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Trends and projections in Europe 2013

Tracking progress towards Europe's climate and energy targets until 2020

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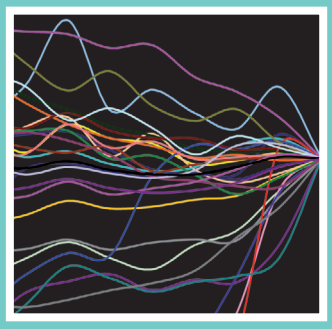

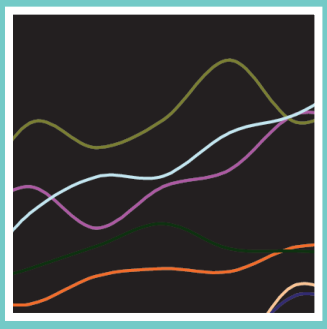

European Environment Agency

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Executive summary

This 2013 edition of the annual EEA 'Trends and projections' report aims to provide an assessment of the progress of the European Union (EU) and European countries towards achieving their climate mitigation and energy policy objectives. These targets include international commitments under the Kyoto Protocol (KP) and the EU's own commitment to reduce its greenhouse gas (GHG) emissions by 20 % during the 2013–2020 period.

The report also broadens its scope to include a new assessment of progress towards energy policy objectives adopted by the EU for 2020, which aim to increase the share of renewable energy sources (RES) to 20 % of the EU's gross final energy consumption and to increase energy efficiency by 20 %. Taken together, these three climate and energy targets for 2020 constitute the 20/20/20 objectives which form part of the 'Europe 2020 — Europe's growth strategy'.

The report supports and complements the annual report of the European Commission to the European Parliament and the Council on the progress of the EU and its Member States towards set targets, as required by Article 21 of the EU Monitoring Mechanism Regulation (MMR) (EU, 2013a).

The first section of the report, Part A, looks at progress towards Europe's objectives under the Kyoto Protocol's first commitment period (2008–2012).

With the recent release by the EEA and 18 EU Member States of approximated estimates of 2012 GHG emissions, complete data on annual GHG emissions during the KP's first commitment period 2008–2012 is available for the first time. These data allow for a more accurate assessment of progress than in previous years as well as a full analysis of the EU Emissions Trading Scheme (ETS) and non-EU ETS sectors for the 2008–2012 period ([1]).

The Kyoto targets in Europe for 2008–2012

The EU-15 has a common target to be achieved collectively under the 'burden-sharing agreement'. This agreement sets differentiated emission limitation and reduction targets for each EU-15 Member State. Eleven other Member States (all except Cyprus and Malta), Iceland, Liechtenstein, Norway and Switzerland have individual GHG reduction and limitation targets under the KP. Each of these Kyoto targets corresponds to an emission budget (corresponding to a quantity of 'Kyoto units') for the first commitment period (2008–2012) of the KP.

To achieve their Kyoto targets, countries must balance their emissions with the amount of Kyoto units they are holding. Such a balance can be achieved by limiting or reducing their domestic emissions and by increasing their emission budget through the contribution of Land Use, Land-Use Change and Forestry (LULUCF) activities, such as forest management, as well as the use of the KP's flexible mechanisms whereby they can acquire Kyoto units from other countries.

Creation of the EU ETS to achieve Kyoto targets

The EU ETS was introduced to help Member States achieve their Kyoto targets and to achieve cost-efficient emission reductions at the sources of pollution themselves (so-called 'point sources') across the EU. Through the allocation of allowances linked to Kyoto units for the trading period 2008–2012, each national Kyoto target was split into an emission budget for the ETS sectors and another emission budget for the sectors not covered by the ETS. These non-ETS sectors include, inter alia, road transport,

([1]) See EEA Technical report No 14/2013, *Approximated EU GHG inventory: proxy GHG estimates for 2012* (EEA, 2013a).

buildings, agriculture and waste. Member States were themselves able to set the proportion of the emission budgets allocated to the EU ETS and to the non-EU ETS sectors.

Participants in the EU ETS are legally bound to match their emissions with an equivalent number of allowances. Participants with a deficit of allowances are permitted to purchase from those with a surplus operating within the ETS or make use of, to a limited extent, international credits under the KP. To achieve their Kyoto targets, governments must therefore ensure that emissions in the non-ETS sectors are limited or reduced below their own non-ETS emission budget. They can also make use of international credits under the KP as long as this supplements domestic action.

In the EU-15, the overall EU ETS cap (i.e. the maximum amount of emissions allowed) for the period 2008–2012 was 9 % below 2005 levels while the non-ETS sectors had an emission budget of 4 % below their 2005 levels. In Austria, Denmark, Italy, Luxembourg, Spain and Liechtenstein, non-ETS reduction needs were higher than 15 % compared to 2005 non-ETS emissions levels. For all these countries, the non-ETS emission targets for 2008–2012 were relatively more demanding than in the ETS sectors.

The EU ETS in 2008–2012

The EU ETS covers CO_2 emissions from installations in the energy sector as well as most industrial sectors. This includes power stations and other combustion plants, oil refineries, etc. During this second trading period under the EU ETS (coinciding with the first commitment period of the KP), the scheme covered around 11 500 installations in 30 participating countries (27 EU Member States, Iceland, Liechtenstein and Norway). Taken together, these installations emitted around 1.9 billion tonnes CO_2 on average per year, which is equivalent to approximately 41 % of EU GHG emissions. CO_2 emissions from aviation have been included in the scheme since 2012.

Emissions in the period 2008–2012 were influenced by a number of factors such as changes in the fuel mix (electricity sector), observing a shift to gas, increased use of RES and reduced production due to the economic crisis (industrial sectors). The accelerated use of offset credits between 2008 and 2012 and the effects of the economic crisis (which resulted in lower emissions than initially anticipated) resulted in the accumulation of a large surplus of around 1.8 billion allowances.

EU ETS emissions were reduced below ETS caps in most Member States during the period 2008–2012, while success in achieving emission budgets in the non-ETS sectors appeared more difficult. The crisis had a greater impact on emission trends in the ETS sectors as these sectors are more strongly linked to economic activity. The recession, unforeseen at the time ETS caps were set for the second trading period, drove down emissions in the EU ETS more than in the other sectors.

Current progress towards 2008–2012 Kyoto targets — EU-15 on track

The EU-15 is on track towards its 8 % reduction target, compared to base-year levels under the KP. Total average emissions of the EU-15 in the 2008–2012 period have declined by 12.2 % compared to base-year levels. Overall, the combined performance of all EU-15 Member States is equivalent to an overachievement of approximately 236 Mt CO_2-equivalent per year (5.5 % of the EU-15's base-year emissions).

Non-ETS emissions in the EU-15 during the period from 2008 to 2012 were lower than the relevant emission budget by 95 Mt CO_2-equivalent per year, which represents an overachievement equivalent to 2.2 % of total EU-15 base-year emissions.

So-called 'carbon sink' activities (such as when carbon is absorbed by forest growth with any net benefit then being accounted for) are expected to contribute towards an additional emission reduction of 64 Mt CO_2-equivalent per year (1.5 % of EU-15 base-year emissions), based on data for the period 2008–2011.

The use of flexible mechanisms by nine EU-15 Member States is expected to represent an increase in the overall EU emission budget by 81 Mt CO_2-equivalent per year (1.9 % of EU-15 base-year emissions). Eight of these Member States have reported information on allocated financial resources, which represent a total amount of EUR 2 351 million for the whole five-year commitment period.

European countries overall on track towards their Kyoto targets

Almost all European countries with an individual GHG limitation or reduction target under the KP (26 EU Member States, Iceland, Liechtenstein, Norway and Switzerland) are on track towards

achieving their respective targets. This compares favourably to assessments in previous years.

Six EU-15 Member States (Finland, France, Germany, Greece, Sweden and the United Kingdom), all eleven of the EU-13 (i.e. those joining after 2004) Member States with a Kyoto target as well as Iceland and Norway are on track to achieve their target through domestic reductions only. When removals from carbon sink activities are also taken into account, three additional EU-15 Member States (Ireland, Portugal and Slovenia) are also on track towards their respective targets.

Austria, Liechtenstein, Luxembourg and Spain need to acquire a large quantity of Kyoto units to achieve compliance

To reach their Kyoto targets, nine Member States and Liechtenstein originally placed more emphasis on emission reductions in the non-ETS sectors (compared to 2005 levels), where domestic emission reductions are in general more costly to achieve compared to the ETS sectors.

By the end of the first commitment period, gaps between average 2008–2012 non-ETS emissions and their respective budgets remained in Austria, Belgium, Denmark, Liechtenstein, Italy, Luxembourg, the Netherlands, Spain and Switzerland (taking into account the effects of carbon sink activities). All these Member States intend to close the gap by making use of flexible mechanisms under the KP.

The relative gaps were the largest in Austria, Liechtenstein, Luxembourg and Spain. In order to achieve their targets, these countries intend to acquire significant quantities of Kyoto units at national level. These quantities represent between 13 % and 20 % of their respective base-year emissions (not accounting for the use of credits by ETS operators), compared to an EU-15 average of 1.9 %.

In Italy, the amount of credits which would be necessary to be on track represents only 1.1 % of base-year emissions. However, Italy remains the only EU-15 Member State using flexible mechanisms that has not provided information on the amount of credits it intends to purchase, nor on the financial resources allocated for this purpose.

* * *

The 20/20/20 objectives

The second part of the report, Part B, provides a new assessment of progress towards EU climate and energy policy objectives for 2020. The 20/20/20 triple objective, endorsed by the European Council in 2007 and implemented through the EU's 2009 climate and energy package and the 2012 Energy Efficiency Directive (EED) (EU, 2012), focuses on:

- a 20 % reduction of the EU's GHG emissions compared to 1990;
- a 20 % share of renewable energy in the EU's gross final energy consumption; and
- a 20 % increase of the EU's energy efficiency.

Progress towards 2020 GHG targets — EU close to reaching target ahead of schedule

Total GHG emissions of the EU-28 decreased by 1 % between 2011 and 2012, based on approximated GHG inventories for the year 2012 from 18 Member States and the EEA.

When considering the scope of the EU's climate and energy package, which includes emissions from international aviation, the reduction of 2012 EU emissions is about 18 % compared to 1990 levels. The EU is therefore very close to reaching its 20 % reduction target, eight years ahead of 2020.

Aggregated projections from Member States indicate that total EU-28 emissions will further decrease between 2012 and 2020. With the current set of national domestic measures in place, EU emissions are expected to reach a level in 2020 which is 21 % below 1990 levels (including emissions from international aviation). Implementing the additional measures at planning stage in Member States is expected to achieve a reduction of 24 % below 1990 levels in 2020.

The projected reductions are to be achieved both in the sectors covered by the EU ETS (mostly energy supply and industry), where an emission cap is determined at EU level, and in the other sectors covered by national emission targets under the Effort Sharing Decision (ESD) (EU, 2009a). Beyond the EU ETS itself, the largest reductions are expected via measures supporting renewable energy to ensure that requirements under the Renewable Energy Directive (RED) (EU, 2009b) are met as well as implementation of the Industrial Emissions

Directive (IED) (EU, 2010a), which covers large combustion plants.

The majority of Member States expect that their individual emission targets for the non-trading sectors under the ESD will be met through those policy measures already in place. Thirteen EU Member States, however, will need to implement additional measures, currently in the planning stage, or use flexibility mechanisms to achieve their targets by 2020. In particular, energy efficiency measures in the residential and services sectors will deliver key contributions towards further emission reductions by 2020.

For six Member States (Austria, Belgium, Finland, Ireland, Luxembourg and Spain), the latest projections indicate that even additional measures planned at national level will not be sufficient to bring 2020 emissions below their respective 2020 target under the ESD. These Member States must therefore increase their efforts to design, adopt and implement emission-reducing policies and measures, and will need to consider the use of flexibility mechanisms.

Progress towards 2020 renewable energy targets — EU on track

RES contributed 13 % of gross final energy consumption in the EU-28 in 2011. The EU has therefore met its 10.8 % indicative target for 2011–2012 and is therefore currently on track towards its target of 20 % of renewable energy consumption in 2020.

The RED and Member States' 2010 national renewable energy action plans (NREAPs) outline two sets of interim targets for the share of RES in gross final energy consumption (referred to as indicative and, respectively, expected trajectories) towards final 2020 RES targets. These include in particular average target values for the two-year period 2011 to 2012.

In 2011, fourteen Member States (Bulgaria, Germany, Estonia, Finland, Greece, Hungary, Italy, Lithuania, Luxembourg, Romania, Slovakia, Slovenia, Spain and Sweden), as well as Norway, had met or exceeded their indicative and expected 2011–2012 trajectories from both the RED and their NREAP. Estonia had already reached its legally binding target for 2020.

Seven Member States (Austria, Cyprus, the Czech Republic, Denmark, Ireland, Poland and Portugal) had reached or exceeded their average 2011–2012 indicative trajectory from the RED, but not the one from their NREAP. In six Member States (Belgium, France, Latvia, Malta, the Netherlands and the United Kingdom), the 2011 RES shares remained below both the RED and NREAP interim 2011–2012 trajectories.

EU Member States need to double their use of renewable energy by 2020 compared to the 2005–2011 period to reach the legally binding renewable energy target.

Progress towards 2020 energy efficiency objectives — only four EU Member States considered to be making good progress

All EU Member States except Croatia and Slovenia have set energy efficiency targets for 2020. The methodology behind these targets varies considerably.

EU Member States are moving towards the level of ambition required by the EED. Their collective primary energy consumption in 2020 is expected to be close to the level required by the EU political objective of 1 483 Mtoe but will remain insufficient to achieve the 20 % energy efficiency target.

The energy efficiency policy landscape has changed in many EU Member States in recent years but the different sectors are not addressed equally. The building sector received particular attention through the implementation of the Energy Performance of Buildings Directive (EPBD) (EU, 2010c). Measures addressing appliances and the transport sector are often limited to the minimum requirements as obliged by European legislation.

Four EU Member States (Bulgaria, Denmark, France and Germany) are making good progress in reducing energy consumption and primary energy intensity through well-balanced policy packages across relevant sectors. For most EU Member States, however, the current policies are not sufficiently developed or implemented across the relevant sectors. This is due to insufficient enforcement as well as impacts arising from the economic crisis.

Good overall progress across EU Member States towards the 20/20/20 targets but progress on energy efficiency remains slow

An assessment of EU Member States' progress at national level across the three policy areas shows that overall the EU is making relatively good progress towards its climate and energy targets set for 2020 (see Table ES.1).

Table ES.1 Progress towards 2020 climate and energy targets in the EU

Countries	EEA assessment of progress		
	National GHG targets under the ESD	National targets on RES share in gross final energy consumption	Improving energy efficiency
Austria	↘	→	→
Belgium	↘	↘	→
Bulgaria	→	↗	↗
Croatia	↗	n.a.	n.a.
Cyprus	↗	→	↘
Czech Republic	↗	→	→
Denmark	↗	→	↗
Estonia (a)	↘	↗	↘
Finland	↘	↗	→
France	↗	↘	↗
Germany	→	↗	↗
Greece	↗	↗	→
Hungary	↗	↗	→
Ireland	↘	→	→
Italy	→	↗	↘
Latvia	→	↘	→
Lithuania	→	↗	→
Luxembourg	↘	↗	↘
Malta	↗	↘	↘
Netherlands	→	↘	→
Poland	↗	→	→
Portugal	↗	→	→
Romania	↗	↗	↘
Slovakia	↗	↗	↘
Slovenia	→	↗	→
Spain	↘	↗	↘
Sweden	↗	↗	→
United Kingdom	↗	↘	→
EU	↗	↗	→

Note: 'National GHG targets under the ESD' (second column):
- ↗ 2012 non-ETS emissions were below the 2013 ESD targets and 2020 non-ETS emissions are projected to be lower than the 2020 ESD target with existing measures;
- → 2012 non-ETS emissions were below their 2013 ESD targets and 2020 non-ETS emissions are projected to be lower than the 2020 ESD target only if planned additional measures are implemented;
- ↘ 2012 non-ETS emissions were above the 2013 ESD targets or 2020 non-ETS emissions are projected to be higher than the 2020 ESD target even if the planned additional measures are implemented.

'National targets on RES share in gross final energy consumption' (third column):
- ↗ the 2011 RES share was above the RED and NREAP 2011–2012 trajectories;
- → the 2011 RES share was above the RED 2011–2012 trajectory, but below the NREAP 2011–2012 trajectory;
- ↘ the 2011 RES share was still below the RED and NREAP 2011–2012 trajectory values.

'Improving energy efficiency' (fourth column):
- ↗ a well-balanced policy package exists across relevant sectors and good progress is made in reducing energy consumption and primary energy intensity;
- → some progress is made in reducing energy consumption but further improvements are necessary to further develop policies or to better implement the existing ones;
- ↘ limited progress is made so far in improving energy efficiency and further efforts are needed to develop polices across the relevant sectors and to implement them.

(a) Estonia updated its energy statistics in September 2013. As this information was not received by the EEA in time for the publishing deadline of the report *Approximated EU GHG inventory: proxy GHG estimates for 2012* (EEA, 2013a), 2012 emissions in non-ETS sectors appear to have been overestimated. The EEA has therefore not been able to take these new data into account for the assessments in the present report.

See Chapters 7–9 for further details on the methodology used.

Source: EEA.

No EU Member State is on track towards meeting targets across all policy domains. Equally, no EU Member State underperforms in all three areas.

Fourteen EU Member States are overall performing positively across the three policy domains, four Member States have an overall neutral rating while nine Member States score negatively overall.

These results vary across Member States irrespective of their GDP levels, geographic location, etc. This indicates an effort to take into account individual Member State situations in the different targets set under the ESD and the RED. Room for improvement remains in all three policy domains, in particular regarding energy efficiency.

How can Europe respond to these challenges?

Energy efficiency improvements can deliver benefits across a large number of sectors, in particular through GHG emission reductions in both the EU ETS sectors and the non-ETS sectors (e.g. households and transport). Good progress towards meeting energy efficiency objectives requires that mechanisms for proper policy implementation and enforcement are in place.

Developing renewable energy results in GHG emissions savings. A first analysis by the EEA of gross avoided GHG emissions from RES deployment between 2005 and 2011 (soon to be published) shows that the development of renewable energy primarily affects emissions in the EU ETS sectors. Appropriate and long-term support instruments are essential for the development of RES. In the light of recent developments in cost reductions for renewable energy technologies, certain RES technologies could play a more important role by 2020 than anticipated when Member States drafted their NREAPs.

National policy frameworks are evolving across Europe. Debates on a national and European level are currently taking place about how to achieve the transition towards a low-carbon and energy-efficient future. Achieving optimal coherence between the various policy domains is crucial to maximise the co-benefits across sectors. This requires not only precise objectives, but also long term perspectives and equally long-term policy instruments.

1 Introduction

1.1 Objective

This 2013 edition of the annual EEA 'Trends and projections' report aims to provide an assessment of the progress of the EU and European countries towards achieving their climate mitigation and energy policy objectives. These targets include international commitments pursuant to the KP and the EU unilateral commitment to reduce its emissions by 20 % during the 2013–2020 period. This later commitment is part of the EU 2020 strategy which provides the following 20/20/20 objectives by 2020: to reduce by 20 % GHG emissions compared to 1990, to create 20 % of energy consumption from renewables and to increase energy efficiency by 20 %.

This 2013 edition of the annual EEA 'Trends and projections report' opens its scope to include a new assessment of progress towards energy policy objectives adopted by the EU. These objectives focus mainly on the development of renewable energy and improvements in energy efficiency, in coherence with the EU's policy framework for 2020 which integrates climate and energy concerns.

