	n.a.	– 0.5	– 5.5
Spain	174.4	178.2	152.7	152.3	6.7 (E)	– 32.6	– 18.3
Sweden	22.9	19.6	25.2	22.8	2.0	1.2	6.0
United Kingdom	245.3	246.8 (F)	246.2	246.2	39.6	– 40.2	– 16.3
Total EU-27	**2 298.5**	**2 129.6** (F)	**2 325.5**	**2 081.0**	**84.7**	**– 133.3**	**– 6.3**

Note: The cap for the first period is higher than allocation to existing installations included in Table 9.1. This is due to new entrant reserves, closures and other cases where EU allowances (EUA) are not allocated to specific installations.
(A) The figures indicated in this column comprise emissions from installations that come under the coverage of the scheme in 2008 to 2012 due to an extended scope applied by the Member State and do not include new installations entering the scheme in sectors already covered in the first trading period.
(B) Due to the recent accession of Bulgaria and Romania to the EU, their 2005 emissions were not independently verified. The emissions for 2005/2006 are taken from the Commission Press release on the adoption of the last second national allocation plan.
(C) The value represents the verified emissions of 2005. It was taken from the Commission's summary information table.
(D) Italy has to include further installations. The amount of additional emissions is not known at this stage.
(E) Additional installations and emissions of over 6 Mt are already included as of 2006. Emissions from these installations were not included in the column 'verified emissions 2005–2006'.
(F) Verified emissions for 2005 and 2006 do not include installations which the United Kingdom opted to exclude temporarily from the scheme for those two years but which will be covered in the period 2008–2012. These emissions are estimated to amount to some 30 Mt CO_2 (included in the 39.6 Mt CO_2).

Source: CITL (5 July 2007); ETC/ACC, 2007; European Commission 2007.

7.3 Second trading period (2008–2012)

For the second trading period, the Commission has been much stricter towards Member States, to ensure that the covered sectors should either reduce emissions or acquire emission allowances (Table 7.3). On average, the Commission fixed the EU-wide cap for 2008 to 2012 at 2.08 billion allowances per year after reducing the number of allowances allocated in the second period by 10.5 %. This corresponds to an actual average reduction of 12.8 % of the total allowances for 23 Member States, and the acceptance of NAPs without cuts for four Member States (Denmark, France, Slovenia and the United Kingdom). The Baltic States had to reduce their proposed caps by the highest percentages: Estonia, 47.8 %; Latvia, 55.5 %; and Lithuania, 47.0 %. In contrast, the Spanish cap was only reduced by 0.3 %. In absolute terms the caps for Poland (76.1 Mt CO_2 per year), Germany (28.9 Mt CO_2 per year) and Czech Republic (15.1 Mt CO_2 per year) were reduced most. In total, the EU-wide cap is 245 Mt CO_2 per year lower than the proposed cap. Several Member States also extended the scope of the trading scheme on their territory and will include installations which temporarily opted out of the scheme in 2005 and 2006. Together with these installations, the difference between the annual cap for 2008–2012 and the average verified emissions for 2005–2006 corresponds to approximately 133 Mt CO_2 per year, which represents 6.3 % of the average verified emissions for 2005/2006.

The Czech Republic, Estonia, Hungary, Latvia, Slovak Republic and Poland decided to challenge the Commission Decisions on their second NAPs in court arguing that the caps would damage their economic development. In total the proposed cap for these six Member States is 121.3 Mt CO_2 per year higher than the allowed cap. Should the court rule in favour of these Member States and give them the right to allocate the requested quantity to their operators, there is a danger that there would again be excess allowances during the second trading period of the EU ETS. An emissions trading scheme can only function properly with an overall shortage of emission allowances in the system.

The carbon market supports the assessment that operators on average will need to reduce emissions or buy emission allowances. The future price for 2008 allowances has remained between EUR 12 per EUA and EUR 25 per EUA since the start of the assessment of the second NAPs in July 2006, despite the parallel free fall of carbon prices for the first trading period.

7.4 The effect of the EU ETS

The EU ETS is one of the key measures introduced to help Member States achieve their Kyoto targets. Nevertheless, consistent and accurate estimates of the effect of the ETS in 2010 are not available for all Member States, due to the limited information contained in the Community independent transaction log (CITL ([17])) and Member States reports. The existing projections on the effect of the EU ETS by 13 Member States (10 of which are EU-15 Member States) are older than the Commission Decisions on the second NAPs and therefore do not take into account the total quantity of emission allowances decided by the Commission. Thus they do not necessarily reflect the full effort expected from the trading sector in terms of CO_2 emission reductions.

As an approximation, three different methods for estimating the effect of the EU ETS were used in this report. These methods use data from the Commission Decisions, Member States submissions and the CITL:

1) **Reported effect and reduction of the NAP2 cap**
   Effect of the EU ETS(1) = (Effect of the ETS projected by Member State) + (cap allowed by the Commission for 2008–2012) – (cap proposed by Member State)
   This approach gives good results for those Member States which estimated the effect of the EU ETS according to their draft NAP2. The reduction of the cap is taken into account because the Commission Decisions were only published after the projections were prepared. Results are exaggerated for those Member States which intended to give their industry more allowances than needed.

2) **Difference between verified emissions and allowed cap**
   Effect of the EU ETS(2) = (cap allowed by the Commission for 2008–2012) ([18]) – (average verified emissions in 2005–2006)
   If a Member State increased the coverage of the scheme for the second period, the additional emissions are added to the verified emissions for the calculation.

([17]) The Community Independent Transaction Log, administered by the European Commission, is provided for the purpose of recording the issue, transfer and cancellation of allowances to and from EU member states. The purpose of CITL is to identify discrepancies in transaction proposals.

([18]) Excluding emissions from installations that come under the coverage of the scheme in 2008–2012 due to an extended scope applied by the Member State but were not included in the scheme in 2005–2007.

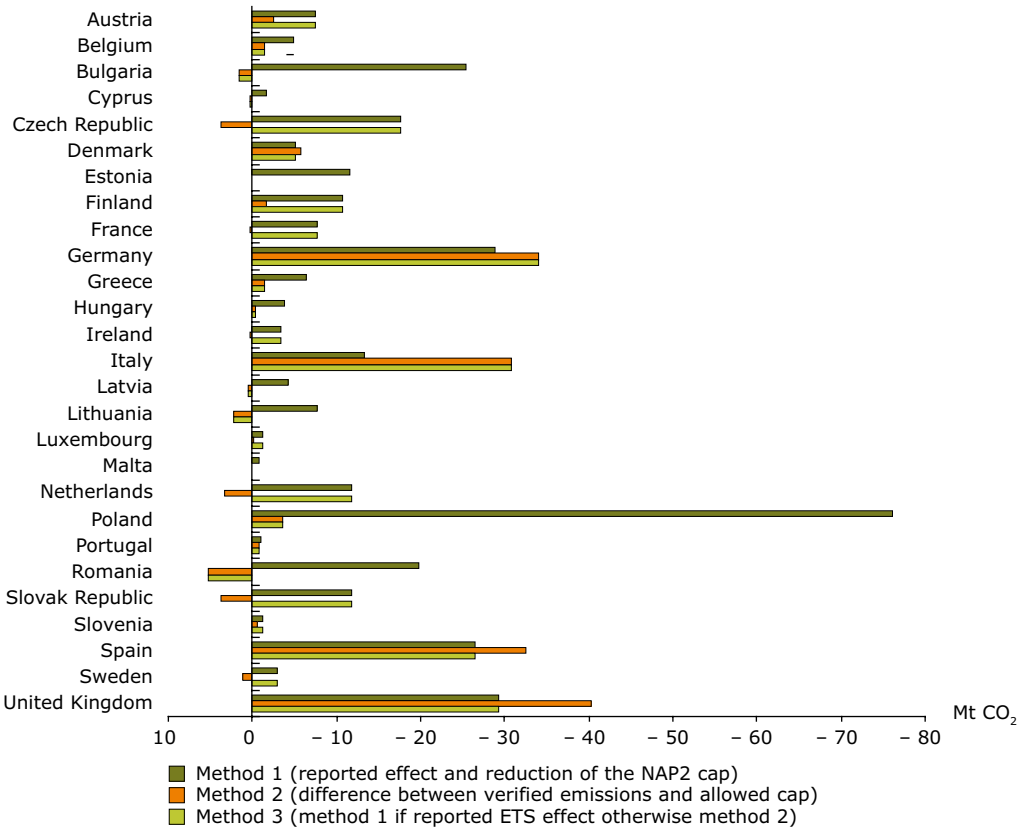
This estimate gives good results for those Member States in which the emissions from sectors included in the EU ETS would remain constant in the absence of the EU ETS. The results are underestimated for those Member States in which emissions from sectors included in the EU ETS would rise strongly without the EU ETS.
The method is also less appropriate for those Member States for which the Commission allowed a cap higher than 2005–2006 verified emissions: in these cases the calculation results in an increase instead of a decrease of emissions.

3) **Combined approach using methods 1 and 2**
Method 1 is used for those Member States which estimated the effect of the EU ETS; method 2 is used for the other Member States.

The results of these different methods are presented in Table 7.4 and Figure 7.3. The assessment shows that the overall effect for the EU 15 is relatively independent from the method chosen. The EU ETS is estimated to provide a reduction of EU-15 total greenhouse gas emissions of approximately 147 to 175 Mt CO_2, which represents 3.4 % to 4.1 % of EU-15 base-year emissions. However, for the new Member States, the results differ greatly between the methods. For the EU 12, estimates range from a reduction of emissions due to the ETS of 182 Mt CO_2 (method 1) to a net increase of emissions by 13 Mt CO_2 (method 2). The main reason for this spread is the extent to which intended overallocation in the draft second NAPs by Member States is taken into account — high overallocations leading to high cuts by the Commission. This is also reflected in the effect of the EU ETS for the EU 27: – 343 Mt CO_2 for method 1, – 133 Mt CO_2 for method 2 and – 200 Mt CO_2 for method 3.

Method 2 can be used as a lower boundary for the effect of the EU ETS in the EU-15, on the assumption that average annual CO_2 emissions from industry between 2008 and 2012 would not be lower in the absence of the EU ETS than they were in 2005–2006. This assumption is supported by the historic trend

Figure 7.3 Effect of the EU Emission Trading Scheme in 2010 according to three calculation methods



Source: CITL (5 July 2007); ETC/ACC, 2007; European Commission 2007; EEA.

Table 7.4 Effect of the EU Emission Trading Scheme in 2010

Member State	Effect as reported by Member State	Verified emissions 2005–2006	Proposed cap	Emissions from additional installations	Allowed cap	Effect of the EU ETS		
						Method 1	Method 2	Method 3
	(Mt CO_2/ year)	(Mt CO_2/ year)	(Million EU allowance/ year)	(Million EU allowance/ year)	(Million EU allowance/ year)	(Mt CO_2/ year)	(Mt CO_2/ year)	(Mt CO_2/ year)
Austria	– 5.5	32.9	32.8	0.4	30.7	– 7.6	– 2.5	– 7.6
Belgium		55.1	63.3	5.0	58.5	– 4.8	– 1.5	– 1.5
Bulgaria		40.6	67.6		42.3	– 25.4	1.7	1.7
Cyprus		5.2	7.1		5.5	– 1.6	0.3	0.3
Czech Republic	– 2.5	83.0	101.9		86.8	– 17.6	3.8	– 17.6
Denmark	– 5.2	30.3	24.5	0.0	24.5	– 5.2	– 5.8	– 5.2
Estonia		12.4	24.4	0.3	12.7	– 11.7	0.0	0.0
Finland	– 8.7	38.9	39.6	0.4	37.6	– 10.7	– 1.7	– 10.7
France	– 7.7	127.3	132.8	5.1	132.8	– 7.7	0.3	– 7.7
Germany		476.1	482.0	11.0	453.1	– 28.9	– 34.0	– 34.0
Greece		70.6	75.5		69.1	– 6.4	– 1.5	– 1.5
Hungary		25.9	30.7	1.4	26.9	– 3.8	– 0.5	– 0.5
Ireland	– 3.0	22.1	22.6		22.3	– 3.3	0.3	– 3.3
Italy		226.5	209.0		195.7	– 13.3	– 30.8	– 30.8
Latvia		2.9	7.8		3.4	– 4.3	0.5	0.5
Lithuania		6.6	16.6	0.1	8.9	– 7.7	2.2	2.2
Luxembourg	0.3	2.7	4.0		2.5	– 1.1	– 0.2	– 1.1
Malta		2.0	3.0		2.1	– 0.8	0.2	0.2
Netherlands	– 7.3	78.5	90.4	4.0	85.8	– 11.9	3.3	– 11.9
Poland		205.7	284.6	6.3	208.5	– 76.1	– 3.5	– 3.5
Portugal		34.8	35.9	0.8	34.8	– 1.1	– 0.7	– 0.7
Romania		70.8	95.7		75.9	– 19.8	5.1	5.1
Slovak Republic	– 1.5	25.4	41.3	1.7	30.9	– 11.9	3.8	– 11.9
Slovenia	– 1.3	8.8	8.3		8.3	– 1.3	– 0.5	– 1.3
Spain	– 26.1	178.2	152.7	6.7	152.3	– 26.5	– 32.6	– 26.5
Sweden	– 0.5	19.6	25.2	2.0	22.8	– 2.9	1.2	– 2.9
United Kingdom	– 29.3	246.8	246.2	39.6	246.2	– 29.3	– 40.2	– 29.3
Total EU-15	**– 93.0**	**1 640.4**	**1 636.5**	**74.9**	**1 568.7**	**– 160.8**	**– 146.6**	**– 174.9**
Total EU-12	**– 5.3**	**489.2**	**689.0**	**9.8**	**512.3**	**– 182.0**	**13.2**	**– 24.6**
Total EU-27	**– 98.3**	**2 129.6**	**2 325.5**	**84.7**	**2 081.0**	**– 342.8**	**– 133.3**	**– 199.5**

Note: For a description of the different methods please see Section 7.4.

Source: CITL (5 July 2007); ETC/ACC, 2007; European Commission 2007.

of CO_2 emissions from industry (in particular energy industries), which have grown or remained stable in recent years.

The EU ETS is therefore estimated to contribute by at least approximately 150 Mt CO_2 to the reduction of EU 15 greenhouse gas emissions, which is equivalent to 3.4 % of EU-15 base-year emissions.

As a consequence, in addition to Member States projections of total emission reductions, the EU ETS could potentially bring a further emission reduction of approximately 50–80 Mt CO_2 to the EU-15. This is obtained by deducting the effect of the EU ETS already included by certain Member States in their projections (93 Mt CO_2) from the estimated total EU ETS effect. This additional reduction would correspond to 1.3 to 1.9 % of base-year emissions, which could be added to the total 11.4 % reduction currently projected by Member States.

The main difficulty for projecting the effect of the EU ETS for this year's report is that Member States had to prepare their projections before their second NAPs and/or the Decisions of the European Commission on their plans, were published. With the termination of the second assessment of NAPs in 2007, Member States should be better able to estimate the effect of the EU ETS for future reports.

7.5 Use of JI and CDM by operators

As part of the second NAPs, Member States had to include a limit on the maximum use of project-based credits by operators (JI and CDM, see Chapter 8). In the first trading period of the ETS, the project-based mechanisms are not expected to be used much, if at all, mainly due to low allowance prices in 2006 and 2007 and the outstanding link of the EU registries system to the Independent Transaction Log of the Kyoto Protocol (ITL) ([19]). The use of CDM and JI is expected to gain importance in the second trading period. Table 7.5 shows the limits accepted by the Commission on the use of JI and CDM by operators in Member States.

In total, up to 278 million CERs ([20]) or ERUs ([21]) may be used per year by ETS installations from all Member States except Estonia in the second trading period. This corresponds to 13.4 % of the EU-wide cap for the second trading period. Thus, the use of the flexible mechanisms by operators in the second trading period may be more than twice the absolute emission reductions from current levels required by all ETS installations, which is about 133 Mt CO_2 per year (see above). This allowed use of JI and CDM by operators is also 2.6 times higher than the intended use of Kyoto Mechanisms by EU Member States, which amounts to 108 Mt CO_2-equivalents. In effect, this means that operators under the EU ETS do not have to reduce their emissions but are able to completely offset excess emissions through the acquisition of emission reduction units.

If CDM and JI were used up to the extent allowed, CO_2 emissions by ETS installations could in fact increase in the second trading period by 6.5 % or 145 Mt CO_2 per year above the verified emissions in 2005/2006 (including additional emissions from installations that are only in the second trading period covered under the ETS). However, the limits for the use of JI and CDM credits represent an upper bound and there are several reasons why they may not be completely used. Firstly, the limits are largely defined per installation and in many cases are not differentiated. Industrial installations, which have been allocated more generously than power plants, might not make use of the option to acquire JI and CDM credits and sell allowances. Secondly, installations in those Member States that are close to achieving, or on track to overachieve their Kyoto targets, do not face as strict allocations. Therefore, as industrial installations, they may not need to engage so much in purchasing JI and CDM credits and reach the limit awarded to them.

([19]) Independent transaction log under the Kyoto Protocol, operated by the UNFCCC secretariat. There will be a link between the CITL and the ITL only during the Kyoto period.
([20]) Certified emission reductions (applies to emission reductions under JI).
([21]) Emission reduction units (applies to emission reductions under the CDM).

Table 7.5 Limit on the use of JI and CDM by EU ETS operators

Member State	2005 total GHG emissions	Share of EU ETS in total GHG emissions in 2005	Difference Kyoto or burden-sharing target and base year	Projected govern-ment use of flexible mechanisms	2008–2012 EU ETS cap	CDM/JI limit for EU ETS operators	
	Mt CO_2/ year	%	Mt CO_2/ year	Mt CO_2/ year	Mt CO_2/ year	% of EU ETS cap	Mt CO_2/ year
Austria	93.3	36 %	– 10.3	9.0	30.7	10.0 %	3.1
Belgium	143.8	38 %	– 11.0	7.0	58.5	8.4 %	4.9
Bulgaria	69.8	58 %	– 10.6		42.3	12.6 %	5.3
Cyprus	9.9	51 %	No target		5.5	10.0 %	0.5
Czech Republic	145.6	57 %	– 15.7		86.8	10.0 %	8.7
Denmark	63.9	41 %	– 14.6	4.2	24.5	17.0 %	4.2
Estonia	20.7	61 %	– 3.4		12.7	0.0 %	0.0
Finland	69.3	48 %	0.0	2.4	37.6	10.0 %	3.8
France	553.4	24 %	0.0		132.8	13.5 %	17.9
Germany	1 001.5	47 %	– 258.8		453.1	20.0 %	90.6
Greece	139.2	51 %	27.8		69.1	9.0 %	6.2
Hungary	80.5	32 %	– 7.4		26.9	10.0 %	2.7
Ireland	69.9	32 %	7.3	2.4	22.3	10.0 %	2.2
Italy	582.2	39 %	– 33.8	19.0	195.7	15.0 %	29.3
Latvia	10.9	26 %	– 2.1		3.4	10.0 %	0.3
Lithuania	22.6	29 %	– 3.8		8.9	20.0 %	1.8
Luxembourg	12.7	20 %	– 3.6	4.7	2.5	10.0 %	0.2
Malta	3.4	58 %	No target		2.1	Tbd	Tbd
Netherlands	212.1	38 %	– 12.9	20.0	85.8	10.0 %	8.6
Poland	399.0	51 %	– 35.2		208.5	10.0 %	20.9
Portugal	85.5	43 %	16.5	5.8	34.8	10.0 %	3.5
Romania	153.7	46 %	– 22.6		75.9	10.0 %	7.6
Slovak Republic	48.7	52 %	– 5.9		30.9	7.0 %	2.2
Slovenia	20.3	43 %	– 1.6		8.3	15.8 %	1.3
Spain	440.6	42 %	43.4	31.8	152.3	20.0 %	30.5
Sweden	67.0	29 %	2.9	1.2	22.8	10.0 %	2.3
United Kingdom	657.4	37 %	– 97.5		246.2	8.0 %	19.7
Total EU-27	**5 177.0**	**41 %**	**– 452.9**	**107.5**	**2 081.0**	**13.4 %**	**278.2**

Note: Tbd = to be determined.

Source: CITL (5 July 2007); ETC/ACC, 2007; European Commission 2007.

8 Sectoral policies and measures in the EU

- Many of the domestic policies and measures already implemented by Member States to reduce their greenhouse gas emissions are based on EU common coordinated policies and measures (CCPMs).
- The sectoral policies and measures, defined at EU level, through which Member States plan to obtain the largest greenhouse gas emissions reductions in the EU are:
  - the Directive on the Promotion of Electricity from Renewable Energy Sources
  - the Emissions Trading Directive
  - the Directive on The Energy Performance On Buildings
  - the Directive on Kyoto Protocol Project Mechanisms
  - the Cogeneration Directive
  - the Biofuels Directive
  - the Directive on Energy Taxation
  - the voluntary agreements to reduce per km CO_2 emissions from new cars reached with the European, Japanese and Korean automobile industries.
- Some Member States still need to implement or reinforce EU policies through additional measures at national level. The largest further emission reductions projected from such measures correspond to the following EU policies:
  - the Emissions Trading Directive
  - the Directive on the Promotion of Electricity from Renewable Energy Sources
  - the Cogeneration Directive
  - the Biofuels Directive
  - the Directive on the Energy Performance on Buildings.
- The European Commission, through the second phase of the European Climate Change Programme, is expected to propose further domestic policies and measures to contribute to meeting the EU Kyoto target. Specific areas for which additional emission reductions measures for 2008–2012 are developed include aviation and CO_2 from cars. Furthermore, the Commission is developing a regulatory framework and is reviewing the EU ETS for the period beyond 2012.

