

Greenhouse gas emission trends and projections in Europe 2004

**Progress by the EU and its Member States towards achieving
their Kyoto Protocol targets**



Cover design: EEA
Layout: EEA

Legal notice

The contents of this publication do not necessarily reflect the official opinions of the European Commission or other institutions of the European Communities. Neither the European Environment Agency nor any person or company acting on behalf of the Agency is responsible for the use that may be made of the information contained in this report.

All rights reserved

No part of this publication may be reproduced in any form or by any means electronic or mechanical, including photocopying, recording or by any information storage retrieval system, without the permission in writing from the copyright holder. For rights of translation or reproduction please contact EEA project manager Ove Caspersen (address information below).

Information about the European Union is available on the Internet. It can be accessed through the Europa server (<http://europa.eu.int>).

Cataloguing data can be found at the end of this publication.

Luxembourg: Office for Official Publications of the European Communities, 2004

ISBN 92-9167-701-9
ISSN 1725-9177

© EEA, Copenhagen, 2004

Environmental production

This publication is printed according to the highest environmental standards.

Printed by Scanprint a/s

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

Paper

- 100 % recycled and chlorine-free bleached paper
- The Nordic Swan label

Printed in Denmark



European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel: +45 33 36 71 00
Fax: +45 33 36 71 99

Web: <http://www.eea.eu.int>
Enquiries: <http://www.eea.eu.int/enquiries>

Contents

Acknowledgements	2
Key messages	3
1 Introduction	5
2 The Kyoto Protocol targets.....	6
3 Greenhouse gas emissions in EU-23	8
4 Progress of EU-15 Member States in limiting greenhouse gas emissions.....	11
5 Use of Kyoto mechanisms	15
6 Progress of new Member States in limiting greenhouse gas emissions.....	16
7 Progress of EU candidate countries and EEA countries in limiting greenhouse gas emissions	19
8 Effects of domestic policies and measures in the EU	21
9 Use of carbon sinks.....	34
10 The reporting scheme	35

Acknowledgements

This report was prepared by the European Environment Agency's European Topic Centre for Air and Climate Change (ETC/ACC). UBA Berlin (Umweltbundesamt, Federal Environmental Agency, Germany) and UBA Vienna (Umweltbundesamt, Austria) also contributed financially as partners in the ETC/ACC. The coordinating author was Bernd Strobel of UBA Berlin. Other authors were, in alphabetical order, Martin Cames (Institute for Applied Ecology, Germany), Bernd Guele (Umweltbundesamt, Austria), Claire Handley (AEA Technology, UK),

Anke Herold (Institute for Applied Ecology, Germany), Kati Huttunen (Umweltbundesamt, Austria), Krzysztof Olendrzynski (Institute of Environmental Protection, Poland), Peter Taylor (AEA Technology, UK). The EEA project manager was André Jol. EEA acknowledges the comments received on the draft report from the National Focal Points of EEA member countries and the European Commission (DG Environment), which have been included in the final version of the report as far as practically feasible.

Key messages

Greenhouse gas emissions in the pre-2004 EU Member States (EU-15) in 2002 were 2.9 % below base-year level ⁽¹⁾. This means the EU-15 was little more than a third of the way towards achieving the 8 % emissions reduction from base-year levels required by 2008–12 under the Kyoto Protocol ⁽²⁾. On the basis of their emissions in 2002 nine of the EU-15 (Austria, Belgium, Denmark, Finland, Greece, Ireland, Italy, Portugal and Spain) were not on track to meet their individual greenhouse gas limitation or reduction targets in 2010.

From 1990 to 2002 EU-15 greenhouse gas emissions decreased from most sectors (energy supply, industry, agriculture, waste management); however emissions from transport increased by nearly 22 % in the same period ⁽³⁾.

The latest projections for 2010 show that neither existing domestic policies and measures by Member States to reduce emissions, nor planned additional domestic policies and measures, will be sufficient for the EU-15 to reach its Kyoto target.

Existing domestic policies and measures will reduce total EU-15 greenhouse gas emissions by only 1.0 % from base-year levels by 2010. This projection has improved a little compared to last year's estimate due to positive updates of individual projections from seven Member States. Sweden and the United Kingdom project that existing domestic policies and measures will be sufficient to meet their burden-sharing

targets and they may even over-deliver on their targets. The Netherlands project to meet the target with a combination of domestic policies and measures and emission allowances from the use of Kyoto mechanisms ⁽⁴⁾. If Sweden and the United Kingdom do no more than meet their agreed targets, the EU-15 reduction will be just 0.6 %.

When the additional domestic policies and measures being planned by Member States are taken into account, an EU-15 emissions reduction of 7.7 % is projected. However, this relies on several Member States cutting emissions by more than is required to meet their national targets, which cannot be taken for granted. If no over-delivery by these Member States is included, the EU-15 will achieve a 5.4 % reduction with additional policies and measures.

The use of Kyoto mechanisms, which are in a stage of implementation by Austria, Belgium, Denmark, Ireland, Luxembourg and the Netherlands, will reduce the gap between projected emissions with planned domestic policies and measures by 2010 and the EU-15 target by 1.1 % additionally. This would bring the total reduction to – 8.8 % and thus the Kyoto target for EU-15 would be achieved.

Six countries (Austria, Belgium, Denmark, Finland, the Netherlands and Sweden) have allocated financial resources for using the Kyoto mechanisms with a total amount of about EUR 1 300 million over the whole

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

(2) The pre-2004 EU-15 Member States are covered by the 'EU burden-sharing' agreement which lays down differentiated emission limits for each of these 15 Member States with the aim of ensuring that the EU-15 meets its overall 8 % reduction commitment under the Protocol. The commitment period 2008–2012 is referred to as the year 2010 in this report.

(3) All data in this report on past and projected trends exclude emissions and removals from land-use change and forestry, unless explicitly mentioned.

(4) Joint Implementation and Clean Development Mechanism according to the Kyoto Protocol, Art. 6 and Art. 12.

5-year Kyoto Protocol commitment period. The same countries and Spain have started to prepare legal and operational frameworks and bilateral agreements for using the Kyoto mechanisms.

Domestic policies and measures in EU-15 Member States that are projected to help most in achieving the targets include promotion of electricity from renewable energy, promotion of combined heat and power (CHP), improvements in energy performance of buildings and energy efficiency in large industrial installations, and promotion of the use of energy-efficient appliances. However, the EU renewable energy target (22 % of gross electricity consumption) and the indicative EU target for CHP (18 % share in total electricity production) for 2010 are unlikely to be met with current trends. Other key policies and measures include promotion of biofuels in transport and reducing the average carbon dioxide emissions of new passenger cars, recovery of gases from landfills and reduction of fluorinated gases. The adopted emissions trading directive is expected to create a market for carbon dioxide allowances from 2005 onwards and

aims to ensure that emissions reductions can be made where it is most economically efficient.

Emissions have declined substantially in almost all new Member States. In 2002 emissions were 33 % below the base-year level, mainly due to the introduction of market economies and the consequent restructuring or closure of heavily polluting and energy-intensive industries. Greenhouse gas emissions from transport decreased by 12 % between 1990 and 1995 but increased afterwards and in 2002 exceeded 1990 levels by 9 %.

With existing domestic policies and measures, all new Member States, except Slovenia, were on track to meet their Kyoto targets on the basis of their emissions in 2002. Seven new Member States project to meet or even over-comply their Kyoto targets by 2010 with existing domestic policies and measures. However, in most countries emissions will increase between 2002 and 2010. Slovenia projects to meet its Kyoto target with additional policies and measures including CO₂ removals from land-use change and forestry.

1 Introduction

This report presents an assessment of the actual (1990 to 2002) and projected progress (by 2010) of the European Community (EC) and its Member States and of EEA countries ⁽⁵⁾ towards achieving their emission targets under the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol.

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

In this report, the assessment of whether Member States are on track to reach their targets is based mainly on an analysis of domestic policies and measures. The use by Member States of the flexible mechanisms of the Kyoto Protocol to fulfil their commitments is only included to a

limited extent. Activities concerning land-use change and forestry ('carbon sinks') are not included, except where explicitly noted. This assessment contains information on 23 EU Member States, but is most detailed for the pre-2004 EU-15 Member States. These are covered by the 'EU burden-sharing agreement' which lays down differentiated emission limits for each of the 15 Member States with the aim of ensuring that the EU-15 meets its overall reduction commitment under the Protocol.

This year (2004) the report is published for the third time. The most recent information submitted by Member States up to April 2004 is included. Updates were available on emission inventories by all Member States and on emission projections and national programmes by nine of the EU-15 Member States and two of the new Member States. Detailed information on national greenhouse gas emission trends, projections, policies and measures and methodologies is presented in a separate EEA technical report.

⁽⁵⁾ This report covers 23 EU Member States and six additional EEA member countries, which include EU candidate countries (Bulgaria, Croatia and Romania) and Norway, Iceland and Liechtenstein. The report does not cover Cyprus and Turkey due to lack of data and because they do not have targets under the Kyoto Protocol. Also Malta does not have a target under the Kyoto Protocol, but the limited available data is presented.

2 The Kyoto Protocol targets



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



The Kyoto Protocol will enter into force early 2005, because, due to Russia's recent ratification, the limit of a minimum of 55 % of carbon dioxide emissions of all those industrialised countries that have ratified, is now covered.

Combating climate change and minimising its potential consequences are key objectives of the UN Framework Convention on Climate Change (UNFCCC) and represent a high priority for the EU.

Achieving stabilisation of atmospheric greenhouse gas concentrations, avoiding dangerous interference with the climate system, is a key objective of the UNFCCC and the EU which would require substantial (50 to 70 %) reductions in global greenhouse gas emissions. As a first step, Parties to the UNFCCC in 1997 adopted the Kyoto Protocol. This requires developed countries, as a whole, to reduce their emissions of a basket of six greenhouse gases to 5.2 % below their levels in a given base-year (1990 in most cases) by the period 2008–12.

For EU-15 the Kyoto Protocol sets the target of an 8 % emissions reduction from the base-year level by the 2008–12 commitment period. Within this overall

target, differentiated emission limitation or reduction targets have been agreed for each of the pre-2004 EU-15 Member States under an EU accord known as the 'burden-sharing agreement'.