The report consists of two main parts, corresponding to two different time periods:

- Part A consists of a retrospective analysis of the period 2008–2012, which corresponds to the second trading period in the EU ETS and the first commitment period under the KP. This part begins with a retrospective analysis of the EU ETS for that period, given the central role of this policy instrument to cap EU emissions and contribute to the achievement of Kyoto targets in the EU. This retrospective is followed by an assessment of the progress achieved by European countries towards their national objectives under the KP and the EU burden-sharing agreement. Part A concludes with a comparative analysis of the emission reductions and efforts observed inside and outside of the EU ETS during the KP's first commitment period.

- Part B presents an analysis in the form of a triptych, assessing progress in the EU towards its triple '20/20/20' targets on GHG emission reductions, renewable energy and energy efficiency for 2020. With a view to provide relevant input to the assessment of progress towards the EU policy objectives for 2020 endorsed by EU leaders in 2007 (the 20/20/20 objectives) and later integrated into Europe's growth strategy for 2020, this new assessment aims to monitor how the EU and European countries address the challenges in the achievement of these different objectives, taken both separately and in an integrated manner.

The report also supports and complements the annual report of the European Commission to the European Parliament and the Council on the progress of the EU and its Member States towards set targets, as required by Article 21 of the MMR.

1.2 Scope

The report covers the geographical area represented by the 33 EEA member countries ([2]).

The assessment of progress towards Kyoto targets for the period 2008–2012 looks in detail at the current state of play for:

- the EU-15 grouping (as one entity comprising the 15 pre-2004 Member States), which has an overall 8 % reduction commitment under the KP;

([2]) EEA member countries are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

- the 26 EU Member States with a Kyoto target (all 28 ([3]) Member States except Cyprus and Malta);
- the four other EEA member countries with a Kyoto target (Iceland, Liechtenstein, Norway and Switzerland).

Cyprus, Malta and Turkey do not have a target under the KP and are therefore not covered by the assessment of progress towards Kyoto targets.

The assessment of progress towards climate and energy targets for 2020 focuses on the EU as a whole (EU-28) as well as its 28 individual Member States. The lack of data availability concerning the newest Member State Croatia has limited parts of the analysis to the EU-27.

1.3 Approach to tracking progress

1.3.1 2008–2012 Kyoto targets

The assessment of progress towards Kyoto (or burden-sharing) targets for the period 2008–2012 is based on historic data for GHG emissions and for carbon sink emissions and removals. It also takes into account information provided by Member States on their expected use of flexible mechanisms under the KP ([4]). This assessment provides an indication of where all countries stood at the end of 2012 with respect to their 2008–2012 targets. It does not aim to predict whether a country will finally achieve its targets or not, as data for 2012 is preliminary. It provides policymakers with a clear picture of where countries stand at the end of 2012. This may give an indication of whether the efforts to achieve Kyoto objectives by the end of 2012 were sufficient, and of whether countries need to modify their plans regarding the use of flexible mechanisms under the KP.

1.3.2 2020 targets

The assessment of progress towards climate and energy targets for 2020 is two-fold:

- **Current** progress is assessed on the basis of a comparison between the latest historic trends from available statistics and relevant target paths (e.g. annual GHG emission targets 2013–2020 under the ESD or indicative trajectories for the development of renewable energy).
- **Projected** progress towards 2020 targets is based on an assessment of projections or trajectories reported by Member States and a comparison with the relevant targets.

The main GHG targets applicable to Member States under international and EU commitments are presented in Table 1.1.

1.4 Data sources

The assessments presented in this report are for the most part based on information submitted by Member States themselves under the Monitoring Mechanism Decision (MMD) (EU, 2004a) ([5]). Under the MMD, Member States reported in 2013:

- GHG inventory reports, including annual GHG emission data for the period from 1990 to 2011, as well as average accounting of carbon removals due to Land Use, Land-Use Change and Forestry (LULUCF) activities for the whole first commitment period 2008–2012.
- GHG projection data until 2020 in two separate scenarios: 'with existing measures' (WEM), which considers the implementation of existing (already implemented) measures only, and 'with additional measures' (WAM), which considers in addition the implementation of additional (at planning stage) measures. These data were subject to a quality review performed by the EEA and its ETC/ACM. This checking process resulted in the adjustment (or recalibration) of the reported projection data for some Member States in order to improve its consistency with historic emission trends available from national GHG inventory reports. In particular, the EEA used for this purpose results from the 2013 update of the climate policy 'baseline with adopted measures' scenario from the European Commission (to be published in autumn 2013).
- Information on the average use of flexible mechanisms as planned by Member States to achieve their Kyoto targets for the first commitment period. Although information

([3]) Croatia joined the EU as the 28th Member State at 1 July 2013.
([4]) This allows countries to account for emission reductions occurring in other countries.
([5]) Replaced by the MMR as of 8 June 2013.

Table 1.1 Main national targets for GHG emissions

	Annex I Party to the Convention	Kyoto Protocol						Effort Sharing Decision target (2020)	Partici-pating in EU ETS
		Included in Annex B	Base year		Base-year level of total national emissions	Target under Burden Sharing Agreement (2012)	Individual target (2012)		
			CO_2, CH_4, N_2O	HFC, PFC, SF_6	Mt CO_2-eq.	In % of base year		% non-ETS emissions 2005	
EU-15	**x**				**4 265.5**	**– 8.0 %**			
Austria	x	x	1990	1990	79.0	– 13.0 %		– 16 %	x
Belgium	x	x	1990	1995	145.7	– 7.5 %		– 15 %	x
Germany	x	x	1990	1995	1 232.4	– 21.0 %		– 14 %	x
Denmark ([a])	x	x	1990	1995	69.3	– 21.0 %		– 20 %	x
Greece	x	x	1990	1995	107.0	25.0 %		– 4 %	x
Spain	x	x	1990	1995	289.8	15.0 %		– 10 %	x
Finland	x	x	1990	1995	71.0	0.0 %		– 16 %	x
France	x	x	1990	1990	563.9	0.0 %		– 14 %	x
Ireland	x	x	1990	1995	55.6	13.0 %		– 20 %	x
Italy	x	x	1990	1990	516.9	– 6.5 %		– 13 %	x
Luxembourg	x	x	1990	1995	13.2	– 28.0 %		– 20 %	x
Netherlands	x	x	1990	1995	213.0	– 6.0 %		– 16 %	x
Portugal	x	x	1990	1995	60.1	27.0 %		1 %	x
Sweden	x	x	1990	1995	72.2	4.0 %		– 17 %	x
United Kingdom ([a])	x	x	1990	1995	776.3	– 12.5 %		– 16 %	x
EU-13									
Bulgaria	x	x	1988	1995	132.6		– 8.0 %	20 %	Since 2007
Croatia	x	x	1990	1990	31.3		– 5.0 %		Since 2013
Cyprus ([b])								– 5 %	x
Czech Republic	x	x	1990	1995	194.2		– 8.0 %	9 %	x
Estonia	x	x	1990	1995	42.6		– 8.0 %	11 %	x
Hungary	x	x	1985–1987	1995	115.4		– 6.0 %	10 %	x
Lithuania	x	x	1990	1995	49.4		– 8.0 %	15 %	x
Latvia	x	x	1990	1995	25.9		– 8.0 %	17 %	x
Malta	x ([c])							5 %	x
Poland	x	x	1988	1995	563.4		– 6.0 %	14 %	x
Romania	x	x	1989	1989	278.2		– 8.0 %	19 %	Since 2007
Slovenia	x	x	1986	1995	20.4		– 8.0 %	4 %	x
Slovakia	x	x	1990	1990	72.1		– 8.0 %	13 %	x
Other EEA member countries									
Iceland	x	x	1990	1990	3.4		10.0 %		Since 2008
Liechtenstein	x	x	1990	1990	0.2		– 8.0 %		Since 2008
Norway	x	x	1990	1990	49.6		1.0 %		Since 2008
Switzerland	x	x	1990	1990	52.8		– 8.0 %		
Turkey	x	- ([d])							

Note: ([a]) The Faroe Islands and Greenland, in the case of Denmark, and the United Kingdom Overseas territories are not members of the EU and therefore not included here.

([b]) Cyprus ratified the UNFCCC in 1997 and the KP in 1999.

([c]) Malta ratified the UNFCCC in 1994 and became an Annex I Party to the Convention at the end of 2010. It ratified the KP in 2001.

([d]) Turkey was not Party to the UNFCCC when the KP was adopted. It ratified the KP in 2009.

Sources: http://unfccc.int/ghg_data/kp_data_unfccc/base_year_data/items/4354.php; EU, 2002; EC, 2009a.

on the actual transfers of Kyoto units through the KP's flexible mechanisms is available from national registries, it is currently impossible to distinguish between the use of such mechanisms by governments and by operators under the EU ETS. The planned use of credits for the whole first commitment period is actually assumed to contribute towards better estimates of final national emission budgets than the mere consideration of annual historic data does.

Additional data used for the GHG assessments include:

- early estimates of 2012 GHG emissions provided by Member States to the EEA on a voluntary basis. Where this information is not available, the report uses EEA's own estimates of approximated 2012 GHG inventories for Member States

- quantitative information on the EU ETS from the European Union Transaction Log (EUTL) ([6]) and made available by the European Commission.

The assessment of the projected progress of Member States towards their national 2020 targets set under the ESD as part of the 2009 EU Climate and Energy Package is based on projection data concerning emissions not covered by the EU ETS submitted by Member States on a voluntary basis. These targets concern GHG emissions such as emissions from transport, agriculture, waste or residential fuel combustion.

Overall, the data and analyses related to the achievement of GHG targets presented in this report are based on the sources shown in Table 1.2.

The assessment of progress towards RES objectives and targets was for the most part based on information reported by Member States to Eurostat under the Energy Statistics Regulation (EU, 2013f) and under the RED, and published by Eurostat via its energy statistics database (Eurostat, 2013c) and Eurostat's Short Assessment of Renewable Energy Sources (Eurostat, 2013d). Targets regarding the RES share in each Member State in 2020 were taken from Part A of Annex I of the RED; indicative trajectories for 2011–2018 were taken from Part B of Annex I of the RED. Expected national RES trajectories for 2011–2012 and until 2020 were derived from information submitted by EU Member States to the European Commission in 2010, in the frame of their NREAPs. Additional data published by EurObserv'ER (Eurobserv'er, 2013) were used for the breakdown of the RES share by energy technologies to supplement, where necessary, the data sourced from Eurostat (EU, 2013f).

The assessment of progress in the area of energy efficiency was based on:

- national progress reports submitted by EU Member States in 2013 in compliance with requirements laid out in Art 24 of the EED;

- national reports prepared within the framework of the EU project Energy Efficiency Watch and the final report assessing the quality of the second national energy efficiency action plans;

- national reports prepared within the framework of the ODYSSEE-MURE project by national experts.

Data on energy consumption and primary energy intensity was based on Eurostat data extracted on 17 August 2013.

1.5 Quality management of reported information

By June 2013, all the countries covered in this report had reported their GHG inventory for the period 1990–2011. The EU GHG inventory is based on the annual inventories of the EU Member States. The EU Member States and the EU implement Quality Assurance and Quality Control (QA/QC) procedures in their inventory compilation process in order to comply with Intergovernmental Panel on Climate Change (IPCC) good practice guidance.

All EU Member States but one (Croatia) submitted updated GHG projections under the MMD in 2013. The reported projections received in 2013 were reviewed and compiled by the ETC/ACM of the EEA. Based on the outcome of quality checks, projections reported by Member States were gap-filled if necessary or adjusted (i.e. recalibrated on the basis of more recent GHG inventory data) by the EEA, in agreement with the countries concerned.

([6]) The EUTL automatically checks, records, and authorises all transactions in the EU ETS.

Table 1.2 Data sources and related reporting requirements

Data	Reporting flow
• National GHG inventory 1990–2011 (Y-2) • KP LULUCF tables • Standard Electronic Format (SEF)	Annual submission from Annex 1 Parties under UNFCCC and KP
• 2012 GHG emissions	Early estimates of 2012 GHG emissions provided by EEA member countries ([a]) and the EEA's approximated 2012 GHG inventory
• GHG emissions projections 2010–2030 • Information on policies and measures to reduce GHG emissions • Information on the intended use of the Kyoto flexible mechanisms at government level for the KP's first commitment period	Biennial submission from Member States to the European Commission under the MMD ([b])
• GHG emission projections 2005–2030	European Commission's 2013 climate policy EU baseline with adopted measures scenario)
• Verified emissions under the ETS • National allocation plans (NAPs) and the subsequent European Commission decisions	European Union Transaction Log (EUTL); National ETS Registry of Switzerland (Switzerland, 2013a)

Note: ([a]) Preliminary emission inventory information for the year 2012 available from Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Poland, Slovenia, Spain, Sweden and the United Kingdom. Information on estimated emissions in 2012 have been publicly available for Norway and Switzerland.

([b]) EU, 2004a.

Part A — Progress towards Europe's 2008–2012 objectives
(The EU ETS, the Kyoto Protocol's first commitment period)

With the recent release by the EEA and 18 EU Member States of approximated estimates of 2012 GHG emissions, complete data on annual GHG emissions during the KP's first commitment period 2008–2012 are available for the first time. These data allow for a more accurate assessment of progress than in previous years as well as a full analysis of the EU ETS and non-ETS sectors for the 2008–2012 period.

Part A presents a retrospective analysis of the period 2008–2012, which corresponds to the second trading period in the EU ETS and the first commitment period under the KP.

A retrospective analysis of the EU ETS for the period 2008–2012 is presented in Chapter 2. The EU ETS occupies a central role in the EU's climate mitigation policy framework and is closely linked in its design to the achievement of emission reduction and limitation objectives under the KP's first commitment period.

Chapter 3 describes the EU and national targets to be achieved under the KP and the mechanics of how compliance is assessed and achieved under such commitments. It notes the importance of cap setting at national level under the EU ETS.

Chapter 4 examines the progress achieved by European countries towards their national objectives under the KP and the EU burden-sharing agreement.

The concluding chapter of Part A, Chapter 5, consists of a comparative analysis of the emission reductions and efforts observed inside and outside the EU ETS during the KP's first commitment period.

2 The EU ETS in 2008–2012

Key messages

1. The EU ETS is one of the key policy instruments implemented in the EU. It was introduced to help Member States achieve their Kyoto targets through cost-efficient emission reductions at point sources across the EU.

2. The second trading period of the ETS ran from 2008 to 2012 and coincided with the first commitment period under the KP. During this period, the scheme covered around 11 500 installations in 30 participating countries (27 EU Member States, Iceland, Liechtenstein and Norway). Taken together, these installations emitted around 1.9 billion tonnes CO_2 on average per year, which is equivalent to approximately 41 % of EU GHG emissions. CO_2 emissions from aviation have been included in the scheme since 2012.

3. Emission caps were set at a national level according to NAPs. Most allowances were allocated for free, especially to industrial sectors. Auctioning and sales of allowances also took place, equivalent to about 5 % of the total amount of EU allowances (EUAs) available during the second trading period.

4. Verified emissions in the period 2008–2012 were influenced by a number of factors such as changes in the fuel mix (electricity sector), observing a shift to gas and increased use of RES and reduced production due to the economic crisis (industrial sectors). The use of international offsets by operators increased during the trading period. For the full period, it was equivalent to about 10 % of total free allocation.

5. During the second trading period, the accelerated use of offset credits and the effects of the economic crisis (which resulted in lower emissions than initially anticipated) resulted in the accumulation of a large surplus of around 1.8 billion allowances.

6. EUA prices decreased from an initial EUR 25 down to EUR 7 at the end of the period.

2.1 Introduction

The European Union ETS is one of the key policy instruments implemented in the EU to achieve its climate policy objectives. It was established by the Emissions Trading Directive (EU, 2003a) and entered into force on 1 January 2005. The EU ETS was established in the context of international mitigation commitments under the KP and aimed at helping Member States reach their individual Kyoto targets in a cost effective manner. The very specific role of the EU ETS in the achievement of Kyoto targets — and in particular the importance of the allocation process — is explained in further detail in Section 3.3.

As part of the Climate and Energy package adopted in 2009, the Emissions Trading Directive was revised through the amended ETS Directive (EU, 2009c) in order to help the EU achieve its commitment to cut its GHG emissions by 20 % compared to 1990 levels by 2020 and contribute to emissions reductions after 2020.

The EU ETS is based on a 'cap and trade' approach whereby a total limit (cap) on CO_2 emissions is set

for the regulated installations. During the first and second trading period, most emission allowances were allocated for free by governments according to national allocation rules and a small amount of allowances was auctioned. By the end of April each year, an amount equivalent to the emissions from the previous year must be surrendered by installation operators. Operators holding more allowances than is required to cover their verified emissions may either sell allowances to other operators or bank them for use in future years.

The first trading period of the EU ETS covered the period 2005–2007 and was a pilot period of 'learning by doing'. It was followed by a second trading period (2008–2012) corresponding to the first commitment period under the KP. Since 2013, the EU ETS has entered its third trading period, which will run until 2020.

2.2 Coverage of the EU ETS

2.2.1 *Installations covered during the second trading period*

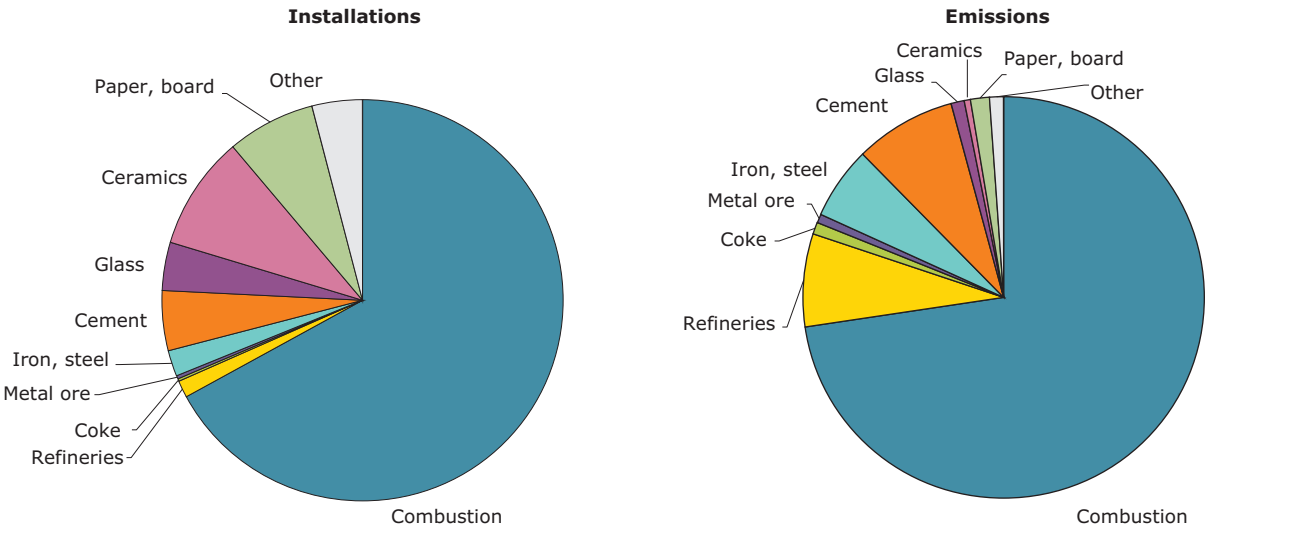
The EU ETS covers installations in the energy and most industrial sectors. Installations covered include power stations and other combustion plants, oil refineries, coke ovens, iron and steel plants and factories making cement, glass, lime, bricks, ceramics, pulp, paper and board. In 2012, aviation was integrated into the scheme (see Table 2.1).