This chapter presents the main sectoral emissions trends and projections in the EU, as reported by Member States. It also attempts to link these trends with existing or planned policies and measures in the EU.

8.1 The European Climate Change Programme (ECCP)

In June 2001, the European Commission reported on a coordinated programme — the European Climate Change Programme (ECCP I) — in which it identified a number of EU-wide common and coordinated policies and measures (CCPMs) to implement the Kyoto Protocol. The large majority of policies and measures identified by the Commission as a priority for the EU, as a result of ECCP I, are now being implemented.

ECCP II was launched in October 2005 with a stakeholder conference held in Brussels. The focus for ECCP II was on the ECCP I review, and on exploring new policy areas. Specific areas for which additional emission reductions measures for 2008–2012 are developed include aviation, and CO_2 and cars. Furthermore, the Commission is developing a regulatory framework and is reviewing the EU ETS for the period beyond 2012. Other policy areas addressed in ECCP II include adaptation, and carbon capture and storage (See Section 8.5 on future action).

8.2 Common and coordinated policies and measures

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, and 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 more detail in Annex 2.

The most important common and coordinated policies and measures are summarised in Table 8.1.

Table 8.1 Main common coordinated policies and measures

Sector	Common coordinated policies and measures
Cross-cutting	EU Emission 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_2 Emission Trading Scheme with the Kyoto mechanisms (COM(2003)403 final, adopted in October 2003 implemented by Member States)
Energy supply and use (energy industries, industry and households)	Directive on the Promotion of Electricity from Renewable Energy Sources (2001/77/EC, adopted in 2001)
	Directive on Combined Heat and Power to Promote High Efficiency Cogeneration (2004/8/EC, adopted in February 2004)
	Directive on the Energy Performance of Buildings (2002/91/EC, adopted in January 2003 transposed by Member States in 2006)
	Directive restructuring the Community Framework for the Taxation of Energy Products and Electricity (2003/96/EC, adopted in October 2003, transposed by Member States in 2005)
	Directive on Establishing a Framework for the setting of Ecodesign Requirements for Energy-using Products (2005/32, adopted in July 2005, to be transposed by Member States in 2007)
	Directive on Energy end Use Efficiency and Energy Services (2006/32/EC adopted on May 2006 and due to be transposed by Member States in 2008)
Industry	Regulation on certain Fluorinated Greenhouse Gases (EC 842/2006 adopted in July 2006, applies in Member States from July 2007)
Transport	Reduction in average CO_2 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, transposed by Member States in 2005)
	Directive relating to Emissions from Air-conditioning Systems in Motor Vehicles (2006/40/EC, adopted in January 2006, to be transposed by Member States in 2008)
Agriculture	Common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers (premium payment 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)

8.3 Linkages between CCPMs and national policies and measures

There is a strong link between national policies and measures (PAM) and EU CCPMs. CCPMs demonstrate the collective determination of the EU-27 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 national level is described and its consequences on existing or new national policy are shown.

For each Member State, three categories of national PAM can be identified:

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

Member States have supplied information on their implementation of CCPMs by reporting, in a questionnaire sent by the European Commission, on the linkages of national PAM to CCPMs. Member States also provided the name of national PAM which implemented the CCPM and the quantitative effect of the measures on emission reductions. This process aimed to improve the transparency of national policy-making.

Fourteen EU-15 Member States and eight new Member States provided information on policy linkages. Good quality information was provided on the linkages of national policies and measures to CCPMs. However, only a limited number of Member States quantified emission savings, so the overall effects of CCPMs could not be assessed. Almost all reporting Member States are implementing the CCPMs. Tables 8.2 and 8.3 indicate that:

- The Emissions Trading Directive led to the adoption of new national measures in all Member States except in Denmark and the United Kingdom, where similar schemes were introduced before this CCPM.
- The Biofuels Directive is a new policy in most Member States, but reinforced existing national policies in France, Germany and Sweden.
- The EU-15 had been active in promoting both electricity generation from renewables and promoting cogeneration before the corresponding directives were introduced. Many Member States either took action before the directives were adopted or had existing measures reinforced by the directives. More of the new Member States needed to introduce new policies to implement these two directives.
- In the case of the Energy Performance of Buildings Directive, more than half of reporting Member States needed to introduce new policies and measures when the directive was adopted.

In general for the CCPMs on which new Member States reported, new national policies and measures were implemented once a CCPM was adopted. Transfer of good practice and CCPM implementation experience from old Member States will help to facilitate implementation of CCPMs in the new Member States.

Table 8.2 Linkages between CCPMs and national policies and measures of the EU-15

Sector	CCPM	Austria	Belgium	Denmark	Finland	France	*Germany	Greece	Ireland	Italy	Luxemborg	Netherlands	Portugal	Spain	Sweden	United Kingdom	Total N	Total R	Total B
Cross-cutting	Kyoto Protocol Project Mechanisms 2004/101/EC	N	N	N	N	N	N		N			B		N	N		9	0	1
Cross-cutting	Emissions Trading 2003/87/EC	N	N	R	N	N	N	N	N	N		N	N	N	N	R	12	2	0
Cross-cutting	Integrated Pollution Prevention and Control 96/61/EC	R	N	B			R		R			N		N	R		3	4	1
Energy supply	Promotion of Cogeneration 2004/8/EC	N	B	B	R	B	B	R	N	N		B	B	N	B	N	4	2	7
Energy supply	Promotion of Electricity from Resources 2001/77/EC	N	N	B	R	R	B	R	R	N		R	R	R	B	N	4	7	3
Energy supply	Taxation of Energy Products 2003/96/EC	R	N	B	R	B	B		B	R		B	N	R	R	B	2	4	6
Energy supply	Internal Electricity Market 2003/54/EC	N	N	R			N		N			R			R		4	3	0
Energy supply	Internal Market in Natural Gas 98/30/EC	N	N	R	D		N		N			N			R		5	2	0
Energy consumption	Directives on Energy Labelling of Appliances	N	N	B	N	N	N	N	N	R		N	N	N	N	N	12	1	1
Energy consumption	Ecodesign Requirements for Energy-using Products 2005/32/EC	N				N	N		N			N					5	0	0
Energy consumption	Energy Performance of Buildings 2002/91/EC	N	N	B	B	N	R	R	N	N		R	R	R	N	N	7	5	2
Energy consumption	End-use Efficiency and Energy Services 2006/32/EC	N			R	N	N		N			N		N			6	1	0
Energy consumption	Eco-Management and Audit Scheme (EMAS) EC 761/2001	N	N	N	N	N	N	R				B	N	N	B		8	1	2
Energy consumption	Energy Labelling for Office Equipment 2422/2001	N			B				N			N			N		4	0	1
Energy consumption	Efficiency Fluorescent Lighting 2000/55/EC	N			N		N		N			N			N		6	0	0
Energy consumption	Efficiency of Hot Water Boilers 92/42/EEC	N	N	B		N	R	B	N			B	N	N	N	N	8	1	3
Transport	Promotion of Biofuels for Transport 2003/30/EC	N	N	N	N	R	R	N	N	N		N	N	N	R	N	11	3	0
Transport	Integrated European Railway Area (COM(2002)18 final)	N		B			R					R					1	2	1
Transport	Transport Modal Shift to Rail 2001/12/EC etc.		N	R	N	B	B		N	N		B		N	R	N	6	2	3
Transport	Consumer Information on Cars 1999/94/EC	N	N	R		N	N		N			N	N	N	N	N	10	1	0
Transport	Agreement with Car Manufacturers (ACEA, KAMA, JAMA)	N	N			R	R	R		B		N	N		N	R	5	4	1
Transport	Marco Polo Programme on Freight Transport			B			B										0	0	2
Transport	Motor Challenge, voluntary EC Programme			B			R		N			N			N		3	1	1
Transport	HFCs in Mobile Air Conditioning 2006/40/EC	B	N			N						R			N		3	1	1

Sector	CCPM	Austria	Belgium	Denmark	Finland	France	*Germany	Greece	Ireland	Italy	Luxemborg	Netherlands	Portugal	Spain	Sweden	United Kingdom	Total N	Total R	Total B
Industrial process	F-gas Regulation (842/2006)	B	R/N	B			R					R			N		1	3	2
Agriculture	Support under CAP (1782/2003)	R	B	N	N	R	N/R		N			N		N	N	N	8	2	1
Agriculture	Support under CAP — amendment (1783/2003)	R	B	N	N	R	N/R		N			N		R	N	N	7	2	1
Agriculture	Rural Development Support and CAP (2603/1999, 1698/2005 and 1290/2005)	R	N						N								2	1	0
Agriculture	Support Scheme for Energy Crops under CAP (795/2004)						R					N		B			1	1	0
Agriculture	Support for Rural Development from EAGGF (1257/1999)	R	N				B		N			N		R	B		3	1	2
Agriculture	Pre-accession Measures for Agriculture and Rural Development (1268/1999)	NA	NA											R			0	0	0
Agriculture	Nitrates Directive 91/676/EEC	R	N				R		N			R		N	B		2	3	1
Waste	Landfill Directive 1999/31/EC	B	B	B	R	B	B	R	N	N		B	N	R	B	N	4	3	7
Waste	Packaging and Packaging Waste (94/62/EC, 2004/12/EC, 2005/20/EC)	B	B						N			B					1	0	3
Waste	Directive on Waste 2006/12/EC	B	B			N			R								1	1	2
All	**Total N**	18	19	5	9	11	12	3	23	7	0	16	9	11	14	11	168		
All	**Total R**	7	1	5	5	5	10	6	3	2	0	7	2	3	6	2		64	
All	**Total B**	5	6	12	2	4	7	1	1	1	0	8	1	0	6	1			55

Note: N: new national PAM implemented or in preparation after CCPM was adopted
R: existing national PAM re-enforced by CCPM
B: national PAM already in force before CCPM was adopted
D: derogation
NA: not applicable
<blank>: not reported
* Germany's CCPMs status is preliminary — the description of policies implementing the CCPMs has not been submitted yet.

Source: 2007 questionnaire and Member State communications to the EEA.

Table 8.3 Linkages between CCPMs and national policies and measures of the new EU Member States

Sector	CCPM	Bulgaria	Cyprus	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Malta	Poland	Romania	Slovak Republic	Slovenia	Total N	Total R	Total B
Cross-cutting	Kyoto Protocol Project Mechanisms 2004/101/EC			N				B		N		B		2	0	2
Cross-cutting	Emissions Trading 2003/87/EC			N	N	N	N	N		N		N	N	8	0	0
Cross-cutting	Integrated Pollution Prevention and Control 96/61/EC			N				R		N		R		2	2	0
Energy supply	Promotion of cogeneration 2004/8/EC			N		N	N	R				B	B	3	1	2
Energy supply	Promotion of Electricity from Resources 2001/77/EC			N		N	R	N		N		N	B	5	1	1
Energy supply	Taxation of Energy Products 2003/96/EC			N			N	R					B	2	1	1
Energy supply	Internal Electricity Market 2003/54/EC						R	R				B		0	2	1
Energy supply	Internal Market in Natural Gas 98/30/EC											B		0	0	1

Sector	CCPM	Bulgaria	Cyprus	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Malta	Poland	Romania	Slovak Republic	Slovenia	Total N	Total R	Total B
Energy consumption	Directives on Energy Labelling of Appliances				N		N			N		B	N	4	0	1
Energy consumption	Ecodesign Requirements for Energy-using Products 2005/32/EC													0	0	0
Energy consumption	Energy Performance of Buildings 2002/91/EC			N		N	N	N		N		N		6	0	0
Energy consumption	End-use Efficiency and Energy Services 2006/32/EC							R				B		0	1	1
Energy consumption	Eco-Management and Audit Scheme (EMAS) EC 761/2001						N			N		B	N	3	0	1
Energy consumption	Energy Labelling for Office Equipment 2422/2001									N				1	0	0
Energy consumption	Efficiency Fluorescent Lighting 2000/55/EC													0	0	0
Energy consumption	Efficiency of Hot Water Boilers 92/42/EEC						N			N		B	N	3	0	1
Transport	Promotion of Biofuels for Transport 2003/30/EC			N		N	N	N		N		N		6	0	0
Transport	Integrated European Railway Area (COM(2002)18 final)												0	0	0	
Transport	Transport Modal Shift to Rail 2001/12/EC etc.						N							1	0	0
Transport	Consumer Information on Cars 1999/94/EC						N					B	N	2	0	1
Transport	Agreement with Car Manufacturers (ACEA, KAMA, JAMA)													0	0	0
Transport	Marco Polo Programme on Freight Transport													0	0	0
Transport	Motor Challenge, voluntary EC Programme													0	0	0
Transport	HFCs in Mobile Air Conditioning 2006/40/EC													0	0	0
Industrial process	F-gas Regulation (842/2006)													0	0	0
Agriculture	Support under CAP (1782/2003)						N						N	2	0	0
Agriculture	Support under CAP — amendment (1783/2003)						R							0	1	0
Agriculture	Rural Development Support and CAP (2603/1999, 1698/2005 and 1290/2005)					N						B		1	0	1
Agriculture	Support Scheme for Energy Crops under CAP (795/2004)													0	0	0
Agriculture	Support for Rural Development from EAGGF (1257/1999)			N								R		1	1	0
Agriculture	Pre-accession Measures for Agriculture and Rural Development (1268/1999)											B		0	0	1
Agriculture	Nitrates Directive 91/676/EEC					N				N		B		2	0	1
Waste	Landfill Directive 1999/31/EC			N	N		N	N		N		B	N	6	0	1
Waste	Packaging and Packaging Waste (94/62/EC, 2004/12/EC, 2005/20/EC)			N	N			N						3	0	0
Waste	Directive on Waste 2006/12/EC				R					N		N		2	1	0
All	**Total N**	0	0	11	4	7	12	6	0	13	0	5	7	65		
All	**Total R**	0	0	0	1	0	3	5	0	0	0	2	0		11	
All	**Total B**	0	0	0	0	0	0	1	0	0	0	13	3			17

Note: N: new national PAM implemented or in preparation after CCPM was adopted.
R: existing national PAM re-enforced by CCPM
B: national PAM already in force before CCPM was adopted
D: derogation
NA: not applicable
<blank>: not reported

Source: 2007 questionnaire and Member State communications to the EEA.

8.4 Quantified savings from CCPMs

Based on responses by the EU-27, the most important CCPMs (already implemented or still to be implemented by certain Member States) in terms of projected reductions in greenhouse gas emissions are, by decreasing size of projected reductions ([22]):

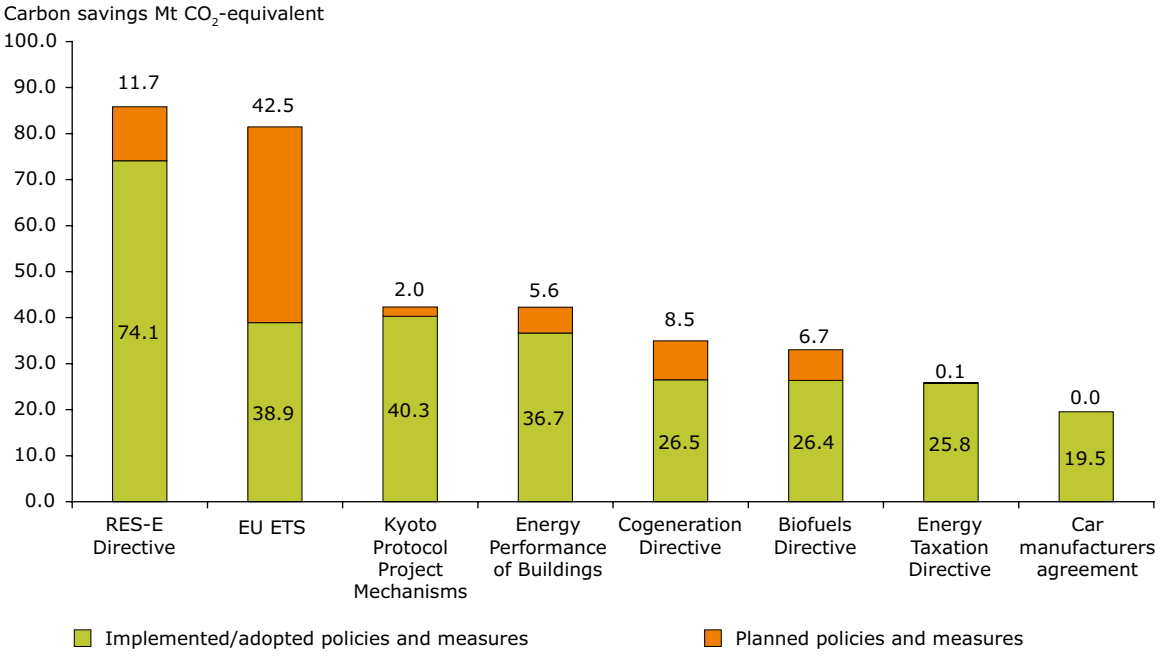
- the Directive on the promotion of Electricity from Renewable Energy Sources (2001);
- the Emissions Trading Directive (2003);
- the Directive on the Energy Performance on Buildings (2002);
- the Directive on Kyoto Protocol Project Mechanisms (2004);
- the Cogeneration Directive (2004);
- the Biofuels Directive (2003);
- the Directive on Energy Taxation (2003);
- the voluntary agreements to reduce per km CO_2 emissions from new cars reached with the European, Japanese and Korean automobile industries (the voluntary agreement with car manufacturers from EU is to reduce fleet average CO_2 emissions to 140 g/km by 2008/2009).

Figures 8.1 and 8.2 present the savings from the top eight CCPMs, as estimated by Member States in the EU-15 and in new Member States.

8.5 Future action at national and EU levels

Some Member States (Figures 8.1 and 8.2) are still anticipating further savings from the implementation or reinforcement of existing CCPMs (through additional policies and measures). This means that some Member States consider that

Figure 8.1 Estimated savings for top eight CCPMs split by status (implemented/adopted or planned) in the EU-15



Note: The quantification of the effect of planned policies and measures refers to a hypothetical 'without measures' scenario.

Source: European Climate Change Programme (ECCP) Database on Policies and Measures in Europe (www.oeko.de/service/pam/sector.php) as of 11 July 2007, based on Member States projections.

([22]) See Annex 2.

they have not yet fully implemented or enforced these CCPMs. Proper and timely implementation of additional domestic policies and measures is expected to bring further significant emission reductions to the EU for the following CCPMs:

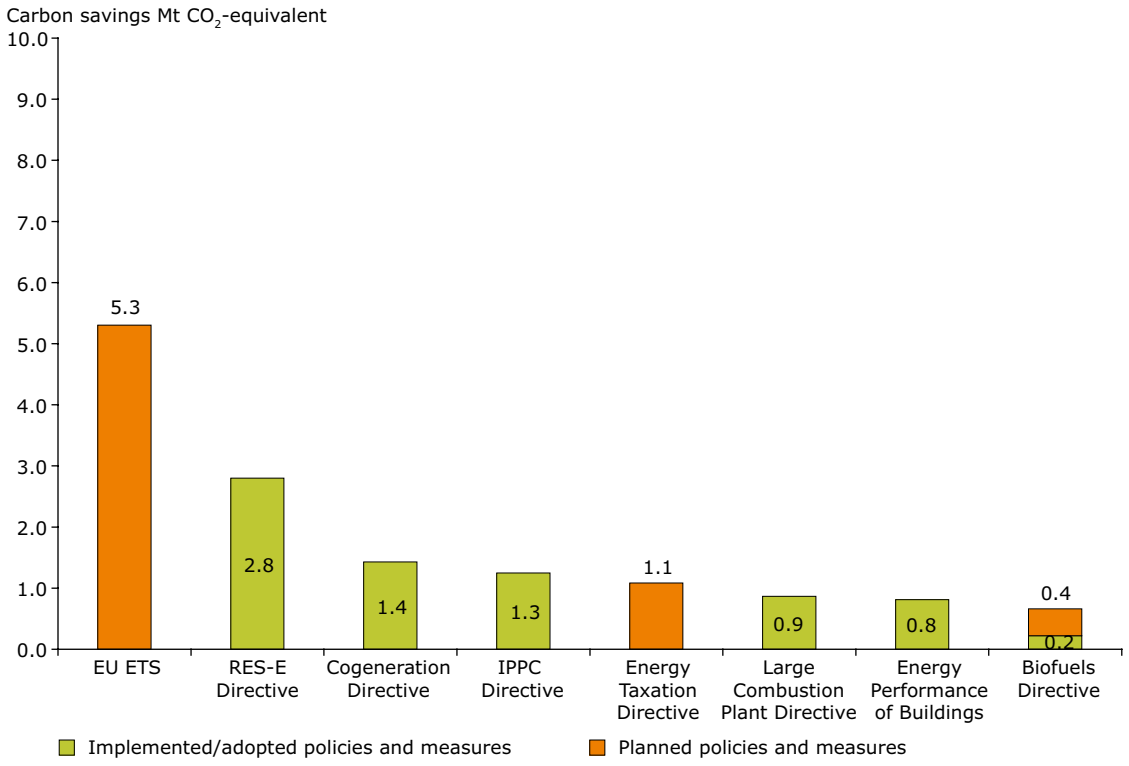
- the Emissions Trading Directive;
- the Directive on the Promotion of Electricity from Renewable Energy Sources;
- the Cogeneration Directive;
- the Biofuels Directive;
- the Directive on the Energy Performance on Buildings.