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

Figure 2.1 Greenhouse gas emission targets of EU-15 Member States for 2008–12 relative to base-year emissions under the EU burden-sharing decision ⁽⁶⁾

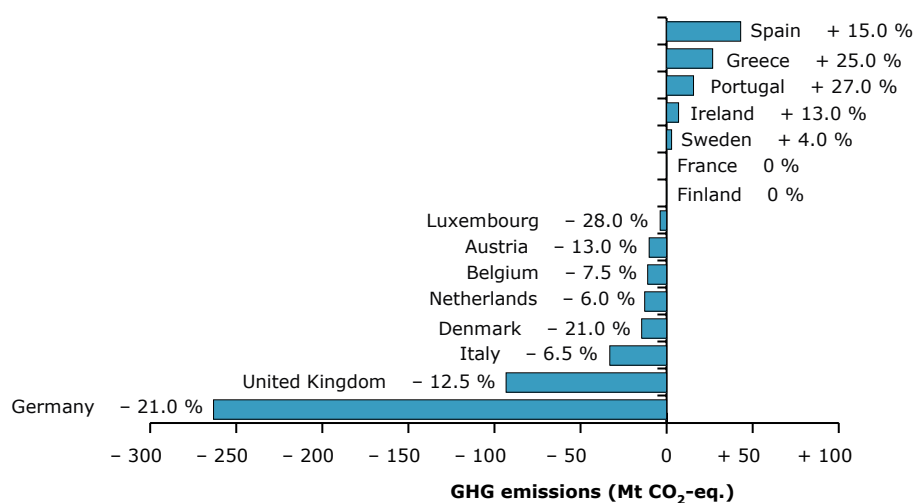
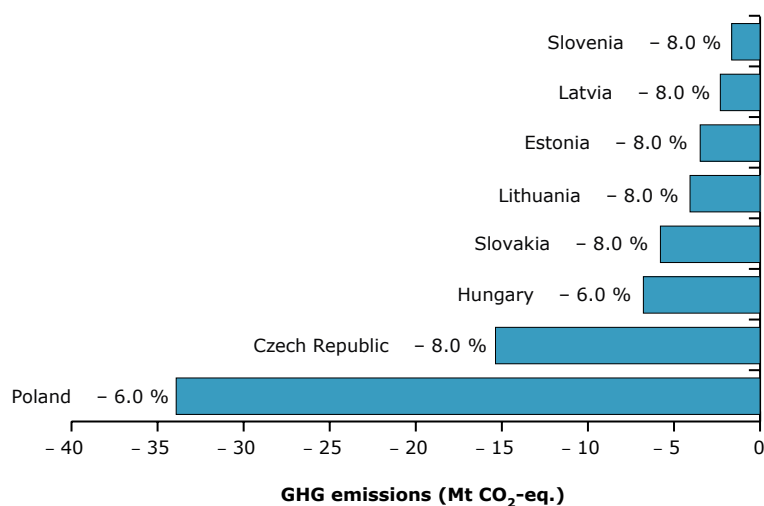


Figure 2.2 Greenhouse gas emission targets of new EU Member States and acceding countries for 2008–12 relative to base-year emissions under the Kyoto Protocol



Note: Countries with base-years other than 1990 are Hungary (average 1985–87) and Poland (1988). Cyprus and Malta have no targets and Turkey is a Party to UNFCCC, but not to the Kyoto Protocol.

⁽⁶⁾ In the Council decision (2002/358/EC) on the approval by the EU of the Kyoto Protocol the various commitments of the Member States are expressed as percentage changes from the base-year. In 2006 the respective emission levels will be expressed in terms of tonnes of CO₂-equivalent. In this connection, the Council of Environment Ministers and the Commission have, in a joint statement, agreed to take into account inter alia the assumptions in Denmark's statement to the Council Conclusions of 16–17 June 1998 relating to base-year emissions.

3 Greenhouse gas emissions in EU-23



With existing policies and measures EU-23 greenhouse gas emissions are projected to be about 5 % below theoretical EU-23 base-year levels in 2010. With additional policies and measures greenhouse gas emissions are expected to stabilise at 2002 levels (about 10 % below theoretical EU-23 base-year levels).

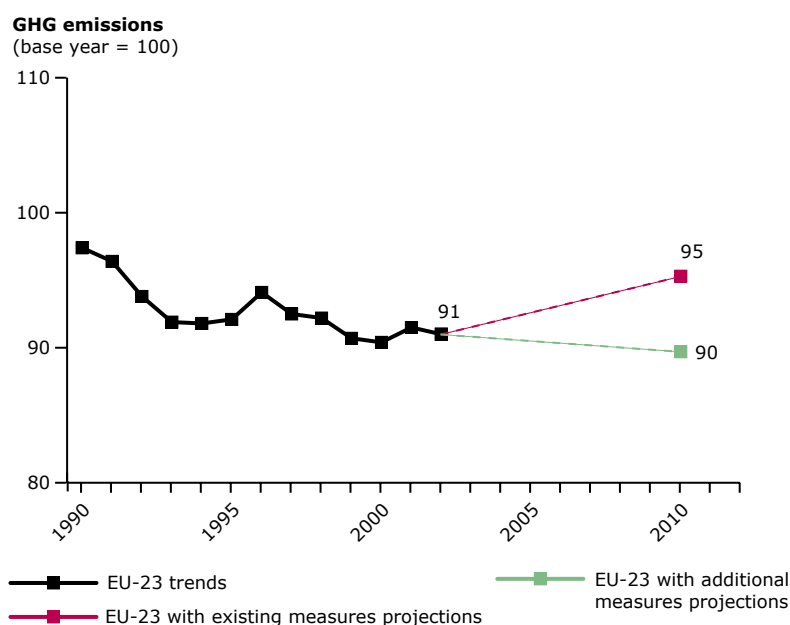
Total EU-23 greenhouse gas emissions declined in 2002 by 1 % compared to 2001 and were 7 % below 1990 levels and 9 % below the theoretical EU-23 base-year emissions (7). The new Member States share was 15 % of the total 2002 emissions (Figure 3.1).

By 2010, total EU-23 greenhouse gas emissions are projected to be about 5 % below the theoretical EU-23 base-year levels

based on Member States' own estimates taking into account all existing domestic policies and measures. The projected decline is 10 % with additional domestic policies and measures. However, emissions are expected to increase between 2002 and 2010 with existing domestic policies and measures.

In the EU-15, greenhouse gas emissions per capita decreased by 6 % from 1990 to

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



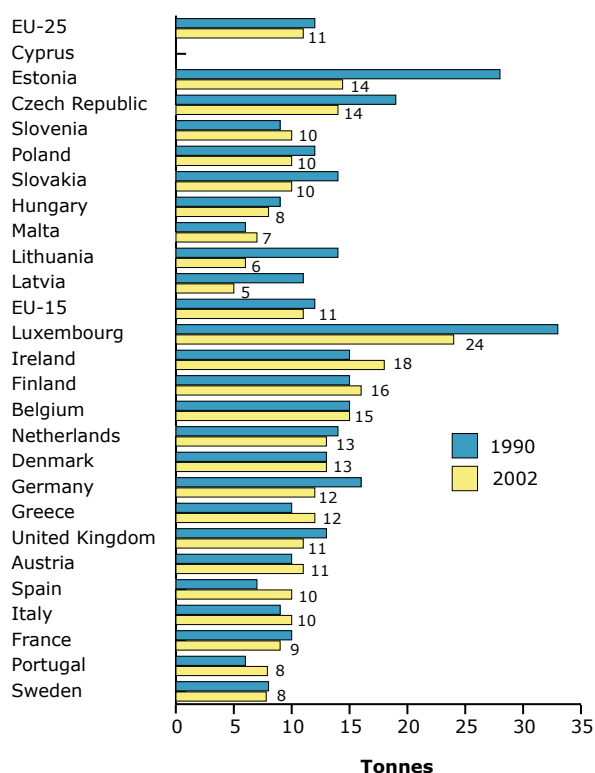
Note: Data exclude emissions and removals from land-use change and forestry. The figure refers to a theoretical EU-23 base-year as 100 in order to allow a consistent analysis of greenhouse gas emission trends and projections. This base-year for EU-23 has no legal status. Cyprus and Malta are not included due to lack of data and because they do not have targets under the Kyoto Protocol.

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

2002 largely due to decreases in Germany and the UK. The new EU Member States have lower per capita emissions on average than the EU-15 Member States. All of the new Member States, except Malta and Slovenia decreased per capita emissions substantially in the 1990s (Figure 3.2). In

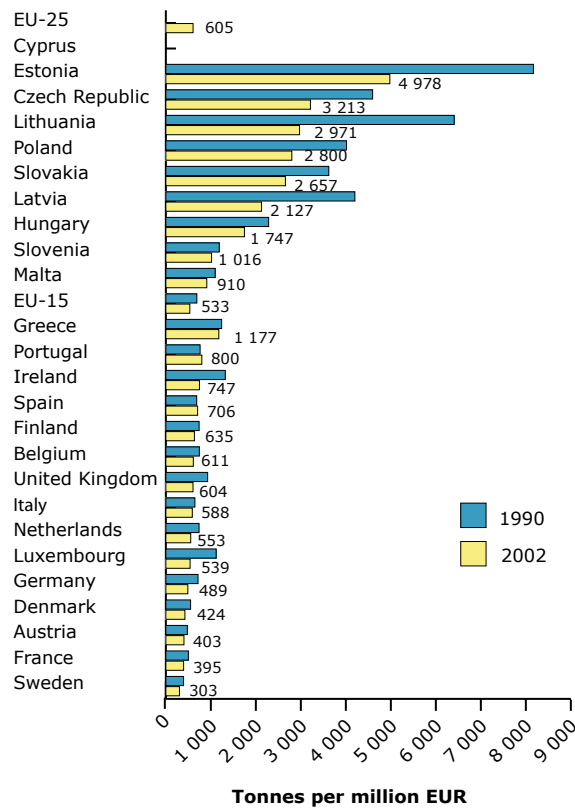
the EU-15, greenhouse gas emissions per GDP decreased by 23 % from 1990 to 2002. Despite substantial decreases between 1990 and 2002, per GDP emissions of the new EU Member States are well above the EU-15 average (Figure 3.3).

Figure 3.2 Greenhouse gas emissions per capita of EU-25 Member States for 1990–2002



Note: For Poland, the 2002 value refers to the latest available data (2001). Cyprus is not included due to lack of data.




Figure 3.3 Greenhouse gas emissions per GDP of EU-25 Member States for 1990–2002



Note: Due to lack of data, 1990 values refer to 1995 for Estonia, Hungary, Poland and Slovakia. For Poland, the 2002 value refers to the latest available data (2001). Cyprus is not included due to lack of data.

4 Progress of EU-15 Member States in limiting greenhouse gas emissions

EU-15 assessment

-  In 2002, greenhouse gas emissions of the EU-15 were 2.9 % below the base-year level, taking the EU-15 little more than a third of the way towards its greenhouse gas emission target under the Kyoto Protocol of 8 % reduction.
-  With existing domestic policies and measures, projections for 2010 show the EU-15 total greenhouse gas emissions decreasing only slightly by 1.0 % relative to the base-year. This leaves a shortfall of 7.0 % in reaching the EU-15 target. The use of Kyoto mechanisms, currently foreseen by six countries, would reduce this shortfall by an additional 1.1 %.
-  Savings from additional domestic policies and measures being planned by Member States would result in emission reductions of 7.7 %, almost sufficient to meet the EU-15 target but this would rely on over-delivery by some Member States. Combined with the use of Kyoto mechanisms the reduction would be 8.8 %, enough to achieve the EU-15 target.

Member States assessment

-  Emission trends until 2002 and projections for 2010 on the basis of existing domestic policies and measures indicate that two Member States (Sweden, United Kingdom) are on track to achieve their burden-sharing targets in 2010, while Germany was on track in 2002 and projects it will be close to its target with existing domestic policies and measures.
-  France was also on track in 2002, and projects it will reach its target in 2010 using additional domestic policies and measures currently being planned.
-  Finland, Greece and Ireland were not on track in 2002, but project that with additional domestic policies and measures they can meet their targets.
-  Luxembourg and the Netherlands project achieving their targets by 2010 by a combination of domestic policies and measures and use of the Kyoto mechanisms.
-  Austria and Belgium were not on track in 2002, but project achieving their targets by 2010 by a combination of additional domestic policies and measures and use of the Kyoto mechanisms.
-  The other four Member States (Denmark, Italy, Portugal and Spain) were not on track in 2002 and do not project to reach their targets with a combination of additional domestic policies and measures and use of the Kyoto mechanisms.

In 2002, the aggregate greenhouse gas emissions of EU-15 Member States were 2.9 % below base-year level with a decrease by 0.5 % from 2001 to 2002 (Figure 4.1). This latter decrease was mainly due to a relatively warm winter and low economic growth. After the lapse of more than half of period between 1990 and the first commitment period (2008–2012) under the Kyoto Protocol, the reduction by 2002 is little more than a third of that needed to reach the EU-15 greenhouse gas emission target of an 8 % reduction.