Table 2.1 Description of the sectors covered by the EU ETS

Sector code	Sector description
1	Combustion installations
2	Mineral oil refineries
3	Coke ovens
4	Metal ore roasting or sintering installations
5	Production of pig iron or steel
6	Production of cement clinker or lime
7	Manufacture of glass including glass fibre
8	Manufacture of ceramic products by firing
9	Production of pulp, paper and board
10	Aviation
99	Other activity opted-in

In the second trading period approximately 11 500 stationary installations ([7]) in the 30 participating countries (27 EU Member States, Iceland, Liechtenstein and Norway) emitted on average 1.9 billion tonnes of CO_2-equivalent per year, which represents about 41 % of total GHG emissions in these countries. In the period from 2008 to 2012, the combustion sector accounted by far for both the largest share of installations (67 %) and emissions (73 %) (see Figure 2.1). While mineral

Figure 2.1 Installations and emissions in EU ETS sectors, 2008–2012



Note: Installations with verified emissions in the 2008–2012 period.

Source: EEA, 2013b; EU, 2013b.

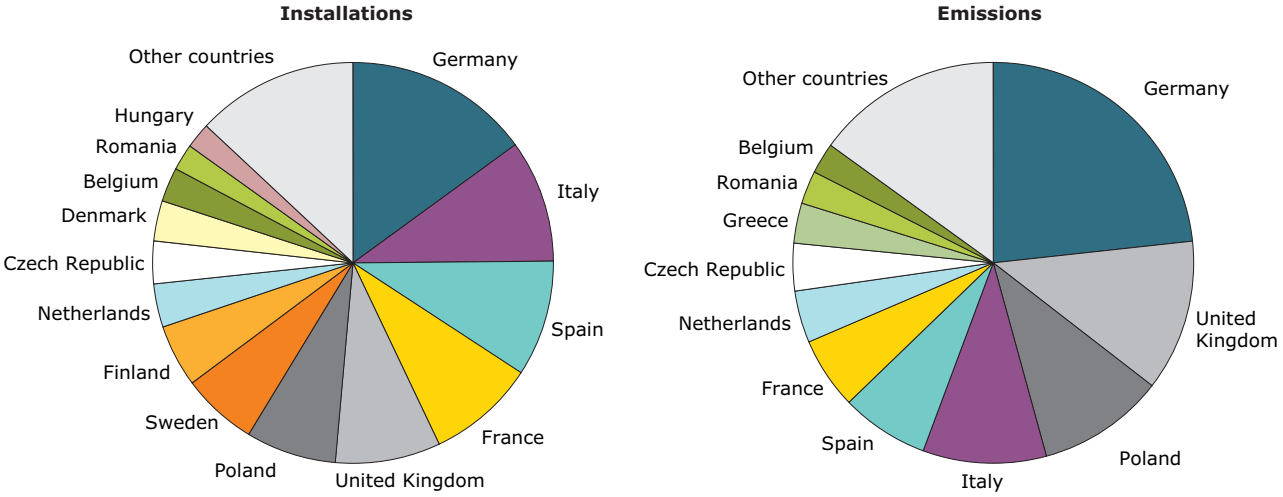
([7]) 11 500 refers to the number of stationary installations with verified emissions in 2008–2012.

oil refineries and installations in the iron and steel sector accounted for only a small share of the overall number of installations (1 % and 2 % respectively), their share of emissions was much larger (7 % and 6 %), which points at the relatively large and emissions-intensive installations in these sectors. Conversely, installations in the ceramics and pulp and paper sectors accounted for 9 % and 7 % of all installations respectively, while they only emitted 1 % and 2 % of emissions in the 2008–2012 period.

In the 30 ETS-participating countries, Germany accounts for the largest share of installations, followed by Italy, Spain, France, the United Kingdom, Poland and Sweden (see Figure 2.2). Comparing the share of installations with the share of verified emissions, certain characteristics of the respective economies can be observed: relatively emission-intensive installations in Germany, the United Kingdom, Poland and Greece (where the share of emissions is larger than the share of installations); and comparatively lower emissions in France and the Nordic countries (where the reverse is true).

The EU ETS covers a wide range of installations from different sectors and sizes. Some installations covered only emit a few tonnes of CO_2 per year, while the most emission-intensive installations emit more than 20 mega (million) tonnes (Mt) CO_2 per year (which represents more than the total annual ETS emissions from Norway or Ireland). Figure 2.3 shows a Lorenz

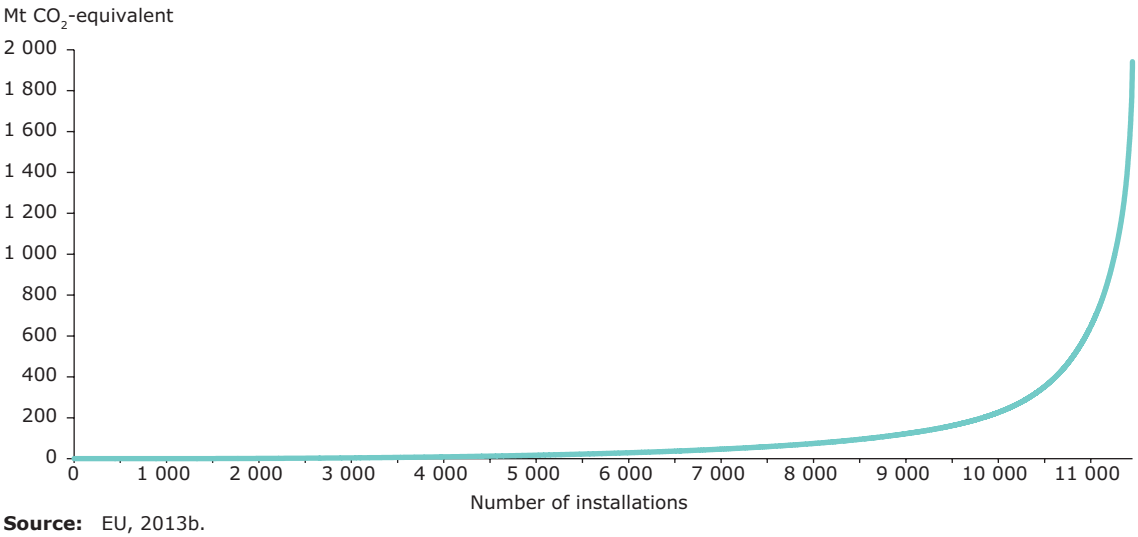
Figure 2.2 Installations and emissions in EU ETS countries, 2008–2012



Note: Installations with verified emissions in the 2008–2012 period.

Source: EEA, 2013b; EU, 2013b.

Figure 2.3 Cumulated verified emissions, annual average 2008–2012



Source: EU, 2013b.

curve of cumulated average verified emissions in 2008–2012 where installations are displayed on the horizontal axis and sorted according to their average emission levels. It shows that 15 % of installations were responsible for 90 % of emissions during the second trading period and that 1 % of all installations emitted nearly 40 % of the total emissions in the EU ETS during the 2008–2012 period.

2.2.2 *Inclusion of aviation*

Since 1 January 2012 aviation has been part of the EU ETS (EU, 2009c). In principle the EU ETS should cover all flights arriving at and departing from airports in all EU Member States, Norway, Iceland and Liechtenstein. However, in 2012 only flights within the EU Member States, Norway, Iceland, Liechtenstein and between closely related territories were covered (EU, 2013c). This 'stopping the clock' decision was taken in order to facilitate negotiation of a global agreement to address aviation emissions. This was due to have been addressed at the 38th Assembly of the International Civil Aviation Organisation (ICAO) meeting in September and October 2013. The exemption of flights to or from non-EU and non-EFTA countries from the EU ETS is limited to the compliance in 2012.

The cap on aviation is based on average historic emissions in this sector between 2004 and 2006 (221.4 million t CO_2 for all participating countries (EC, 2011a)). The cap for 2013–2020 equals 95 % of the baseline emissions (EU, 2008). It thus expands the total ETS cap by approximately 10 %. The predominant method of distribution will be free allocation to aircraft operators (82 % in 2013–2020), 15 % will be auctioned and the remaining 3 % are allocated to the special reserve for new entrants and fast growing airlines (EU, 2008). Free allocation is based on benchmarks which were calculated by dividing the total number of allowances to be allocated for free by the sum of the tonne-kilometre data reported by aircraft operators in their applications for free allocation (EC, 2011b).

Aircraft operators receive specific allowances, called EU aviation allowances (EUAAs). Whereas aircraft operators may use aviation allowances as well as common EUAs from the stationary sectors, stationary installations are not allowed to use aviation allowances for compliance. In addition, a certain quantity of international credits may be used by aircraft operators: up to 15 % of their verified emissions in 2012. From 2013 onwards 'each aircraft operator shall be entitled to use international credits up to a maximum of 1.5 % of its verified emissions during the period from 2013 to 2020, without prejudice to any residual entitlement from 2012' (EC, 2009c).

2.2.3 *Changes in the scope of stationary installations covered by the EU ETS*

Scope correction of ETS-related numbers
The number of countries and installations participating in the EU ETS has increased steadily since its inception. This has to be taken into account when comparing numbers across years. To be able to assess the developments since the introduction of the EU ETS, numbers on, for example, total emissions have to be corrected for the change in coverage. This process is called 'scope correction'. Scope correction means that for those years, where less installations and emissions were covered, emissions are added as if the installations already participated then. To cite an example: Romania and Bulgaria entered the EU ETS in 2007. For the years prior to their entry (2005 and 2006) estimated emissions for those two countries have to be added to the total number. If one is looking at total ETS numbers, it would otherwise appear as if emissions had increased significantly between 2006 and 2007, although this increase is mainly caused by additional installations and scope-corrected emissions have stayed relatively flat.

In order to make aggregate numbers comparable across years and trading periods, a scope correction per country was estimated by the EEA and is documented in Table 2.2. In the following the extension of the scope of the EU ETS to date is summarised and the data sources and assumptions underlying the estimated scope correction discussed.

Participating countries
The EU ETS started with the EU-25 in 2005, but the number of countries covered has since increased to 31. Bulgaria and Romania entered the EU ETS in 2007. Norway, Iceland and Liechtenstein joined in 2008 and stationary installations from Iceland will participate in the EU ETS from 2013 onwards (EEA Joint Committee, 2007). Croatia joined the EU on 1 July 2013 and has been participating in the EU ETS since 1 January 2013.

The scope correction concerning newly participating countries is based on the following assumptions:

- Bulgaria, Romania: ETS emissions for 2005 and 2006 for Bulgaria and Romania were gap-filled

by assuming that emissions in those years were equal to emissions in 2007 ([8]).

- Norway, Liechtenstein: Data for ETS emissions in 2005 for Norway (17.82 Mt CO_2) is available from the Norwegian NAP (Norway, 2008). Data for ETS emissions in 2005 for Liechtenstein are available from the NAP of Liechtenstein (0.018 Mt CO_2) (Liechtenstein, 2008). As no information was available on the trend of ETS emissions for Norway and Liechtenstein in 2006 and 2007, ETS emissions in 2006 and 2007 were assumed to be equal to 2005 levels for the purpose of the scope correction.

Participating installations, sectors and gases
Fewer installations participated in the first trading period of the EU ETS than in the second trading period. There are different reasons for this:

- Some countries (United Kingdom, Netherlands and Belgium) used the limited possibility to temporarily exclude (opt-out) certain installations during the first trading period of the EU ETS.

- For the second trading period, the definition of combustion installations was clarified by the European Commission (EC, 2005a). This resulted in the inclusion of additional installations in the EU ETS from 2008 onwards in several Member States which had applied a more restrictive definition from 2005 to 2007.

Since 2012 aviation is included in the scheme. Additional sectors and gases covered from 2013 onwards include (EU, 2009c):

- Capture, transport and geological storage of GHG emissions;

- CO_2 emissions from the petrochemicals, ammonia and aluminium production;

- Nitrous oxide emissions (N_2O) from the production of nitric, adipic and glyoxylic acid;

- Perfluorcarbon (PFC) emissions from aluminium production.

Furthermore, from 2013 onwards some countries used the possibility included in Article 27 of the Emissions Trading Directive to exclude small installations (emitting less than 25 000 tonnes CO_2 per year) from the scheme.

The scope corrections made by the EEA to make data comparable across years and relating to additional sectors and gases are based on the following data sources and assumptions:

- Data about the extent of the scope correction necessary for the year 2005 is available from the process leading to the determination of annual emission allocations (AEAs) under the ESD (EC, 2013a). For the purposes of scope correction, it was assumed that the scope change for the years 2006 and 2007 is equal to the year 2005. For the purposes of this report, it was assumed that the scope correction for the years 2006 and 2007 is equal to the year 2005. In Spain and the United Kingdom, the scope correction for 2007 is lower than for 2005 and 2006 because the opt-out for installations entered the scheme in 2007 (DECC, 2009).

- On the other hand certain installations were covered by the scheme in the first period but not in the second period (e.g. due to de-minimis rules or temporary opt-ins). The corresponding emissions had to be subtracted.

- For the second period, corrections are included for (mainly N_2O emitting) installations that have been opted into the EU ETS in the second trading period by three Member States (Austria, Latvia and the Netherlands). The values are also based on data for the years 2008–2010, used for the setting of absolute targets under the ESD. For 2011 and 2012 data are assumed to be equal to 2010. The scope correction is both applied to verified emissions and free allocation.

For the sectoral disaggregation used in Sections 2.3 and 2.4 the following methodology was used:

- For Bulgaria and Romania it was assumed that the sectoral disaggregation in 2005 and 2006 was equal to the one in 2007.

- For Norway and Liechtenstein it was assumed that the sectoral disaggregation in 2005 to 2007 matched the one of 2008.

- It was further assumed that the change in scope from all other countries can be assigned to the sector of combustion installations.

No scope correction was carried out for aviation.

([8]) This approach has been used also by the Commission in the process of ESD target setting.

Table 2.2 Scope correction, 2005–2012

Country	2005	2006	2007	2008	2009	2010	2011	2012
				Mt CO_2-equivalent				
Austria	0.350	0.350	0.350			– 0.064	– 0.064	– 0.064
Belgium	5.189	5.189	5.189					
Bulgaria	39.182	39.182						
Cyprus								
Czech Republic								
Denmark								
Estonia	0.247	0.247	0.247					
Finland	0.400	0.400	0.400					
France	4.710	4.710	4.710					
Germany	11.000	11.000	11.000					
Greece								
Hungary	1.432	1.432	1.432					
Iceland								
Ireland	– 0.041	– 0.041	– 0.041					
Italy	5.920	5.920	5.920					
Latvia				– 0.017	– 0.018	– 0.010	– 0.010	– 0.010
Liechtenstein	0.018	0.018	0.018					
Lithuania	0.057	0.057	0.057					
Luxembourg								
Malta								
Netherlands	3.923	3.923	3.923	– 0.558	– 0.493	– 0.301	– 0.301	– 0.301
Norway	17.820	17.820	17.820					
Poland	4.952	4.952	4.952					
Portugal	0.770	0.770	0.770					
Romania	69.616	69.616						
Slovakia	1.794	1.794	1.794					
Slovenia								
Spain	6.223							
Sweden	1.671	1.671	1.671					
United Kingdom	29.149	29.149	20.549					
EU-25	**77.747**	**71.524**	**62.924**	**– 0.575**	**– 0.510**	**– 0.375**	**– 0.375**	**– 0.375**
EU-27	**186.545**	**180.322**	**62.924**	**– 0.575**	**– 0.510**	**– 0.375**	**– 0.375**	**– 0.375**
All countries	**204.383**	**198.160**	**80.762**	**– 0.575**	**– 0.510**	**– 0.375**	**– 0.375**	**– 0.375**

Source: EC, 2013a; Liechtenstein, 2008; Norway, 2008; EEA, 2013b.

2.2.4 *Linking of the EU ETS to other trading schemes*

Switzerland has a separate emissions trading scheme, which involves approximately 450 installations that emitted around 3 million tonnes CO_2 per year between 2008 and 2012 (Switzerland, 2013a). A new mandatory cap and trade system came into force in 2013. Switzerland and the EU are currently negotiating the possibility of linking their two schemes, which would operate on the basis of mutual recognition of emission allowances. Since the beginning of 2013, the Swiss ETS is based on a new and revised CO_2 Act, which was devised with a view to making the two trading systems more compatible and hence linking possible.

Australia has an emissions trading system with a fixed price and no cap since July 2012, which will revert into a cap-and-trade scheme with flexible prices and tradable permits in 2015 (while recent

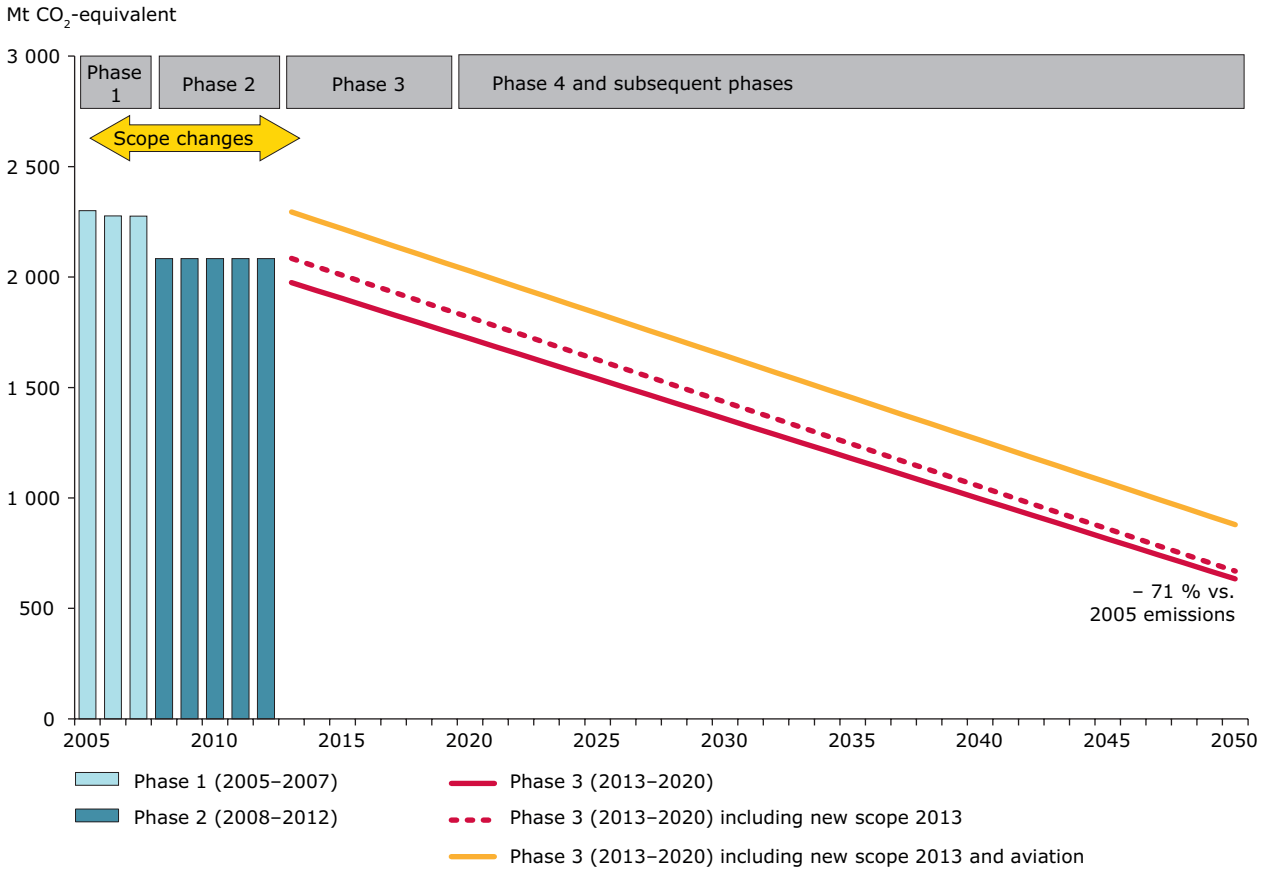
proposals include a start of trading in 2014). The scheme covers about 60 % of Australian GHG emissions in the following sectors: Electricity generation, stationary energy combustion, landfills, wastewater, industrial processes and fugitive emissions (Australian Government, 2011). In May 2012, the European Council approved a mandate for the Commission to start negotiations with Australia towards fully linking the EU and Australian emissions trading systems. An interim link will be established in July 2015 allowing Australian operators to use EU allowances for some of their compliance. It has been announced that the full link, which would also allow operators in the EU ETS to use Australian certificates for compliance, will 'start no later than 1 July 2018' ([9]). Since the election victory of the Australian Liberal National party Coalition on 7 September 2013, the future of the Australian emissions trading scheme is unclear, since the Coalition campaigned on a promise to abolish the scheme.