ECCP II working groups met throughout 2006 and 2007 to review ECCP I and explore new policy areas. As a result, the Commission has proposed several actions:

- aviation: legislative proposal integrating aviation into EU ETS (December 2006);
- Fuel quality directive: legislative proposal (January 2007);
- CO_2 and cars: Communication (February 2007) and legislative proposal (end 2007 or early 2008);
- revised targets for 2020 for the use of renewable energy and biofuels in the integrated climate change and energy package (January 2007);
- EU ETS review: legislative proposal for the post-2012 period (end 2007);
- impacts and adaptation: Green Paper on adaptation (June 2007); and
- carbon capture and geological storage: legislative proposal on carbon capture and geological sequestration (end 2007).

The first three proposals, if adopted in a timely manner, could still contribute to help Member States and the EU reach their targets.

Figure 8.2 Estimated savings for top eight CCPMs split by status (implemented/adopted or planned) in the new Member States



Note: The quantification of the effect of planned policies and measures refers to a hypothetical 'without measures' scenario.

Source: European Climate Change Programme (ECCP) Database on Policies and Measures in Europe (www.oeko.de/service/pam/sector.php) as of 11 July 2007, based on Member States projections.

9 Sectoral trends, projections and effects of policies and measures

- EU-15 greenhouse gas emissions decreased in all sectors between 1990 and 2005 except in the transport sector, where they increased significantly (+ 26 %).
- Transport emissions are projected to stabilise by 2010, or even decrease below existing levels if additional measures are implemented. This is due to new projections from Germany, where transport emissions are expected to be significantly reduced from current levels by 2010.
- Emissions are expected to decrease between 2005 and 2010 in all sectors except in industrial processes.
- Emissions from industrial processes are projected to be at best stabilised by additional measures. However, projections give a more positive picture than last year, due to the inclusion of new projections from Germany in the EU-15 analysis.
- Significant reductions of greenhouse gas emissions between 2005 and 2010 (in relative terms) can be expected from existing measures in the waste sector and from additional measures in the transport sector.

See further key assessments in the sections addressing each sector.

This chapter presents graphs for both the EU-15 and EU-27, but analyses focus on EU-15 trends.

9.1 Key sources, main trends and projections

The main greenhouse gas emission sources are (see Figure 9.1 for EU-15):

- energy supply and use excluding transport: CO_2 from fossil fuel combustion in electricity and heat production, refineries, manufacturing industries, households and services;
- transport: CO_2 from fossil fuel combustion, but also nitrous oxide (N_2O) from catalytic converters;
- agriculture: CH_4 from enteric fermentation and manure management, and N_2O from soils and manure management;
- industrial processes: CO_2 from cement production, N_2O from chemical industry, HFCs from replacing CFCs in cooling appliances and from production of thermal insulation foams;
- waste management: CH_4 from waste disposal sites.

A detailed analysis for the key sources covering almost 90 % of total EU-15 greenhouse gas emissions can be found in the Annex (Chapter 1). Figure 9.1 shows that the importance of key sources did not change much between 1990 and 2005. However, the two largest emitting sectors ('Public electricity and heat production' and 'Transport') increased their share.

Figure 9.2 represents the past emissions trends and projected emissions, considering existing measures and additional measures. Table 9.1 summarises the expected consequence of the existing measures on sectoral greenhouse gas emissions between 2005 and 2010 and the projected effect of additional policies and measures. Figure 9.2 and Table 9.1 show that:

- Emissions have decreased between 1990 and 2005 in all sectors except the transport sector, where they increased significantly.
- However, transport emissions are projected to be stabilised by 2010, or even to decrease from current levels if additional measures are implemented.

- Emissions are expected to decrease between 2005 and 2010 in all sectors except in industrial processes, where additional measures are not expected to be sufficient to prevent emissions from this sector increasing.

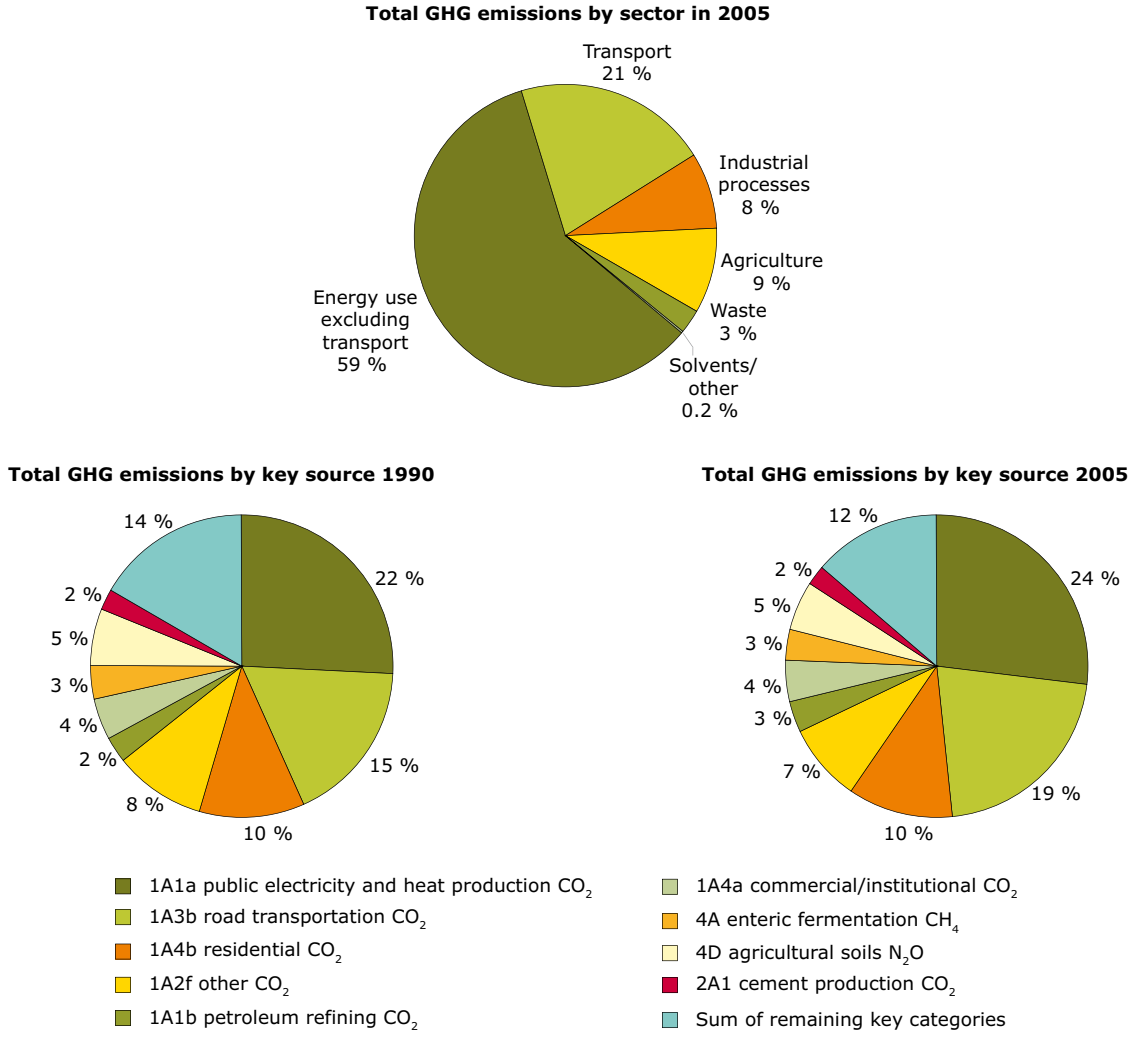
- Significant reductions of greenhouse gas emissions between 2005 and 2010 can be expected from existing measures in the waste sector and from additional measures in the transport sector.

The 2010 projections for transport emissions represent a major change compared to last year's analysis, where emissions from transport were projected to increase by 2010 at a level 35 % above base-year emissions with existing measures, and 27 % above base-year emissions with additional measures. This significant change is mainly due to the inclusion for the first time of projections from Germany, which show a decreasing trend for the transport sector in contrast to almost all other Member States. France also projects a much smaller increase in transport emissions compared to last year's projections.

Although they are still projected to increase between 2005 and 2010, emissions from industrial processes are expected to be reduced more through existing measures than in last year's analysis. They could even be roughly stabilised at current levels with additional measures. This is also due to the inclusion of projections from Germany as well as revised projections from the United Kingdom. Both Member States are projecting a significant decrease of these emissions, thereby reinforcing the slight decrease compared to base-year emissions projected last year.

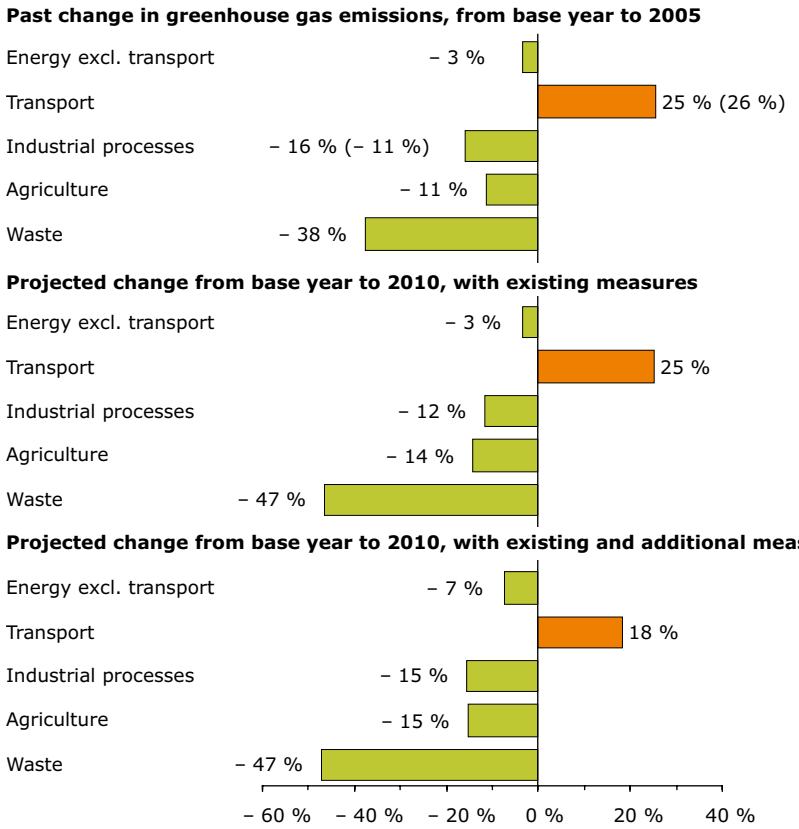
Compared to last year's analysis, the changes in sector 'Energy (supply and use) excluding transport', 'Agriculture' and 'Waste' are of minor importance.

Figure 9.1 Share of EU-15 sectors and key sources in 1990 and 2005



Source: EEA, 2007a.

Figure 9.2 Changes in EU-15 greenhouse gas emissions by sector



Note: The numbers presented correspond to changes compared to base-year emissions except for the numbers in brackets (past trends for transport and industrial processes), which correspond to changes compared to 1990. For the transport sector, the 1990 emissions were recalculated after base-year emissions were submitted in initial reports, which generated an inconsistency between the two numbers. For industrial processes, the relative importance of fluorinated gases (for which most Member States chose 1995 as the base year) results in a significant difference between base-year emissions and 1990 emissions.

Several Member States did not report projections for all sectors or scenarios. Therefore, the information on the total EU-15 projections is based on gap-filling and should be interpreted with care.

Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections.

Table 9.1 Projected effect of existing and additional measures on sectoral greenhouse gas emissions between 2005 and 2010

Sector	Projected change in sectoral greenhouse gas emissions between 2005 and 2010 in the EU-15	
	Consequence of existing measures	Further effect of additional measures
Energy supply and use, excluding transport	→ (0)	↘ (– 4)
Transport	→ (0)	↘↘ (– 7)
Industrial processes	↗ (+ 4)	↘ (– 3)
Agriculture	↘ (– 3)	→ (– 1)
Waste	↘↘ (– 9)	→ (– 1)

Note: The numbers indicated correspond to projected change of sectoral greenhouse gas emissions in the EU-15 between 2005 and 2010, in percentage points relative to base-year emissions.

The projected effect of additional measures is calculated in comparison with a scenario of existing measures. The overall effect of all measures (existing and additional) is the sum of the trends presented in the two columns.

Source: EEA.

9.2 Energy supply and use, excluding transport

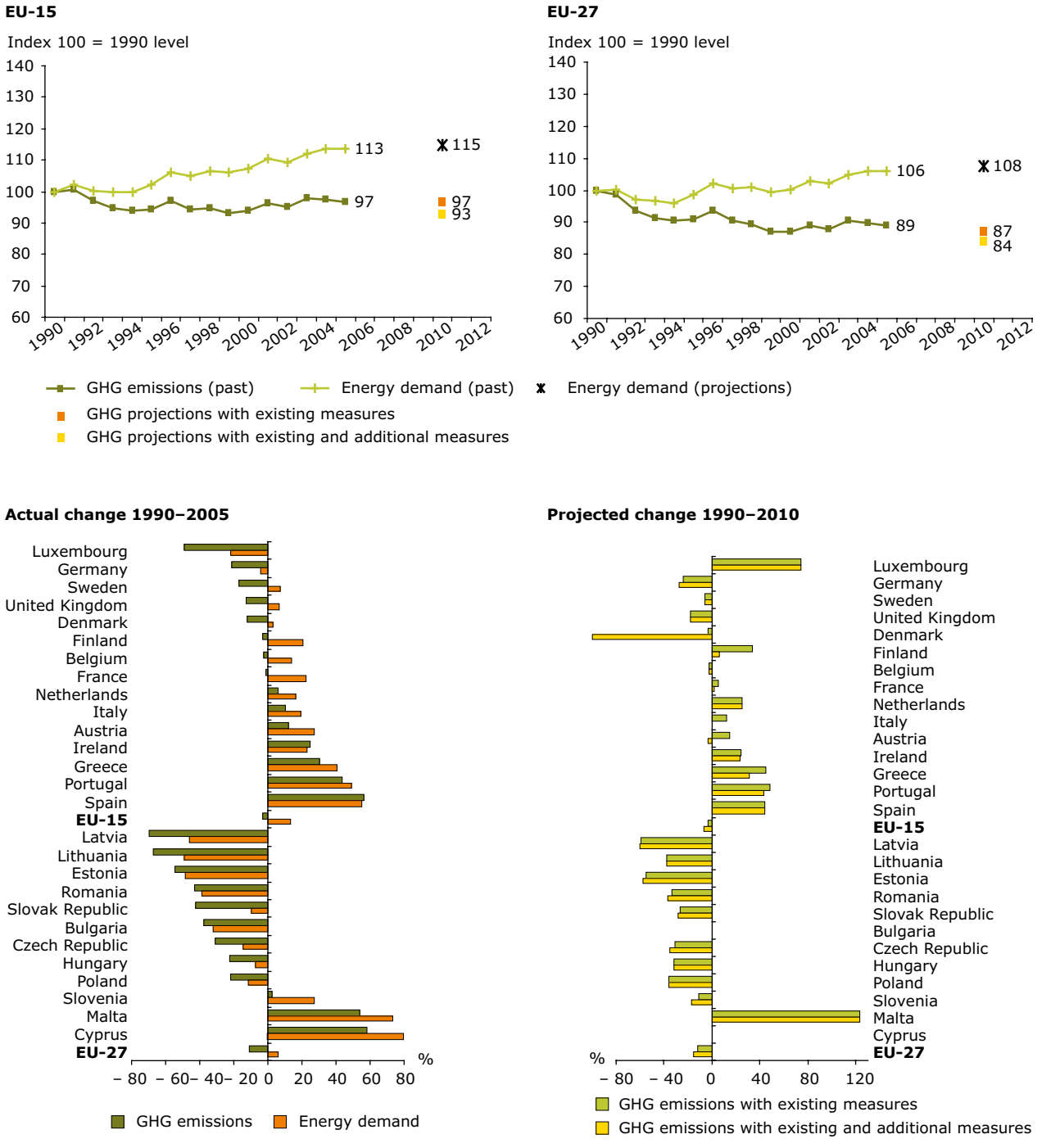
- Emissions from energy supply and use (excluding transport) decreased by 3 % between 1990 and 2005 and are expected to be stabilised at the same level by 2010 with existing measures.
- In 2005, CO_2 emissions from public electricity and heat production were decreasing for the second consecutive year (– 0.9 % compared to 2004). However since 1990, these emissions have increased by + 6 %, driven by increasing electricity production in thermal power plants (+ 38 % between 1990 and 2005).
- Decoupling of greenhouse gas emissions from energy consumption has been observed in all Member States, although there are large differences between Member States.
- The share of renewable energy use increased between 2004 and 2005. However, the target of 21 % of renewable electricity by 2010 and especially the overall target of a 20 % share of renewable energy in overall EU energy consumption by 2020 will require further significant efforts in the implementation of renewable energy sources. The 2020 target requires an increase in the share of renewable energy by about a factor of 3.
- The share of electricity from combined heat and power (CHP) in electricity production in EU-27 has roughly stabilised between 2000 and 2004. Further efforts are needed to increase the share of CHP by 2010.
- CO_2 emissions from households decreased by 1.7 % from 1990 to 2005, while the number of dwellings increased by 18 %.
- After an increase observed between 2003 and 2004, emissions from manufacturing industries remained stable in 2005 (10 % below 1990 levels).

The main sources covered by the sector 'Energy supply and use, excluding transport', are public electricity and heat production, refineries, manufacturing industries and households. From 2004 to 2005, the total emissions from these sources decreased by 0.9 % in the EU-15. The decrease is mainly due to lower electricity generation from thermal power plants. Finland and Denmark had higher electricity imports and Sweden had higher exports from increased electricity generation from hydropower plants. The fuel switch from solid to gaseous and liquid fuels resulted in a further emissions reductions, especially in Germany.

During the period from 1990 to 2005, the rise in energy demand exceeded the increase in emissions in all EU-15 Member States, except Ireland and Spain (Figure 9.3). Luxembourg, Sweden, Finland and France were most successful at accomplishing such decoupling of emissions levels from energy demand. By 2005, EU-15 greenhouse gas emissions were 3.3 % lower than in 1990 while the energy demand increased by 13 % in the same period. Eight Member States achieved emission reductions between 1990 and 2005 (Germany, Luxembourg, Sweden, the United Kingdom, Denmark, Finland, Belgium and France), while the rise in emissions was greatest in Spain, Portugal, Greece and Ireland. The decline of related 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 due to the reunification process) and the United Kingdom (fuel switch in electricity and heat production). Between 2000 and 2005, emissions and energy demand increased by 3 % and 6 % respectively, although emissions have been slightly decreasing since 2003.

If no additional measures are implemented, emissions from energy use without transport are projected to stabilise at 2005 levels. Estimates based on sectoral projections suggest that with the implementation of additional measures the EU-15 emissions could be reduced to 7 % below 1990 level. National projections show that decoupling of emissions level and energy demand is likely to continue.

Figure 9.3 EU-15 and EU-27 greenhouse gas emissions from energy supply and use (excluding transport) compared with energy demand



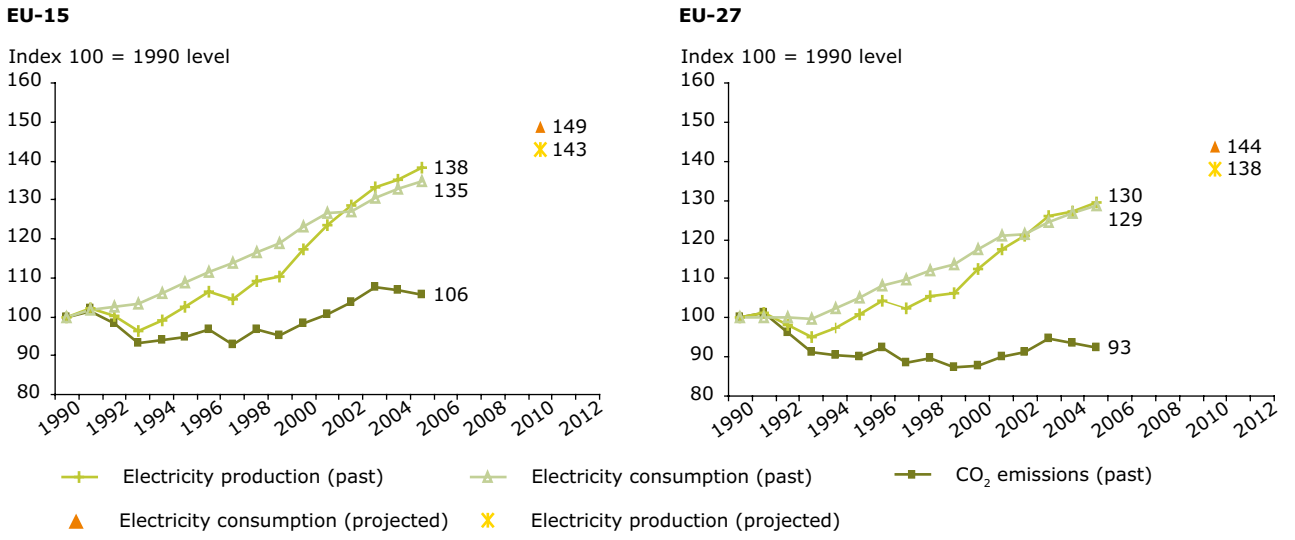
Note: For France and Italy, sectoral projections 'with additional measures' had to be gap-filled to calculate EU-15 greenhouse gas projections. Since sectoral emission projections for Bulgaria and Cyprus were not available, greenhouse gas projections for the EU-27 are calculated on the basis of projections reported by 25 Member States. The 2005–2010 percent variation for the EU-25 was applied to Cyprus and Bulgaria to obtain an EU-27 projection for 2010. No additional measures were reported for Belgium, Denmark, Luxembourg, Netherlands, Spain, Sweden, United Kingdom, Hungary, Latvia, Lithuania, Malta and Poland. For these Member States, the 'with existing measures' projections were used for the calculation of the EU-27 'additional measures' projections.

Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections; Eurostat.

9.2.1 *Public electricity and heat production*

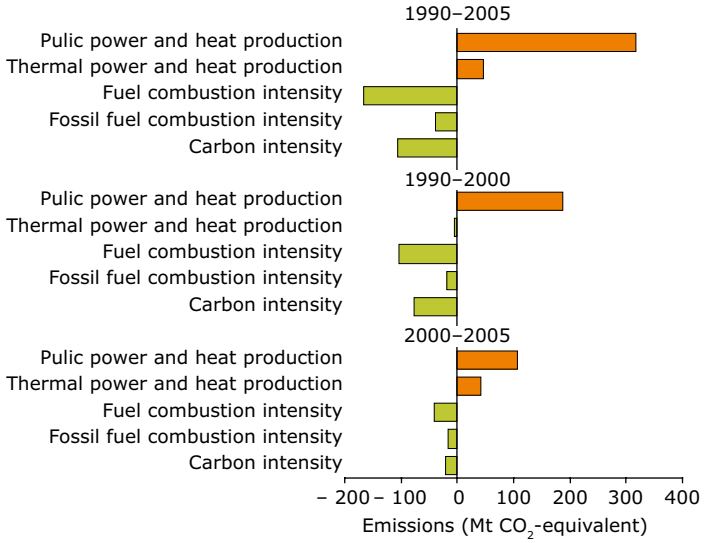
Of the energy supply sectors, public electricity and heat production is the most important source of greenhouse gas emissions (24 % of overall EU-15 emissions in 2005), mainly CO_2. Increasing CO_2 emissions between 1999 and 2003 have more than offset a 7 % reduction achieved between 1990 and 1993. Although emissions decreased between 2003 and 2005 by 1 % every year, emissions in 2005 were still 6 % above 1990 levels (Figure 9.4). The carbon intensity and fuel combustion intensity

Figure 9.4 EU-15 and EU-27 CO_2 emissions from public electricity and heat production compared with electricity production in thermal power plants and final electricity consumption



Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections; Eurostat.

Figure 9.5 Decomposition analysis of the main factors influencing the CO_2 emissions from public electricity and heat production (1990–2005)



Note: The orange bars show the factors that have an increasing effect on emissions and the green bars show the factors that have a reducing effect. Aggregating both effects provides the actual emission changes.
Fuel combustion intensity describes the effect resulting from the amount of fuel used in public power plants.
Fossil fuel combustion intensity describes the effect resulting from the amount of fossil fuels used in public power plants (decreases may be due to increased use of biomass, for example).
Carbon intensity describes the effect resulting from the shift to less carbon-intensive fossil fuels in public power plants; decreases are for example due to a shift from coal to oil or gas.

Source: EEA 2007a, Eurostat.

have significantly decreased since 1990. Most of the reductions in fuel combustion intensity and carbon intensity were achieved in the 1990s (Figure 9.5).

9.2.2 Renewable energy

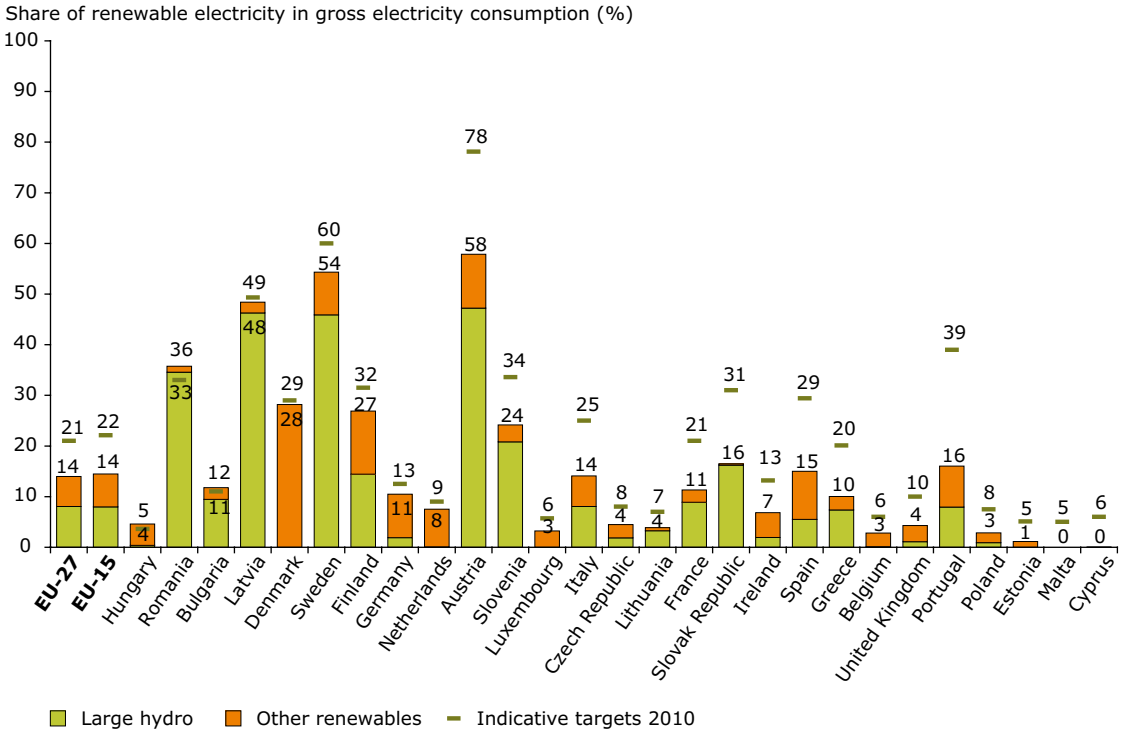
Share of renewable energy sources in electricity consumption

Figure 9.6 shows the share of renewable energy sources (wind energy, solar energy, biomass, hydropower and waste) in electricity consumption and the indicative 2010 targets agreed by each Member State under the Directive on the promotion of electricity produced from renewable energy sources.

The share of renewable electricity in the EU-27's electricity consumption increased by just 0.1 percentage point from 2004 to 2005 (from 13.9 % to 14.0 %). This was due to growth in electricity generation from wind, biomass and waste. Between 1990 and 2005, the overall contribution of renewables to total electricity consumption grew from 11.9 % to 14.0 % in the EU-27. In the EU-15 the increase was similar, from 12.9 % to 14.5 %. For the new Member States, the share of renewable electricity has typically oscillated between 11 and 13 % over the period for which data is available (1995 onwards), but in 2003 it dropped below 10 %. However, since 2003 there has been strong growth and in 2005 the share of renewables in total electricity consumption reached 15 %. For the EU-27 as a whole, 17 Member States (including nine of the 12 new Member States) increased their share of total renewable electricity sources in electricity production between 2004 and 2005.

Hydropower still dominates renewable electricity production in most Member States with a share of approximately 66 % across the EU-27 in 2005 (mostly large hydro), compared to around 17 % coming from

Figure 9.6 Share of renewable electricity in gross electricity consumption in EU-27 in 2005 (and 2010 indicative targets)



Note: Large hydro: hydropower stations with a capacity higher than 10 MW.

National indicative targets for the share of renewable electricity in 2010 are taken from Directive 2001/77/EC. Notes to their 2010 indicative targets are made by Italy, Luxemburg, Austria, Portugal, Finland and Sweden in the Directive; Austria and Sweden note that reaching the target is dependent on climatic factors affecting hydropower production. Sweden considers 52 % a more realistic figure if long-term models on hydrologic and climatic conditions are applied.

The Member States are ranked in order of the magnitude of the difference between their current share of renewable electricity and their 2010 target (as a percentage difference), from smallest to largest.

Source: Eurostat.

biomass and waste, 15 % from wind and the rest from geothermal (1.2 %), and solar (0.3 %).

There are significant differences in the share of renewables between the EU-27 Member States. These reflect differences in the availability of natural resources in each country and the policies chosen to support the development of renewable energy. In 2005 the three largest users of renewables for their national electricity consumption in the EU-27 were Austria, Sweden and Latvia (as in 2004), with shares of 58 %, 54 % and 48 %, respectively. Following a rise of 12 percentage points from 2003 to 2004, Latvia's share of renewable energy in electricity consumption grew by only 1.3 percentage points from 2004 to 2005. Sweden saw the largest increase (8.2 percentage points) and the only other Member State to increase its share by more than five percentage points was Romania. The increase in Sweden was driven mainly by growth in the consumption of electricity from hydropower, which increased by 21 %, and from biomass and wood wastes, both of which increased by 6 %. The increase in hydropower was due to increased precipitation and not increased capacity in hydropower production. Similarly, in Romania consumption of electricity from hydropower increased by 22 % (317 ktoe) with biomass and wood wastes increasing by 1.6 % (51 ktoe).

For the second consecutive year, Portugal's share of renewable electricity production decreased most (– 8.4 percentage points). However, Portugal's share of renewable electricity has been variable over the past 10 years, with a high of 44.3 % in 1996 and a low of 17.6 % in 1992, largely due to the strong oscillations in hydroelectric production caused by annual variations in precipitation.

Wind power, solar, biomass and waste

Wind power production increased by a factor of 90 in the EU-15 during the period 1990–2005 and by a factor of 1.2 between 2004 and 2005. This increase was driven mostly by Denmark, Germany and Spain, 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 EU-12, with generation increasing by a factor of 3.6 in just a few years (2002–2005) although capacity is still small compared to the EU-15 total.

Solar (photovoltaic) electricity increases have been driven by Germany and Spain, mainly as a result of a combination of 'feed-in' arrangements and high subsidies. In these Member States, consumption of photovoltaic electricity continues to grow at an unprecedented rate (growth of 285 % in Germany and 90 % in Spain between 2003 and 2005).

Energy production from biomass/waste resources has also expanded rapidly for both the EU-15 and the new Member States. In absolute values, the amount of electricity produced from wood/waste was highest in France, Germany and Sweden in 2005. These Member States provided considerable research and development support and subsidies to the biomass power industry. In Sweden, the introduction of CO_2 and energy taxes from which biomass is exempt also helped the expansion of biomass power plants.

EU and national targets on the use of renewable energy

The increase in renewable energy use has great potential for the reduction of CO_2 emissions from the energy sector. Following on from the 1997 White Paper on renewable sources of energy (RES) ([23]) , which sets a global indicative goal of 12 % of gross national energy consumption from renewables by 2010, the RES-E Directive ([24]) sets an indicative target of 22.1 % for the share of electricity produced from renewable energy sources in total EU-15 electricity consumption by 2010 (21 % for the whole EU), with individual indicative targets for all Member States (Figure 9.6).

The EU-27 target on the share of electricity produced from renewable energy sources (21 % by 2010) is unlikely to be met under current trends because renewable electricity is dominated by large hydropower. Hydropower is not projected to increase substantially, firstly because capacity is almost reached, especially for large-scale hydro, and secondly due to concerns about their impact on the environment, e.g. through the loss of land

([23]) Communication from the Commission Energy for the Future: Renewable Sources of Energy, White Paper for a Community Strategy and Action Plan, COM(97)599 final (26/11/1997).

([24]) Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market. Since 1 January 2007, the directive applies to the EU-27 following Council Directive 2006/108/EC of 20 November 2006 adapting Directives 90/377/EEC and 2001/77/EC in the field of energy, by reason of the accession of Bulgaria and Romania.

and resulting destruction of natural habitats and ecosystems. Therefore, in order to meet the targets, large increases in energy production from other renewables are required.

Likewise, the White Paper global indicative goal of 12 % of gross domestic energy consumption from renewables in 2010 is unlikely to be met with the current contribution of renewable energy to total energy consumption at 6.7 % in both the EU-27 and the EU-15.

Projected savings from energy CCPMs

The main current EU-wide Common and Coordinated Policies and Measures (CCPMs) to support the further expansion of the use of renewables are the RES-E Directive and the Biofuels Directive ([25]). The effect of these policies and measures has been assessed quantitatively by most Member States. Across the EU-27, existing policies and measures are projected to contribute 103 Mt CO_2-equivalents of emission reductions in the Kyoto commitment period, and additional measures a further 18.8 Mt CO_2-equivalents. These savings only represent those derived from the CCPMs. Further savings will be achieved through country-specific policies and measures (see also Figures 8.1 and 8.2). Further analysis is provided in Annex A2.4 of this report.

Future EU policy on renewable energy

In January 2007, the European Commission launched an integrated energy and climate change package with the Communication 'An Energy Policy for Europe' ([26]) . The European Council subsequently endorsed the Commission proposals in March 2007 and adopted a comprehensive European Council Action Plan for the period 2007–2009 ([27]) . Key points agreed on include a binding target of 20 % for the share of renewable energy in overall EU energy consumption by 2020 and a 10 % minimum share of biofuels in transport fuels by 2020, provided this is produced in a sustainable way. Thus, compared to a share of renewable energy of 6.7 % in 2005 ([28]), the target requires a total increase by about a factor of 3. Such goals will be easier to achieve if energy use decreases, as reflected in a further objective to save 20 % of the EU's energy consumption in a cost-efficient manner by 2020 (compared to a 'business as usual' projection), as presented in the Commission's Energy Efficiency Action Plan ([29]). From the overall 20 % renewables target, differentiated national overall targets will be derived through a Commission proposal in 2007 for a new comprehensive directive on the use of all renewable energy sources, due toward the end of 2007.

9.2.3 Combined heat and power

Share of combined heat and power in electricity production

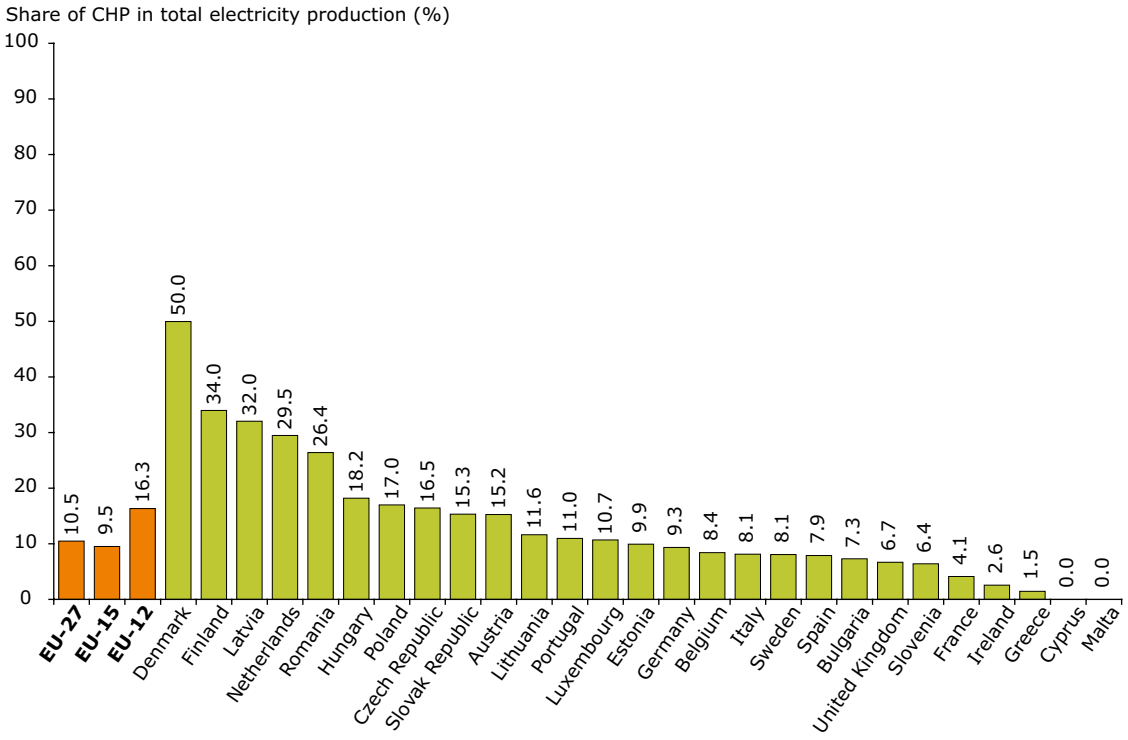
Combined heat and power (CHP) technology uses fossil fuels, biomass or waste to supply end-users with heat as well as electricity. In doing so, it reduces significantly the heat losses that would otherwise occur in normal electricity production. The efficiency of CHP plants can be well over 85 %, much higher the average of about 35–45 % in current thermal 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 district heating schemes in relatively cold climates. The heat generated may also be well suited for use in some industrial processes.

In 2004, the share of total gross electricity production from CHP in the EU-27 was 10.5 % (Figure 9.7). It was significantly higher in the new Member States (16.3 %) than in the EU-15 (9.5 %).

In 2004, Member States with the highest share of CHP electricity generation were Denmark, Finland, Latvia and the Netherlands. In Denmark CHP has received strong government policy support through tax incentives and subsidies, and growth has been seen mainly in public supply as a result of investments in district heating infrastructure. Government support was also an important factor in the Netherlands, combined with widespread availability of natural gas, the favoured fuel for CHP. The high level of CHP production in Finland and

([25]) Directive 2003/30/EC of the European Parliament and the Council of 8 May 2003 on the Promotion of the Use of Biofuels or other Renewable Fuels for Transport.
([26]) COM(2007)1 final.
([27]) Council of the European Union, Brussels European Council 8–9 March 2007, Presidency conclusions, Brussels, 2 May 2007, at www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/93135.pdf.
([28]) Eurostat (accessed 20 July 2007): http://epp.eurostat.ec.europa.eu/.
([29]) Communication from the Commission, Action Plan for Energy Efficiency: Realising the Potential, (SEC(2006)1173), (SEC(2006)1174), (SEC(2006)1175, Brussels, 19.10.2006, COM(2006)545 final.

Figure 9.7 Share of combined heat and power in gross electricity production in 2004



Note: The most recent available data are for 2004.

In Cyprus and Malta there was no CHP generation in 2004.

The share is defined as the proportion of CHP electricity production (from both private and public utilities) in total gross electricity production, including generation in pumped storage power stations. However, it should be noted that not all electricity production from a CHP 'plant' may be considered as CHP production as the plant may consist of different types of units (such as heat only, or flexible units where the power-to-heat ratio may be adjusted).

Source: Eurostat; EEA Energy Fact sheet EN20 Combined Heat and Power (CHP).

Latvia reflects both the significant demand for heat and the development of district heating networks, due to the cold climate. Poor infrastructure for natural gas and less demand for heat has hindered CHP development in some Member States, for example Greece.

EU and national policies on combined heat and power

The 1997 Community strategy to promote CHP ([30]) set for the EU-15 the target of doubling CHP electricity as a proportion of total electricity production from 9 % in 1994 to 18 % in 2010. Projections show that meeting this target is expected to lead to avoided CO_2 emissions of over 65 Mt CO_2 per year by 2010 ([31]) . The share of CHP generation in EU-15 gross electricity production decreased slightly from 9.2 % in 2000 to 9.5 % in 2004. These data include electricity generated from public supply and autoproducers. The apparent decline can be partly explained by changes in the methodology used to calculate the CHP production in 2000 and 2002. These revisions have resulted in lower figures for some Member States. Therefore, the current share of CHP production is not directly comparable to the 18 % target.

Despite the changes in the calculation methods, it appears that the EU-15 is not on track to meet the indicative target of doubling the share of CHP electricity in gross electricity production between 1994 and 2010.

In recent years, CHP has suffered from adverse market conditions in many Member States. The problems encountered by CHP include: increasing natural gas prices that have reduced the competitiveness of CHP (the preferred fuel for new CHP plants is natural gas); falling electricity prices

([30]) COM(97)514 final.
([31]) ManagEnergy (2007), www.managenergy.net/products/R81.htm, accessed 19 July 2007.

resulting from market liberalisation and increased competition (although these have now started to rise again); barriers to accessing national electricity grids to sell surplus electricity; and, relatively high start-up costs. To counteract these barriers, a number of EU Member States, including Czech Republic, Hungary, Slovak Republic, Germany and the United Kingdom, have introduced support mechanisms to promote new CHP. The Directive on the Promotion of Cogeneration (2004/8/EC) encourages Member States to promote CHP uptake and help overcome the current barriers. The Directive does not include a target, but instead requires Member States to carry out analyses of their potential for high efficiency cogeneration and evaluate and report progress towards increasing the share of high efficiency cogeneration.