Greenhouse gas emission reductions from domestic policies and measures up to 2002 were not sufficient for many EU-15 Member States to be on a path towards achieving their targets. Greenhouse gas emissions in 2002 of most Member States are well above their hypothetical target paths from their base-year emissions to their targets in 2010 ⁽⁸⁾ (Figure 4.2).

The emission reductions in the early 1990s were largely a result of increasing efficiency in power and heating plants, the economic restructuring in the five new federal states in Germany, the liberalisation of the energy market and subsequent changes in the choice of fuel used in electricity production from oil and coal to gas in the United Kingdom and significant reductions in nitrous oxide emissions in the chemical industry in France, Germany and the United Kingdom (see Section 8).

CO₂ emissions from electricity production has increased since 1999 in EU-15. Only Denmark, Germany, Ireland, the United Kingdom and Belgium increased their share of renewable energy sources in electricity production and therefore helped to limit the emission increase in that sector (see Section 8). Greenhouse gas emissions from transport have increased every year since

1990 in most Member States. However transport emissions decreased in 2001 and 2002 in Germany and the United Kingdom.

For 2010, the aggregate projections for EU-15 of greenhouse gas emissions based on existing domestic policies and measures show a small fall to 1.0 % below base-year levels (Figure 4.1). This means that most of the current emission reduction of 2.9 % achieved by 2002 from the base-year level is projected to be lost by 2010. This development leads to a shortfall of 7.0 %, assuming only existing domestic policies and measures, in meeting the EU-15 Kyoto commitment. Compared to last year's analysis, the gap between the target and the projection based on existing domestic policies and measures for the EU-15 has narrowed slightly due to positive updates of projections from seven Member States.

Only two Member States — Sweden and the United Kingdom — project that only existing domestic policies and measures will be sufficient to meet or even exceed their burden-sharing targets (Figure 4.3). Germany is close to its burden-sharing target while all others are projected to be significantly above their commitments with their existing domestic policies and measures.

Under the Kyoto Protocol, Member States can use flexible mechanisms (Kyoto mechanisms: Joint Implementation (JI) and Clean Development Mechanism (CDM)) to help meet their targets. Several countries have intentions to use these instruments, but only a few are in an advanced stage of implementing Kyoto mechanisms (see Section 5). Contributions from the use of Kyoto mechanisms by Austria, Belgium, Denmark, Ireland, Luxembourg and the Netherlands ⁽⁹⁾ reduce the gap between projected emissions by 2010 and the target

⁽⁸⁾ The evaluation of greenhouse gas emissions in this section is mainly based on domestic policies and measures. Several countries, including Austria, Belgium, Denmark, Ireland, Luxembourg and the Netherlands, have put in place measures and financial commitments to make use of the Kyoto mechanisms and thus project they will achieve their burden-sharing targets.

⁽⁹⁾ These Member States have reported substantiated information on their intended use of Kyoto mechanisms in their National allocation plans under the EU emission trading by end of October 2004.

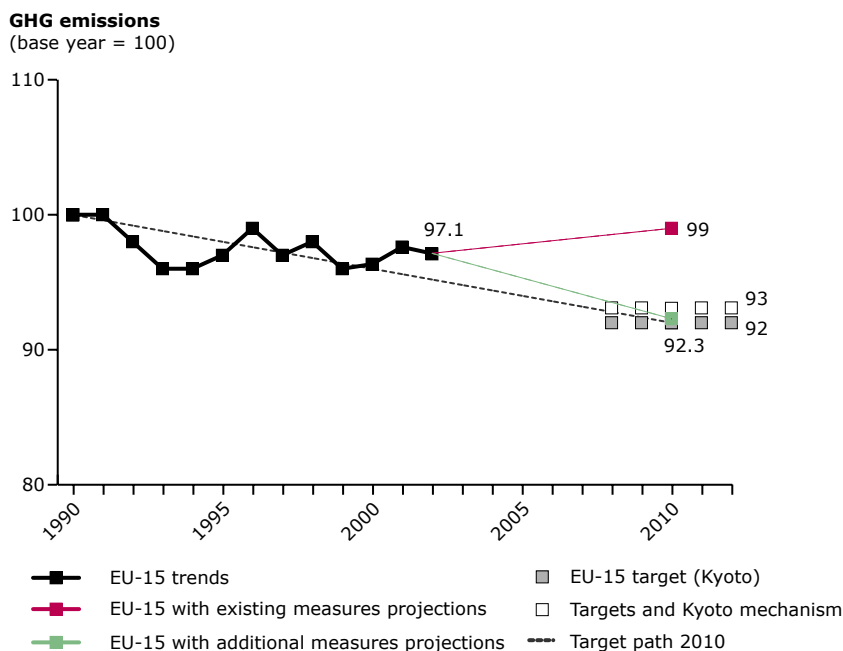
by an additional 1.1 %. This would reduce the above mentioned shortfall of EU-15 greenhouse gas projections in 2010 of 7 % with only existing domestic policies and measures to 6 %, including use of Kyoto mechanisms. Combining planned policies and measures with the use of Kyoto mechanisms the reduction would be 8.8 %, enough to achieve the EU-15 target.

Luxembourg and the Netherlands project to achieve their targets with a combination

of domestic policies and measures and emission allowances bought through the use of Kyoto mechanisms.

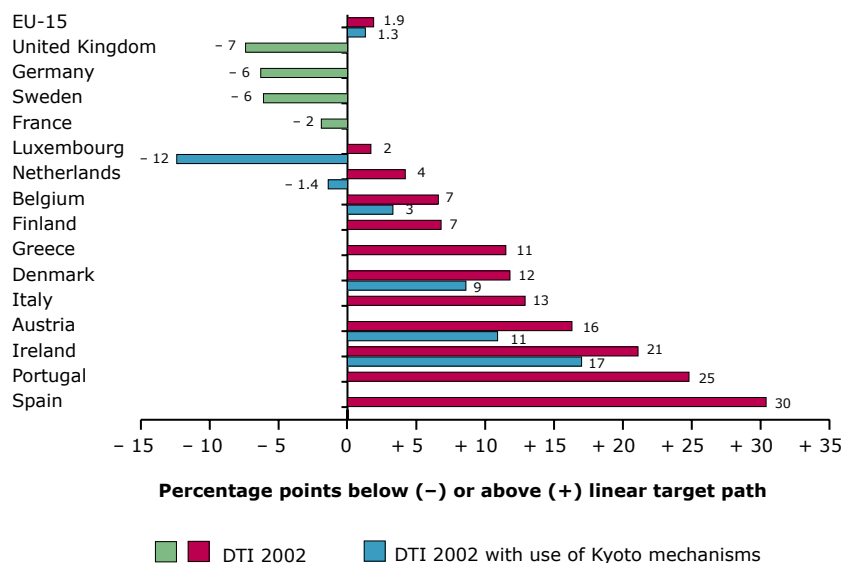
Additional domestic policies and measures planned by several Member States would almost close the gap to the EU-15 target, assuming over-delivery by several Member States (Finland, France, Greece, Ireland, Sweden and the United Kingdom) compared with their burden-sharing targets. This over-delivery cannot be taken for granted.

Figure 4.1 Actual and projected EU-15 greenhouse gas emissions compared with Kyoto target for 2008-12



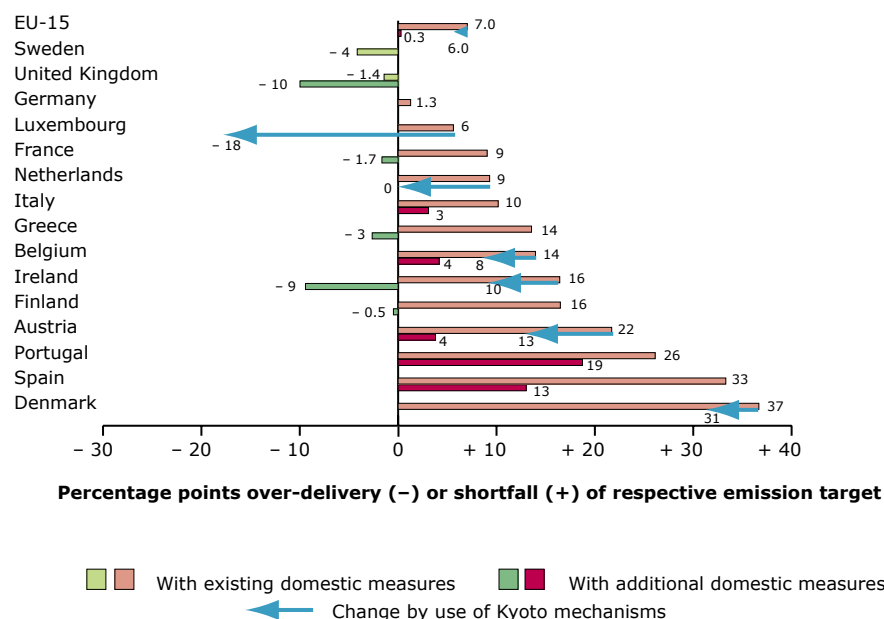
Note: The target path is used to analyse how close 2002 emissions were to a (hypothetical) linear path of emission reductions or allowed increases from the base-year to the Kyoto Protocol target, assuming domestic policies and measures are used. Data exclude emissions and removals from land-use change and forestry.

Figure 4.2 Distance-to-target (burden-sharing targets) for EU-15 Member States in 2002




Note: The distance-to-target indicator (DTI) measures the deviation of actual emissions in 2002 from a (hypothetical) linear path between base-year emissions and the burden-sharing target for 2010. A positive value suggests an under-achievement and a negative value an over-achievement by 2002. The DTI is used as an early indication of progress towards the Kyoto and Member States' burden-sharing targets. It assumes that the Member States meet their targets entirely on the basis of domestic policies and measures. Therefore, for those Member States in an advanced stage of implementing Kyoto mechanisms a second DTI estimate is presented, showing the additional effects of the use of these mechanisms in 2002.


Figure 4.3 Relative gap (over-delivery or shortfall) between greenhouse gas projections based on domestic policies and measures and 2010 targets and additional changes by the use of Kyoto mechanisms for EU-15 Member States



Note: All EU-15 Member States provided projections assuming existing domestic policies and measures. Several countries provided projections with additional domestic policies and measures. Only for those countries that provided quantitative information on their projected use of Kyoto mechanisms the effect of these mechanisms is presented (Austria, Belgium, Denmark, Ireland, Luxembourg and the Netherlands). For EU-15 the effect of use of Kyoto mechanisms is calculated based on information from these six countries. For more information see Section 5.

5 Use of Kyoto mechanisms

 The projected use of Kyoto mechanisms by Austria, Belgium, Denmark, Ireland, Luxembourg and the Netherlands to help achieve the EU-15 target amounts to 45.6 Mt CO₂-equiv. per year of the commitment period or about 1 % of the EU target of - 8 %.

 Six countries have allocated financial resources for using the Kyoto mechanisms (Austria, Belgium, Denmark, Finland, the Netherlands and Sweden) with a total amount of about EUR 1 300 million over the whole 5-year commitment period. The same countries and Spain have started to prepare legal and operational frameworks and bilateral agreements for using the Kyoto mechanisms.