2.3 Emission caps

The emission target of the EU ETS — the cap — is determined by the total amount of EUAs which are available to the regulated entities either through free allocation or purchases or auctions. In the first and second trading periods, the exact number of these allowances depended on the NAPs drawn up by participating countries, which had to be reviewed and accepted by the European Commission. The individual caps of EU Member States as a total form the EU-wide cap. From the third trading period onwards, a single EU-wide cap determines the amount of emissions allowed to be emitted by EU ETS sectors (EU, 2009c). Furthermore, from 2013 onwards, a linear reduction factor of – 1.74 % per annum applies (Figure 2.4).

In the following, numbers on free allocation are only presented for stationary installations, which, together with auctions and sales, form the actual

Figure 2.4 Perspective of the EU ETS cap up to 2050



Source: EEA, 2013b; including scope correction (see Section 2.2.3)

([9]) http://ec.europa.eu/clima/policies/ets/linking/index_en.htm.

EU ETS cap for stationary installations (excluding aviation). Table 2.3 shows the average amount of allowances issued each year by all participating countries during the second trading period. This amount is equal to the sum of allowances allocated for free and allowances auctioned or sold. The amount of allowances issued is compared to average verified ETS emissions in 2005 (scope corrected), the start date of the ETS. This comparison illustrates which countries issued allowances that set their ETS sectors on a path of reducing emissions between 2005 and 2012 and which countries allowed their ETS emissions to grow during that period.

The rationale for the differences between countries lies in the fact that national circumstances (growth trend development and carbon intensity trend development between 2005 and 2010) in the

Table 2.3 Allowances issued by participating countries, 2008–2012

	'2005 verified emissions (scope corrected)'	'Free allocation 2008–2012'	'Auctions and sales 2008–2012'	'Total EUAs issued 2008–2012'	'EUAs issued 2008–2012'
	(Average) million EUA/year				Change compared to 2005 verified emissions
Austria	33.7	30.5	0.4	30.9	– 8 %
Belgium	60.6	56.7	1.9	58.6	– 3 %
Bulgaria	39.2	39.7	0.0	39.7	+ 1 %
Cyprus	5.1	5.5		5.5	+ 8 %
Czech Republic	82.5	86.1	0.5	86.6	+ 5 %
Denmark	26.5	23.9	0.6	24.5	– 8 %
Estonia	12.9	13.1		13.1	+ 2 %
Finland	33.5	37.5		37.5	12 %
France	136.0	132.0		132.0	– 3 %
Germany	486.1	400.3	44.0	444.3	– 9 %
Greece	71.3	64.6	3.8	68.3	– 4 %
Hungary	27.6	25.0	1.5	26.5	– 4 %
Ireland	22.4	20.9	0.1	21.0	– 6 %
Italy	231.9	201.9		201.9	– 13 %
Latvia	2.9	4.6		4.6	+ 61 %
Liechtenstein	0.0	0.0		0.0	– 1 %
Lithuania	6.7	7.9	0.7	8.6	29 %
Luxembourg	2.6	2.5	0.0	2.5	– 4 %
Malta	2.0	2.1		2.1	+ 9 %
Netherlands	84.3	84.3	3.2	87.5	+ 4 %
Norway	17.8	8.1	7.0	15.1	– 15 %
Poland	208.1	205.7	0.0	205.8	– 1 %
Portugal	37.2	32.0		32.0	– 14 %
Romania	69.6	74.2	0.1	74.3	+ 7 %
Slovakia	27.0	32.5		32.5	+ 20 %
Slovenia	8.7	8.2		8.2	– 6 %
Spain	189.9	152.2		152.2	– 20 %
Sweden	21.1	22.2		22.2	+ 5 %
United Kingdom	271.7	220.8	24.6	245.4	– 10 %
EU-27	**2 200.6**	**1 986.7**	**81.5**	**2 068.2**	**– 6 %**
All EU ETS countries	**2 218.5**	**1 994.8**	**88.5**	**2 083.3**	**– 6 %**

Note: Free allocation for Austria and France has been corrected downwards as these countries have bought EUAs from the market and allocated these to new entrants. Therefore, the amount of free allocation recorded in EEA (2013b) is higher than the amount of EUAs initially issued by these two countries. In Germany, some operators gave back their free allocation and it was not possible to correct this in the EUTL. Therefore, the amount of free allocation available from the EUTL for Germany was corrected downwards by 4.8 million EUAs for the second trading period.

Source: EEA, 2013b; EU, 2013b; personal communication with German Emissions Trading Authority (DEHSt); 16.05.2012; including scope correction (Section 2.2.3).

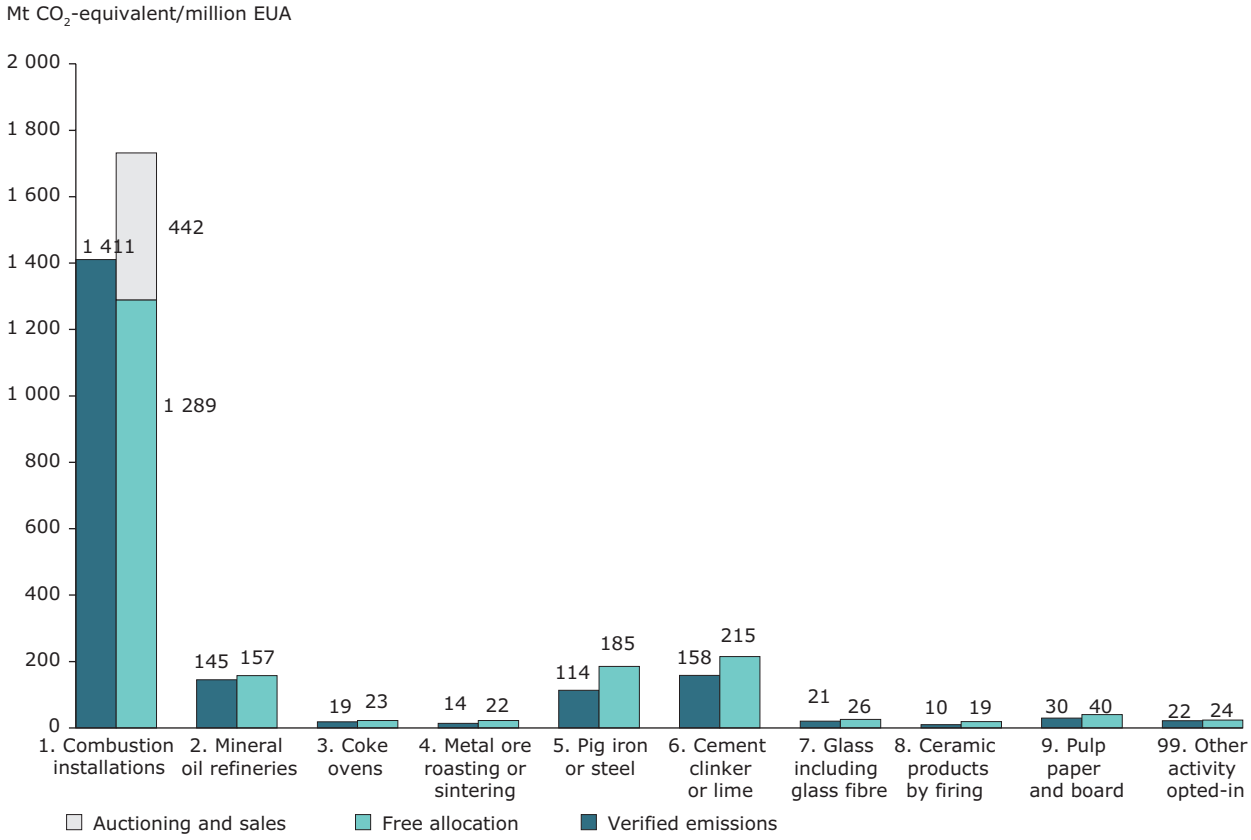
respective countries were considered when setting the caps (EC, 2006a). Compared with 2005 ETS emissions, Spain issued the smallest amount of allowances at – 20 % of 2005 emissions, followed by Norway with – 15 %, Portugal with – 14 % and Italy with – 13 %. Latvia, Lithuania and Slovakia issued EUAs that allowed their ETS emissions to grow by 20 % or more of 2005 levels during the second trading period. But also Bulgaria, Cyprus, the Czech Republic, Estonia, Finland, Malta, the Netherlands, Romania and Sweden set caps that allowed emissions covered by the EU ETS to grow as compared to 2005 emissions. All other countries issued allowances between 1 % and 10 % below 2005 ETS emissions.

2.3.1 Free allocation

The rules for allocation of allowances to individual installations in the first and second trading periods was also determined in the NAPs (EC, 2006a). During the first trading period, almost all allowances were allocated for free (less than 1 % was auctioned or sold). The allocation level for individual installation was mainly based on historical emissions. In the second trading period, 95 % of emission allowances were allocated for free. In many countries (e.g. Denmark, Germany, the United Kingdom), benchmarks were used to allocate allowances to electricity generators, while allocation was still largely based on historic emissions for industrial sectors. As a result, free allocation (relative to emissions) tended to be higher for industrial sectors compared to combustion installations (a large part of which generate electricity).

Figure 2.5 details average verified emissions, free allocation and auctioning for the period 2008–2012 by sector. On average, free allocation of allowances in the second trading period surpassed total emissions in the ETS sectors. While free allocation surpassed

Figure 2.5 Comparison of verified emissions and free allocation in all participating countries, average 2008–2012



Note: Allowances that were auctioned and sold are attributed to the combustion sector, as this mode of allocation was often introduced for electricity generation, where, generally, free allocation was lower than verified emissions. As electricity generation is included in sector 1 (combustion installations), auctioned EUAs are shown in this sector, since it can be expected that it were mostly electricity generators who bought these allowances.

Source: EEA, 2013b; see Section 2.3.2 for auctioning quantities.

verified emissions in all industrial sectors, the combustion sector had to buy additional allowances.

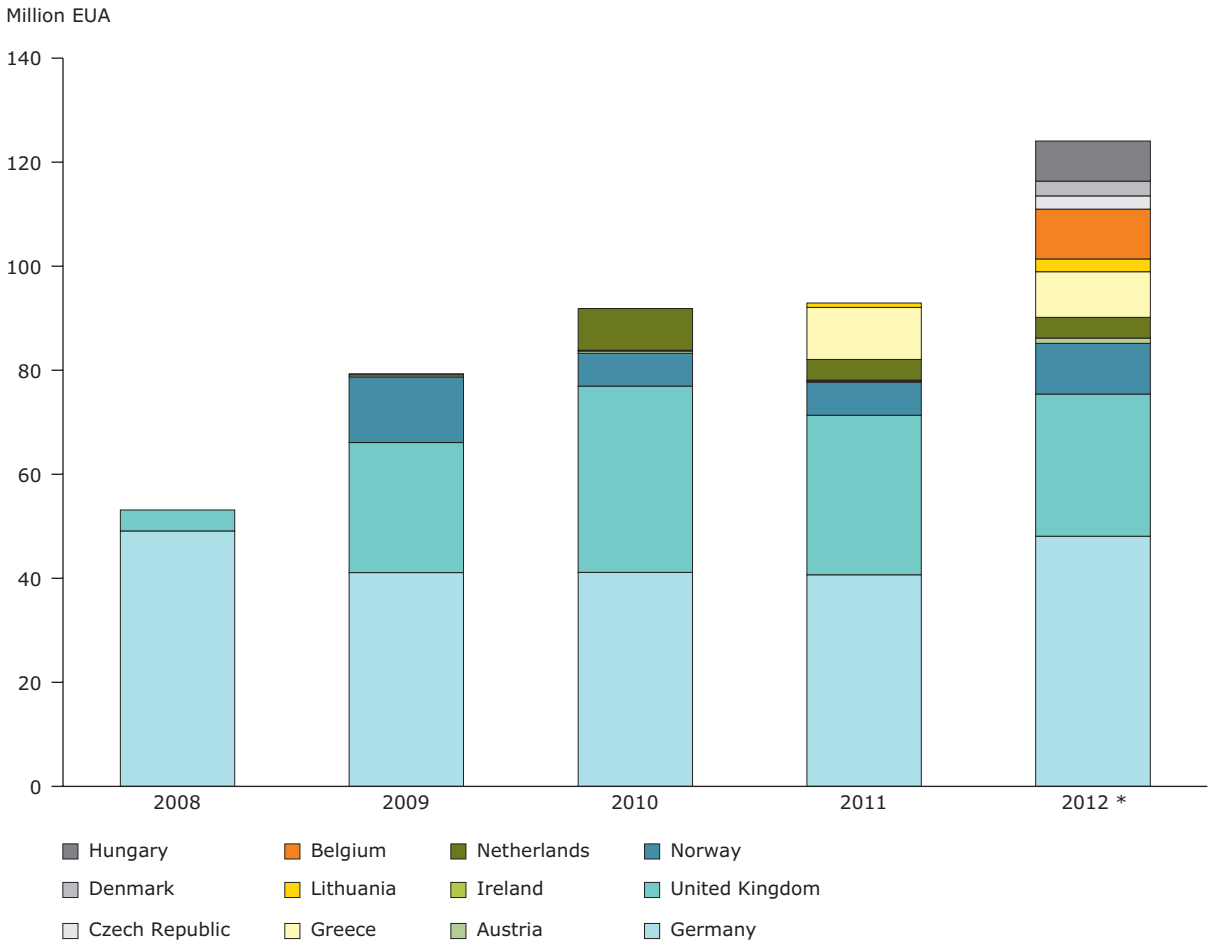
2.3.2 *Auctioning and sales*

In the second trading period, 16 countries sold or auctioned allowances. As recorded in the EEA's EU ETS data viewer (EEA, 2013b) 53 million EUAs were auctioned or sold in 2008. The volume of auctioned EUAs increased to 80 million EUAs in 2009, 92 million EUAs in 2010, 93 million EUAs in 2011, and 125 million EUAs in 2012. Overall, about 5 % of the total ETS cap for the second trading period was auctioned. Most countries implemented rather simple auctioning procedures using single round, single price auctions.

In the second trading period Germany (49 %), the United Kingdom (28 %) and Norway (8 %) had the biggest share in total auctions. Other countries contributed smaller amounts of auctioning quantities and started auctioning rather late in the second half of the trading period. The Netherlands started in 2010 and auctioned a total of 16 million EUAs (4 %). Greece started auctioning in 2011 and auctioned a total of 19 million EUAs (4 %). Together these five countries were responsible for 93 % of the total amount of auctioned allowances. Figure 2.6 shows quantities between 2008 and 2012 for countries that carried out auctions or sales in quantities larger than 1 million EUAs for the whole second trading period.

Germany was the first country to bring allowances to the market in the second trading period. In order

Figure 2.6 Quantities of EUAs auctioned or sold by participating countries, 2008–2012



Note: *: auctions are included until June 2013 as long as they referred to the second trading period. The quantities of EUAs auctioned by Bulgaria, Luxembourg, Poland and Romania, smaller than 1 million EUAs for the whole second trading period, are not represented on this figure.

Source: EEA, 2013b.

to be able to already supply the market with allowances from the beginning of year 2008 onwards, EUAs were not auctioned but sold in the years 2008 and 2009 ([10]). The government-owned bank KfW was contracted as the broker and performed daily sales of EUAs at the European Energy Exchange (EEX) in Leipzig (Germany) and the European Climate Exchange (ECX) ([11]) in London (United Kingdom). During the period 2010 to 2012, Germany held weekly auctions at the EEX. Germany auctioned on average about 44 million EUAs per year during the full commitment period.

The United Kingdom took a slightly different approach. Allowances were auctioned by banks and operators were only able to participate via intermediaries at the auctions (DMO, 2008). The first auction was held at the end of 2008. In each auction about 4 million EUAs were sold. The United Kingdom auctioned about 25 million EUAs per year. The United Kingdom implemented special provisions to facilitate the participation of small installations in the auctions by reserving a share of EUAs to non-competitive bids in two auctions. However, few small installations participated in these auctions. In total 0.6 million EUAs had been offered in the two non-competitive auctions (DMO, 2010a; DMO, 2010b). Only 3 % of this total amount was sold. The remaining quantity was sold in normal auctions. In its NAP, the United Kingdom announced it would auction 7 % of its cap (DEFRA, 2007). Additionally, remaining allowances from the new entrant reserve equalling 3 % of the cap were also auctioned (DMO, 2012).

Norway sold a total of 35 million EUAs in the second trading period and contracted the bank Barclays to sell the EUAs. Norway auctioned nearly 50 % of its cap. As Norway is not a Member of the EU the limitation that not more than 10 % of the cap can be auctioned did not apply to Norway (EEA Joint Committee, 2007; Norway, 2008).

2.4 Emission trends in the EU ETS

2.4.1 Emission trends by sector, 2005–2012

Between 2005 and 2012, verified emissions in stationary installations decreased by 16 %, taking into account the change in ETS scope. In the first trading period, emissions increased slightly between 2005 and 2007 (see Figure 2.7). During the second trading period, they decreased significantly in 2008 and 2009, with a significant proportion of this decrease due to the economic crisis. In 2008 emissions were 5 % below 2005 levels. They decreased to 15 % below 2005 levels in 2009 and stayed at this level in 2010 (– 13 %), 2011 (– 14 %) and 2012 (– 16 %).