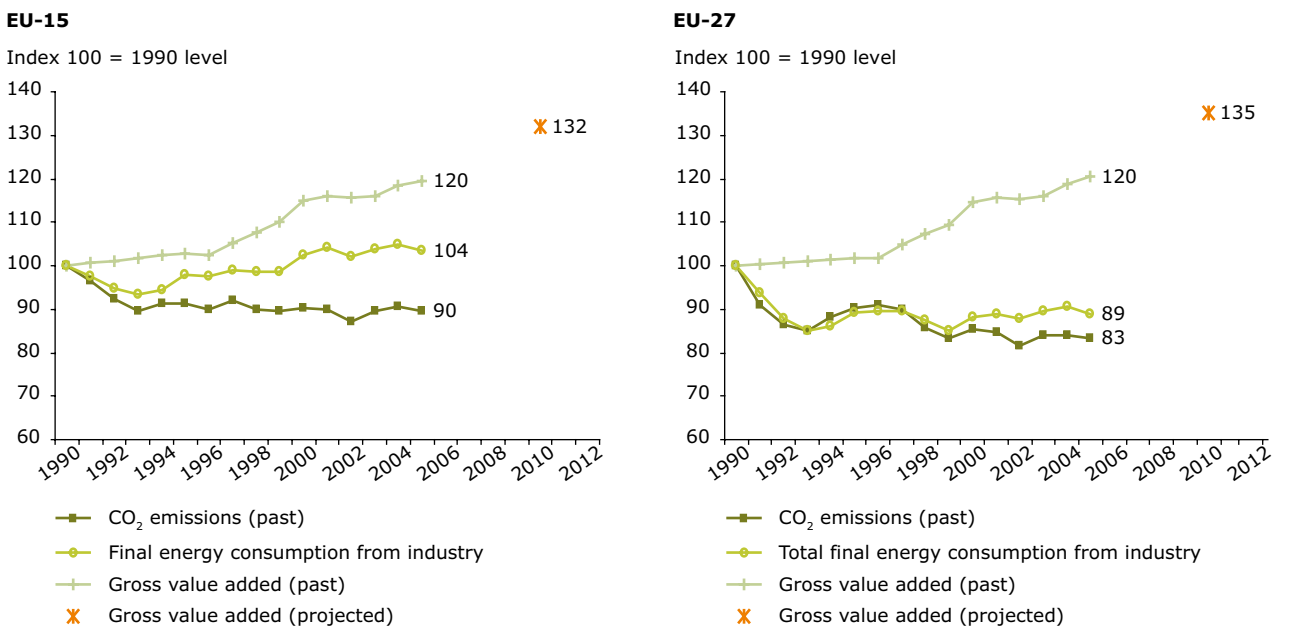
9.2.4 Manufacturing industries

Energy use in manufacturing industries consists of fossil fuel combustion for heat, and electricity production for own use. Emissions of CO_2 from fossil fuel combustion fell by 10 % between 1990 and 2005 (Figure 9.8). This now represents a 13% share of total EU-15 greenhouse gas emissions. Most emission reductions had already been achieved by 1993, mainly due to efficiency improvements and structural change in Germany after reunification, and to the relatively small economic growth in the EU-15. Between 1993 and 2005, emissions fluctuated marginally around 89–91 % of 1990 emissions.

However, in 2002, there was a larger reduction to 13 % below 1990 levels, partly a result of lower fuel combustion (mainly liquid and solid fuels). Additionally, a fuel shift from carbon-intensive solid fuels to less carbon-intensive gaseous fuels took place. Between 1990 and 2005, industrial output — the main driving force for emissions from the industry sector — in terms of gross value added, increased by 20 %. Therefore, emissions have stabilised although gross value added is increasing and is projected to increase further. The growth of final energy consumption is very similar to the emissions trend. The reduction of CO_2 emissions between 2004 and 2005 by 1 % continued the trend decoupling gross value added and emissions.

Direct and indirect emissions from iron and steel production contribute 4 % of total greenhouse gas emissions. For accounting purposes, emissions of CO_2 from iron and steel production are split between the industry sector (process-related emissions) and the energy sector (combustion-related emissions). Energy-related CO_2 emissions and process-related CO_2 emissions each contributed 2 % to total EU-15 greenhouse gas emission in 2005. Emissions depend partly on the method of processing (either integrated steelworks or electric processing); electric processing causing less direct emissions in any specific category. Between 1990 and 2005, the share of steel production by electric arc furnaces increased by 11 percentage points in the EU-15, which explains the generally decreasing emission trend. Between 2000 and 2005,

Figure 9.8 EU 15 and EU-27 CO_2 emissions from manufacturing industries and construction compared with value added and energy consumption



Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections; Eurostat; European Commission, 2007.

emissions only decreased by 1 %. The production of iron and steel is projected to increase further, but if the observed decoupling continues, this would not necessarily be linked with a rise in emissions.

The decomposition analysis presented in Figure 9.9 shows that the decrease in final energy intensity, fuel combustion intensity and carbon intensity contributed substantially to reduced CO_2 emissions. Together, they offset the emission increases that were due to a rise in economic activity (i.e. gross value added) in this sector.

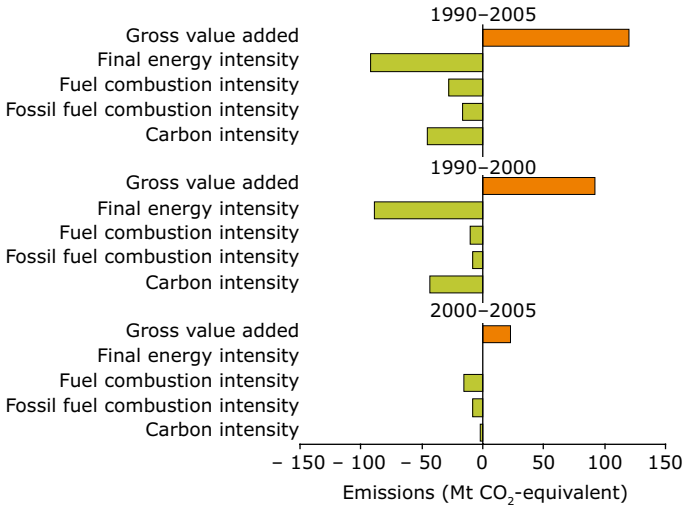
9.2.5 Households

Emissions of CO_2 from energy use in households accounted for 10 % of total EU-15 greenhouse gas emissions in 2005. From 1990 to 2005, household emissions fluctuated mainly in line with outdoor temperature in the winter season, with an overall slightly increasing trend (Figure 9.10). The energy demand of the household sector is mainly driven by:

- the number and size of dwellings;
- the standard of the building stock;
- the appliances for heating and warm water production.

Over the period 1990–2005 the number of households increased by 18 % while emissions only grew slightly. This decoupling of emissions from growth in households seen up to 2005, results from energy efficiency improvements due to thermal insulation, fuel switching to natural gas and an increase in district heating. The decomposition analysis (Figure 9.11) shows that decreases in fuel combustion intensity and carbon intensity resulted in significant lowering of emissions. However, these reductions were more than offset by the increases in population and energy consumption per household, and by an increase in average household size. The rise in emissions between 2000 and 2005 may have been driven by increased energy demand. Most of the decreases in fuel combustion intensity and carbon intensity were achieved in the 1990s, whereas population, household size and final energy intensity continue to increase.

Figure 9.9 Decomposition analysis of the main factors influencing the development of EU-15 CO_2 emissions from manufacturing industries and construction (1990–2005)



Note: The orange bars show the factors that have an increasing effect on emissions and the green bars show the factors that have a reducing effect. Aggregating both effects provides the actual emission changes.

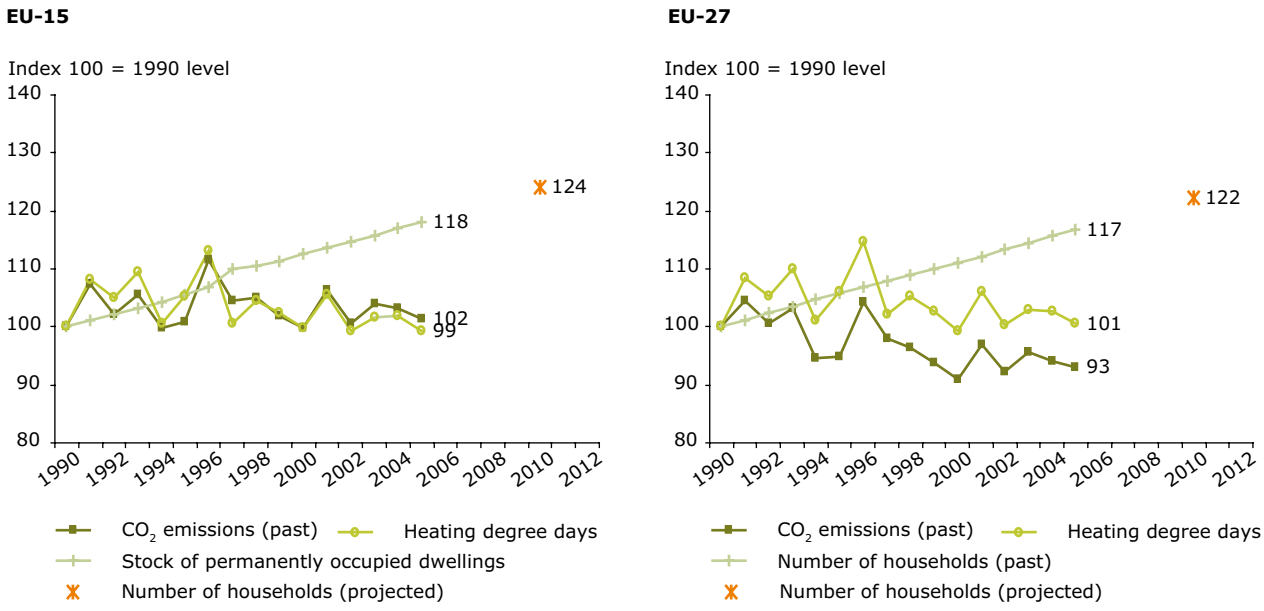
Final energy intensity describes the effect resulting from the change of final energy consumption per gross value added.

Fuel combustion intensity describes the effect resulting from the share of fuel use in final energy consumption. Fossil fuel combustion intensity describes the effect resulting from the amount of fossil fuels used in total fuel use (e.g. decreases due to increased use of biomass).

Carbon intensity describes the effect resulting from the shift to less carbon-intensive fossil fuels; decreases are due to a shift from coal to oil or gas.

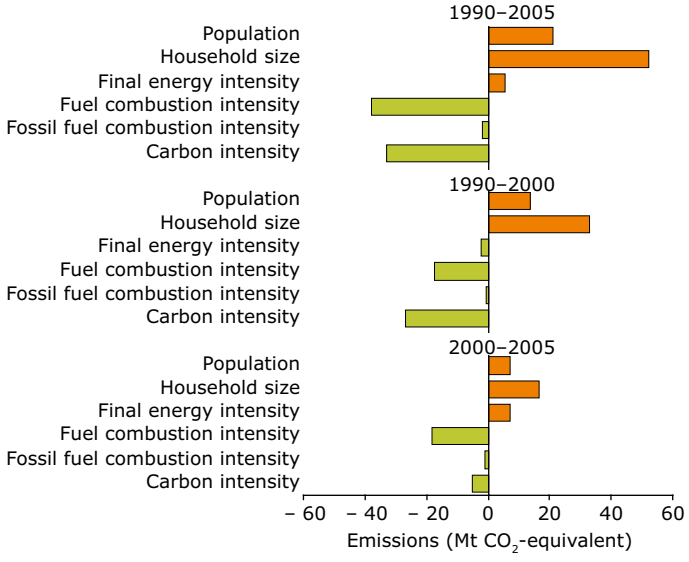
Source: EEA, 2007a; Eurostat.

Figure 9.10 EU-15 and EU-27 CO_2 emissions from households, compared with the number of permanently-occupied dwellings, heating degree days



Source: EEA, 2007a; Eurostat; European Commission, 2007.

Figure 9.11 Decomposition analysis of the main factors influencing the development of EU-15 CO_2 emissions from households (1990–2005)



Note: The orange bars show the factors that have the effect of increasing emissions; the green bars show the factors that have a reducing effect. Aggregating both effects provides the actual emission changes. Final energy intensity describes the effect resulting from the change of final energy consumption (including electricity and district heating) per household.

Fuel combustion intensity describes the effect resulting from the share of fuel use in final energy consumption. Fossil fuel combustion intensity describes the effect resulting from the amount of fossil fuels used in total fuel use (e.g. decreases may be due to increased use of biomass). Carbon intensity describes the effect resulting from the shift to less carbon-intensive fossil fuels; decreases are due to the shift from coal to oil or gas.

Source: EEA, 2007a; Eurostat.

9.3 Transport

- Between 1990 and 2005, EU-15 greenhouse gas emissions from domestic transport increased by 26 %. More than 90 % of total domestic transport emissions are due to road transport.
- For 2010, EU-15 greenhouse gas emissions from domestic transport are projected to be stabilised at current levels as a result of existing domestic policies and measures. In particular, significant emission reductions are projected as a result of the introduction of mandatory biofuel quotas in Germany.
- The CO_2 emissions from road transport decreased by 0.8 % (6.0 Mt) between 2004 and 2005 for the first time since 1990. This is mainly attributed to Germany, and is due to an increased share of diesel-powered cars, increasing fuel prices (including effects of the eco-tax) and purchase of fuel outside Germany.
- The average CO_2 emissions of new passenger cars were reduced by 12 % between 1995 and 2004, but progress is slowing down. Low emission cars are available on the market, but are not sold in sufficient numbers to affect substantially the average CO_2 emissions per car.
- EU CO_2 emissions from international aviation and navigation (not addressed under the Kyoto Protocol) have increased by 96 % and 50 %, respectively, between 1990 and 2005.

Trends and projections in greenhouse gas emissions from transport

In 2005, greenhouse gas emissions from transport accounted for 21 % of the total EU-15 emissions. They are mostly due to carbon dioxide from fuel combustion, with minor contributions from nitrous oxide and methane (from road transport).

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 current EU policies and measures). Road transport is by far the biggest transport emission source (93 % of total transport emissions).

Transport caused the largest increase in greenhouse gas emissions between 1990 and 2005 (26 %). Emissions increased continuously during that period due to high growth in both passenger transport (28 %) and freight transport by road (62 %). After steep growth during the late 1990s (increase of 11 percentage points between 1995 and 2000), transport emissions increased less intensively between 2000 and 2005 (6 %) (Figure 9.12). For the first time since 1990, transport emissions in the EU-15 decreased slightly by 0.4 % between 2004 and 2005.

Carbon dioxide emissions from international aviation and navigation (maritime transport) are growing faster than emissions from other transport modes. Emissions from international aviation are growing fastest with an increase of 96 % between 1990 and 2005. International navigation also shows a substantial increase of 50 % over the same period.

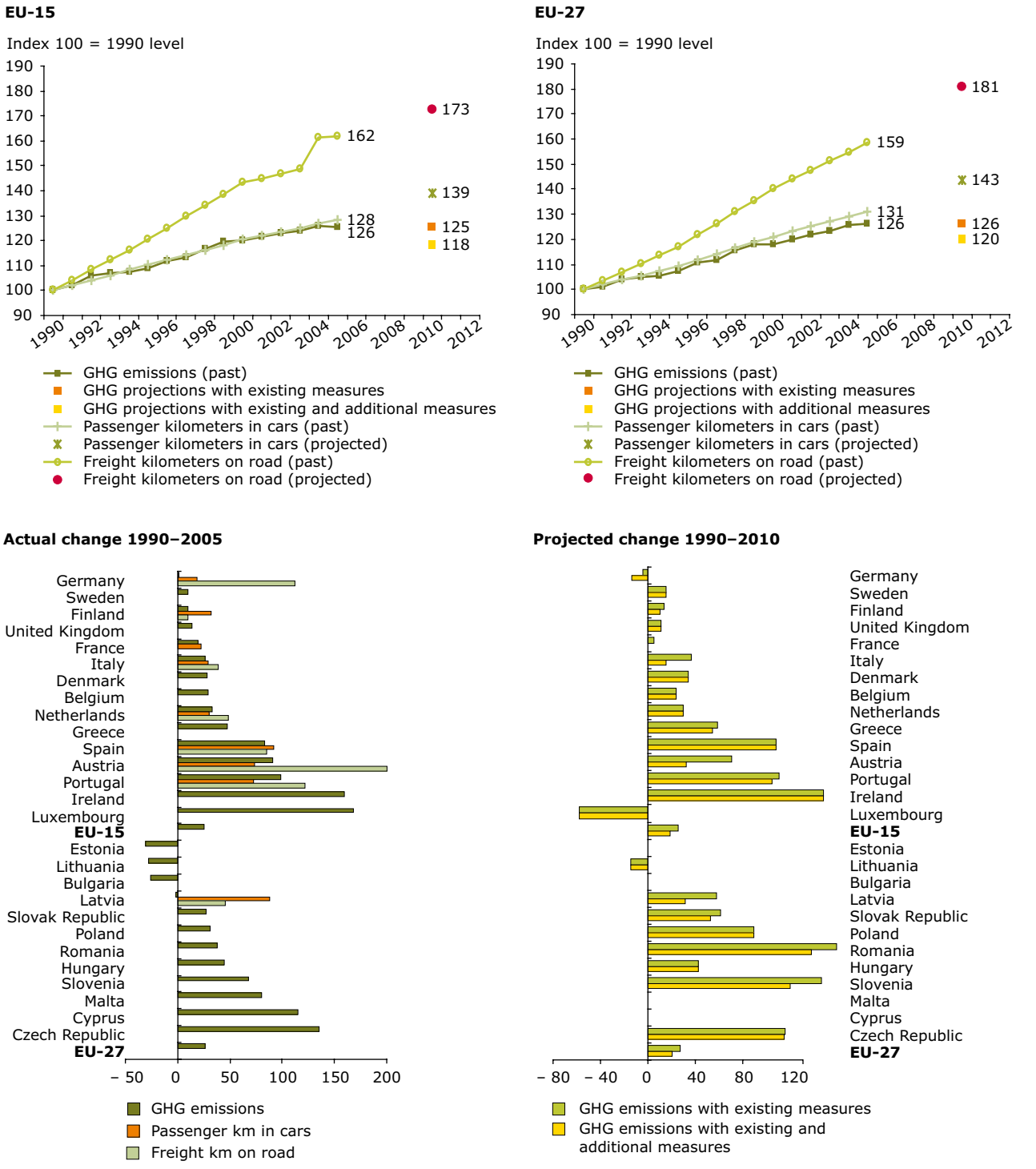
All reporting EU-15 Member States except Germany and Luxembourg project growing transport emissions, indicating that in most Member States existing policies and measures are not sufficient to decouple emissions from activity growth.

Compared to last year's analysis, emission projections for the transport sector have changed significantly and now give a significantly more positive picture. Stabilisation of emissions at current levels is projected as a result of existing measures, instead of a projected increase of 10 percentage points (relative to 1990 levels). This is mostly due to the recent inclusion of projections from Germany, where transport emissions — which accounted for 19 % of all EU-15 transport emissions in 2005 — are projected to decrease with existing measures. In Germany, significant emission reductions are projected, mainly as a result of the introduction of mandatory biofuel quotas in 2002; further emission reductions are projected from additional measures such as the introduction of a CO_2-based car taxation and the mandatory use of low-friction oils and tyres.

In last year's analysis, the missing projections from Germany were gap-filled on the basis of projections reported by the 14 other EU-15 Member States, therefore assuming a 26 % increase of transport emissions based on existing measures.

The projected effect of additional policies and measures is slightly higher than in last year's analysis and is estimated to represent further emissions reductions of eight percentage points.

Figure 9.12 EU-15 and EU-27 greenhouse gas emissions from transport compared with transport volumes (passenger transport by car and freight transport by road) (1990–2005)



Note: To calculate EU-15 greenhouse gas projections, sectoral WAM projections for France and Italy had to be gap-filled. Since sectoral emission projections for Bulgaria, Cyprus, Estonia and Malta were not available, greenhouse gas projections for the EU-27 are calculated on the basis of projections reported by 23 Member States. The 2005–2010 percent variation for the EU-23 was applied to Cyprus, Bulgaria, Estonia and Malta to obtain an EU-27 projection for 2010. No additional measures were reported for Belgium, Denmark, Ireland, Luxembourg, Netherlands, Spain, Sweden, United Kingdom, Hungary, Lithuania, and Poland. For these Member States, the 'with existing measures' projections were used for the calculation of the EU-27 'additional measures' projections.

Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections; Eurostat.

Factors influencing CO_2 emissions from transport

According to the decomposition analysis (Figure 9.13), the main driving force for rising emissions is the number of kilometres driven by passenger cars and, to a lesser extent, the increased proportion of private cars on the roads. Efficiency improvements cannot counteract this. For freight transport, the number of kilometres driven by trucks acts also as the main driving force but the increased proportion of trucks in road freight transport plays a greater role than for passenger cars.

Policy responses to rising transport emissions

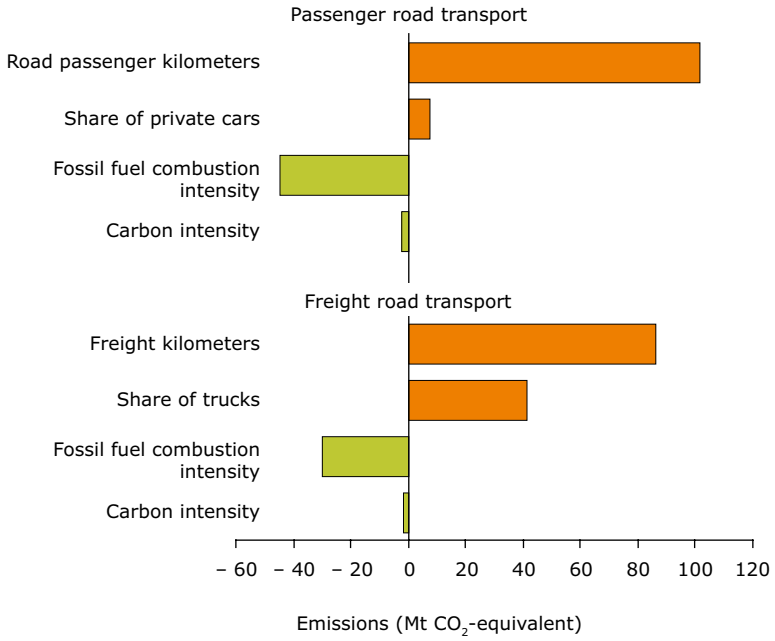
In most Member States the projected increase of emissions from transport is mainly due to continued growth in transport volumes. This is projected despite policies and measures aimed at achieving the EU objective of shifting traffic from roads to railways and inland waterways.