Twelve Member States — Austria, Belgium, Denmark, Finland, Ireland, Italy, the Netherlands, Portugal, Slovenia, Spain, Sweden and the United Kingdom — have provided information on their intended use of the flexible mechanisms of the Kyoto Protocol (Kyoto mechanisms: Joint Implementation (JI) and Clean Development Mechanism (CDM)) to achieve their targets for the commitment period 2008–12⁽¹⁰⁾. JI enables industrialised countries to work together to meet their emission targets by means of project activities. The CDM enables an industrialised country to meet its target, while project activities must be hosted by a developing country.

The information available is limited so far⁽¹¹⁾. Only Austria, Denmark and the Netherlands provided substantial amounts of information on the intended use of Kyoto mechanisms in their national allocation plans submitted to the European Commission under the EU Emission trading scheme. Belgium, Ireland and Luxembourg gave limited information to the European Commission to substantiate their indications on the amounts of their intended use of Kyoto mechanisms. Based on information from these six Member States the projected use of Kyoto mechanisms for achieving

the burden-sharing target would amount to about 45.6 Mt CO₂-equiv. per year in the commitment period. This would represent about 13 % of the total EU-15 emission reduction required or almost one percentage point of the 8 % Kyoto target (Figure 4.3).

Sweden and the United Kingdom indicate that they will reach their burden-sharing targets without using the Kyoto mechanisms.

So far only Austria, Belgium, Denmark, Finland, the Netherlands and Sweden have allocated financial resources for the purchase of Kyoto units over the whole 5-year commitment period. The largest resources were as follows: Austria EUR 288 million, Belgium EUR 120 million, Denmark EUR 126 million and the Netherlands EUR 736 million. Finland allocated EUR 8.5 million and Sweden EUR 23 million. However, Finland and Sweden have not yet decided whether to use Kyoto mechanisms or not. The same six countries and Spain have started to implement legal and organisational arrangements or bilateral/multilateral agreements for JI/CDM programmes for the purchase of project based Kyoto units.

⁽¹⁰⁾ Kyoto Protocol Art. 6 and 12 in connection with Art. 3, para 10, 11, 12.

⁽¹¹⁾ Information is taken from a questionnaire sent out in 2002 and 2003 under the greenhouse gas monitoring mechanisms (280/2004/EC), 3rd National communications under UNFCCC and National allocation plans of the EU Emission trading scheme (2003/87/EC). During the phase of Commission decisions on national allocation plans information on the intended use of Kyoto mechanisms is changing quite rapidly. The assessment in this report is as of 30 October 2004.

6 Progress of new Member States in limiting greenhouse gas emissions



In 2002 total greenhouse gas emissions in the new Member States were about 33 % below the theoretical base-year level. Emission trends until 2002 and projections for 2010 on the basis of existing domestic policies and measures show that all new Member States except Slovenia are on track in 2002 to meet their Kyoto targets. Slovenia projects to meet its Kyoto target with additional policies and measures and by including CO₂ removals from land-use change and forestry.



Greenhouse gas emissions from transport decreased by 9 % between the base-year level and 1995 but increased afterwards and in 2002 exceeded base-year levels by 12 %.

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

Since 1990 total emissions have declined substantially in almost all new Member States, mainly due to the introduction of market economies and the consequent restructuring or closure of heavily polluting and energy-intensive industries (Figure 6.1). Emissions of almost all new Member States were well below their linear target paths meaning that they were on track to meet their Kyoto targets (Figure 6.2).

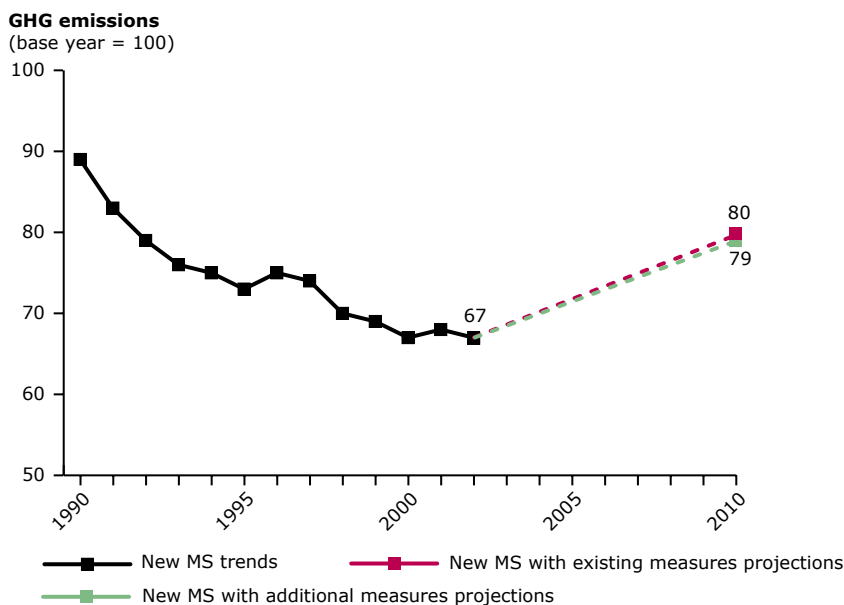
Emissions from transport increased in the second half of the 1990s, exceeded the 1990 level in 1999 and were increasing further in 2002. The new Member States seem to be repeating the experience of Greece, Ireland, Portugal and Spain in that, starting from relatively low transport levels, high economic growth leads to strong growth in transport and its greenhouse gas emissions.

Greenhouse gas emissions in seven new Member States are projected to meet or even over-comply with their Kyoto targets by 2010 with existing domestic policies and measures. Slovenia projects to meet its Kyoto target with additional policies and measures and by including carbon dioxide removals from land-use change and forestry (Figure 6.3).

Emissions aggregated from all new Member States are projected to increase after 2002 but will still in 2010 be 20 % below the base-year level. Only the Czech Republic, Estonia and Slovenia project decreasing emissions between 2002 and 2010. In Hungary and Poland greenhouse gas emissions for 2010 are projected to be significantly above 2002 emission levels (Figure 6.1).

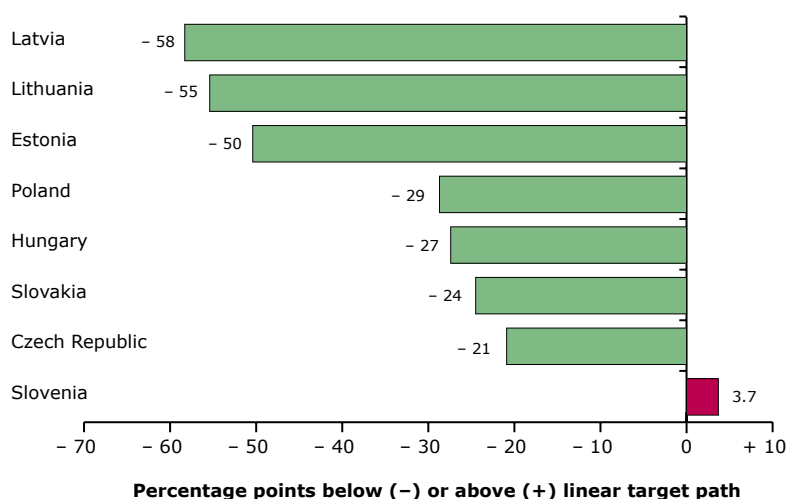
All countries have policies and measures in place to reduce greenhouse gas emissions and two countries have identified additional policies and measures.

Figure 6.1 Actual and projected greenhouse gas emissions aggregated for new Member States



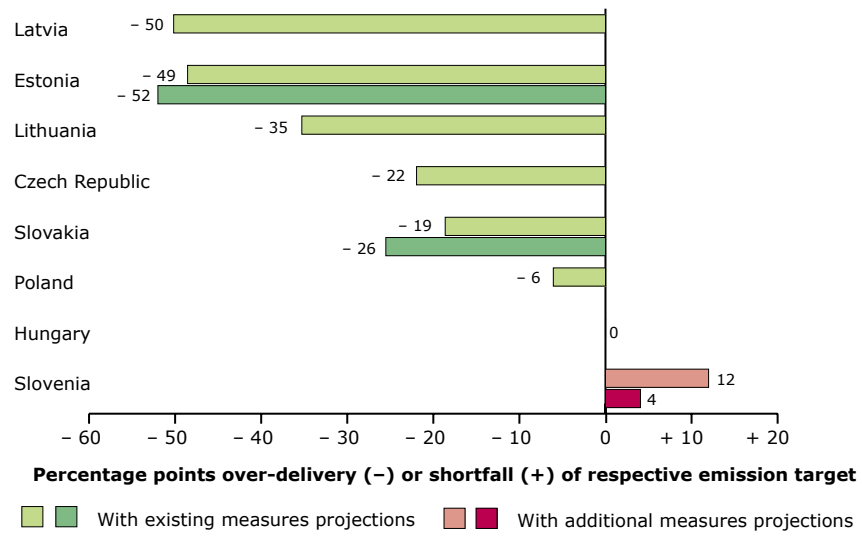
Note: Data exclude emissions and removals from land-use change and forestry. The figure refers to a theoretical 'aggregated new EU Member States base-year' as 100 in order to allow a consistent analysis of greenhouse gas emission trends and projections. This base-year has no legal status. Due to lack of data Cyprus and Malta are not included.

Figure 6.2 Distance-to-target (Kyoto Protocol) for new Member States countries in 2002



Note: The distance-to-target indicator (DTI) measures the deviation of actual emissions in 2002 from a (hypothetical) linear target path between 1990 and 2010. A positive value suggests an under-achievement by 2002 and a negative value an over-achievement in 2002. The DTI is used as an early indication of progress towards the Kyoto targets. It assumes that the countries meet their targets entirely on the basis of domestic policies and measures. Countries with base-years other than 1990 are Hungary (average 1985–87), Poland (1988) and Slovenia (1986). Due to lack of more recent data, for Poland the DTI refers to 2001.

Figure 6.3 Relative gap (over-delivery or shortfall) between projections and targets for 2010 for new Member States



Note: Projections for Poland include only the energy sector.

7 Progress of EU candidate countries and EEA countries in limiting greenhouse gas emissions



All EU candidate countries and Iceland were on track, based on both their 2002 emissions and their projected 2010 emissions, to meet or even over-achieve their Kyoto targets.



Liechtenstein and Norway project falling short of their Kyoto target with existing policies and measures. Information on possible additional measures was not available.

Analyses for Bulgaria, Croatia and Romania, candidates to join the EU, are presented in this section, as well as analyses for the countries Iceland, Liechtenstein and Norway, which are members of the European Environment Agency.

In 2002, greenhouse gas emissions of all candidate countries were well below their linear target paths meaning that they were on track to meet their Kyoto targets (Figure 7.1). Also Iceland was on track to achieve its emission limitation of + 10 %

under the Kyoto Protocol. Liechtenstein and Norway fall short of their Kyoto targets of - 8 % and + 1 % according to their distance to target emissions indicator in 2002.

For 2010, projections taking into account domestic policies and measures show that Bulgaria, Romania and Iceland will over-achieve their Kyoto targets while Liechtenstein and Norway will fall short with existing domestic policies and measures (Figure 7.2).