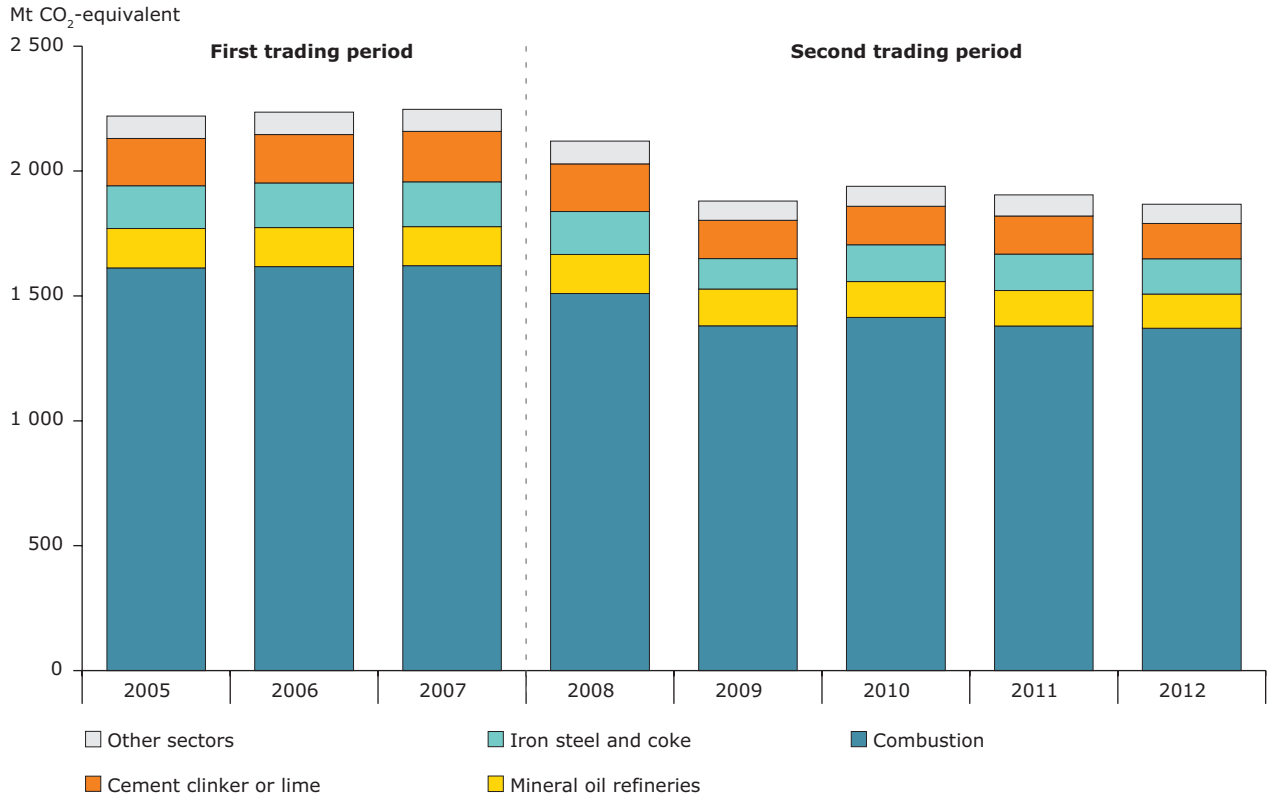
Figure 2.8 illustrates sectoral trends in more detail. In order to present a clear picture, only the four sectors with the highest emissions under the EU ETS (combustion installations, oil refineries, iron and steel and cement clinker or lime) are shown in Figure 2.8. These four sectors represent 94 % of total EU ETS emissions. Verified emissions in these sectors have experienced a downward trend since 2005. Emissions from the iron and steel sector were most significantly influenced by the economic crisis, experiencing the biggest drop (in percentage terms) of verified emissions in 2009, but rebounded in 2010 and have since stabilised at around 13 % below 2005 levels. Emissions from the cement clinker or lime sector also dropped considerably in 2009 by nearly 20 % below 2005 emissions and in 2012 experienced a further drop to 25 % below 2005 levels. Emissions from mineral oil refineries appear to have been less impacted by the economic crisis. Emissions from this sector have steadily decreased to 14 % below 2005 emissions levels during the second trading period. Finally, the combustion sector also experienced a dip of 14 % in 2009, rebounding slightly in 2010 and declining to 15 % below 2005 sector emissions at the end of the second trading period.

Comparison of emission trends with electricity generation mix, 2005–2011

The sector 'combustion installations' is dominated by electricity and heat generation. After continued growth of electricity generation in the years 2005 to 2007, the economic crisis led to a reduced demand for electricity and thus lower emissions. This is especially visible in 2009 and 2011. Besides demand, increasing generation by renewable energy sources and fuel switch from coal to gas constitute other important drivers for emission reductions in electricity generation. The trend in electricity generation in the EU-27 and Norway is represented in Figure 2.9 ([12]). In this time period changes in the fuel mix for electricity generation have occurred, with an 8 %

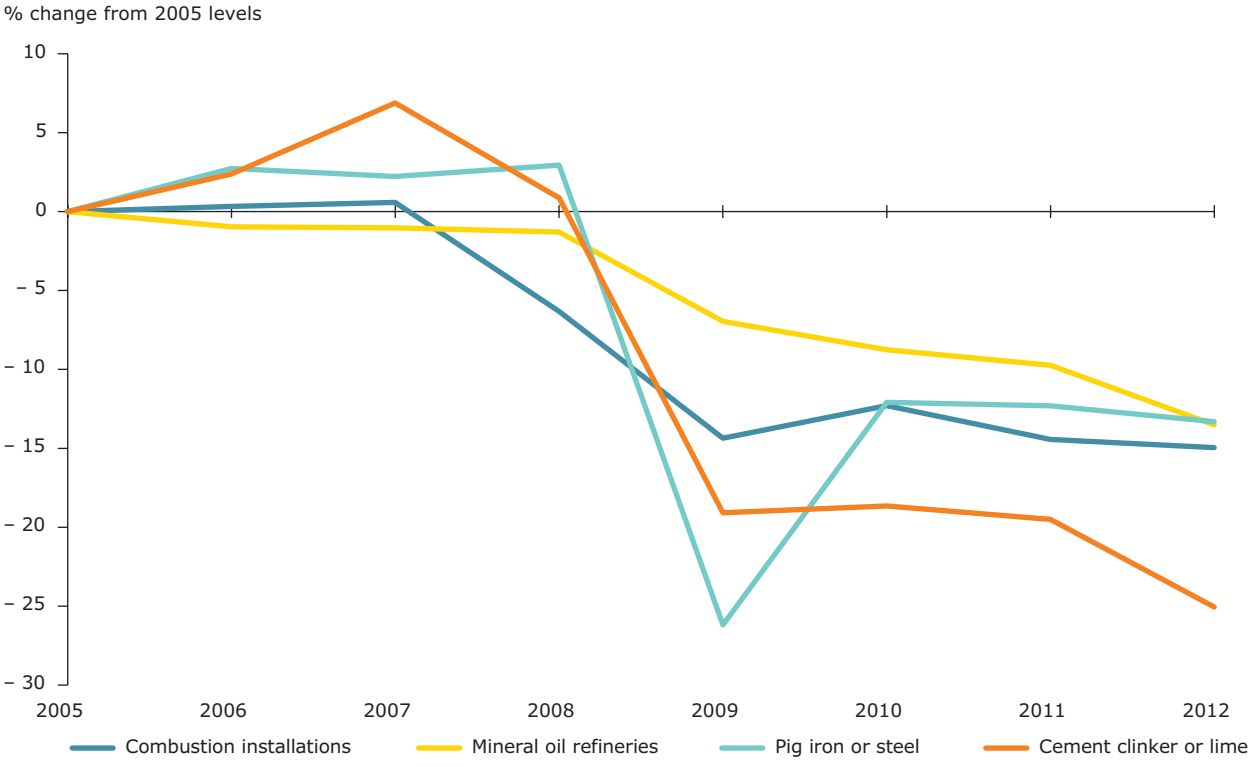
([10]) Auctions in Germany in 2008 include sales of 8.125 million EUAs by the KfW to compensate for costs of the replenishment of the NER in phase 1 (DEHSt, 2009).
([11]) ECX was acquired by Intercontinental Exchange (ICE) in 2010.
([12]) Data are presented for the period from 2005 until 2011. Data for electricity production in 2012 was not available from Eurostat at the time of writing.

Figure 2.7 Verified emissions of stationary EU ETS installations by sectors, 2005–2012



Source: EEA, 2013b; including scope correction (see Section 2.2.3).

Figure 2.8 Trend of verified emissions in key sectors, 2005–2012



Source: EEA, 2013d; including scope correction (Section 2.2.3).

decrease in overall electricity generation from fossil fuels and nuclear during that period and an increase in renewable electricity generation:

- Generation from hard coal (– 100 TWh), lignite (– 20 TWh), oil (– 60 TWh) and nuclear declined (– 90 TWh) between 2005 and 2011.
- From 2005 to 2008 production from natural gas increased by 110 TWh. In the years from 2009 to 2011 electricity production from natural gas decreased by 80 TWh. In 2011 generation was still 30 TWh higher than in 2005.
- Electricity generation from new renewables (solar, wind and biomass) increased by 210 TWh between 2005 and 2011. The increase was 75 TWh between 2005 and 2008. New renewable production gained pace between 2008 and 2011 (+ 135 TWh), mainly due to wind (+ 60 TWh), solar (+ 40 TWh) and biomass (+ 35 TWh). During this period, photovoltaic production grew by 640 % while electricity generation from wind and biomass increased by 50 %.

The decrease of emissions from combustions installations in the EU ETS by nearly 15 % from 2005 to 2011 did therefore not only result from a reduction of fossil electricity generation related to a reduced demand triggered by the economic crisis, but also from increased renewable energy production and fuel switching from hard coal and oil to natural gas.

Figure 2.9 Trend of electricity generation by fuel, 2005–2011

Source: Eurostat, 2013.

In the cement, iron and refinery sectors, verified emissions closely reflect production trends (see Figure 2.10). This illustrates the fact that emission reductions in these industrial sectors were rather driven by reduced production than by efficiency improvements.

2.4.2 *Emission trends by country, 2005–2012*

In parallel to the analysis of sectoral emission trends presented in Section 2.4.1, four countries were selected in order to illustrate characteristic differences in emission trends among the countries covered by the EU ETS. Trends in verified emissions result from several drivers which vary depending on the specific situation of each country: climatic conditions, renewable energy potential, fossil fuel resources and use, economic development, etc.

Figure 2.11 details the trend of verified emissions for a selection of European countries, each representing a different region and situations ([13]). Finland was chosen as an example for a Nordic country, Poland as an example for a country from central eastern Europe, Spain as an example for southern Europe and the United Kingdom as an example for a western European country. As discussed above, the economic crisis influenced emission trends in all countries. This is well illustrated by the parallel drop of emissions in 2009. The observed emission trends are, however, diverse. In the following, drivers behind overall development of emissions in the EU ETS are illustrated, taking each of the countries as a specific example:

- The trend of emissions in Finland illustrates the large variability of emissions in Nordic countries. Emissions from fuel combustion in

Figure 2.10 Verified emissions and production/consumption trends in key sectors, 2005–2012

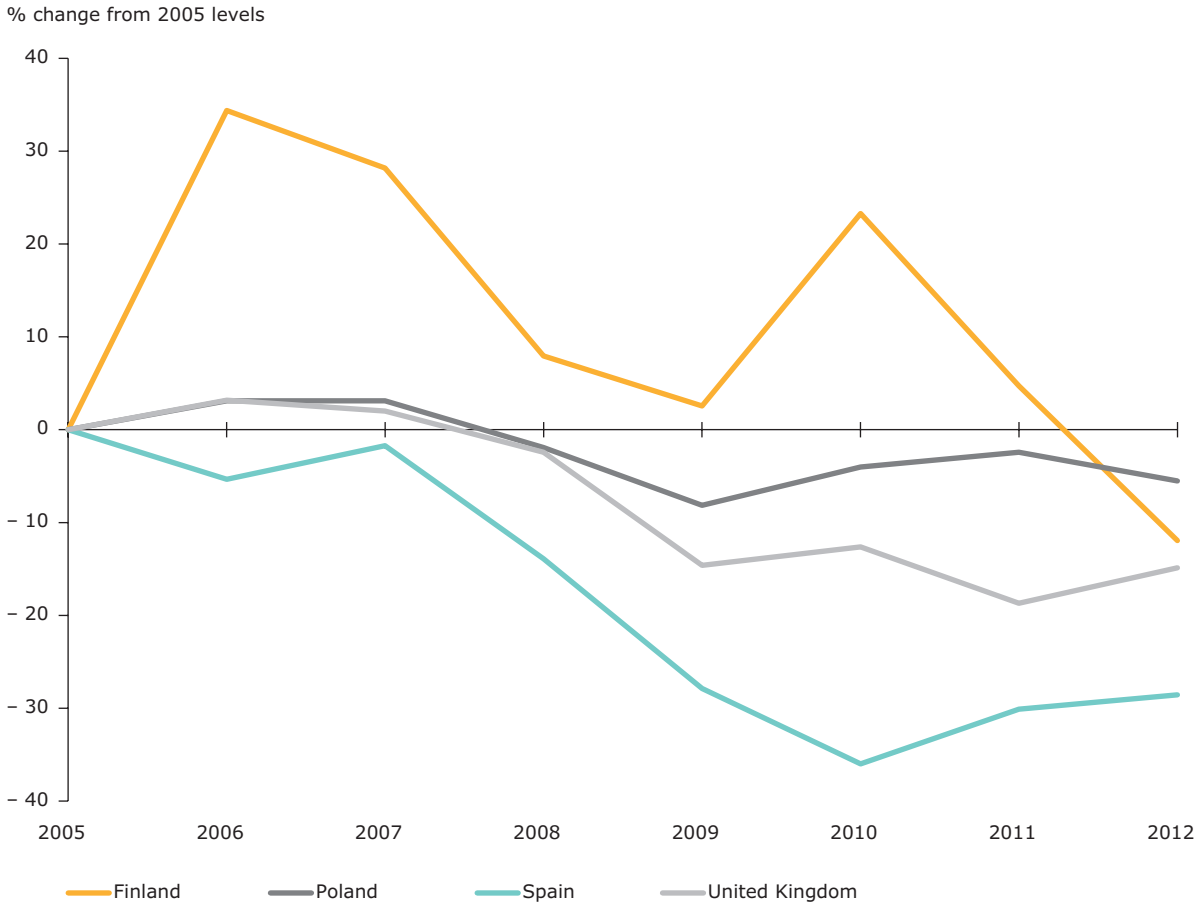
Source: EEA, 2013b; including scope correction (Section 2.2.3); Cembureau, 2013; Worldsteel, 2013; Eurostat, 2013b.

([13]) Two of these countries (Poland and the United Kingdom) belong to the four countries with the highest absolute emissions in the EU ETS (Germany, the United Kingdom, Italy and Poland, in decreasing order).

Nordic countries are influenced by precipitation levels which affect the availability of hydro resources. Less electricity generated by hydro means increased use of other generation fuels, including fossil fuels. The fossil power plants in Denmark and Finland often serve as swing producers ([14]). In 2005, high levels of hydro production were observed in Norway, Sweden and Finland, due to high precipitation levels in the same year. Due to lower precipitation in the following years, emissions in Finland exhibit spikes in 2006, 2007 and 2010. In 2012, hydro production was again high in Nordic countries, so emissions covered by the EU ETS in Finland were 12 % lower than in 2005 ([15]). Furthermore, Finland has a relatively large share of industrial ETS emissions (around 35–40 %), which were impacted by the economic crisis and in turn influenced overall emissions. Emissions in the industry sectors had dropped by 13 % below 2005 levels in 2009, rose again in 2010 and 2011, before dropping to a level 14 % below 2005 levels in 2012.

- Poland's EU ETS emissions from fuel combustion are dominated by coal-fired power generation. Since the generation mix did not change substantially between 2005 and 2012 and consumption levels stayed constant, emissions have not deviated significantly from 2005 levels. Emissions in industry sectors represent less than 15 % of Polish ETS emissions. Industrial emissions declined in 2009, but increased to a level 10 % above 2005 levels by 2012. However, this did not greatly impact overall ETS emissions in Poland.

Figure 2.11 Trend of verified emissions for selected countries, 2005–2012



Source: EEA, 2013b; including scope correction (Section 2.2.3).

([14]) In 1990, emissions in Denmark, for example, were considerably lower due to a high level of imports of electricity produced by hydro resources.

([15]) Trends in electricity generation referred to in this paragraph are based on statistics on electricity production available from Eurostat.

- Spain, on the other hand, has experienced a considerable uptake of renewable energy sources since 2005 (mainly wind and solar). Therefore, emissions covered by the EU ETS dropped by 29 % below 2005 levels, although overall electricity generation levels remained constant. The other driver of this drop in emissions is the economic crisis, which affected emissions in Spanish industry sectors especially hard. In 2012, emissions in industry sectors, which account for 30–40 % of ETS emissions, were 32 % below 2005 levels.

- The United Kingdom has also seen emissions decline by 15 % since 2005. Here a reduced demand for electricity and increased generation from wind power explain the decreasing trend in emissions from combustion. Furthermore, emissions in industrial sectors, which had grown until 2008, had also dropped by 7 % below 2005 levels by 2012.

2.5 Use of international emission credits

Operators liable under the EU ETS are allowed to use certain credits from Clean Development Mechanism (CDM) and Joint Implementation (JI) projects to comply with part of their legal obligation. According to the Linking Directive (EU, 2004b), certified emission reductions (CERs), from the CDM, were allowed from 2005 and emission reduction units (ERUs), from JI, from 2008. Before 2006 only a small amount of CERs had been issued ([16]) and in 2006 EUA prices decreased significantly. Therefore, no CERs and ERUs were surrendered during the first trading period of the ETS. The use of CDM and JI credits gained increasing importance during the second trading period (see Figure 2.12).

2.5.1 Allowed use

For the second trading period of the EU ETS, entitlement limits are set in the NAPs. These define the entitlements as a percentage of the free allocation to each installation in the 2008 to 2012 period. The percentages vary from 4 % in Estonia to 22 % in Germany. In total, this adds up to an upper limit of 1.4 billion CERs or ERUs that may be used in the second trading period (see Table 2.4). This corresponds to 14 % of the total free allocation (in all 30 countries participating in the EU ETS) in the second trading period.

The amended ETS Directive sets the upper limit for credit use for the period from 2008 to 2020 at a maximum of 50 % of the reduction effort below 2005 levels. The exact quantity of CDM or JI credits (CERs or ERUs) that can be used by operators is regulated on an installation level. The installation-level limits in the draft Commission Regulation on international credit entitlements (RICE) adopted on 10 July (EC, 2013a). The regulation is set to enter into force in October when the three months scrutiny period of the European Parliament and Council ends.

Under the proposed rules EU ETS participants operating stationary installations will be entitled to use international credits during the 2008–2020 period up to the higher of either the international credit entitlement specified in the NAP for the second trading period or 11 % of the free allocation of EU allowances granted to them in that period. Operators of stationary installations who were new entrants during the second trading period and operators of stationary installations newly included in the scope of the EU ETS in the third trading period which did not receive free allocations nor entitlements for international credit use in the second trading period, will be able to use international credits up to a maximum of 4.5 % of their verified emissions in the third trading period. The proposed regulation also sets out special provisions for operators of stationary installations with a significant capacity extension and, operators of stationary installations which received free allocation during the second trading period and which carry out activities newly included in the EU ETS in the third trading period. Finally, aircraft operators are entitled to use international credits beyond those allowed in 2012, up to a maximum of 1.5 % of their verified emissions in the third trading period.