A key instrument to reduce emissions from passenger cars is the voluntary commitment by European, Japanese and Korean car industries to reduce average CO_2 emissions from new passenger cars. They have set a target of 140 g/km for 2008 in the EU and for 2009 in Japan and Korea. But progress in the reduction of average CO_2 emissions for new passenger cars is slowing down, causing doubts about whether car manufacturers will meet this target. The consumer trend towards larger, more luxurious and therefore heavier cars is an important obstacle to achieving net reductions. Low emission cars are available on the market, but are not sold in sufficient numbers to affect substantially the average CO_2 emissions per car.

As an illustration, average specific CO_2 emissions from new passenger cars were reduced by 12 % between 1995 and 2004 (Figure 9.14), as the average European passenger car is becoming more efficient each year due to the industry agreement. The reasons for the specific emission reductions between 1995 and 2004 were the technological development made, especially in diesel cars, and an increased share of diesel passenger cars in the vehicle fleet. All car associations increased the diesel share of their fleets between 1995 and 2004. However the increased share of diesel cars also raises concerns, because this could result in higher emissions of particulates and nitrogen oxides and thus negatively affect air quality.

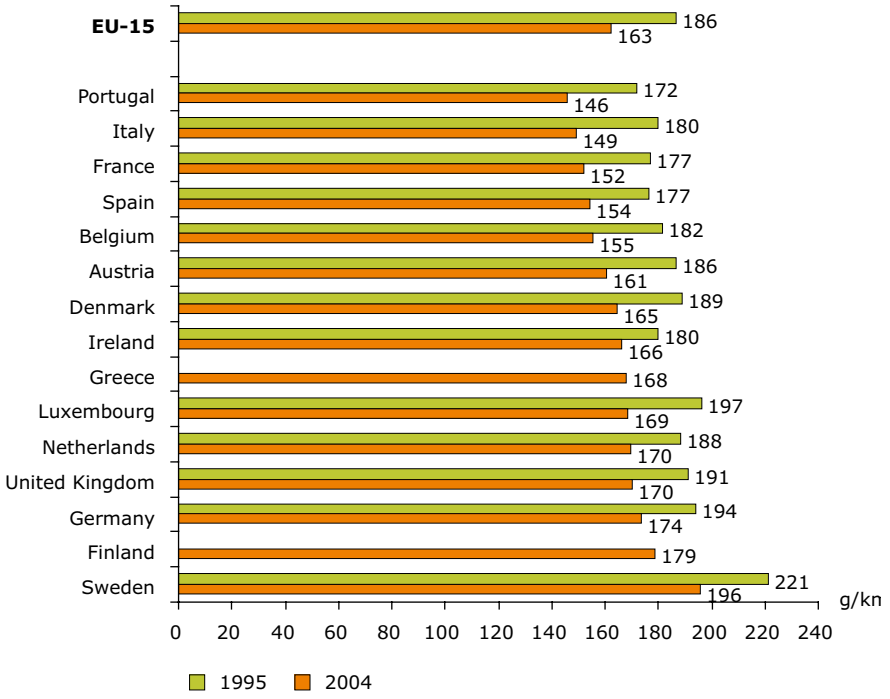
Freight transport is projected to increase more than passenger road transport. However, freight transport is not directly included in any EU strategy to reduce CO_2 emissions. Over the past decade, the share of road transport in the inland freight markets in the EEA member countries increased to 78 % in 2004, at the expense of rail and inland shipping. In the EU-15, the share of rail transport is declining

Figure 9.13 Decomposition analyses of the main factors influencing the development of EU-15 CO_2 emissions from passenger road transport and freight road transport (1990–2005)



Source: EEA, 2007a; Eurostat; European Commission, 2007.

Figure 9.14 Average specific CO_2 emissions of new passenger cars per fuel type, with targets (1995–2005)



Note: The consistency of the time series 1995–2004 is not guaranteed. In the European Commission's 2006 report, CO_2 monitoring data, as officially reported by Member States to the European Commission, were used for the first time for calculating the 2002 figures. For previous years, the car manufacturing associations provided the underlying data.

Greece: 2003 value available only.

Source: EEA, 2007c; European Commission, 2006.

rapidly, while road transport's share is growing fast. The main reason behind this change seems to be that road transport is generally fast and more flexible when compared to other modes of transport ([32]).

9.4 Agriculture

- EU-15 greenhouse gas emissions from agriculture fell by 11 % between 1990 and 2005.
- Based on existing domestic policies and measures, EU-15 greenhouse gas emissions from agriculture are projected to decrease to 14 % below the 1990 level in 2010.

In 2005, greenhouse gas emissions from agriculture represented 9 % of total EU-15 emissions, making it the second largest sector after the energy sector (including transport). The most important greenhouse gases from agriculture are nitrous oxide (N_2O) and methane (CH_4), accounting for 5 % and 4 % of the total EU-15 emissions respectively.

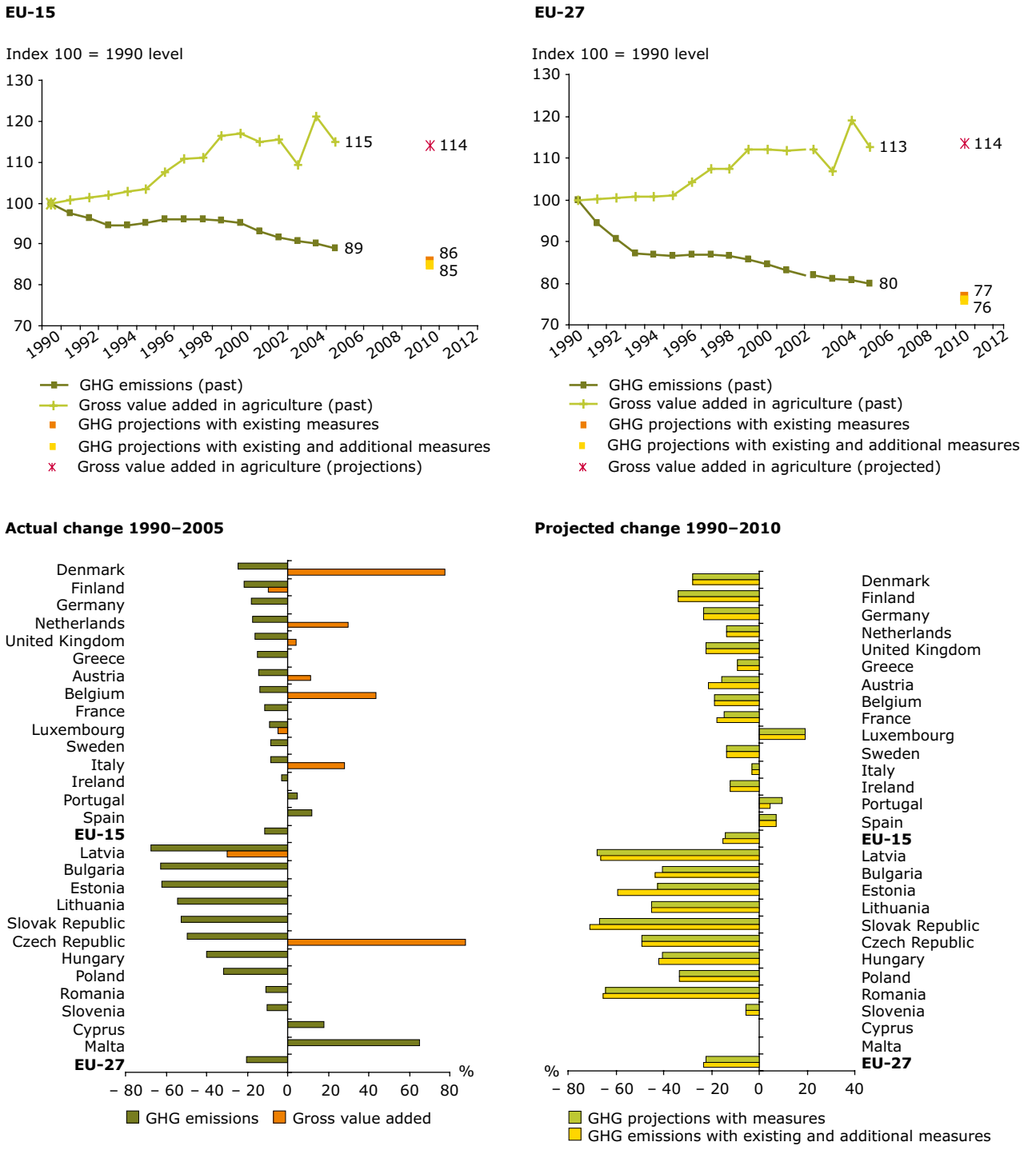
Between 1990 and 2005, the emissions from this sector decreased by 11 %. In 2005, the emissions decreased by 1.4 % compared to 2004.

Between 1990 and 2005 nitrous oxide emissions from agricultural soils fell by 11 %, mainly due to a decrease in the use of nitrogen fertiliser and manure. The 6 % decrease between 2000 and 2005 was twice that observed between 1990 and 2000 and the decrease continued between 2004 and 2005 (– 1 %). This was to a large extent a consequence of efficiency improvements, the reform of the EU's common agricultural policy (CAP) as well as 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.

For 2010, emissions from agriculture are projected to decrease further down to 14 % below 1990 levels (Figure 9.15). This is partly due to the continuing effect of the CAP reform and the implementation of the EU Nitrate Directive.

([32]) EEA, 2007c, Transport and environment: on the way to a new common transport policy, TERM 2006: indicators tracking transport and environment in the European Union, EEA Report No 1/2007, European Environment Agency.

Figure 9.15 EU-15 and EU-27 past and projected greenhouse gas emissions from agriculture and gross value added (1990–2005)



Note: Gross value added is the difference between output and intermediate consumption for any given sector, i.e. the difference between the value of all newly generated goods and services, and the value of all goods and services consumed as intermediate consumption.

For Italy sectoral WAM projections had to be gap-filled to calculate EU-15 greenhouse gas projections. Since sectoral emission projections for Cyprus and Malta were not available, greenhouse gas projections for the EU-27 are calculated on the basis of projections reported by the other 25 Member States. The 2005–2010 percent variation for EU-25 was applied to Cyprus and Malta to obtain EU-27 projections for 2010. No additional measures were reported for Belgium, Denmark, Finland, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, United Kingdom, Czech Republic, Lithuania, Poland, and Slovenia. For these Member States, the 'with existing measures' projections were used for the calculation of EU-15 and EU-27 'additional measures' projections.

Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections; Eurostat.

9.5 Industry (non-energy related)

- EU-15 greenhouse gas emissions from industrial processes (carbon dioxide, nitrous oxide and fluorinated gases) were reduced by 16 % compared to base-year levels ([33]). They are projected to increase by 2010 with existing measures and to stabilise at 2005 levels with the implementation of planned policies and measures.
- EU-15 CO_2 emissions from cement production increased by 5 % from base-year levels and might increase further if no decoupling from projected cement production takes place.
- EU-15 nitrous oxide emissions from chemical industries decreased by 56 % between the base year and 2005, and as a share of total greenhouse gas emissions, decreased from 2.5 % to 1.1 %.
- EU-15 hydrofluorocarbon emissions from refrigeration and air conditioning increased by a factor of 19 between the base year and 2005.

In 2005, industry greenhouse gases emissions (non-energy related) represented 8 % of total EU-15 emissions. These emissions are mainly CO_2 emissions from cement production and from iron and steel production, N_2O emissions from nitric acid production, and HFC emissions from refrigeration and air conditioning equipment. Total greenhouse gas emissions from industrial processes in 2005 were 16 % below base-year levels, while the gross value added in the industrial sector increased by 20 % between 1990 and 2005 (Figure 9.16). However, emissions stabilised between 2000 and 2005. The trend of increasing emissions between 2003 and 2004 (2 % increase) changed to a stabilisation of emissions from 2004 to 2005.

The trends in emissions in the 1990s show a reduction in CO_2 emissions from cement production due to lower economic activity and increased imports in the early 1990s. In 2005, emissions from cement production were 5 % above the 1990 level. Cement production is projected to increase by 11 % in 2010, which could lead to increased CO_2 emissions.

The trend in N_2O emissions from adipic acid production can be explained by trends in the main emitting countries. The Netherlands, with a 17 % share of these emissions in 2005, implemented technical installations at one plant which resulted in emission reductions in 2001. Since then, N_2O emissions have increased slightly due to increased production. In Germany (34 % share of emissions in 2005) N_2O emissions increased between 2002 and 2005 by almost 70 %, mainly due to the start-up of two new plants in 2003.

Large increases in HFC emissions occurred as they replaced chlorofluorocarbons (CFCs), which have been and will continue to be phased out because of the damage they cause to the ozone layer. HFC emissions from consumption of halocarbons and sulphur hexafluoride (SF_6) currently account for only 1.0 % of total EU-15 greenhouse gas emissions, but have grown substantially. The main reason is the phasing out of ozone-depleting CFCs. HFCs are replacing CFCs mainly in refrigeration and air conditioning, and as aerosol propellants and blowing agents for the production of thermal insulation foams. Between the base year and 2005, EU-15 HFC emissions from consumption of halocarbons and SF_6 increased by a factor of nine. This was the highest increase in relative terms of all emission sources in the EU-15. In addition, large reductions were achieved in the United Kingdom due to reduction measures in hydrochlorofluorocarbon (HCFC) production between 1998 and 1999.

For 2010, EU-15 emissions from industrial processes are projected to increase from 2005 levels (16 % below base-year level), with existing domestic policies and measures, up to 12 % below base-year level. In last year's analysis, emissions were projected to climb to 4 % below base-year levels by 2010. This year's projections therefore give a more positive picture. This is mainly due to Germany, where for the first time, projections are available; significant emission reductions are projected in this sector.

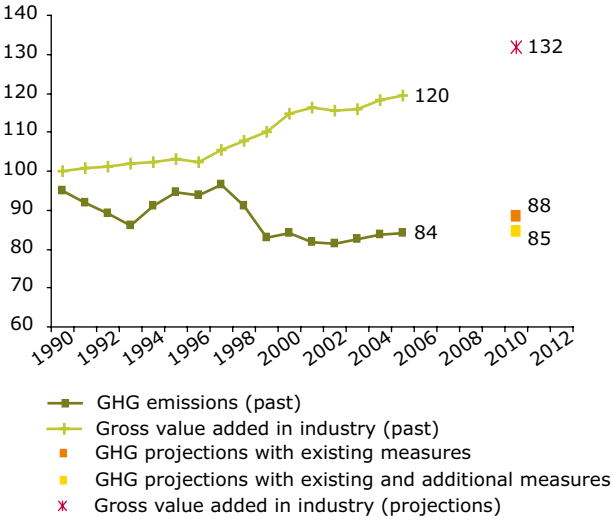
With the additional domestic regulatory policies and measures planned by six Member States, the greenhouse gas emissions from industrial processes are projected to stabilise at 2005 levels, 16 % below base-year emissions.

([33]) All EU-15 Member States except Austria, France and Italy chose 1995 as the base year for fluorinated gas emissions, which represent in the EU-15 approximately 20 % of total emissions from industrial processes.

Figure 9.16 Non-energy related greenhouse gas emissions from industrial processes in the EU-15 and EU-27 and gross value added (1990–2005)

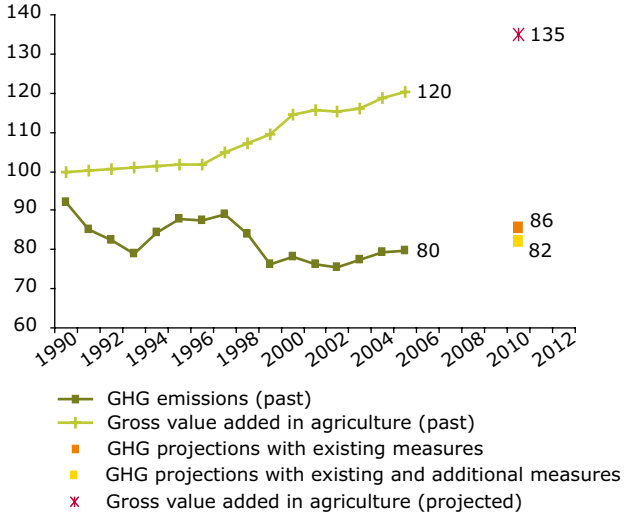
EU-15

GHG emissions: index 100 = base-year level
Gross value added: index 100 = 1990 level

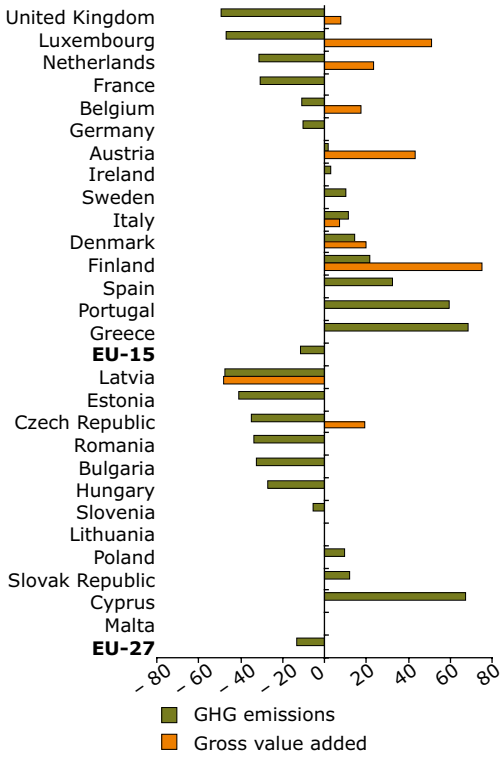


EU-27

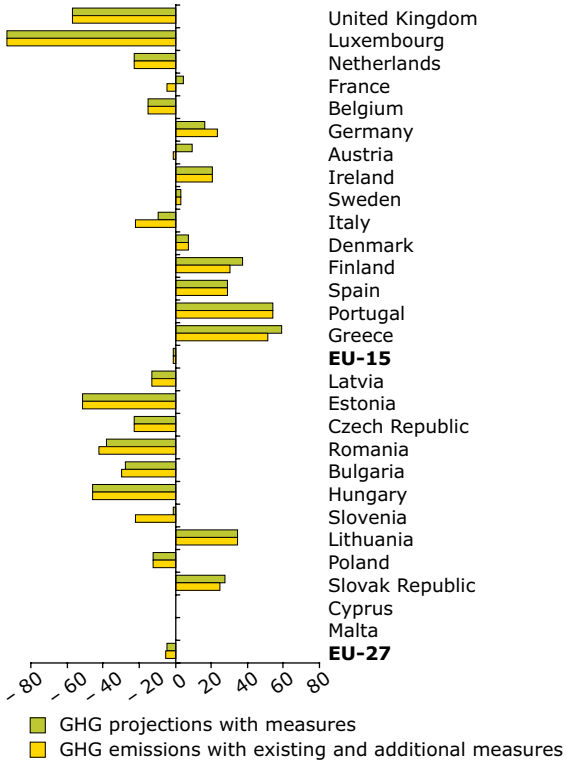
GHG emissions: index 100 = base-year level
Gross value added: index 100 = 1990 level



Actual change 1990–2005



Projected change 1990–2010



Note: Gross value added is the difference between output and intermediate consumption for any given sector, i.e. the difference between the value of all newly-generated goods and services, and the value of all goods and services consumed as intermediate consumption.

For France and Italy, sectoral WAM projections had to be gap-filled to calculate EU-15 greenhouse gas projections. Since sectoral emission projections are missing for Cyprus and Malta, greenhouse gas projections for the EU-27 are calculated on the basis of projections reported by the remaining 25 Member States. The 2005–2010 percent variation for the EU-25 was applied to Cyprus and Malta to obtain an EU-27 projection for 2010. No additional measures were reported for Belgium, Denmark, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom, Czech Republic, Estonia, Hungary, Latvia, Lithuania and Poland. For these Member States, the 'with existing measures' projections were used for the calculation of the EU-15 and EU-27 'additional measures' projections.

Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections; Eurostat.

9.6 Waste management

- EU-15 greenhouse gas emissions from waste fell by 38 % between 1990 and 2005.
- EU-15 greenhouse gas emissions from waste are projected to be approximately 47 % below 1990 levels by 2010.

In 2005, greenhouse gas emissions from waste management activities represented 2.0 % of total EU-15 emissions. The observed decrease in greenhouse gas emissions from waste between 1990 and 2005 (– 38 %) is due to the decrease in methane emissions from landfills, which have fallen since 1990. A reduction of 21 % was observed between 1990 and 2000, followed by a further reduction of 15 % between 2000 and 2005. This decrease is mainly a result of:

- the decrease in the amount of waste disposal on land;
- the decreased organic carbon content in the landfilled waste;
- the installation of landfill gas recovery on all new sites, as required by the Landfill Directive.