Figure 7.1 Distance to target (Kyoto Protocol) for candidate and other EEA countries in 2002

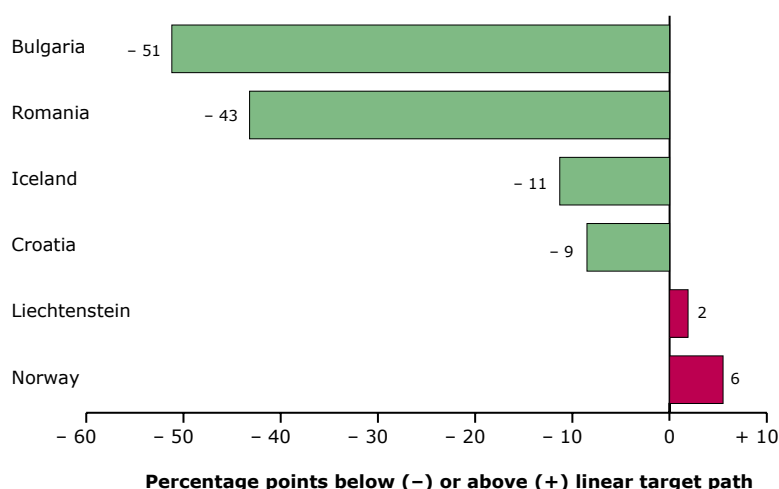
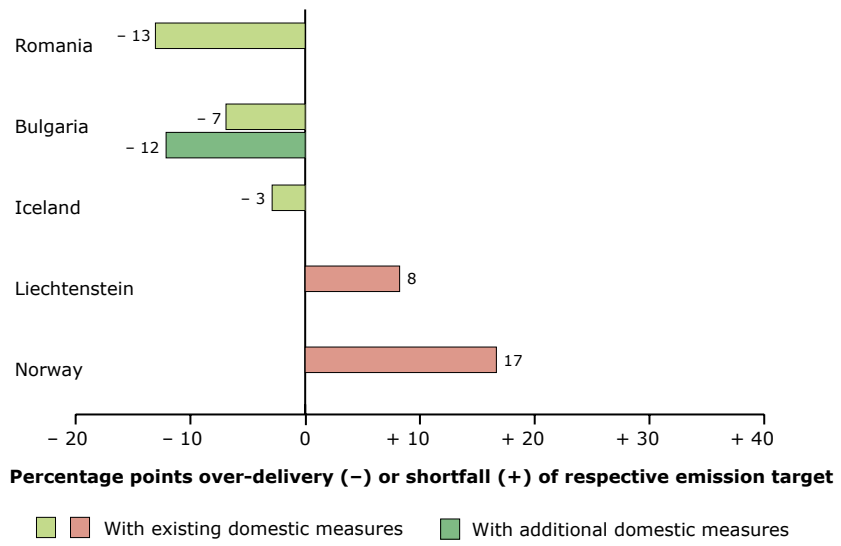


Figure 7.2 Relative gap (over-delivery or shortfall) between projections and targets for 2010 for candidate and other EEA countries



8 Effects of domestic policies and measures in the EU

Overview of policies and measures



The Commission has proposed additional common and coordinated policies and measures — some of which the EU has already adopted — which would result in additional emission reductions potentially sufficient to bridge the gap between projected emissions with existing domestic policies and measures and the EU target.

The European Commission has identified EU-wide common and coordinated policies and measures through the European Climate Change Programme (ECCP). The potential for greenhouse gas emission reduction of the ECCP as a whole has been estimated to be about 300 Mt CO₂-equivalents which is of a similar magnitude as the reduction needed to achieve the EU-15 Kyoto target. However, this early estimate is uncertain and the actual effects of policies and measures after their implementation must be evaluated.

A few policies and measures had already been adopted before the ECCP started. A second report on the progress of the ECCP was published in May 2003 and since then a number of the policies and measures have been adopted or are at an advanced stage of preparation. Several are also included in the Member States' reporting on policies and measures. In several Member States similar national policies and measures had already been in place and the EU-wide policies and measures enhance these. Furthermore many Member States have specific national policies and measures in place, which are not directly related to the EU-wide common and coordinated policies and measures. These national policies and measures are presented in detail in the separate EEA technical report on analysis of trends and projections.

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

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

- EU CO₂ emissions trading scheme (Directive 2003/87/EC, to start 1 January 2005);
- Directive linking the EU CO₂ emissions trading scheme with the Kyoto mechanisms (COM (2003) 403 final, agreed upon by Council and Parliament and to be adopted second half of 2004);
- Directive on the promotion of electricity from renewable energy sources (2001/77/EC, adopted by Council and Parliament in 2001, to be transposed by Member States by October 2003);
- Directive on Combined Heat and Power to promote high efficiency cogeneration (2004/8/EC, adopted by Council and Parliament in February 2004, to be transposed by Member States by February 2006);
- Directive on the Energy Performance of Buildings (2002/91/EC, adopted by Council and Parliament January 2003, to be transposed by Member States by January 2006);
- Directive restructuring the Community framework for the taxation of energy products and electricity (2003/96/EC, adopted the Council October 2003, to be transposed by Member States by 2005).

Transport:

- Reduction in the average CO₂ emissions of new passenger cars (agreements between the Commission and car manufacturers in EU, Japan and Korea; 1998/1999);
- Directive on use of biofuels in transport (2003/30/EC, adopted by Council and Parliament May 2003, to be transposed by Member States by 2005).

Agriculture:

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

Waste management:





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

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

The emissions trading directive is expected to create a market for CO₂ allowances from 2005 onwards and to ensure that emissions reductions can be made where it is most economically efficient. The linking of the EU emissions trading scheme to the Kyoto mechanisms is aimed at reducing costs for those companies participating and promoting the transfer of environmentally sound technology to countries with economies in transition (e.g. Russia) and to developing countries.

Based on information from Member States key national policies and measures are in the areas of: renewable energy, combined heat and power (CHP), energy efficient appliances and building standards, implementing the EU-wide agreement on CO₂ emissions from passenger cars and the landfill directive. The largest emission savings for EU-15 are projected to be from renewable energy policies, followed by the landfill directive. All EU-15 Member States apply energy taxes, but the scope of them is still limited. A prominent example is the ecological tax reform in Germany, aiming at incentives for energy saving, energy efficiency and promotion of renewable energy sources.

Sectoral emission trends and projections

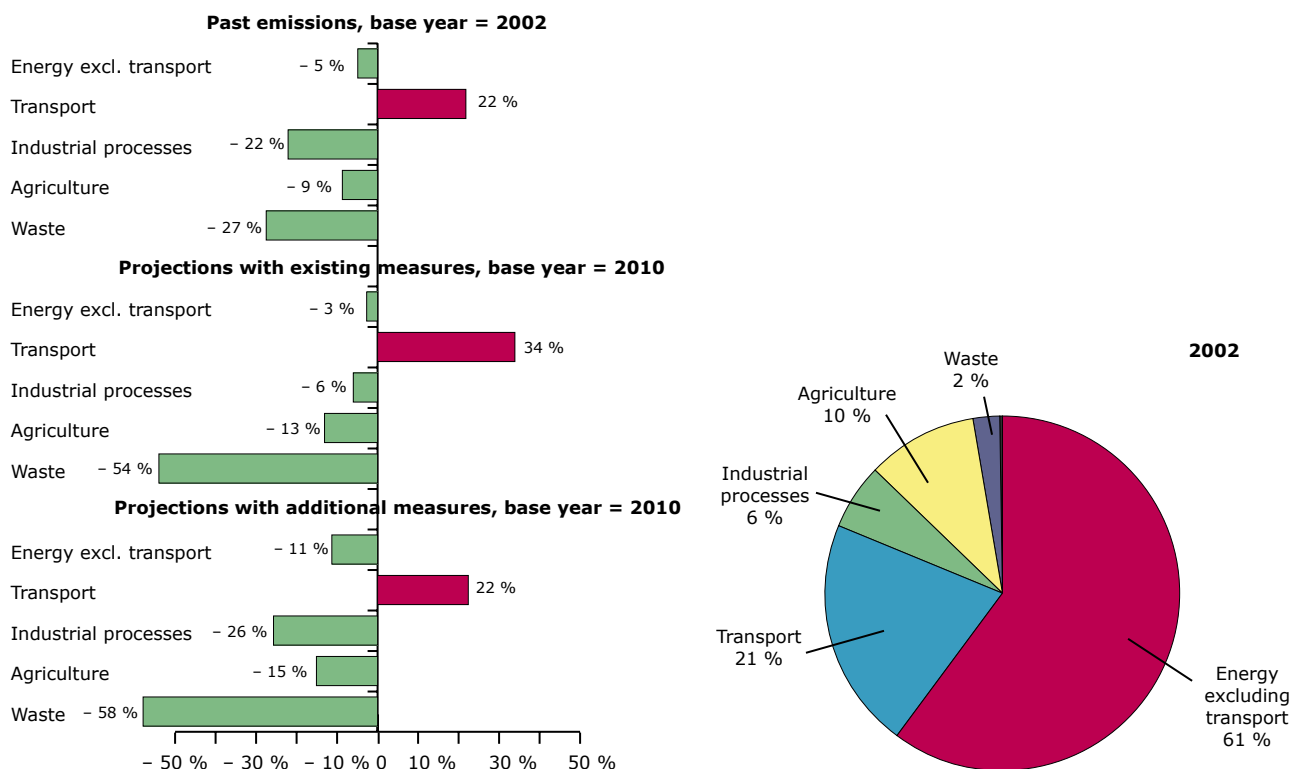
-  From 1990 to 2002, EU-15 greenhouse gas emissions decreased in most sectors (most in waste management, industrial processes, agriculture, least in energy supply and use, excluding transport).
-  EU-15 greenhouse gas emissions from transport increased by nearly 22 % in the same period and are projected to increase further to 34 % above 1990 levels by 2010 in the projection, with existing policies and measures.
-  EU-15 greenhouse gas emissions from energy supply and use excluding transport were 5 % below 1990 levels in 2002, but are projected to increase again to 3 % below 1990 levels by 2010 in the projection, with existing policies and measures.
-  With additional domestic policies and measures EU-15 greenhouse gas emissions in most sectors are projected to decline further by 2010 compared to 2002 levels, except for transport emissions which are expected at best to be stabilised.

The common and coordinated policies and measures of the EU and domestic policies and measures implemented by Member States have influence on the past and projected greenhouse gas emissions. For EU-15 the emission shares and changes for the main sectors are presented in Figure 8.1.






The most important gases and main emission sources are:

- *energy supply and use excluding transport*: CO₂ from fossil fuel combustion in electricity and heat production, refineries, manufacturing industries, households and services;
 - *transport*: CO₂ from fossil fuel combustion, but also N₂O from catalytic converters;
 - *industrial processes*: CO₂ from cement production, N₂O from chemical industry, HFCs from replacing CFCs in cooling appliances and from production of thermal insulation foams;
 - *agriculture*: CH₄ from enteric fermentation and manure management and N₂O from soils and manure management; and
 - *waste management*: CH₄ from waste disposal sites.