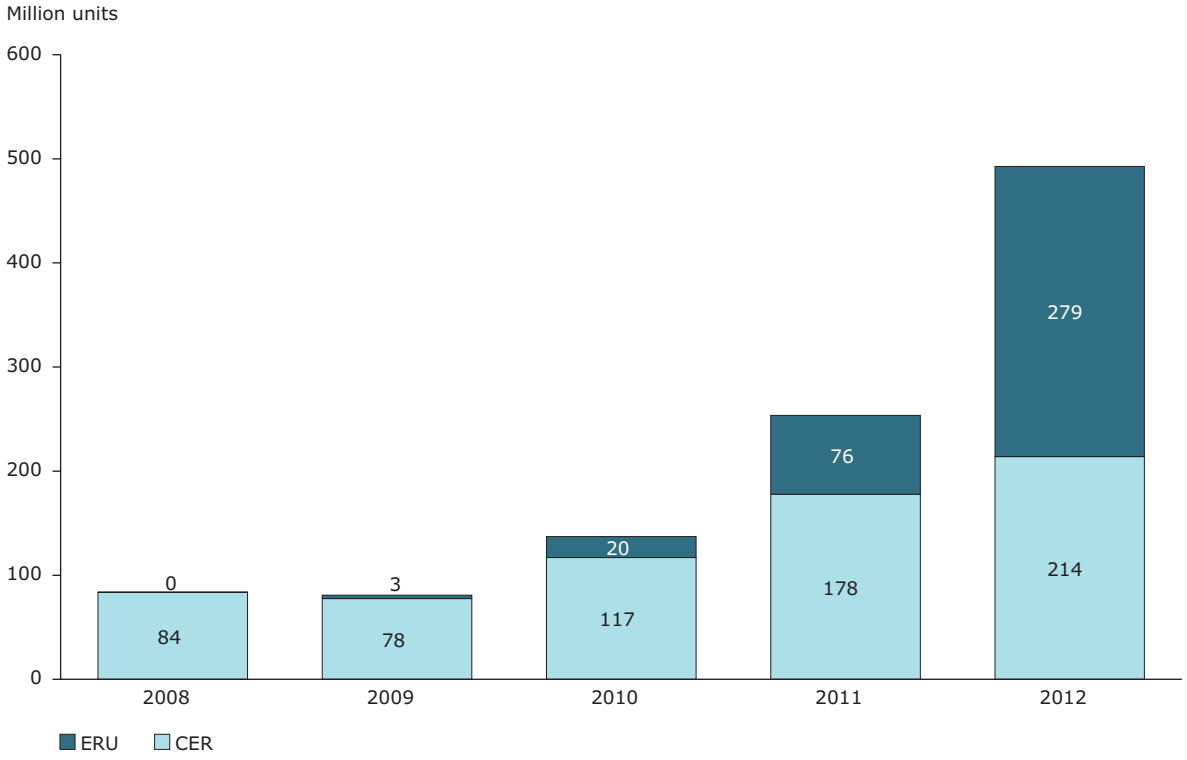
The sum of the installation-level limits is expected to be lower than the upper limit, but higher than the 1.4 billion CERs and ERUs already allowed in the second trading period. Since some entitlements are expressed as a percentage of verified emissions, the overall maximum amount will only be known at the end of third trading period.

2.5.2 Observed use

Operators in all countries, except Liechtenstein, have used project based credits so far. At the end of the second trading period, 76 % of the allowable offsets

([16]) http://cdmpipeline.org.

Figure 2.12 Annual use of international credits (CERs and ERUs) in the EU ETS, 2008–2012



Source: EEA, 2013b.

in this period had been used (1 048 million units in total). This figure differs significantly from country to country. 10 countries have used 90 % or more of the allowable offsets: Malta (100 %), Cyprus, Greece and Slovenia (96 %), Poland (93 %), Portugal and Austria (92 %), Sweden (91 %), the Czech Republic and Estonia (90 %). In absolute terms, most credits from flexible mechanisms were used by operators in Germany (302 million), Spain (107 million), Poland (96 million), Italy (96 million), the United Kingdom (77 million) and France (76 million). Those six countries together account for 72 % of the CERs and ERUs used.

The amount of credits surrendered increased from 4 % of total verified emissions in 2008 and 2009, to 7 % in 2010, 13 % in 2011 and 26 % in 2012 (nearly 500 million units). Units from JI projects (ERUs) only accounted for 0.1 % of those credits in 2008. However, their use increased significantly and covered 4 % of surrendered credits in 2009, 15 % in 2010, 30 % in 2011 and 57 % in 2012.

As prices for international offsets collapsed during the second half of the second trading period, the spread between EUA and CER/ERU prices widened and because of looming quality restrictions starting in 2013 ([17]), operators submitted large quantities of these permits instead of EUAs.

2.6 Supply and demand in the EU ETS in the second trading period

The analysis of the supply and demand balance of allowances for the second trading period from 2008 to 2012 brings together data on the cap, verified emissions and CER and ERU use described in the previous chapters. The supply and demand balance depends on the following factors:

([17]) During the second trading period, EU legislation excluded JI/CDM credits from nuclear projects and temporary forest credits; for large hydroelectricity projects certain conditions applied. From 2013 onwards, the use of credits from CDM and JI projects destroying trifluoromethane (HFC-23) and N_2O from adipic acid production will no longer be permitted under the EU ETS either, due to concerns about the additionality of such projects (see Sandbag, 2013 for more detailed discussion).

Table 2.4 Entitlements for the use of CDM and JI credits for stationary installations

	CER/ERU use allowed as % of free allocation in second trading period	Total allowed CER/ERU use 2008–2012	Actual use of CER/ERU 2008–2012	Remaining CER/ERU use from second trading period	Share of used budget until 2012
	%		Million CER/ERU		%
Austria	10 %	15.2	14.0	1.2	92 %
Belgium	8 %	23.8	19.1	4.7	80 %
Bulgaria	15 %	29.8	23.4	6.4	79 %
Cyprus	10 %	2.7	2.6	0.1	96 %
Czech Republic	10 %	43.0	38.6	4.4	90 %
Denmark	17 %	20.3	12.5	7.8	61 %
Estonia ([a])	4 %	3.0	2.7	0.3	90 %
Finland	10 %	18.8	16.3	2.4	87 %
France	14 %	89.1	75.6	13.5	85 %
Germany	22 %	440.3	302.2	138.1	69 %
Greece	9 %	29.1	27.9	1.2	96 %
Hungary	10 %	12.5	9.8	2.7	78 %
Ireland	10 %	10.4	6.6	3.9	63 %
Italy	15 %	151.3	95.5	55.8	63 %
Latvia	10 %	2.3	1.6	0.7	71 %
Liechtenstein	11 %	0.0	0.0	0.0	0 %
Lithuania	20 %	7.9	6.8	1.1	86 %
Luxembourg	10 %	1.2	0.8	0.4	64 %
Malta	10 %	1.1	1.1	0.0	100 %
Netherlands	10 %	42.1	28.6	13.5	68 %
Norway ([b])	13 %	12.4	9.0	3.4	73 %
Poland	10 %	102.9	95.6	7.3	93 %
Portugal	10 %	16.0	14.7	1.3	92 %
Romania	10 %	37.1	32.2	4.9	87 %
Slovakia	7 %	11.4	10.0	1.4	88 %
Slovenia	16 %	6.5	6.2	0.3	96 %
Spain	20 %	152.2	107.1	45.2	70 %
Sweden	10 %	11.1	10.1	1.0	91 %
United Kingdom	8 %	88.3	77.4	11.0	88 %
EU-25	**14 %**	**1 302.6**	**983.4**	**319.3**	**75 %**
EU-27	**14 %**	**1 369.5**	**1 038.9**	**330.6**	**76 %**
All countries	**14 %**	**1 381.9**	**1 047.9**	**334.0**	**76 %**

Note: ([a]) Estonia: As the final Estonian NAP had only been approved by 2011 it only included use of international credits in 2011 and 2012. For 2011 and 2012, 10 % were allowed (based on the NAP notified by Estonia on 5 September 2011), which would be equivalent to 4 % over the five year period from 2008 to 2012.

([b]) Norway: The allowed use of CER/ERU is defined as a share of verified emissions (instead of free allocation). The share of free allocation compared to emissions is considerably lower in Norway than in all the other participating countries (Norwegian operators of combustion installations received only 19 % of their actual 2008–2011 emissions as free allocation). Whereas the EU Member States are bound by the Emissions Trading Directive which foresees at least 90 % of free allocation in the second trading period, Norway was free to choose to apply stricter standards.

Source: EEA, 2013b; EC, 2010a.

- The cap on emissions set in the NAPs, which determines the number of emissions allowances available during the second trading period of the EU ETS:
  - A major share of emissions allowances were made available by free allocation to the operators of the respective installations (Section 2.3.1).
  - Some allowances were supplied by auctions or government sales at market prices (Section 2.3.2).

- The trends of verified emissions in the EU ETS specify the need or demand for emission allowances by the regulated entities (Section 2.4). This determines whether the amount of allowances made available under the EU ETS is sufficient to cover those emissions.

- The operators were also entitled to use a certain amount of lower-priced emissions reduction credits from the CDM and JI (CERs and ERUs, respectively) as a substitute for EU emission allowances (Section 2.5).

During the first trading period permits supplied by governments exceeded verified emissions in all three years (see Figure 2.13). Since banking was not possible between the first and the second trading periods, no allowances could be carried over into 2008. In 2008, the amount of allowances freely allocated, auctioned or sold was not sufficient to cover verified emissions during this year. Operators additionally surrendered CERs. The remaining shortfall was covered by making use of the flexibility resulting from multi-year phases, i.e. using a number of emissions permits available for 2009. From 2009 through 2012, however, the supply of permits made available by the governments consistently exceeded demand in every year. The additional use of CERs and ERUs contributed to an accumulating surplus of allowances.

Table 2.5 further illustrates the components leading to a cumulated surplus of nearly 1.8 billion allowances at the end of the second trading period. The major share (about 1 billion allowances) can be attributed to the fact that operators surrendered CERs and ERUs despite the fact that verified emissions were below the available amount of allowances. The

Figure 2.13 Supply and demand balance for stationary installations in all EU ETS countries, 2008–2012

Source: EEA, 2013b; including scope correction (Section 2.2.3).

rest of the surplus (about 750 million) stems from the reduced emissions from 2009 to 2012, which dropped from 2 119 million tonnes CO_2 in 2008 to 1 867 million tonnes CO_2 in 2012. As discussed in Section 2.4, the reduction in emissions covered by the EU ETS is driven by a combination of factors such as fuel switching, development of renewable energy and a decrease in production and hence energy consumption largely driven by the economic crisis. While the expected emission abatement due to fuel switching and the increased use of renewable energy were taken into account when EU ETS caps were set in 2007 (Capros, P., Mantzos, L., Papandreou, V., and Tasios, N., 2008), the unexpected economic crisis resulted in additional and unforeseen emission reductions. This led in turn to the constitution of an important surplus of unused allowances. Since banking is allowed between the second (2008–2012) and third trading period (2013–2020), this surplus is carried over to the next stage of the scheme.

Recent analysis suggests that bringing scarcity back to the EU ETS in order to address the current surplus of allowances would require a retirement of 1 400 million allowances and the increase of the linear reduction factor to 2.6 % (Öko-Institut, 2012).

As a first step, the European Commission proposed a 'backloading' of allowances, which would consist in withholding 900 million allowances from auctioning between 2013 and 2015 and reintroducing them later in the same period (EC, 2012a). The European Parliament voted on this proposal on 3 July 2013 and accepted it with amendments (EP, 2013). The European Council has not yet voted on the proposal.

Furthermore, the European Commission has identified six different structural measures to address the supply-demand imbalance in the EU ETS more sustainably (EC, 2012b):

- increasing the EU reduction target to 30 % in 2020;
- retiring a number of allowances in the third trading period;
- early revision of the annual linear reduction factor;
- extension of the scope of the EU ETS to other sectors;
- limit access to international credits;
- discretionary price management mechanism.

2.7 Allowance price development

The EU ETS is based on the principle of 'cap and trade'. Operators can sell or buy allowances on a market. Furthermore, they are allowed to submit a certain percentage of international credits (CERs and ERUs), which are also traded. Carbon prices are determined by the interplay of supply and demand.

Table 2.5 Surplus of allowances in the EU ETS, 2008–2012

All countries		First trading period			Second trading period				
		2005	2006	2007	2008	2009	2010	2011	2012
EUAs allocated for free	M EUA	2 096	2 072	2 193	1 960	1 975	1 989	2 007	2 043
EUAs sold or auctioned by governments	M EUA	0	7	2	53	79	92	93	125
Scope correction	Mt CO_2	204	198	81	– 1	– 1	0	0	0
Available EUAs (EU ETS scope II)	M EUA	2 301	2 277	2 275	2 013	2 054	2 080	2 099	2 167
Surrendered CERs	M CER	0	0	0	84	78	117	178	214
Surrendered ERUs	M ERU	0	0	0	0	3	20	76	279
Available emission credits	M credits	2 301	2 277	2 275	2 097	2 135	2 218	2 353	2 660
Verified emissions	Mt CO_2	2 014	2 036	2 165	2 120	1 880	1 939	1 905	1 867
Scope correction	Mt CO_2	204	198	81	– 1	– 1	0	0	0
Verified emissions and scope correction	Mt CO_2	2 218	2 234	2 246	2 119	1 879	1 939	1 904	1 867
Shortage/surplus	M EUA	82	43	30	– 22	256	279	449	793
Cumulated shortage/surplus phase 2	M EUA				– 22	233	512	961	1 754

Note: The surplus carried over to the third trading period at the end of 2012 is in fact higher than the amount shown, due to early auctioning and early NER300 sales of third trading period allowances. These allowances couldn't be used for compliance in the second trading period, but were already issued before the end of 2012 and are contributing to the surplus for the third trading period.

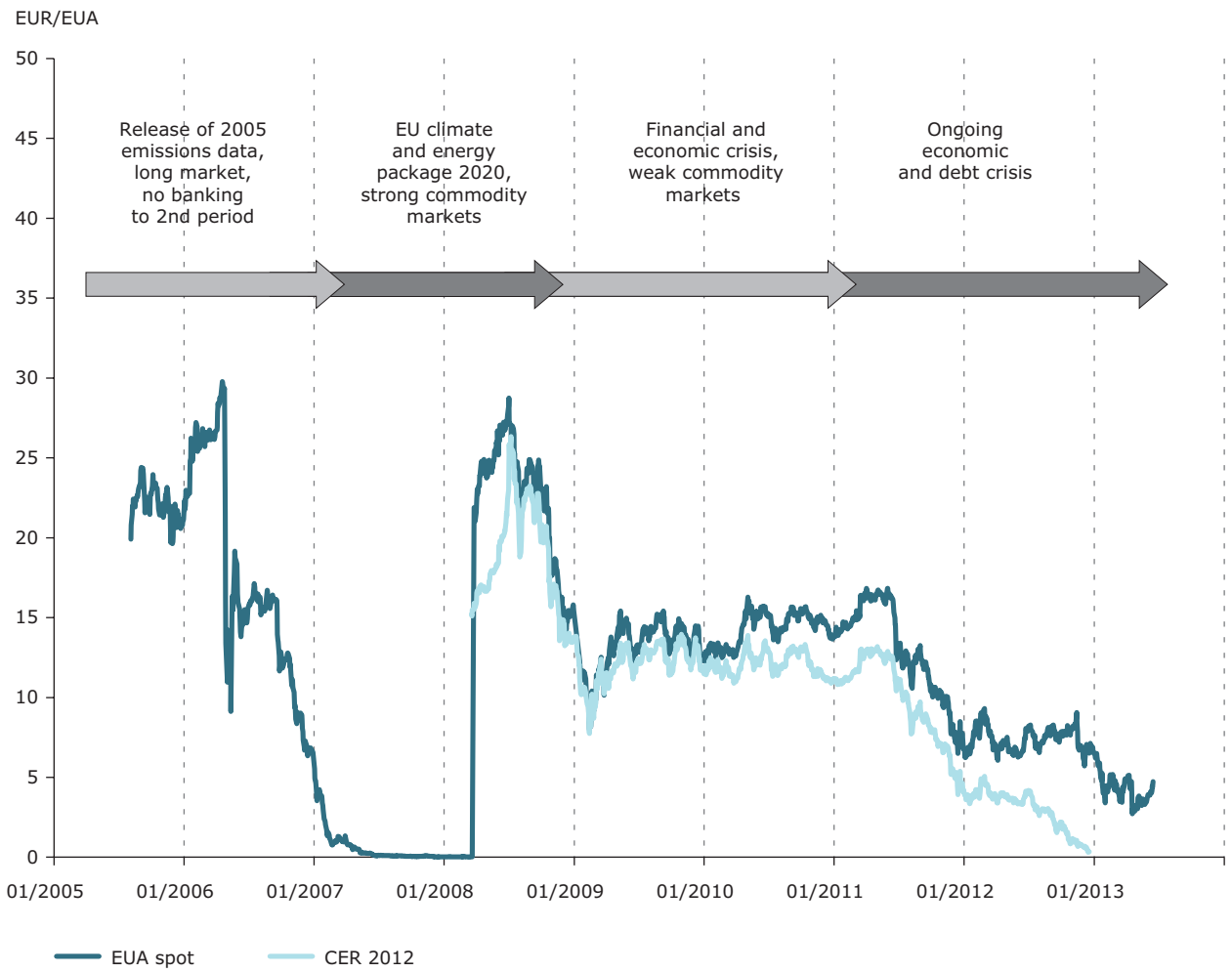
Source: EEA, 2013b; including scope correction (Section 2.2.3); auctioning quantities (Section 2.3.2).

The supply is determined by the cap (for EUAs) and the allowed amount of offset credits (CERs and ERUs). The demand for credits depends on the emissions of covered installations. These, in turn, depend on economic output, prices of inputs to productions, such as oil, gas and coal, and climatic conditions, amongst others ([18]).

The allowance spot price in the EU ETS has passed through different phases since the start of the scheme in 2005 (see Figure 2.14). During the first trading period, the EUA price reached price levels between EUR 20 and EUR 25, but dropped after the first information on the amount of verified emissions was made available in April 2006 and it became clear that there would be a surplus of allowances. Given the fact that banking was not allowed between the first and the second trading period, the price decreased to levels of almost zero up to the end of 2007.

During the second trading period, the EUA price first reached levels of between EUR 25 and EUR 30, but decreased significantly on two occasions. First it dropped to EUR 10, as a result of the financial and economic crisis in 2009, which decreased the demand for allowances. The EUA price then stabilised at about EUR 15. A second drop can be observed in 2011, when it became clear that the crisis would last longer than anticipated and that a considerable surplus of allowances would be built up by the end of the period. This decreased EUA prices further to around EUR 7 by the end of the period. Meanwhile, CER prices traded at less than EUR 1 at the end of the second trading period.

Figure 2.14 Price trends for EUAs and CERs, 2005–2012



Source: EEX, 2013; EEA, 2013b; ICE, 2013; calculations by Öko-Institut.

([18]) See Schumacher et al., 2012, for a discussion of the different drivers behind EUA prices.

3 2008–2012 emission targets and compliance under the Kyoto Protocol

Key messages

1. The EU-15 has a common target to be achieved collectively under the 'burden-sharing agreement'. This agreement sets differentiated emission limitation and reduction targets for each EU-15 Member State. Eleven other Member States (all except Cyprus and Malta), Iceland, Liechtenstein, Norway and Switzerland have individual GHG reduction and limitation targets under the KP. Each of these Kyoto targets corresponds to an emission budget (corresponding to a quantity of 'Kyoto units') for the first commitment period (2008–2012) of the KP.

2. Together, these European countries (as EU-15 and all other countries with their individual targets) have committed to achieve an emission reduction of 452 Mt CO_2-equivalent below 1990 levels. This emission objective is to be achieved on average during the 2008–2012 first commitment period.

3. To achieve their Kyoto targets, countries must balance their emissions with the amount of Kyoto units they are holding. Such a balance can be achieved by limiting or reducing their domestic emissions and by increasing their emission budget through the contribution of LULUCF activities, such as forest management, as well as the use of the KP's flexible mechanisms whereby they can acquire Kyoto units from other countries.