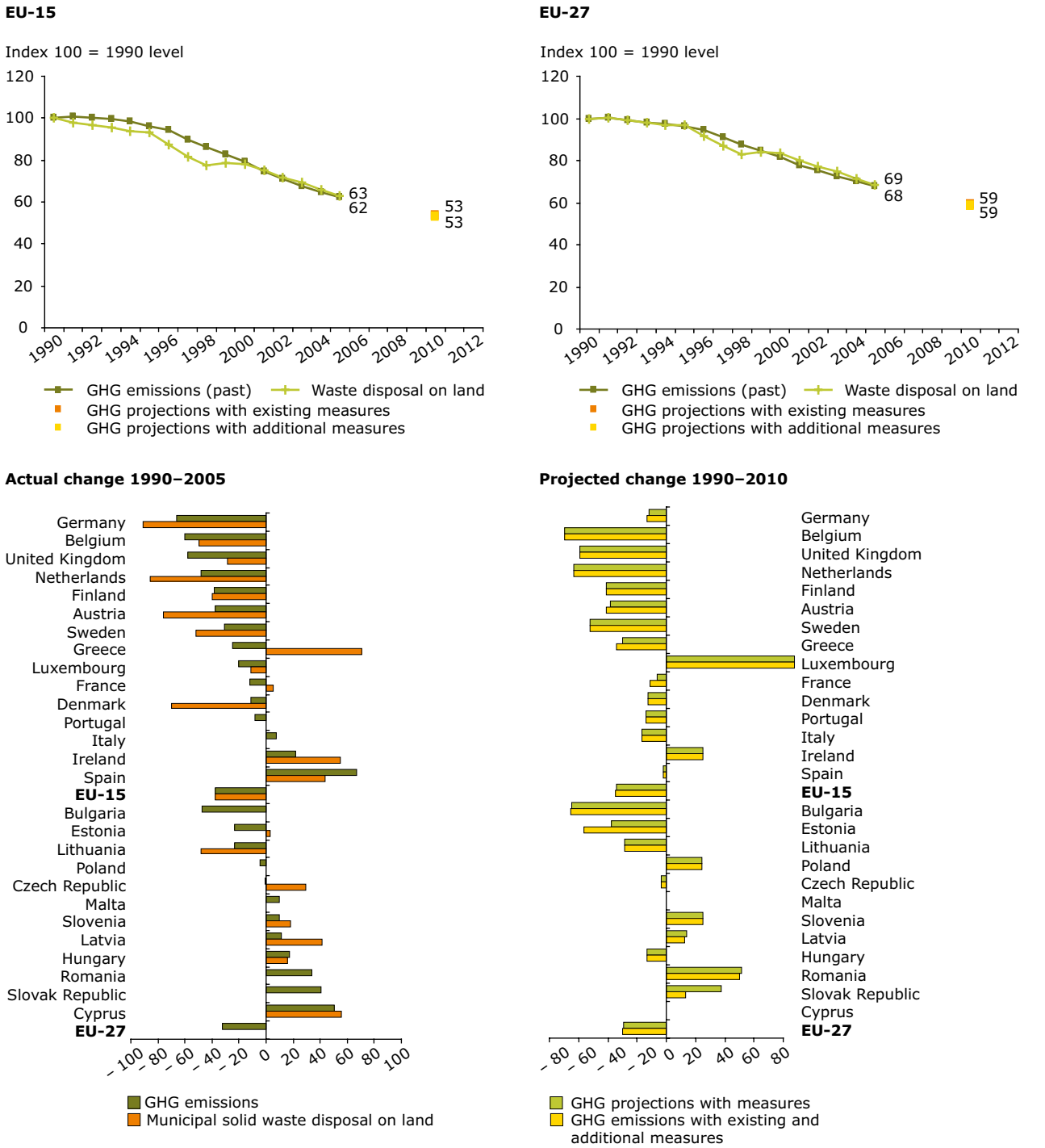
Since 1990 greenhouse gas emissions from other waste management activities, such as composting and waste-water handling, were also reduced. This was mainly due to efficient waste management policies and the creation of value for waste (e.g. as a raw material or as an energy source). Emissions resulting from recycling activities and incineration of waste with energy recovery are accounted for in the energy supply and use sector.

According to Member States projections, with existing measures, EU-15 greenhouse gas emissions from the waste sector are projected to decrease further down to 53 % of the 1990 level (Figure 9.17). This is mainly due to further implementation of the Landfill Directive, which stipulates that all new landfill sites must now have gas recovery facilities and such facilities should also be installed in all existing landfill sites by 2009. In addition, the amount of biodegradable municipal waste going to landfill must be reduced by 50 % with respect to 1995 levels by 2009, and by 2016 it must be reduced by 65 % from 1995 levels ([34]). The implementation of additional measures would result in only a very small further decrease. Only France, Greece and Austria provide separate projections for a scenario with additional measures.

Comparisons of changes between greenhouse gas emissions and amount of waste going to landfill have to be undertaken with care, as these parameters are not directly linked. In particular, there is a time-delay observed between the two trends.

([34]) Second ECCP Progress Report 'Can we meet our Kyoto targets?', April 2003.

Figure 9.17 EU-15 and EU-27 past and projected greenhouse gas emissions from waste (1990–2005)



Note: For Italy, sectoral WAM projections had to be gap-filled to calculate EU-15 greenhouse gas projections. Since sectoral emission projections are missing for Cyprus and Malta, greenhouse gas projections for the EU-27 are calculated on the basis of projections reported by the remaining 25 Member States. The 2005–2010 percent variation for the EU-25 was applied to Cyprus and Malta to obtain EU-27 projections for 2010. No additional measures were reported for Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom, Czech Republic, Hungary, Lithuania, Poland and Slovenia. For these Member States, the 'with existing measures' projections were used for the calculation of the EU-15 and EU-27 'additional measures' projections.

Source: EEA, based on EU-15 Member States greenhouse gas inventories and projections.

10 Use of Kyoto mechanisms

- Governments in 10 EU-15 Member States (Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain) as well as Slovenia, have decided to use the Kyoto mechanisms in order to meet their targets under the Kyoto Protocol.
- The projected use of Kyoto mechanisms by EU-15 Member States amounts to 107.5 Mt CO_2-equivalents per year of the commitment period. This corresponds to 2.5 of the 8 % emission reduction required for the EU-15.
- Twelve Member States have allocated financial resources for using the Kyoto mechanisms (Austria, Belgium, Denmark, Finland, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and Sweden) with a total amount of EUR 2 860 million for the whole five-year commitment period.

10.1 Kyoto mechanisms

The Kyoto Protocol defines three 'flexibility mechanisms' to lower the overall costs of achieving emissions targets for the commitment period 2008–2012: joint implementation (JI); clean development mechanism (CDM); and international emissions trading.

JI and the CDM enable developed countries to invest in approved projects ([35]) that lead to emission savings, hosted by other countries (developed countries for JI, developing countries for CDM). Investing countries can use the resulting emission credits to meet their Kyoto targets. These mechanisms aim in particular at stimulating investment in and transfer of clean technologies, while providing flexibility for developed countries to meet their emission targets.

International emission trading allows countries that have achieved emissions reductions beyond those required under the Kyoto Protocol to sell their excess reductions to countries finding it more difficult or expensive to meet their commitments. The difference between international emission trading and the EU Emission Trading Scheme is the following:

- International emissions trading is a mechanism under the Kyoto Protocol directed at Annex I Parties. Trading takes place between governments; private investors are not able to participate.
- The EU Emission Trading Scheme (ETS) is directed at operators of certain installations in the EU. It is an EU measure to reduce CO_2 emissions and not part of the Kyoto Protocol mechanisms. Trading takes place between private entities; to ensure consistency with the accounting rules under the Protocol a transfer of an EU ETS allowance from one Member State to another is backed by a simultaneous transfer of one Kyoto allowance between the two countries.

This chapter provides an overview on government programmes; information on the use of Kyoto mechanisms by operators in the EU Emission Trading Scheme can be found in Chapter 9. The information is based on questionnaires submitted by 20 EU Member States, second national allocation plans under the EU ETS and the respective Commission decisions.

([35]) Project activities under the CDM must be fully registered and approved by the CDM executive board. See: http://unfccc.int/kyoto_protocol/mechanisms/items/1673.php.

10.2 Government use of Kyoto mechanisms

Eleven EU Member States — Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Slovenia and Spain — have decided to use the Kyoto mechanisms to meet their burden-sharing or Kyoto targets. Within the EU-15, only France, Germany, Greece, Sweden and the United Kingdom intend to achieve their Kyoto targets without government use of the Kyoto mechanisms, although their companies are allowed to buy carbon allowances under the EU Emission Trading Scheme and the Linking Directive (see Section 10.1). Slovenia is the only new Member State that plans to acquire units either through project mechanisms or on the carbon market but has not yet decided on the quantity.

For the EU-15, the intended use of Kyoto mechanisms amounts to 107.5 Mt CO_2-equivalents per year for the commitment period 2008–2012 (Table 10.1). This amount corresponds to a third of the total-required emissions reduction for the EU 15 of 342 Mt CO_2-equivalents per year during the first commitment period (8 % reduction of base-year emissions).

Out of the group of other EEA member countries, two countries intend to use flexible mechanisms. Norway reported that it will need to close a gap of approximately 9 Mt CO_2-equivalents per year for the first commitment period. A decision on the intended acquisition of Kyoto mechanisms to fill this gap has not yet been taken. Switzerland is charging a 'climate cent' on transport fuels which will be used to reduce emissions domestically and to invest in Kyoto mechanism projects abroad. Through this mechanism, up to 8 Mt CO_2-equivalents will be bought by Switzerland for the first commitment period.

10.3 Allocated budget for the use of Kyoto mechanisms

With the exception of Slovenia, all Member States which intend to use Kyoto Mechanisms have allocated budgets. The Netherlands, Portugal, Austria, Spain and Luxembourg allocated the largest budgets (EUR 693, EUR 354, EUR 319, EUR 310 and EUR 300 million, respectively, for the five-year commitment period). In Slovenia, the budget has not yet been decided because the quantity of allowances to be bought is still unknown.

Table 10.1 Planned use of Kyoto mechanisms by EU Member States

Member State	Planned use of Kyoto mechanisms by government to meet its burden-sharing target	Projected emission reduction 2008–2012 through the use of Kyoto mechanisms (Mt CO_2-eq/year)	Allocated budget (EUR million)
Austria	Yes	9.0	319
Belgium	Yes	7.0	104
Denmark	Yes	4.2	152
Finland	Yes	2.4	120
Germany	No	-	23
Ireland	Yes	3.6	290
Italy	Yes	19.0	170
Luxembourg	Yes	4.7	300
Netherlands	Yes	20.0	693
Portugal	Yes	5.8	354
Spain	Yes	31.8	310
Sweden	Yes	(1.2)a	25
EU-15	**Yes**	**107.5**	**2 860**
Slovenia	Yes	< 0.6	-

Note: Sweden intends to achieve its Kyoto target without the use of flexible mechanisms but has made the necessary preparations to use them if necessary. Sweden intends to acquire 1.2 Mt CO_2-equivalents per year through the Swedish CDM and JI programme. This figure has not been considered in the target assessment for Sweden and the EU-15.

Source: Questionnaires submitted by EU Member States; second national allocation plans under the EU ETS; European Commission Decisions on the second national allocation plans under the EU ETS.

These ten countries, together with Germany and Sweden, decided to invest EUR 2 860 million to acquire units through JI, CDM or international emissions trading for the whole five-year commitment period.

10.4 Overview of projects for all Annex I countries

This section describes the type and location of projects used for CDM and JI by Annex I parties. It is not specific to European countries. As of July 2007, 2 434 projects were expected to deliver 2 359 Mt CO_2-equivalents until the end of the first commitment period under the Kyoto Protocol ([36]). More than half of the total emission reductions will be achieved by 21 % of the projects (Table 10.2). The largest share of reductions will be generated from projects reducing non-CO_2 gases (Table 10.3). This is mainly due to:

- high global warming potential ([37]) for non-CO_2 gases (CH_4: 21; N_2O: 310; HFC-23: 11 700);
- point sources with large emissions;
- low abatement costs.

The large emission reduction potentials for projects reducing non-CO_2 gases are also reflected in the regional distribution of CDM projects. Advanced developing countries with large industries offer better conditions for investors; China, India and Brazil alone account for 75 % of all the expected certified emission reductions (CER) until 2012 (Figure 10.1).

Table 10.2 Number of projects by average and total amount of emission allowances

Average emission allowances per project	Number of projects	Share in total number of projects	Total reduction units (Mt CO_2-eq)	Share of total emission allowances
Less than 500 kt CO_2-eq	1 652	68 %	322	14 %
Between 500 kt CO_2-eq and 1.5 Mt CO_2-eq	519	21 %	432	18 %
More than 1.5 Mt CO_2-eq	263	11 %	1 604	68 %
Total	**2 434**	**100 %**	**2 359**	**100 %**

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 2007.

([36]) UNEP Risoe CDM/JI Pipeline Analysis and Database, July 2007, see: http://cdmpipeline.org/overview.htm. This database is updated monthly.

([37]) The global warming potential is used to convert emissions of different greenhouse gases with different warming effects into the unit CO_2-equivalent, which is the global warming effect of one tonne of carbon dioxide.

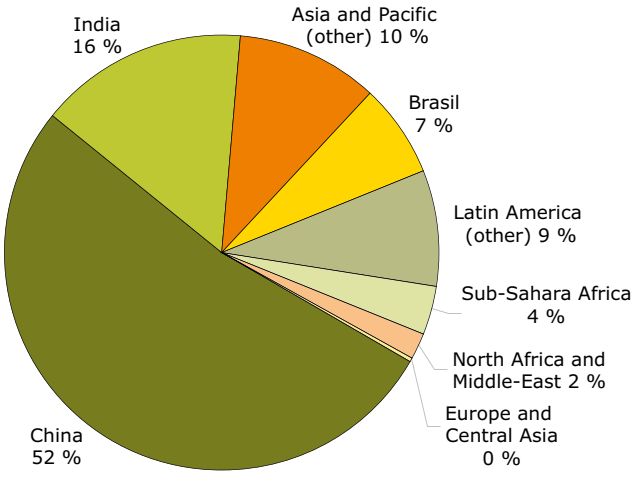
Table 10.3 Overview of CDM and JI projects by project type

Type of project	Number of projects	Reduction units until 2012 (Mt CO_2-eq)	Share in total reduction	Reduction units per project
Destruction of HFC 23 (by-product of HCFC 22 production)	18	501	21 %	27.9
Use or flaring of methane from coal beds and mines, fugitive emissions from oil and gas installations and landfills	265	506	22 %	8.1
N_2O abatement	45	261	11 %	5.8
Fossil fuel switch	79	152	6 %	1.9
Energy efficiency own generation	226	220	9 %	1.0
Biomass energy and biogas	576	207	9 %	0.7
Wind energy	280	128	5 %	0.5
Hydro energy	528	220	9 %	0.4
Energy efficiency industry	112	34	1 %	0.3
Agriculture	177	44	2 %	0.3
Other (12 project types)	128	87	68 %	0.7
Total	**2 434**	**2 359**	**100 %**	**1.0**

Note: The table includes all projects which have reached the validation stage (CDM) or the determination stage (JI). Not all of these projects will be realised and the actual reduction of greenhouse gases might differ from the expected reduction included in the project description.

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 2007.

Figure 10.1 Host regions for CDM projects by share of expected CERs until 2012



Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 2007.

11 Use of carbon sinks

- The projected use of carbon sinks for achieving the EU-15 Kyoto target is relatively small. It is estimated that the removal of carbon dioxide due to activities under Articles 3.3 and 3.4 of the Kyoto Protocol during the first commitment period will amount to 39.1 Mt CO_2 per year for EU 15 Member States. This represents 0.9 % of EU-15 base-year emissions, just over one tenth of the reduction target of – 8 %. In addition, Slovenia expects an additional reduction of 1.7 Mt CO_2 per year of the commitment period.
- Forest management is the main activity elected under Article 3.4 of the Kyoto Protocol.

In addition to policies and measures targeting sources of greenhouse gas emissions (see Chapter 11), Member States can also use policies and measures to enhance CO_2 removals by land use change and forestry activities (carbon sinks). These carbon sinks include mandatory activities covered by Article 3.3 of the Kyoto Protocol (afforestation, reforestation and deforestation) and voluntary activities under Article 3.4 (forest management, cropland management, grazing-land management and revegetation).

Fourteen Member States have provided preliminary estimates of their intended use of carbon sinks under Article 3.3 to achieve their burden-sharing targets (Austria, Belgium, Czech Republic, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Slovenia, Spain, Sweden and the United Kingdom). So far for the EU-15, there are expectations to remove, by 2008–2012, a net amount of 13.5 Mt CO_2 per year through afforestation and reforestation. Additionally, Slovenia expects a net removal of 0.4 Mt CO_2 per year.

With the submission of their initial report under the Kyoto Protocol in 2006, all Parties had to decide which activities under Article 3.4 they will elect. Forest management is the main activity selected under Article 3.4:

- nine Member States decided not to elect any activity under Article 3.4;
- sixteen Member States (10 from EU-15) elected forest management;
- three elected cropland management;
- two elected grazing-land management;
- Romania is the only Member State which elected revegetation.

As a result, additional reductions of greenhouse gas emissions from activities in forest management, cropland management and grazing-land management for the EU-15 are projected to be 17.6 Mt CO_2 per year. Slovenia expects an additional reduction of 1.3 Mt CO_2 per year.

Activities under Articles 3.3 and 3.4 in EU-15 Member States are projected to reduce total emissions by 39.1 Mt CO_2 per year of the commitment period ([38]). This is equivalent to just over one-tenth of the EU-15 reduction commitment of 342 Mt CO_2 per year of the commitment period compared to base-year emissions. Slovenia expects an additional reduction of 1.7 Mt CO_2 per year of the commitment period.

([38]) Spain only provided an estimate for activities under Articles 3.3 and 3.4 together. This is included in the EU 15 total of 39.1 Mt CO_2/year but not in the individual figures for activities under Articles 3.3 and 3.4.

12 Sources of information

Country	Information source(s) used	Date of publication or submission ([1])
General information sources, used for most countries	Submissions under the monitoring mechanism, pursuant to Decision No 280/2004/EC ([2])	As of 31 May 2007
	Fourth national communications on climate change under the UNFCCC and reports on demonstrable progress under the Kyoto Protocol	
	National Allocation Plans for 2008–2012	
	Commission decisions on the national allocation plans	
	Member State responses to the CCPMs questionnaire, 2005 (for all EU Member States except Bulgaria, Cyprus, Luxembourg, Malta, Romania and Slovak Republic); updated by some Member States in 2007	2005 and 2007
	The European Community's initial report under the Kyoto Protocol, Report to facilitate the calculation of the assigned amount of the European Community pursuant to Article 3, paragraphs 7 and 8 of the Kyoto Protocol (Submission to the UNFCCC Secretariat), EEA Technical report No 10/2006 for all EU Member States except Cyprus and Malta)	2 February 2007
	European Climate Change Programme (ECCP), database on Policies and Measures in Europe (list of sources for each PAM): www.oeko.de/service/pam/index.php	As of 19 July 2007
Austria	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	March 2007
	National Allocation Plans for 2008–2012	15 January 2007
	Commission Decision on the national allocation plan	2 April 2007
Belgium	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	15 March 2007
	National Allocation Plans for 2008–2012	29 September 2006
	Commission Decision on the National allocation plan	16 January 2007
Bulgaria	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	2007
	Fourth National Communication on climate change under the UNFCCC	2006
	Second National Action Plan on Climate Change, 2005–2008	2006
	National Allocation Plans for 2008–2012	2007
	Commission Decision on the national allocation plan	26 October 2007
Croatia	Second, Third and Fourth National Communication on climate change under the UNFCCC	November 2006
Cyprus	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	March 2007
	National Allocation Plans for 2008–2012	26 February 2007
Czech Republic	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	March 2007
	National Allocation Plans for 2008–2012	8 December 2006
	Commission Decision on the national allocation plan	26 March 2007

Country	Information source(s) used	Date of publication or submission ([1])
Denmark	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	15 March 2007
	Projection of Greenhouse Gas Emissions — 2005 to 2030 (National Environmental Research Institut, University of Aarhus)	January 2007
	Denmark's CO_2 emissions – the effort in the period 1990–2001 and the associated costs (Danish EPA)	March 2005
	National Allocation Plans for 2008–2012	7 March 2007
	Commission Decision on the national allocation plan	31 August 2007
Estonia	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	March 2007
	Fourth National Communication on climate change under the UNFCCC	2005
	Report on Demonstrable Progress under the Kyoto Protocol	2005
	National Allocation Plans for 2008–2012	7 July 2006
	Commission Decision on the national allocation plan	4 May 2007
Finland	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	31 May 2007
	National Allocation Plans for 2008–2012	29 September 2006
	Commission Decision on the national allocation plan	4 June 2007
France	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	March 2007
	National Allocation Plans for 2008–2012	28 December 2006
	Commission Decision on the national allocation plan	26 March 2007
Germany	Endbericht zum Forschungsvorhaben Politikszenarien für den Klimaschutz IV — Szenarien bis 2030 für den Projektionsbericht 2007(Politikszenarien IV), not yet published by UBA	2007
	National Allocation Plans for 2008–2012	28 June 2006
	Commission Decision on the national allocation plan Amendment to decision on the national allocation plan	29 November 2006 26 October 2007
Greece	Fourth National Communication on climate change under the UNFCCC	March 2006
	National Allocation Plans for 2008–2012	1 September 2006
	Commission Decision on the national allocation plan	29 November 2006
Hungary	Fourth National Communication on climate change under the UNFCCC	2005
	Report on Demonstrable Progress under the Kyoto Protocol	2005
	National Allocation Plans for 2008–2012	23 January 2007
	Commission Decision on the national allocation plan	16 April 2007
Iceland	Fourth National Communication on climate change under the UNFCCC	March 2006
	Report on Demonstrable Progress under the Kyoto Protocol	March 2006
	Initial report under Article 7, paragraph 4, of the Kyoto Protocol	31 December 2006
	UNFCCC Country Profile on Iceland	2005
Ireland	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	31 May 2007
	Fourth National Communication on climate change under the UNFCCC	April 2007
	Determining the share of national greenhouse gas emissions for emissions trading in Ireland 2008–2012, prepared for the Irish Government by ICF Consulting and Byrne O Cleirigh	March 2006
	National Allocation Plans for 2008–2012	12 July 2006
	Commission Decision on the national allocation plan	29 November 2006