Figure 8.1 Changes in EU-15 greenhouse gas emissions by sector between the base-year and 2002 and projected for 1990–2010 with existing and additional domestic policies and measures and contribution of sectors in 2002



Energy supply and use excluding transport

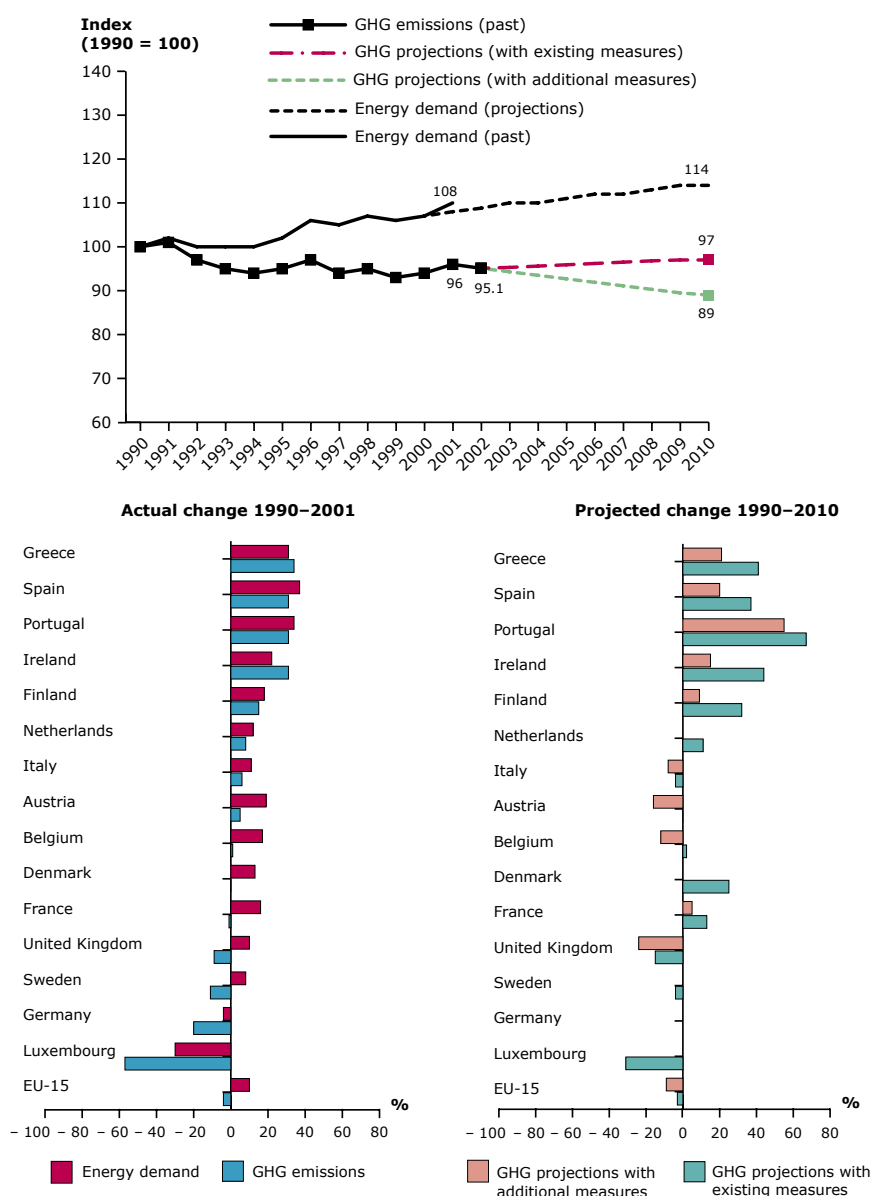
-  Between 1990 and 2002, CO₂ emissions from electricity and heat production increased by 3 % due to an increase in electricity production in thermal power plants by more than 20 %. In 2010, a further increase of electricity production up to 40 % is projected.
-  Relatively small increases in CO₂ emissions compared to the large increases in electricity production show a decoupling in all Member States.
-  Renewable energy targets for the EU-15 (22 % of gross electricity consumption) and Member States for 2010 are unlikely to be met on current trends. In order to meet the target large increases in renewable energy are therefore required.
-  In the EU, the current rate of increase in combined heat and power (CHP) is not sufficient to achieve the indicative (previous) EU target of an 18 % share of CHP in total electricity production by 2010.
-  CO₂ emissions from households increased by 1 % from 1990 to 2002, while the number of dwellings increased by 12 %, showing some decoupling. For 2010, the number of dwellings is projected to grow still further.

The main sectors covered by energy supply and use, excluding transport, are public electricity and heat production, refineries, manufacturing industries and households. The decline of greenhouse gas emissions in the early 1990s is primarily the result of reductions in Germany (efficiency improvements in electricity and heat production and restructuring of the industry) and the United Kingdom (fuel switch in electricity and heat production). In 2001 (the most recent year for which data on energy demand are available), greenhouse gas emissions decreased by 4 % relative to 1990 while energy demand increased by 8 % in the same period (Figure 8.2). The decrease of emissions between 2001 and 2002 by 0.9 % was mainly

due to warm outdoor temperatures in the winter season. Almost all Member States decoupled greenhouse gas emissions from energy consumption at least to a certain extent; only in Ireland and Greece did emissions grow more rapidly than energy consumption.

For 2010 the decoupling of emissions from energy demand during the 1990s is projected to weaken. Emissions in EU-15 are projected to increase by 1 % while energy demand increases by 4 % compared to 2001 with existing domestic policies and measures. Denmark, Finland, Greece, Ireland, Luxembourg, Portugal and Spain project higher greenhouse emissions than in 2001.

Figure 8.2 EU-15 greenhouse gas emissions from energy supply and use (excluding transport) compared with energy demand



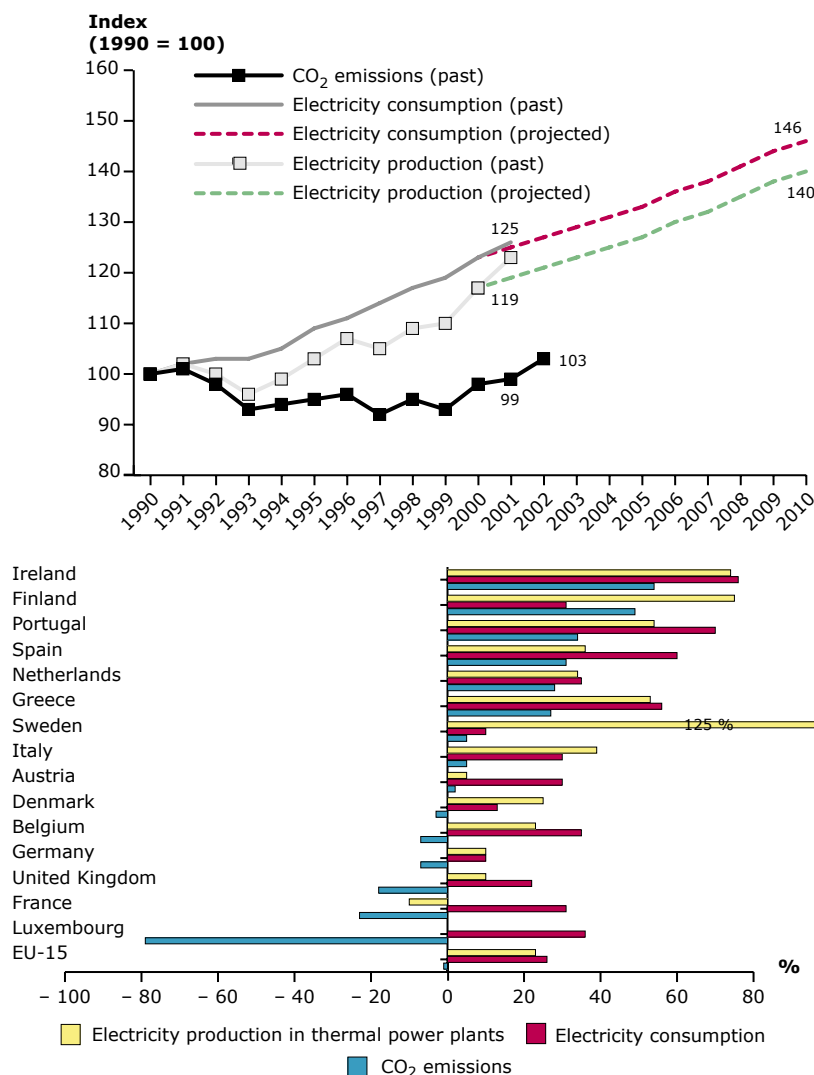
On the supply side *public electricity and heat production* is the most important source of greenhouse gas emissions, mainly CO₂. Increasing CO₂ emissions in recent years have more than offset an 8 % reduction achieved in the early 1990s and result in emissions 3 % above 1990 levels in 2002 (Figure 8.3). This trend is not projected to improve for 2010, as the electricity production in thermal power plants is projected to increase further.

The share of *renewable energy* (wind energy, solar energy, biomass and hydropower) in the EU's electricity consumption grew slightly from 13.4 % to 13.6 % between 1990 and 2002. In 2002, Austria and Sweden were by far the largest users of renewables for their national electricity production with shares of about 66 % and 47 %, respectively.

The EU-15 has experienced a drop in the share of electricity produced from renewables as the share in 2001 was 15.2 % compared to 13.6 % in 2002. This decrease is due to a reduction in generation from large hydropower resulting in the share of output declining from 11.3 % in 2001 to 9.0 % in 2002 for large hydropower, while the share of electricity generation from all other renewable energy sources increased. Only Belgium, Denmark, Germany, Ireland and the United Kingdom increased their share of total renewable energy sources in electricity production in 2002.

Increase in wind power (increasing by a factor of 46 in the EU during the period 1990–2002) was driven mostly by Denmark, Germany and Spain, with policies and measures including 'feed-in' arrangements

Figure 8.3 EU-15 CO₂ emissions from public electricity and heat production compared with electricity production in thermal power plants



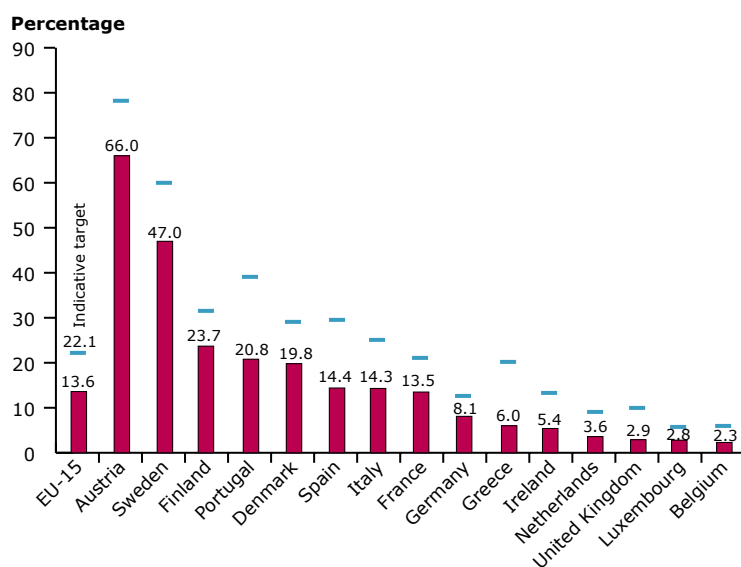
that guarantee a fixed favourable price for renewable electricity producers. Solar (photovoltaic) electricity increase was driven by Germany and Spain, mainly as a result of a combination of 'feed-in' arrangements and high subsidies. Biomass/waste resources have also expanded rapidly (almost 200 % increase between 1990 and 2002). The absolute change in electricity produced from biomass and waste was largest for Finland, Germany and the UK. In absolute values, the amount of electricity produced from wood/waste was highest in Finland, followed by Sweden. Both countries provided considerable research and development support and subsidies to the biomass power industry. In Sweden, the introduction of CO₂ and energy taxes from which biomass is exempt also helped the expansion of biomass power plants.

For 2010, the EU has proposed indicative targets for Member States and agreed to an overall indicative target of 22.1 % for the EU-15 for the contribution of renewable energy sources to gross electricity consumption (Figure 8.4). That target is unlikely to be met under current

trends because renewable electricity was dominated by large hydropower (66 % share of output in 2002, compared to biomass/waste 13 % and wind power 10 %) and its capacity is not expected to increase substantially because of concerns about its impact on the environment through the loss of land and resulting destruction of natural habitats and ecosystems. In order to meet the target large increases in other renewables are therefore required.