4. With the introduction of an ETS in the EU-27, Norway, Iceland, Liechtenstein and Switzerland, allowances linked to Kyoto units were allocated to the ETS sectors. The level of allocated allowances determined the contribution of the sectors covered by the EU ETS towards achieving each country's Kyoto target. As a result, each national Kyoto target was split into an emission budget for the ETS sectors and another emission budget for emissions in the sectors not covered by the ETS. These non-ETS sectors include, inter alia, road transport, buildings, agriculture and waste. Member States were themselves able to set the proportion of the emission budgets allocated to the EU ETS and to the non-ETS sectors.To achieve their Kyoto targets, governments must therefore ensure that emissions in the non-ETS sectors are limited or reduced below their own non-ETS emission budget. They can also make use of international credits under the KP as long as this supplements domestic action. In order to assess the progress of Member States towards their Kyoto targets, it is not only relevant but also necessary to compare GHG emissions in the sectors not covered by the EU ETS with their corresponding targets.

5. To ensure that the EU-15 reaches its common target, all its Member States must achieve their respective burden-sharing target. Excess compliance units resulting from overachievement by some countries might not be available to the EU-15 for achieving compliance.

3.1 Emission targets under the Kyoto Protocol's first commitment period and the burden-sharing agreement

Under the KP, the EU-15 has committed to a common emission reduction target of – 8 % compared to base-year levels, to be achieved over a five-year commitment period (from 2008 to 2012). 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 (see Figure 3.1).

The EU-28 does not have a Kyoto target: the protocol was ratified before 2004, and 13 countries became EU Member States after. Eleven of these EU-13 Member States have individual targets under the KP, while Cyprus and Malta do not have targets.

Of the other EEA member countries Iceland, Liechtenstein, Norway and Switzerland have individual targets under the KP. Turkey, which acceded to the KP in February 2009, has no quantified emission reduction commitment. Despite being an Annex I party to the UNFCCC, Turkey is not included in the KP's Annex B because it was not party to the UNFCCC when the KP was adopted ([19]). Cyprus and Malta also have no quantified emission reduction or limitation commitment. Both countries are parties to the KP; Malta became an Annex I party to the convention at the end of 2010, and in July 2011, Cyprus submitted a proposal to be added to the Annex ([20]).

3.2 Achieving 2008–2012 objectives: the 'Kyoto compliance equation'

To comply with its objective under the KP, a party must keep its total GHG emissions during the five years of the KP's first commitment period (2008–2012) within a specific emission budget. In other words, total GHG emissions during that period must remain equal to or below the party's assigned amount, which is the total quantity of valid Kyoto units it holds (within its registry). One Kyoto unit corresponds to 1 tonne of CO_2-equivalent emissions.

Each party's assigned amount is equal to:

- an initial assigned amount, determined according to the party's base-year emissions and its Kyoto target, and measured in assigned amount units (AAUs);
- **plus/minus** any additional Kyoto units that the party has acquired from or transferred to other parties through the Kyoto mechanisms (CERs from CDM projects, ERUs from JI projects or AAUs from international emissions trading (IET) between governments);
- **plus/minus** any additional Kyoto units that the party has issued/cancelled for net removals/ emissions from a LULUCF activity (removal units (RMUs)).

To comply with its Kyoto obligations, a party needs to satisfy a 'Kyoto compliance formula', which can be summarised as follows:

'2008–2012 total GHG emissions' ≤ 'total Kyoto units'

With: '**total Kyoto units**' = 'initial assigned amount (AAUs)' + 'use of flexible mechanisms (AAUs + CERs + ERUs)' + 'carbon sink removals (RMUs)'

Therefore, to achieve its target, a party can act on two sides of the 'compliance equation':

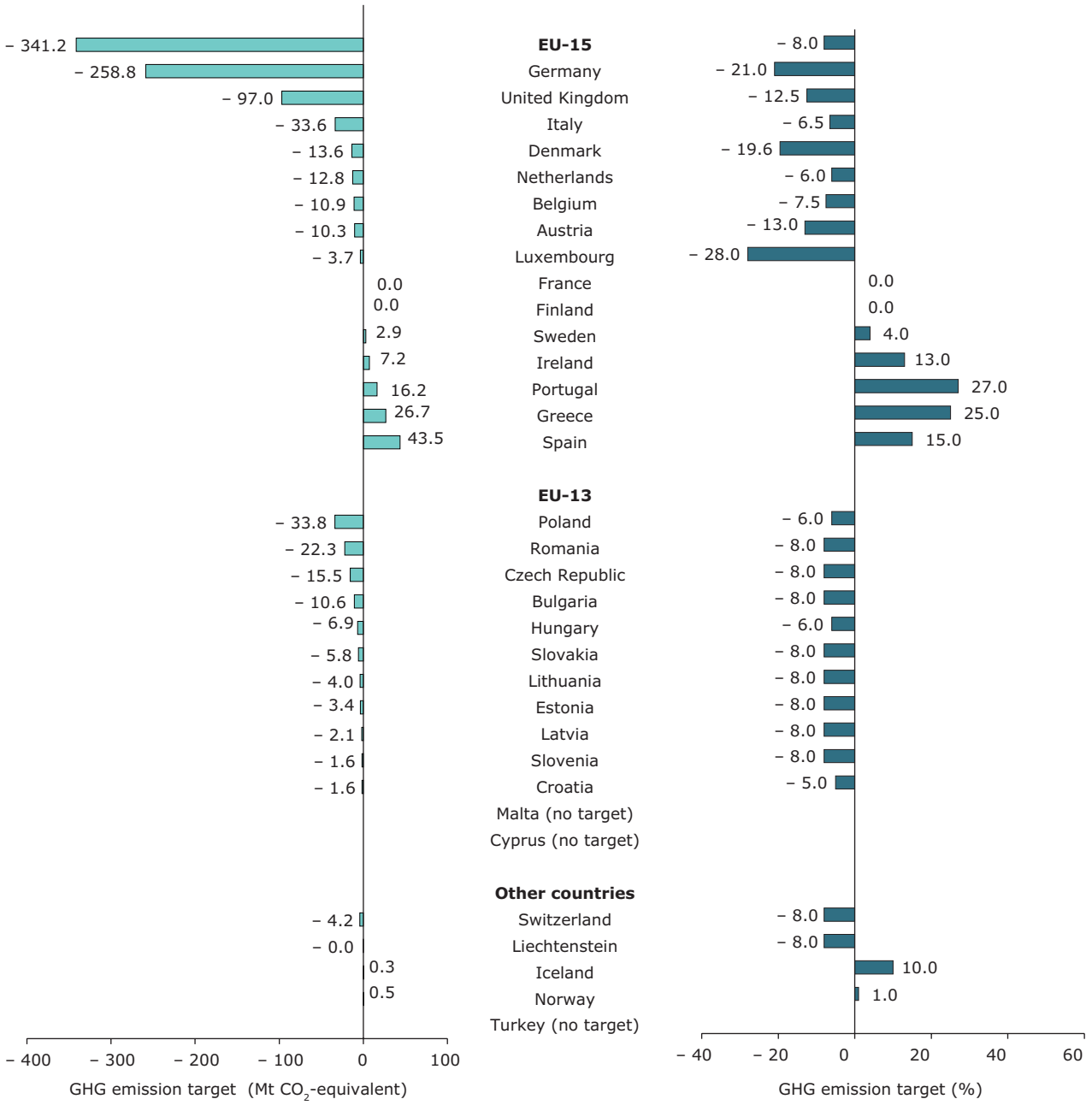
- **emissions**: emissions can be limited or reduced by acting at national level;
- **assigned amount**: the assigned amount can be increased by acquiring additional Kyoto units at international level and by further enhancing CO_2 removals by carbon sinks and reducing GHG emissions from land activities.

Compliance of EU-15 Member States under the internal EU Burden-Sharing Agreement relies on the same principles, with each Member State's initial assigned amount being determined according to its individual burden-sharing target, instead of the – 8 % reduction target of the whole EU-15 under the KP.

After final emissions have been reported and reviewed for the entire commitment period, parties to the KP will have 100 days to undertake final

([19]) See also UNFCCC's KP target information online (UNFCCC, 2013).
([20]) See also UNFCCC, 2011.

Figure 3.1 Average annual GHG emission targets in Europe under the KP (2008–2012) relative to base-year emissions (absolute and relative)

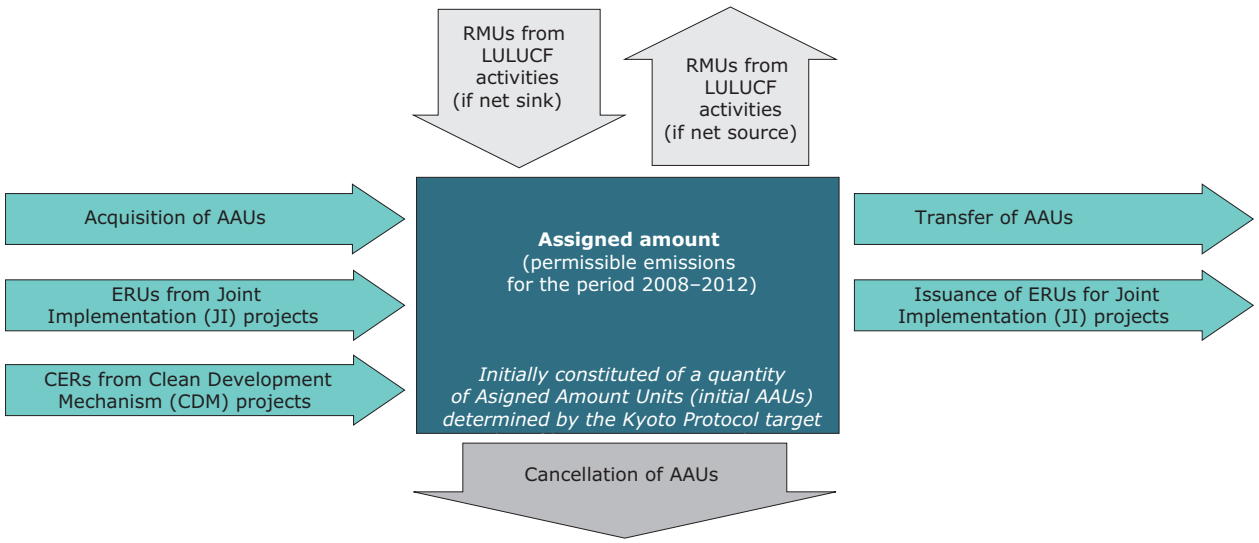


Note: The final emission levels allocated to the EU and each Member State were established after completion of the reviews of the initial reports pursuant to Article 8 of the KP in 2008. To account for Denmark's exceptionally low base-year emissions compared to other years, Denmark received 5 million AAUs from the Union registry for the first commitment period under the KP, which is already reflected in numbers above (EC, 2010b).

Source: EEA, 2006; EC, 2006b; EC, 2010b.

transactions necessary to achieve compliance with their commitment (the 'true-up period'). A final Kyoto compliance assessment will therefore not be possible before the end of 2014 or beginning of 2015. The assessment presented in this report is based on preliminary data for the commitment period. It gives an indication of countries' progress in relation to their emission reduction targets at the end of 2012, but cannot predict whether a country will finally be compliant.

Figure 3.2 Possible changes in an assigned amount under the KP



Note: AAU: assigned amount unit; CER: certified emission reduction; CDM: clean development mechanism; ERU: emission reduction unit; JI: joint implementation; RMU: removal unit; LULUCF: Land Use, Land-Use Change and Forestry.

3.3 Role of the Emission Trading System in the achievement of Kyoto targets

By setting cap levels under the ETS, EU Member States — as well as Liechtenstein, Norway and Switzerland — have shared the national effort required to reach their Kyoto target among the sectors covered by the ETS and the other sectors.

The EU ETS is a domestic EU policy which aims at achieving cost-efficient emission reductions by setting emission targets to operators (primarily of industrial installations and power plants) in the EU. Operators have a choice between reducing their own emissions, and purchasing carbon allowances (or CDM/JI credits) on the European carbon market whenever this is more cost-effective. For more information on the EU ETS, please refer to Chapter 2.

The EU ETS is linked to the flexible mechanisms under the KP. Any trading or transfer of EUAs, which serve the purpose of proving compliance of an operator under the EU ETS, implies the transfer of an equal quantity of AAUs under the KP between Member States or within a Member State.

Following the introduction of the EU ETS and the finalisation of the second NAPs, EU Member States as well as Liechtenstein and Norway (who joined the ETS in 2008) have determined national caps for the emissions from sectors covered by the EU ETS for the first commitment period of the KP. These caps correspond to a certain number of Kyoto units being transformed into EU emission allowances and allocated/sold to EU ETS operators. In so doing, these countries have fixed the overall contribution of the EU ETS to reach their burden-sharing or Kyoto target, and they have indirectly determined the number of Kyoto units to remain for the other sectors not covered by the EU ETS (such as buildings, transport or agriculture). Hence, they have assigned themselves a 'non-ETS target' for 2008 to 2012, equivalent to their initial assigned amount reduced by the ETS cap that they have determined.

In other words, governments have split their Kyoto emission budgets into two: one budget is allocated to the sectors covered by the ETS, where total emissions are capped under EU or national law and the distribution of abatement measures among sources is determined by market forces within the trading mechanism; the remaining budget is allocated to non-ETS sectors. Since national caps have been fixed for the 2008–2012 trading period of the EU ETS, the situation is as follows ([21]):

([21]) Instead of the caps fixed in the national allocation plan decisions, EUAs issued to the trading sector (the sum of free allocation and auctions/sales) were used for the calculation. This is because allowances remaining in the NER at the end of the trading period that are not sold to the market might be used to achieve the national Kyoto target. Most Member States have not yet decided how to use remaining allowances. Ireland reported the quantity of unused allowances they expect to remain in the NER, which is intended to be used towards achieving its burden-sharing target. As Member States which decided to sell the allowances remaining in the NER on the market could do so beginning of 2013, in this report it was assumed that those not sold are likely to be used for Kyoto compliance.

- Governments must reach their Kyoto or burden-sharing targets through emission reductions from policies and measures addressing the sectors **not** covered by the ETS and/or through flexible mechanisms. A country's progress towards its Kyoto target is therefore determined by comparing its emissions in non-ETS sectors with its emission budget for the non-ETS sectors.

- Emission levels in the sectors covered by the ETS result in the trading of allowances at ETS level, but do not influence the achievement by a country of its Kyoto or burden-sharing target, since ETS operators are legally bound to surrender to their government an amount of allowances equivalent to their emissions.

To comply with their Kyoto obligations, countries with an emission trading scheme in the 2008 to 2012 period and which have an individual Kyoto target (all countries except Croatia, Cyprus and Malta), must satisfy the following equation:

Total GHG emissions
≤
'initial assigned amount' − 'allowances issued under the ETS' + 'allowances surrendered under the ETS' + 'use of flexible mechanisms at government level' + 'carbon sink removals'

With: '**allowances issued under the ETS**' = 'free allocation 2008–2012 ETS' + 'ETS auctions/sales for the period 2008–2012 ' and '**allowances surrendered under the ETS**' = allowances, ERUs and CERs surrendered by ETS operators for compliance under the EU ETS.

As the amount of surrendered allowances corresponds to ETS verified emissions, we can also write:

Total GHG emissions − ETS verified emissions
≤
'initial assigned amount' − 'allowances issued under the ETS'
+ 'use of flexible mechanisms at government level' + 'carbon sink removals'

This condition for compliance under the KP is also equivalent to:

Non-ETS GHG emissions
≤
'non-ETS cap' + 'use of flexible mechanisms at government level' + 'carbon sink removals'

This method is used in Chapter 4 to assess progress towards Kyoto and burden-sharing targets in Europe.

In Switzerland too, an emission trading system has been applied, which is also linked to the flexible mechanisms under the KP, therefore in the following assessment it is treated in parallel to the EU ETS.

In the last year of the second trading period, the EU ETS has been extended to the aviation sector (see Section 2.2.2). For the following analysis, verified emissions and free allowances of the aviation sector have not been taken into account, as aviation was not included in the initial Kyoto fulfilment plans. Here the EU ETS is exclusively referring to emissions and allowances of stationary installations.

3.4 Increasing assigned amounts through carbon sinks and use of international credits

The total quantity of valid emission allowances (Kyoto units) held by Member States within their national registry (their assigned amounts) and subsequently the target for the sectors that are not covered by the EU ETS, can be modified by the following means:

- Accounting for CO_2 removals from carbon stock changes, under Article 3.3 and Article 3.4 of the KP.

- Use of the Kyoto mechanisms at government level (JI, CDM and IET).

3.4.1 Carbon sinks

In addition to policies and measures targeting sources of GHG emissions, Member States can use policies and measures to protect their existing terrestrial carbon stocks (e.g. by reducing deforestation and forest degradation, devegetation, and land degradation) and to further enhance terrestrial carbon stocks (e.g. by increasing the area or carbon density of forests by afforestation and reforestation, rehabilitating degraded forests, and

altering the management of forest and agricultural lands to sequester more carbon in biomass and soil). These LULUCF activities include the following:

- afforestation, reforestation and deforestation since 1990 (mandatory activities covered by Article 3.3 of the KP), which encompass lands that have been subject to direct, human-induced conversion from a non-forest to a forest state, or vice versa;

- forest management (FM) ([22]), cropland management, grazing land management and revegetation (voluntary activities under Article 3.4 of the KP), which encompass lands that have not undergone conversion since 1990, but are otherwise subject to a specific land activity.

Parties account for net emissions or removals for each activity during the commitment period by issuing RMUs in the case of net GHG removals from LULUCF activities, or cancelling Kyoto units in the case of net source of GHG emissions. LULUCF activities can therefore be used to compensate emissions from other sources if removals are higher than emissions from this sector. The number of RMUs that can be issued by each party under Article 3.4 'Activity forest management' is capped (according to UNFCCC, 2006a). Thus, issued RMUs corresponding to this activity might be lower than the carbon removals from FM that are actually reported.

RMUs can be accounted for at the end of the first commitment period or annually. According to Decision 13/CMP.1, parties must indicate the frequency of accounting with their initial reports. For each activity under Article 3.3 and Article 3.4, parties have chosen whether they want to account annually during the commitment period or only once at the end of this period. The decision on the frequency determines when parties may issue RMUs or cancel other units in the case of emissions from Article 3.3 and Article 3.4 activities. Of the countries assessed in this report, Denmark, France, Hungary, Liechtenstein and Switzerland have opted for annual accounting.

Actual accounted emissions from KP LULUCF activities were calculated according to the IPCC guidelines and the respective accounting rules for the Member States. One important rule relates to debit compensation under Article 3.3: if Member States have net emissions from Article 3.3 activities (Article 1 and Article 2), they can increase their FM cap by this amount of net emissions, with condition that FM sink is larger than the cap. The KP LULUCF accounting tables provide cumulative data for all years of the commitment period. Thus, these values were divided by the number of reported years except for forest management where the cap applies to five years, and therefore the total cap should be divided by five (see results in Table 4.2).

3.4.2 Kyoto mechanisms

As an additional means of meeting commitments under the KP, parties may use three market-based mechanisms to lower the overall costs of achieving emission targets for the commitment period from 2008 to 2012:

- project-based mechanisms in industrialised countries (JI);

- CDM in developing countries;

- IET, which allows countries that have achieved emission reductions beyond those required by the KP to sell their surplus Kyoto units to countries finding it more difficult or expensive to meet their commitments.

Use of these mechanisms must be 'supplemental to domestic action' to achieve KP targets.

3.5 Implications of target over-delivery by some EU-15 Member States

A Member State that limits or reduces its domestic emissions below its assigned amount would hold an amount of unused AAUs (or other unit types) by the end of the commitment period (Figure 3.3).