Country	Information source(s) used	Date of publication or submission (1)
Italy	Report on Demonstrable Progress under the Kyoto Protocol	11 November 2006
	National Allocation Plans for 2008–2012	15 December 2006
	Commission Decision on the national allocation plan	15 May 2007
Latvia	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	June 2007
	Fourth National Communication on climate change under the UNFCCC	2005
	National Allocation Plans for 2008–2012	16 August 2006
	Commission Decision on the national allocation plan	29 November 2006
Liechtenstein	Fourth National Communication on climate change under the UNFCCC	7 April 2006
	Report on Demonstrable Progress under the Kyoto Protocol	25 September 2006
	Initial report under Article 7, paragraph 4, of the Kyoto Protocol	22 December 2006
	Personal communication from the Office of Environmental Protection	July 2007
Lithuania	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	March 2007
	Third and Fourth National Communication on climate change under the UNFCCC	November 2005
	National Allocation Plans for 2008–2012	7 July 2006
	Commission Decision on the national allocation plan	29 November 2006
Luxembourg	National Allocation Plans for 2008–2012	18 July 2006
	Commission Decision on the national allocation plan	29 November 2006
Malta	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	May 2007
	National Allocation Plans for 2008–2012	27 September 2006
	Commission Decision on the national allocation plan	29 November 2006
Netherlands	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	March 2007
	Fourth National Communication on climate change under the UNFCCC	December 2005
	National Allocation Plans for 2008–2012	26 September 2006
	Commission Decision on the national allocation plan	16 January 2007
Norway	Fourth National Communication on climate change under the UNFCCC	December 2005
	Norwegian National Budget for 2007	2006
	Initial report under Article 7, paragraph 4, of the Kyoto Protocol	December 2006
	National Inventory Report	2007
	Personal communications	2007
Poland	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	2007
	National Allocation Plans for 2008–2012	30 June 2006
	Commission Decision on the national allocation plan	26 March 2007
Portugal	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	May 2007
	National Allocation Plans for 2008–2012	30 October 2006
	Commission Decision on the national allocation plan	18 October 2007
Romania	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	2007
	Fourth National Communication on climate change under the UNFCCC	November 2006
	National Allocation Plans for 2008–2012	December 2006
	Commission Decision on the national allocation plan	26 October 2007

Country	Information source(s) used	Date of publication or submission (1)
Slovak Republic	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	March 2007
	National Allocation Plans for 2008–2012	18 August 2006
	Commission Decision on the national allocation plan	29 November 2006
Slovenia	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	2007
	National Allocation Plans for 2008–2012	2 November 2006
	Commission Decision on the national allocation plan	5 February 2007
Spain	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	16 March 2007
	National Allocation Plans for 2008–2012	25 November 2006
	Commission Decision on the national allocation plan	26 February 2007
Sweden	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	March 2007
	National Allocation Plans for 2008–2012	2006
	Commission Decision on the national allocation plan	29 November 2006
	Amendment to decision on the national allocation plan	13 July 2007
Switzerland	Fourth National Communication on climate change under the UNFCCC	2005
	Report on Demonstrable Progress under the Kyoto Protocol	2005
	Initial report under Article 7, paragraph 4, of the Kyoto Protocol	2006
Turkey	First National Communication on climate change under the UNFCCC	2007
United Kingdom	Submission under the Monitoring Mechanism, pursuant to Decision No 280/2004/EC	31 May 2007
	National Allocation Plans for 2008–2012	28 August 2006
	Commission Decision on the national allocation plan	29 November 2006

Note: (1) Date of submission refers to the date the information was received by the European Commission or submitted to UNFCCC.

(2) Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol.

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14 Glossary

ACEA	European Automobile Manufacturers Association (EU-wide agreement with ACEA automobile manufacturing industries)
CAP	common agricultural policy
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 greenhouse gas emissions between industrialised countries and developing countries
CER	Certified emission reductions (applies to emission reductions under JI).
CFCs	chlorofluorocarbons
CHP	combined heat and power
CH_4	methane
CITL	Community Independent Transaction Log
CO_2	carbon dioxide
CO_2-eq	carbon dioxide-equivalents
COP	Conference of the Parties
CRF	common reporting format
DNA	designated national authority
DTPI	distance-to-target-path indicator
ECCP	European Climate Change Programme
EEA	European Environment Agency
EMAS	eco-management and audit scheme
ERU	Emission reduction unit (applies to emission reductions under the CDM).
ETC/ACC	European Topic Centre on Air and Climate Change
ETS	Emission Trading Scheme
EUA	emission unit allowance

GDP	gross domestic product
GHG	greenhouse gases
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
IPPC	integrated pollution prevention and control
ITL	Independent transaction log of the Kyoto Protocol
JAMA	Japanese Automobile Manufacturers Association
JI	Joint implementation as defined in the Kyoto Protocol, Article 6, meaning projects on the reduction of greenhouse gas emissions between industrialised countries and countries in transition
KAMA	Korean Automobile Manufacturers Association
KP	Kyoto Protocol
Kt	kilo tonnes
LULUCF	land use, land-use change and forestry
MoU	memorandum of understanding
Mt	Mega (million) tonnes
MS	Member State
NAP	national allocation plan
N_2O	nitrous oxide
PAM	policies and measures
PFCs	perfluorocarbons
RES	renewable energy sources
SF_6	sulphur hexafluoride
UNFCCC	United Nations Framework Convention on Climate Change
WM	With existing measures
WAM	With additional measures

15 Tables and figures

16 Summary of greenhouse gas emission trends and projections in Europe

Table 16.1 Greenhouse gas emission trends and targets for 2008–2012

Country	Base-year emissions (1)	2005 emissions	Change 2004–2005	Change 2005/ base year	EU burden–sharing or Kyoto target		DTPI (2005 emissions relative to target path)(3) without/with Kyoto mechanisms and carbon sinks
	Mt CO_2	Mt CO_2	%	%	%	Mt CO_2	Percentage points
Austria	79.0	93.3	2.3	18.1	– 13.0	68.7	+ 27.9 / + 18.7
Belgium	146.9	143.8	– 2.6	– 2.1	– 7.5	135.9	+ 3.6 / 0.0
Bulgaria	132.1	69.8	1.3	– 47.2	– 8.0	121.5	– 41.2 / n.a.
Cyprus	6.0 (2)	9.9	0.2	63.7	No target	No target	No target
Czech Republic	196.3	145.6	– 1.0	– 25.8	– 8.0	180.6	– 19.8 / n.a.
Denmark	69.3	63.9	– 6.3	– 7.8	– 21.0	54.8	+ 8.0 / + 1.0
Estonia	43.0	20.7	– 2.3	– 52.0	– 8.0	39.6	– 46.0 / n.a.
Finland	71.1	69.3	– 14.6	– 2.6	0.0	71.1	– 2.6 / – 5.7
France	563.9	553.4	– 0.5	– 1.9	0.0	563.9	– 1.9 / n.a.
Germany	1 232.5	1 001.5	– 2.3	– 18.7	– 21.0	973.7	– 3.0 / n.a.
Greece	111.1	139.2	1.2	25.4	25.0	138.8	+ 6.6 / n.a.
Hungary	123.0	80.5	1.2	– 34.5	– 6.0	115.7	– 30.0 / n.a.
Ireland	55.8	69.9	1.9	25.4	13.0	63.0	+ 15.6 / + 8.0
Italy	519.5	582.2	0.3	12.1	– 6.5	485.7	+ 17.0 / + 11.8
Latvia	25.9	10.9	1.5	– 58.0	– 8.0	23.8	– 52.0 / n.a.
Lithuania	48.1	22.6	7.2	– 53.1	– 8.0	44.3	– 47.1 / n.a.
Luxembourg	12.7	12.7	– 0.4	0.4	– 28.0	9.1	+ 21.4 / – 6.4
Malta	2.2(2)	3.4	6.1	54.8	No target	No target	No target
Netherlands	214.6	212.1	– 2.9	– 1.1	– 6.0	201.7	+ 3.4 / – 3.7
Poland	586.9	399.0	0.6	– 32.0	– 6.0	551.7	– 27.5 / n.a.
Portugal	60.9	85.5	1.0	40.4	27.0	77.4	+ 20.1 / + 7.2
Romania	282.5	153.7	– 4.0	– 45.6	– 8.0	259.9	– 39.6 / n.a.
Slovak Republic	73.4	48.7	– 1.6	– 33.6	– 8.0	67.5	– 27.6 / n.a.
Slovenia	20.2	20.3	2.1	0.4	– 8.0	18.6	+ 6.4 / – 2.1
Spain	289.4	440.6	3.6	52.3	15.0	332.8	+ 41.0 / + 31.3
Sweden	72.3	67.0	– 3.9	– 7.4	4.0	75.2	– 10.4 / – 12.6
United Kingdom	779.9	657.4	– 0.5	– 15.7	– 12.5	682.4	– 6.3 / – 6.7
EU-15	4 278.8	4 192.0	– 0.8	– 2.0	– 8.0	3 936.5	+ 4.0 / + 1.4
EU-27	5 818.4 (2)	5 177.0	– 0.7	– 11.0	No target	No target	No target
Croatia	34.6	29.2	0.0	– 15.5	– 5.0	32.9	– 11.8 / n.a.
Iceland	3.4	3.7	0.7	10.5	10.0	3.7	+ 3.0 / n.a.
Liechtenstein	0.2	0.3	0.1	17.4	– 8.0	0.2	+ 23.4 / n.a.
Norway	49.8	54.2	– 1.3	8.8	1.0	50.2	+ 8.1 / – 7.0
Switzerland	52.7	53.6	1.1	1.7	– 8.0	48.5	+ 7.7 / + 5.4

Note and source: See page 102.

Table 16.2 Greenhouse gas emission projections in Europe, compared with burden-sharing and Kyoto targets for 2008–2010

Country	Base-year emissions consistent with projections (1)	EU burden-sharing of Kyoto target		Projections for 2010 with existing measures (2)		Gap between projections and target (3)	
	Mt CO_2-eq	% of base year	Mt CO_2-eq	Mt CO_2-eq	% change/ base year	Mt CO_2-eq	% of base year
Austria	78.9	– 13.0	68.7	92.5	17.2	23.8	30.2
Belgium	146.9	– 7.5	135.9	141.6	– 3.6	5.8	3.9
Bulgaria	138.3	– 8.0	127.3	87.1	– 37.0	– 40.2	– 29.0
Cyprus (3)	6.0	No target	No target	12.2	101.6	No target	No target
Czech Republic	196.3	– 8.0	180.6	145.7	– 25.8	– 34.9	– 17.8
Denmark	69.3	– 21.0	54.8	62.6	– 9.7	7.8	11.3
Estonia	43.5	– 8.0	40.0	18.9	– 56.6	– 21.2	– 48.6
Finland	71.1	0.0	71.1	85.0	19.6	13.9	19.6
France	564.0	0.0	564.0	569.0	0.9	5.0	0.9
Germany	1 231.5	– 21.0	972.9	955.4	– 22.4	– 17.6	– 1.4
Greece	111.7	25.0	139.6	150.4	34.7	10.8	9.7
Hungary	122.2	– 6.0	114.9	87.4	– 28.5	– 27.5	– 22.5
Ireland	55.8	13.0	63.0	68.4	22.6	5.4	9.6
Italy	519.5	– 6.5	485.7	587.3	13.1	101.6	19.6
Latvia	25.3	– 8.0	23.3	13.6	– 46.2	– 9.7	– 38.2
Lithuania	48.0	– 8.0	44.1	33.5	– 30.2	– 10.7	– 22.2
Luxembourg	12.7	– 28.0	9.1	14.2	11.9	5.1	39.9
Malta (3)	1.0	No target	No target	2.2	123.5	No target	No target
Netherlands	213.2	– 6.0	200.4	211.8	– 0.6	11.4	5.4
Poland	586.9	– 6.0	551.7	420.0	– 28.4	– 131.7	– 22.4
Portugal	60.9	27.0	77.4	88.0	44.3	10.6	17.3
Romania	282.5	– 8.0	259.9	192.5	– 31.9	– 67.4	– 23.9
Slovak Republic	73.0	– 8.0	67.2	58.3	– 20.2	– 8.9	– 12.2
Slovenia	20.2	– 8.0	18.6	21.6	6.8	3.0	14.8
Spain	288.4	15.0	331.6	410.2	42.3	78.6	27.3
Sweden	72.3	4.0	75.2	69.8	– 3.4	– 5.4	– 7.4
United Kingdom	775.2	– 12.5	678.3	595.6	– 23.2	– 82.7	– 10.7
EU-15	4 271.4	– 8.0	3 929.7	4 101.8	– 3.97	172.2	4.0
Croatia	35.2	– 5.0	33.4	35.3	0.4	1.9	5.4
Iceland	3.3	10.0	3.6	3.4	2.4	– 0.2	– 7.6
Liechtenstein	0.3	– 8.0	0.2	0.3	3.8	0.0	11.8
Norway	49.8	1.0	50.3	59.2	18.9	8.9	17.9
Switzerland	52.5	– 8.0	48.3	50.8	– 3.2	2.5	4.8
Turkey (3)	170.4	No target	No target	340.3	99.7	No target	No target

Table 16.2 Greenhouse gas emission projections in Europe, compared with burden-sharing and Kyoto targets for 2008–2010 (continued)

Country	Effect of additional measures		Use of carbon sinks ([5])		Use of Kyoto mechanisms ([5])		Projections for 2010 with all measures, use of carbon sinks and Kyoto mechanisms		Gap between projections and target ([3])	
	Mt CO_2-eq	% of base year	Mt CO_2-eq	% of base year	Mt CO_2-eq	% of base year	Mt CO_2-eq	% change/ base year	Mt CO_2-eq	% of base year
Austria	– 14.4	– 18.2	– 0.7	– 0.9	– 9.0	– 11.4	68.4	– 13.4	– 0.3	0
Belgium	0.0	0.0	0.0	0.0	– 7.0	– 4.8	134.6	– 8.4	– 1.2	– 1
Bulgaria	– 6.4	– 4.6	0.0	0.0	0.0	0.0	80.7	– 41.7	– 46.6	– 34
Cyprus ([3])	– 0.8	No target	0.0	No target	No target	No target	11.3	87.9	No target	No target
Czech Republic	– 6.0	– 3.1	0.0	0.0	0.0	0.0	139.7	– 28.8	– 40.9	– 21
Denmark	0.0	0.0	– 2.3	– 3.3	– 4.2	– 6.1	56.1	– 19.0	1.4	2
Estonia	– 1.4	– 3.3	0.0	0.0	0.0	0.0	17.4	– 59.9	– 22.6	– 52
Finland	– 12.4	– 17.4	– 0.6	– 0.8	– 2.4	– 3.4	69.6	– 2.0	– 1.5	– 2
France	– 24.0	– 4.3	0.0	0.0	0.0	0.0	545.0	– 3.4	– 19.0	– 3
Germany	– 40.9	– 3.3	0.0	0.0	0.0	0.0	914.5	– 25.7	– 58.4	– 5
Greece	– 10.9	– 9.8	0.0	0.0	0.0	0.0	139.5	24.9	– 0.1	0
Hungary	– 0.3	– 0.2	0.0	0.0	0.0	0.0	87.1	– 28.7	– 27.8	– 23
Ireland	– 0.1	– 0.2	– 2.1	– 3.7	– 3.6	– 6.5	62.6	12.3	– 0.4	– 1
Italy	– 63.3	– 12.2	– 16.7	– 3.2	– 19.0	– 3.7	488.3	– 6.0	2.6	0
Latvia	– 0.6	– 2.4	0.0	0.0	0.0	0.0	13.0	– 48.6	– 10.3	– 41
Lithuania	0.0	0.0	0.0	0.0	0.0	0.0	33.5	– 30.2	– 10.7	– 22
Luxembourg	– 0.3	– 2.7	0.0	0.0	– 4.7	– 37.3	9.1	– 28.0	0.0	0
Malta ([3])	0.0	No target	0.0	No target	No target	No target	2.2	123.5	No target	No target
Netherlands	0.0	0.0	– 0.1	– 0.1	– 20.0	– 9.4	191.7	– 10.1	– 8.7	– 4
Poland	0.0	0.0	0.0	0.0	0.0	0.0	420.0	– 28.4	– 131.7	– 22
Portugal	– 2.5	– 4.0	– 4.7	– 7.6	– 5.8	– 9.5	75.0	23.1	– 2.3	– 4
Romania	– 11.1	– 3.9	0.0	0.0	0.0	0.0	181.4	– 35.8	– 78.5	– 28
Slovak Republic	– 2.3	– 3.1	0.0	0.0	0.0	0.0	56.0	– 23.3	– 11.1	– 15
Slovenia	– 1.7	– 8.2	– 1.7	– 8.3	– 0.6	– 3.0	17.6	– 12.7	– 1.0	– 5
Spain	0.0	0.0	– 5.8	– 2.0	– 31.8	– 11.0	372.6	29.2	41.0	14
Sweden	0.0	0.0	– 2.1	– 2.9	0.0	0.0	67.7	– 6.4	– 7.5	– 10
United Kingdom	0.0	0.0	– 4.1	– 0.5	0.0	0.0	591.6	– 23.7	– 86.7	– 11
EU-15	– 168.8	– 4.0	– 39.1	– 0.9	– 107.5	– 2.5	3 786	– 11.4	– 143	– 3.4
Croatia	– 3.9	– 11.1	0.0	0.0	0.0	0.0	31.4	– 10.8	– 2.0	– 6
Iceland	0.0	0.0	0.0	0.0	0.0	0.0	3.4	2.4	– 0.2	– 8
Liechtenstein	0.0	0.0	0.0	0.0	0.0	0.0	0.3	3.8	0.03	12
Norway	0.0	0.0	0.0	0.0	– 10.0	– 20.1	49.2	– 1.1	– 1.1	– 2
Switzerland	– 1.3	– 2.4	0.0	0.0	– 1.6	– 3.1	47.9	– 8.7	– 0.4	– 1
Turkey ([3])	0.0	No target	0.0	No target	No target	No target	340.3	99.7	No target	No target

Note and source: See page 102.

Notes: Table 16.1 — Greenhouse gas emission trends and targets for 2008–2012

Note: (1) The base year (first column) refers to the base year of the Initial Reports due at the end of 2006 and do not consider changes due to UNFCCC reviews, as the base years were not finalised in time to be considered in this report. The base years of the EU-15 are consistent with the base years of the EC Initial Report.

(2) The EU-27, Cyprus and Malta have no target under the Kyoto Protocol, and therefore no legal base year. As a result, in this table, 1990 emissions were taken as reference emissions for the EU-27, Cyprus and Malta and Turley.

(3) The distance-to-target-path indicator (DTPI) measures the deviation in percentage points of actual emissions in 2005 from a (hypothetical) linear path between base-year emissions and the burden-sharing target for 2010. A positive value suggests an underachievement and a negative value an overachievement by 2005. The DTPI is used as an early indication of progress towards the Kyoto and burden-sharing targets.

The mention n.a. indicates that the country does not intend to use carbon sinks or Kyoto mechanisms to meet its target.

Source: EEA, based on EU Member States greenhouse gas inventories.

Notes: Table 16.2 — Greenhouse gas emission projections in Europe, compared with burden-sharing and Kyoto targets for 2008–2010

Note: (1) The base-year emissions used for the projections assessment and presented in this table are the data on which projections were based and are therefore not necessarily consistent with the Initial Report base years of Table 2. This also explains why, for many countries, the EU burden-sharing differs from those presented in Table 0.2.

(2) Eight Member States (Austria, Finland, France, Ireland, Luxembourg, Czech Republic, Slovak Republic and Slovenia) included an estimated effect of the EU ETS in their projections. For five other Member States which reported it separately (Denmark, Netherlands, Spain, Sweden and United Kingdom), the estimated effect of the EU ETS was introduced in the 'with existing measures' projections.

(3) For gaps between projections and targets, positive figures mean that the target is not met; negative figures mean a projected over-delivery of emissions.

(4) Relative gaps between projections and targets (in percentage points) are relative to base-year emissions, not to target emissions.

(5) The negative figures for additional measures, Kyoto Mechanisms and carbon sinks represent projected emission reductions.

(6) Gaps for total EU in terms of million tonnes of CO_2-equivalents are not equal to the sum of Member States gaps due to slight inconsistency between the sum of Member States burden-sharing targets and the EU Kyoto target in terms of percentages, mainly due to revised base-year estimates occurring the past years.

(7) Cyprus, Malta and Turkey do not have a Kyoto target.

Source: EEA, based on EU Member States greenhouse gas inventories and projections.

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