Additional policies and measures to support the further expansion of the use of renewables include the EU Directive on the use of biofuels in transport. Austria, Finland, France, Greece, Ireland, Italy and Portugal have reported additional domestic policies and measures. Those which have been assessed quantitatively provide a reduction potential of almost 30 Mt CO₂-equiv., additional to the about 80 Mt CO₂-equiv. assessed for existing policies and measures. Germany has recently amended its Renewable energy act ⁽¹²⁾ in order to achieve its 12.5 % target for the share of renewables in electricity consumption under the EU indicative target mentioned above.

Figure 8.4 Targets for 2010 and share of electricity production met by renewable energy sources in 2002



Note: National indicative targets shown are reference values that Member States agreed to take into account when setting their indicative targets by October 2002, according to the EU renewable electricity directive.

⁽¹²⁾ Decision of Federal Council of Germany, 9 July 2004, http://www.bmu.de/de/1024/js/sachthemen/erneuerbar/eeg_nov/

New national goals for the increased use of renewables have been laid down at the international conference Renewables 2004 in Bonn. The main outcome of the conference is an action list of commitments made by governments, including fourteen EU Member States, to promote the use of renewable energy sources ⁽¹³⁾.

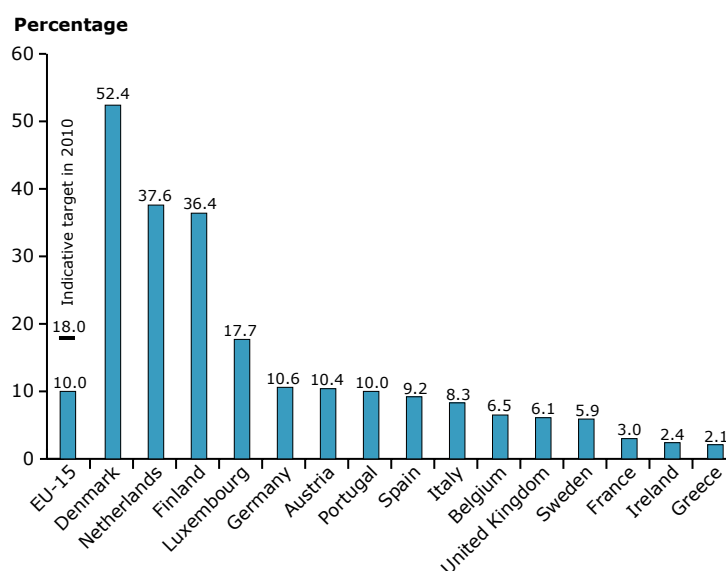
Combined heat and power (CHP) technology uses fossil fuels, biomass or waste to supply end-users with heat as well as electricity. CHP utilises over 85 % of the energy in the fuel rather than the average of about 35 to 45 % in current plants producing only electricity. In the EU-15, CHP increased its share in electricity production to about 10 % in 2000 (Figure 8.5). Tax incentives and subsidies stimulated investment in CHP. In recent years, however, many Member States have had problems with intensification of CHP use, in particular Germany, the Netherlands and the United Kingdom. Rising natural gas prices, falling electricity prices and uncertainty over the evolution of

the liberalisation of the electricity markets make companies reluctant to invest in CHP.

For 2010, the EU had set, before the adoption of the new CHP Directive, an indicative target of doubling electricity production from CHP from the 1994 level (from 9 % to 18 %). The current rate of increase is not sufficient to achieve this indicative EU target of 18 % by 2010. The new EU directive on CHP adopted in 2004 and the EU CO₂ Emission Trading Scheme, which will start working in 2005, will promote the use of CHP but have not set a target for the share of electricity from CHP.

Energy use in *manufacturing industries* consists of fossil fuel combustion for heat and electricity produced for own use. CO₂ emissions from fossil fuel combustion fell by 11 % between 1990 and 2002 towards a share of 14 % of total EU-15 greenhouse gas emissions. Emission reductions were already achieved in 1993, and were mainly due to efficiency improvements and structural

Figure 8.5 EU-15 target for 2010 and share of gross electricity production met from combined heat and power production in 2000



Note: The data include combined heat and power production from public electricity and heat producers as well as from autoproducers (at specific industrial sites). Eurostat has adopted a new methodology to calculate the share of CHP in gross electricity production designed to better identify electricity production from combined heat and power. This revision has resulted in different (lower) figures for some countries. The 18 % indicative target for 2010 was set by the European Commission in 1997 on the basis of a previous methodology and may therefore not be directly comparable with the new methodology. The directive on CHP (2004) does not contain an indicative target.







⁽¹³⁾ International Conference for Renewable Energies — renewables 2004, Bonn, June 2004, <http://www.renewables2004.de/>

change in Germany after reunification and the relatively small economic growth in the EU-15. Additionally a fuel shift from carbon intensive solid fuels to less carbon intensive gaseous fuels took place. Between 1990 and 2000, industrial output — the main driving force for emissions from the industry sector — in terms of gross value added increased by 13 % and is projected to increase further to 45 % above the 1990 level by 2010. Past developments show that all EU-15 Member States except Spain have decoupled their CO₂ emissions from manufacturing industries from gross value added.

CO₂ emissions from energy use in *households* accounted for 10 % of total EU-15 greenhouse gas emissions in 2002 and fluctuated mainly in line with outdoor

temperature in the winter season. The 2002 emissions were 1 % above 1990 levels in 2002. The energy demand is mainly driven by the number and size of dwellings, the standard of the building stock and the appliances for heating and warm water production. Over the period 1990–2002 the number of households increased by 12 %. The decoupling of emissions from growth in households seen until 2000 results from energy efficiency improvements due to thermal insulation, fuel switching to natural gas and an increase in district heating using biomass. For 2010, the number of dwellings is projected to grow by 23 % relative to 1990 levels.

Transport

-  Between 1990 and 2002, EU-15 greenhouse gas emissions from domestic transport (mainly road) increased by 22 %.
-  EU carbon dioxide emissions from international aviation and navigation (not addressed under the Kyoto Protocol) made up 6 % of total emissions in 2002, and increased by 44 % from 1990 levels.
-  EU-15 greenhouse gas emissions from domestic transport are projected to increase by 34 % from 1990 levels by 2010 even with existing domestic policies and measures ⁽¹⁴⁾.
-  Strong increases in freight transport by road occurred in the past and are projected to continue, if no additional policies and measures are taken.
-  The average carbon dioxide emissions of new passenger cars were reduced by about 11 % from 1995 to 2002, but the significant decrease in previous years has stopped in 2002. In order to meet the EU target additional efforts are necessary.
-  Past and projected increases in passenger transport by road will make it difficult to limit overall carbon dioxide emissions from passenger cars by 2010.

The transport sector gives rise to carbon dioxide emissions through fossil fuel combustion in road transportation, national civil aviation, railways, national navigation and other transportation. Transport caused the largest increase in greenhouse gas

emissions between 1990 and 2002 (+ 22 %), with road transport being by far the biggest transport emission source (93 % share). Emissions increased continuously due to high growth in both passenger and freight transport by road (by 18 % and 40 %, respectively).

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

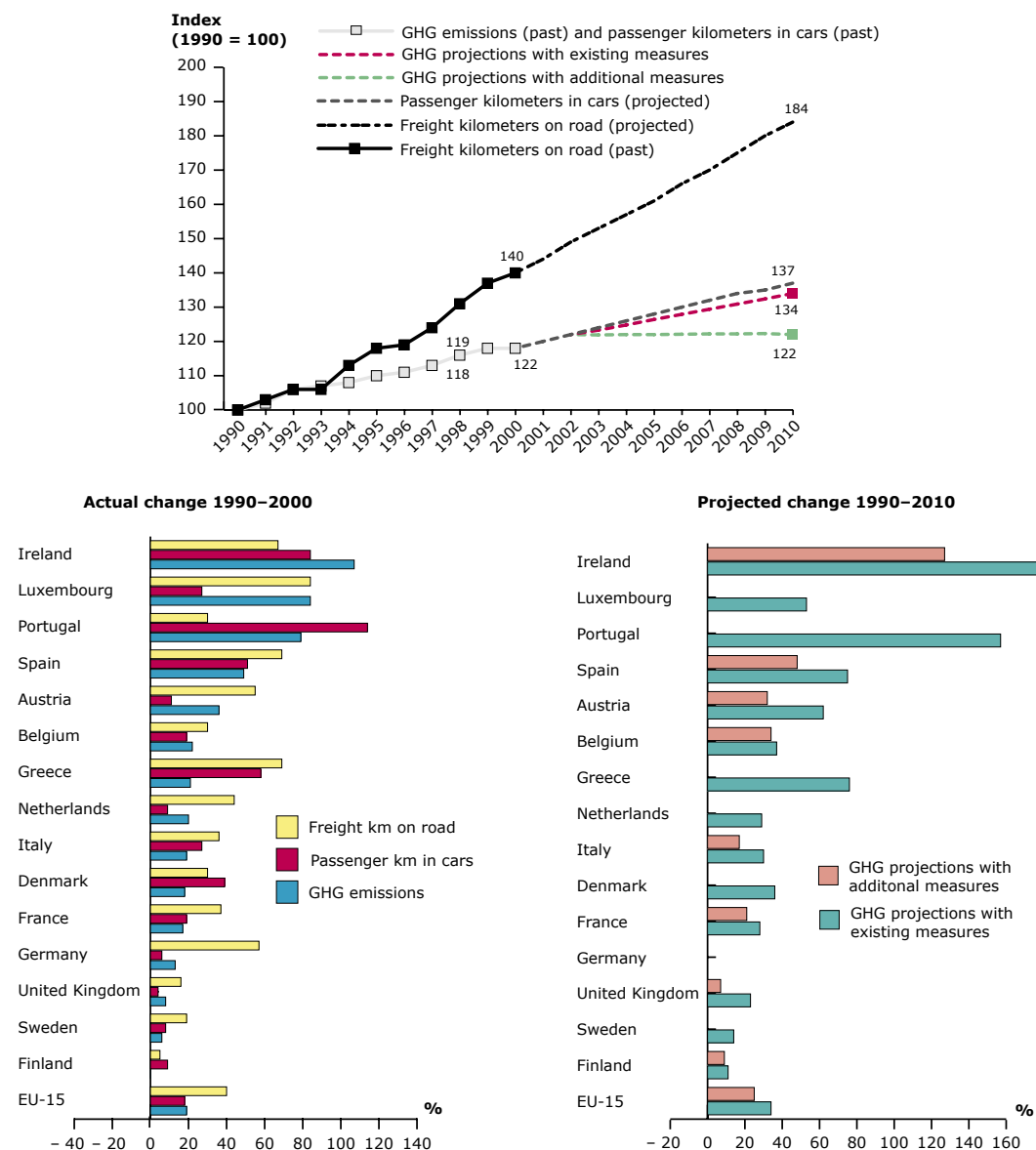
respectively, between 1990 and 2000) (Figure 8.6). Only Germany and the United Kingdom show decreasing emissions in recent years.

at 34 % and 84 %, respectively, compared to 1990. Additional policies and measures are projected to stabilise the growth of emissions at about 2002 levels.

For 2010, the current emissions increase is projected to continue up to 37 % above 1990 levels with existing domestic policies and measures (14). Passenger and freight transport on road is then expected to be

Greenhouse gas emissions from transport are mainly carbon dioxide emissions accounting for 20 % of total EU emissions. Carbon dioxide emissions from international aviation and navigation are growing

Figure 8.6 EU greenhouse gas emissions from transport compared with transport volumes (passenger transport by car and freight transport by road)



Note: Greenhouse gas emission projections for EU-15 are calculated on the basis of projections reported by 14 Member States. Sectoral emission projections are missing for Germany.

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

faster (a 44 % increase from 1990 to 2002 of emissions from international aviation), but these are currently not addressed in the Kyoto Protocol or in EU policies and measures.

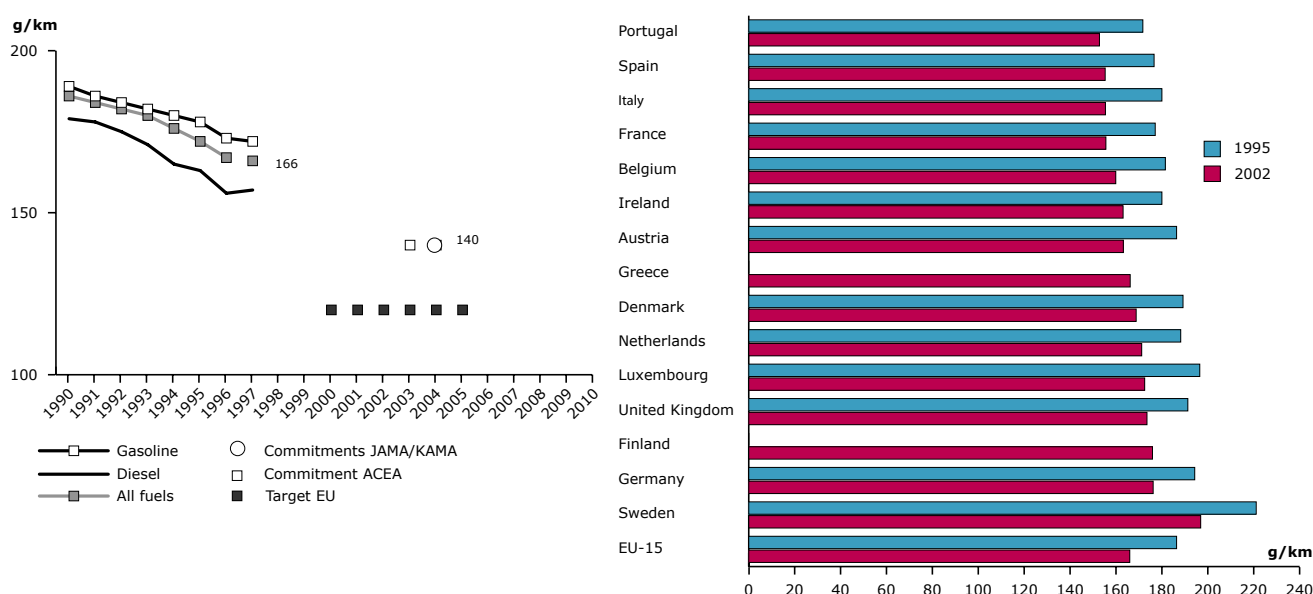
Nitrous oxide emissions from transport account for only a small part of total EU greenhouse gas emissions but they increased after the introduction of catalytic converters for petrol-driven cars, which reduce emissions of air pollutants but also emit nitrous oxide as an unintended side effect. The introduction of catalytic converters has helped to improve air quality and the importance of the unintended side effect is diminishing as catalytic converters have improved in recent years.

All reporting Member States project growing transport emissions, indicating that existing policies and measures are not sufficient to decouple emissions from activity growth. Austria, Ireland, Italy, Spain and the United Kingdom expect that additional policies and measures will significantly reduce the projected growth in transport emissions.

Emissions from transport are projected to increase up to 2010 due to continued




increases in both passenger and freight transport by road, despite policies and measures aimed at achieving the EU objective of shifting traffic from road to rail and inland waterways. A key EU policy is the agreement between the European Commission and the European, Japanese and Korean car industries to reduce average carbon dioxide emissions from new passenger cars, by setting a target for 2008 (European industries) and 2009 (Japanese and Korean industries). Carbon dioxide emissions were reduced between 1995 and 2001, but did not fall significantly in 2002 (Figure 8.7). The main reasons for the reductions since 1995 are fuel efficiency improvements, mainly in diesel, and a shift in fleet composition from petrol to diesel passenger cars, which are more energy efficient but emit more air pollutants than petrol-fuelled cars. In order to meet the EU's final target of 120 g CO₂/km, additional efforts are needed. Additionally, the continuous increase in passenger transport by road will make it difficult to limit its absolute emissions.

Figure 8.7 Average specific CO₂ emissions of new passenger cars per fuel type and targets



Note: Targets for the average carbon dioxide emissions of new passenger cars in 2008/2009 have been agreed between the European Commission and the European Automobile Manufacturers Association (ACEA) and similarly with Japanese (JAMA) and Korean (KAMA) automobile manufacturing industries.

Industry (non-energy related)

-  Between 1990 and 2002 EU-15 nitrous oxide emissions from chemical industries decreased by 58 %.
-  Between 1995 (base-year for fluorinated gases) and 2002, EU hydrofluorocarbon emissions, currently accounting for 1 % of total EU greenhouse gas emissions, increased by a factor of seven.
-  EU-15 greenhouse gas emissions from industrial processes (carbon dioxide, nitrous oxide and fluorinated gases) were reduced by 22 % from 1990 to 2002, are projected to rise again to 6 % below 1990 levels with existing domestic policies and measures but could fall to 26 % below 1990 levels with additional domestic measures ⁽¹⁵⁾.



The trends in emissions in the 1990s show a reduction in carbon dioxide emissions from cement production due to lower economic activity and increased imports in the early 1990s, and in nitrous oxide emissions through emission reduction measures in the adipic acid production industry in France, Germany and the United Kingdom. Very large increases in emissions of hydrofluorocarbons occurred as they replaced chlorofluorocarbons, which have been and will continue to be phased out because of the damage they cause to the ozone layer. In 2002, total greenhouse gas emissions from industrial processes (carbon dioxide, nitrous oxide and fluorinated gases) were 22 % below 1990 levels.

For 2010, EU-15 emissions from industrial processes are projected with existing

domestic policies and measures to achieve only a 6 % cut relative to 1990 levels ⁽¹⁵⁾. The significant abatement of nitrous oxide emissions in the manufacture of adipic acid in a few Member States is to a large extent offset by increases in emissions of fluorinated gases which are projected to almost double from the base-year to 2010, and expected increases in cement production of 11 %.

With additional domestic regulatory policies and measures, which a few Member States are planning, the actual decline of greenhouse gas emissions from industrial processes is projected to continue further to 26 % below 1990 levels ⁽¹⁵⁾.

Agriculture

-  Between 1990 and 2002, EU-15 greenhouse gas emissions from agriculture fell by 9 %. Nitrous oxide emissions from agricultural soils fell by 8 % and methane emissions from enteric fermentation (from cattle) by 9 %.
-  Based on existing domestic policies and measures, EU-15 greenhouse gas emissions from agriculture are projected to decrease to 13 % below the 1990 level in 2010 ⁽¹⁶⁾.

⁽¹⁵⁾ EU-15 greenhouse gas emission projections from industrial processes are calculated on basis of projections reported by ten Member States. Sectoral emission projections are missing for Germany, Ireland, Luxembourg, the Netherlands and Spain.

⁽¹⁶⁾ EU-15 greenhouse gas emission projections from agriculture are calculated on basis of projections reported by 12 Member States. Sectoral emission projections are missing for Germany, Luxembourg and Spain.

Between 1990 and 2002 nitrous oxide emissions from agricultural soils fell mainly because of a decrease in the use of nitrogen fertiliser and manure. This was a consequence of the reform of the EU's common agricultural policy (CAP) and the implementation of the nitrate directive, aimed at reducing water pollution. Methane emissions from enteric fermentation (by

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

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

Waste management



Between 1990 and 2002, EU methane emissions from landfills fell by 27 %.



EU greenhouse gas emissions from the waste sector are projected to be more than 50 % below 1990 levels in 2010 (with existing policies and measures) ⁽¹⁷⁾.

Since 1990 methane emissions from landfills have fallen. The decrease is mainly due to the (early) implementation of the landfill waste directive and similar national legislation intended to reduce the amount of untreated biodegradable waste disposed of in landfills and to ensure the installation of landfill gas recovery at all new sites.

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

⁽¹⁷⁾ EU-15 greenhouse gas emission projections from waste management are calculated on basis of projections reported by eleven Member States. Sectoral emission projections are missing for Germany, Luxembourg, the Netherlands and Spain.

9 Use of carbon sinks



The projected use of carbon sinks for achieving the EU Kyoto target is so far relatively small, with an estimated removal by forestry and agricultural activities of 23 and 5 Mt CO₂ per year respectively or in total about 0.7 % in relation to the EU target of – 8 %.





In addition to policies and measures targeting at sources of greenhouse gas emissions (see Section 8), Member States can make use of CO₂ removals by land-use change and forestry activities (carbon sinks). Nine Member States have provided quantitative information on their intended use of carbon sinks to achieve their burden-sharing targets (Austria, Denmark, Ireland, Italy, the Netherlands, Portugal, Slovenia, Spain and the United Kingdom). This limited information shows for EU-15 that so far there are plans to remove, by 2008–2012, around 23 million tonnes CO₂ per year through forestry activities⁽¹⁸⁾ and an additional almost 5 million tonnes CO₂ per year through agricultural activities⁽¹⁹⁾.

These removal estimates represent almost 8 % of the total EU-15 reduction required. This means that 0.7 % could be delivered by using carbon sinks to help closing the gap of 7.0 % between projected greenhouse gas emissions with existing domestic policies and measures and the EU-15-target (see Section 4). The European climate change programme estimates that potentially 93–103 million tonnes CO₂ could be sequestered through the enhancement of sink activities in the agricultural and forestry sectors.

⁽¹⁸⁾ Afforestation, reforestation and deforestation under Article 3.3 of the Kyoto Protocol.

⁽¹⁹⁾ Only forest management; no data available for other activities under Article 3.4 (cropland management, grazing land management and revegetation).

10 The reporting scheme

-  Under the EU monitoring mechanism all Member States provided greenhouse gas inventory data for 1990 to 2002 for all gases. Three Member States have gaps for a few years or gases (Greece, Ireland, Luxembourg).
-  Most new Member States provided greenhouse gas inventory data for 1990 to 2002. For many, gaps exist in reporting on fluorinated gases.
-  The quality of emission projections and policies and measures has improved for those Member States that reported this information under the Monitoring Mechanism or through National Communications under UNFCCC.
-  Further improvements in reporting of inventories, projections and policies and measures are still needed.

Reporting of greenhouse gas inventories has improved, but needs to be more complete and include all gases, especially for new Member States. Reporting on additional information required under the Kyoto Protocol, including information on emissions and removals from land-use change and forestry has taken a small step forward but is still only available for eleven Member States and in many cases not complete. The quality of reporting of emission projections and policies and

measures has improved, but further improvements are needed regarding completeness, comparability, consistency and transparency. Information on the use of flexible mechanisms under the Kyoto Protocol was available in substantiated detail for six Member States. It is expected that use of the new implementing provisions, adopted under the EU monitoring mechanism by end of 2004, will help to improve the quality of reporting.

European Environment Agency

**Greenhouse gas emission trends and projections in Europe 2004
Progress by the EU and its Member States towards achieving
their Kyoto Protocol targets**

Luxembourg: Office for Official Publications of the European Communities

2004 — 40 pp. — 21 x 29.7 cm

ISBN 92-9167-701-9

ISSN 1725-9177

Price (excluding VAT) in Luxembourg: EUR 15.00