By the end of the commitment period, a Kyoto unit held by a party within its national registry can be:

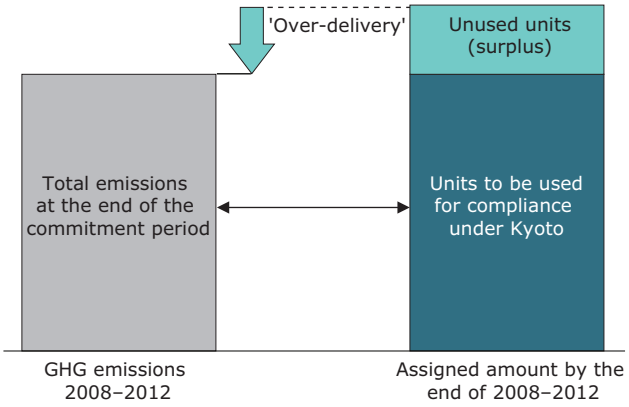
- transferred to another party's registry (e.g. under **international** emissions trading);

- 'retired', i.e. used towards meeting a Kyoto or burden-sharing commitment; or

- cancelled, i.e. this unit would not be further transferred or used towards meeting a Kyoto or burden-sharing commitment.

([22]) The amount accountable for forest management is restricted by country-specific caps which are, in most cases, only a fraction of the anticipated uptake.

Figure 3.3 Target over-delivery and surplus assigned amount



In addition, the KP allows parties holding surplus units by the end of the commitment period to request that these units (with the exception of RMUs ([23])) be carried over to the subsequent commitment period, subject to applicable rules. Without restriction, such banking may have considerable negative effects on the environmental integrity of a future climate agreement and on the comparability of efforts among Annex I parties.

If surplus AAUs held by an EU-15 Member State by the end of the commitment period are retired or transferred through the flexible mechanisms, to be subsequently retired either to another EU-15 Member State or to the European Union, the EU-15 would benefit from these AAUs; it would be able to fill any shortfall of units left by Member States not able to meet their burden-sharing target.

If surplus AAUs held by an EU-15 Member State by the end of the commitment period are transferred to another Party outside the EU-15, cancelled or banked for use in a subsequent commitment period, the EU-15 would not be able to benefit from these units for its compliance. The extent of the over-delivery currently projected would subsequently be reduced.

There is certainty that such a situation will occur in at least one EU-15 Member State for part of the potentially surplus AAUs ([24]), but other Member States could adopt similar strategies. As it cannot be taken for granted that any other EU-15 Member State will make surplus Kyoto units available to the EU-15 for its compliance, the EU-15 relies on each single EU-15 Member State to achieve its own burden-sharing target. Any Member State not complying with its target could lead to non-compliance for the EU-15 as well.

Any shortfall in emission reductions, in particular in the sectors not covered by the EU ETS, will have to be compensated for by the acquisition of additional Kyoto units through Kyoto mechanisms. The Kyoto mechanisms will, in practice, act as a safety valve: parties, under the KP, can undertake final transactions necessary to comply with their commitment during a 100-day period after the 2008–2012 period emissions have been reported in 2014 and reviewed by the UNFCCC (the 'true-up period').

3.6 Post-2012 emission reduction commitments in Europe under the Kyoto Protocol

At the 2012 Conference of the Parties (COP18/CMP.8) in Doha, Qatar, amendments to the KP to establish the second commitment period was adopted in decision 1/CMP.8. The set of amendments to the KP, including includes a new Annex B with QELRCs (quantified emission limitation and reduction commitment) for Annex I parties that intend to take part in such second commitment period.

QELRC

A QELRC describes the level of assigned amounts (see Section 3.1) as a percentage of a party's base-year emissions. It is calculated using the following formula:

$$\text{QELRC} = \frac{\text{Total allowed emissions during commitment period}}{\text{Base-year emissions x length commitment period}} = \frac{\text{Average annual allowed emissions}}{\text{Base-year emissions}}$$

([23]) See Decision 13/CMP.1 16.of the Report of the Conference of the Parties (UNFCCC, 2006b).

([24]) In the United Kingdom, the Carbon Accounting Regulations 2009 ensure that any carbon units, in the carbon credit account, in excess of the United Kingdom's first carbon budget (which requires greater emissions reductions than the country's Kyoto target) are cancelled, and therefore are not used to offset GHG emissions in the United Kingdom or in any other country during the first commitment period.

The QELRC for the EU and its Member States for the second commitment period is a 20 % emission reduction during the period 2013–2020 compared to the base year (1990 for most Member States). This decision translated the EU's 2020 target pledge into an emission budget for a second commitment period under the KP based on the legislation adopted under the EU Climate and Energy Package.

The scope of existing EU legislation implementing its 20 % commitment is different from the scope of the second commitment period, which is why the total allowed emissions or 'emissions budget' under the Climate and Energy Package cannot be used directly in the calculation of the corresponding QELRC. The main differences between the Climate and Energy Package and the second commitment period which have been taken into account in determining the provisional information on QELRCs are the following:

- International aviation: international aviation is included in the Climate and Energy Package and its overall 20 % reduction target, while its emissions from international aviation are not accounted for under the KP.
- LULUCF: the LULUCF sector in the EU is not included in the 20 % target under the Climate and Energy package, but is accounted for under the KP according to the relevant decisions made in Durban.
- Inclusion of nitrogen trifluoride (NF_3): NF_3 is not included in the Climate and Energy Package, whereas the scope of the second commitment period has been extended to include the additional gas. The impact of NF_3 on aggregate EU emissions is insignificant.
- Base years: The EU 2020 target uses 1990 as the base year, while it was agreed in Durban to continue with the same flexibilities to set a different base year which applied to the first commitment period.

In the amendment of the KP, it is already documented that Croatia and Iceland will jointly fulfil their emission reductions commitments with the EU and their QELRCs. A QELRC for Iceland in Annex B in the amendment to the KP for the second commitment period is therefore the same as for the European Union, its 27 Member States, and for Croatia. QELRCs for the second commitment period have also been adopted for Liechtenstein, Norway and Switzerland (see Table 3.1).

Table 3.1 Overview table of QELRCs submitted by European countries

Party	Base-year emissions Mt CO_2-equivalent	QELRC submitted by parties (2013–2020) % of base-year emissions	Average annual emissions in the commitment period consistent with the QELRC Mt CO_2-equivalent
EU-27	5 736.2	80.0	4 588.9
Croatia ([a])	31.3	80.0	22.4
Iceland	3.5	80.0	2.8
Liechtenstein	0.2	84.0	0.2
Norway	49.8	84.0	41.8–40.3
Switzerland	53.1	84.2	44.7–41.2

Note: ([a]) Base-year emissions for Croatia are those from the KP commitment period. For the other countries, base-year emissions for the post-2012 period are not the same as for the first commitment period (see Table 1.1. Preliminary base-year emissions have been taken from 'Analysis of quantified emission limitation and reduction commitments expressed as percentage of base year and absolute emission levels' prepared by the secretariat at the request of Parties (17 August 2012). Base-year emissions for the post-2012 period will not be fixed and will depend on most actual inventory.

Source: UNFCCC, 2012; FCCC/KP/CMP/2012/13/Add.1: Decision 1/CMP.8.

4 Current progress towards 2008–2012 Kyoto targets

Key messages

1. Based on GHG emission data covering the entire KP's first commitment period 2008–2012, almost all European countries with an individual GHG limitation or reduction target under the KP (twenty-six EU Member States, Iceland, Liechtenstein, Norway and Switzerland) are on track towards achieving their respective targets. This compares favourably to assessments in previous years.
2. Six EU-15 Member States (Finland, France, Germany, Greece, Sweden and the United Kingdom), all eleven of the EU-13 (i.e. those joining after 2004) Member States with a Kyoto target as well as Iceland and Norway are on track to achieve their target through domestic reductions only. When removals from carbon sink activities are also taken into account, three additional EU-15 Member States (Ireland, Portugal and Slovenia) are also on track towards their respective targets.
3. The relative gaps between average 2008–2012 non-ETS emissions and their respective budgets are the largest in Austria, Denmark, Luxembourg and Spain. Since overachievements in the ETS cannot be used to counter-act shortfalls in the non-ETS sectors (apart from the possibility to use remaining allowances from new entrants reserves), these Member States intend to close the gap by making use of flexible mechanisms of the KP. Belgium, Italy, Liechtenstein, the Netherlands and Switzerland will also have to purchase international emission credits to achieve their respective targets.
4. The quantities of Kyoto units that Austria, Liechtenstein, Luxembourg and Spain intend to acquire in order to achieve compliance represent 20 %, 20 %, 21 % and 13 % of their respective base-year emissions (not accounting for the quantities actually used by EU ETS operators), to be compared with Kyoto targets of – 13 %, – 8 %, – 28 % and + 15 %.
5. In Italy, the amount of credits which would be necessary to be on track represents only 1.1 % of base-year emissions. However, Italy remains the only EU-15 Member State using flexible mechanisms that has not provided information on the amount of credits it intends to purchase, nor on the financial resources allocated for this purpose.
6. The EU-15 is on track towards its 8 % reduction target, compared to base-year levels under the KP. Total average emissions of the EU-15 in the 2008–2012 period have declined by 12.2 % compared to base-year levels. Overall, the combined performance of all EU-15 Member States is equivalent to an overachievement of approximately 236 Mt CO_2-equivalent per year (5.5 % of the EU-15's base-year emissions). This corresponds to the following contributions:
   - Non-ETS emissions in the EU-15 during the period from 2008 to 2012 were lower than the relevant emission budget by 95 Mt CO_2-equivalent per year, which represents an overachievement equivalent to 2.2 % of total EU-15 base-year emissions.
   - Carbon sink activities are expected to contribute towards an additional emission reduction of 64 Mt CO_2-equivalent per year (1.5 % of EU-15 base-year emissions), based on data for the period 2008–2011.
   - The use of flexible mechanisms by nine EU-15 Member States is expected to represent an increase in the overall EU emission budget by 81 Mt CO_2-equivalent per year (1.9 % of EU-15 base-year emissions). Eight of these Member States have reported information on allocated financial resources, which represent a total amount of EUR 2 351 million for the whole five-year commitment period.
7. Final compliance under the KP will not be determined before 2015. After GHG emission data for the whole period and accounting of LULUCF activities is officially submitted under the UNFCCC in 2014 and subsequently reviewed, KP Parties will still have the possibility to undertake final transactions to achieve compliance with their Kyoto commitment during a 100-day period after final emissions for the commitment period have been reported and reviewed (the 'true-up period').

4.1 Total emission levels

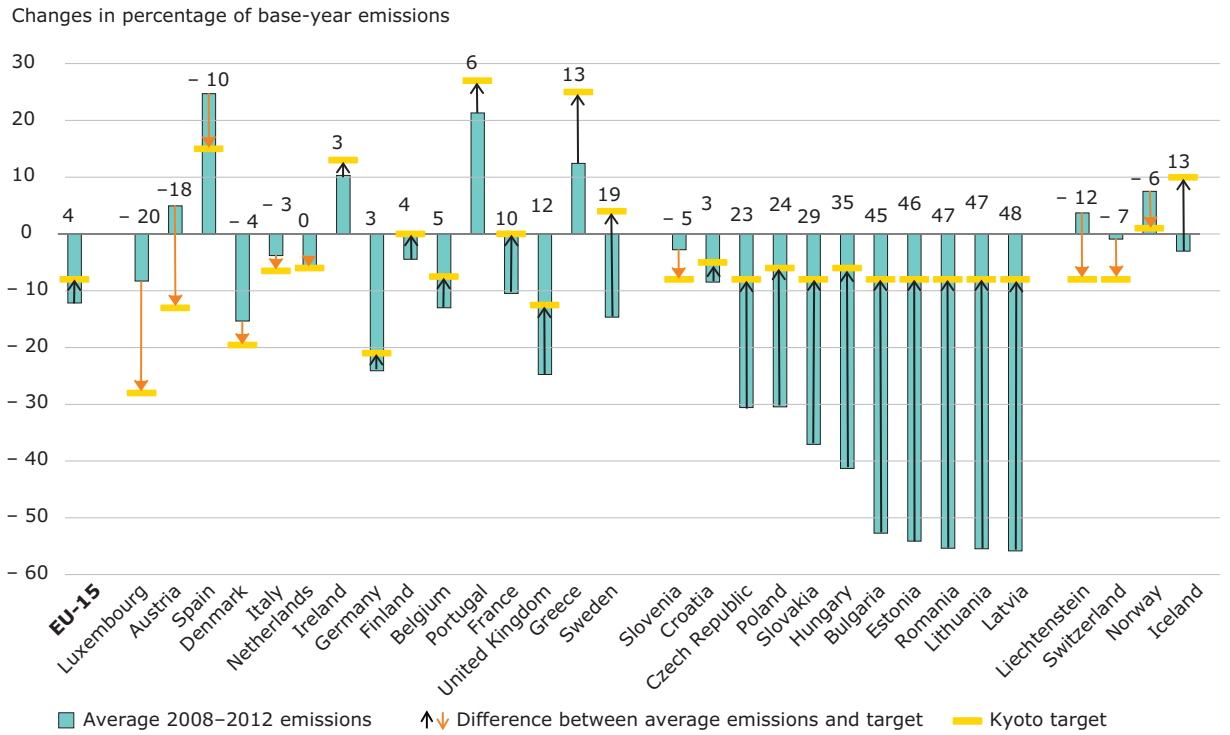
National GHG inventories are available for the period 2008–2011, i.e. the four years of the first commitment period under the KP.

Approximated GHG inventories for GHG emissions were also calculated by a number of Member States and the EEA (EEA, 2013g), making emission data for 2012 available for all Member States, Norway (Norway, 2013) and Switzerland (Switzerland, 2013b). No proxy data are available for Iceland and Liechtenstein: for the purpose of the assessment, 2012 total or non-ETS emissions have been assumed to remain at the same level as in 2011.

Based on these estimates, a comparison between total emissions and targets for the whole period 2008–2012 can be made although it is purely indicative, showing only how domestic emission levels compare with initial assigned amounts. Such comparison does not provide a full and accurate picture of the actual progress of countries towards their respective targets, because it does not reflect any change in Kyoto accounting units, i.e. the accounting side of the Kyoto compliance equation. In particular, it does not take into account the effect of the allocation of allowances under emissions trading schemes such as the EU ETS ([25]) on the assigned amounts that are available to achieve the Kyoto targets (see Section 3.3). Furthermore, the removal of atmospheric CO_2 through LULUCF activities and the use of Kyoto mechanisms may further modify the countries' assigned amounts and help countries achieve their targets.

In 20 of the 30 European countries which have a Kyoto target and are assessed in this report,

Figure 4.1 Average gaps between total GHG emissions and Kyoto or burden-sharing targets (without the use of carbon sinks and flexible mechanisms), 2008–2012



Note: Each bar represents the percentage change of domestic emissions compared to base-year emissions; the red line represents the Kyoto or burden-sharing target in relation to base-year emissions. The numbers represent the gap between emissions and targets, expressed in percentage of base-year emissions. A positive value (and black arrow pointing up) indicates that total emissions were lower than the Kyoto or burden-sharing target. A negative value (and orange arrow pointing down) indicates that total emissions were higher than the Kyoto or burden-sharing target.

Due to the unavailability of (complete) approximated 2012 GHG emission estimates, constant 2011 emissions have been assumed in the following cases: Liechtenstein (constant non-ETS emissions) and Iceland (total emissions).

Cyprus, Malta and Turkey are not represented as they do not have a 2008–2012 Kyoto target.

Source: EEA, 2013a; EEA, 2013c; EEA, 2013d; Norway, 2013; Switzerland, 2013b.

([25]) All EU Member States (bar Croatia), Iceland, Norway and Liechtenstein participate in the EU ETS in 2012, Croatia joined the scheme in 2013. Switzerland has its own emissions trading scheme.

average 2008–2012 GHG emissions were below the respective Kyoto target. Figure 4.1 compares Kyoto or burden-sharing targets (expressed in relative terms) with average 2008–2012 emissions in relation to base-year emissions. Within the EU-15, Austria, Luxembourg and Spain show the largest differences between their average total emissions and their respective targets.

4.2 Emission levels in non-ETS sectors

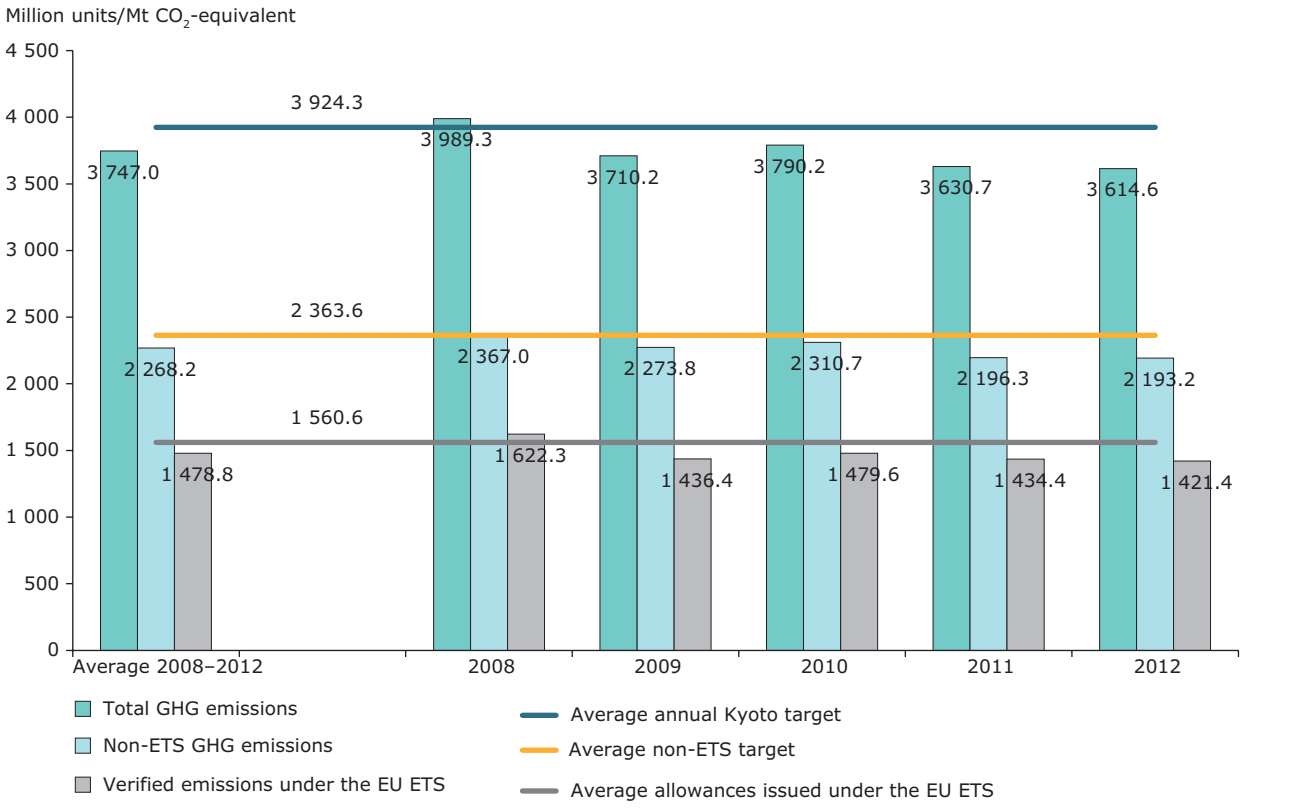
In this section, the analysis focuses only on domestic emission limitation and reductions achieved by European countries against their respective targets. This analysis is complemented in the following section by information on the planned use of flexible mechanisms and carbon sinks by governments.

As discussed in Section 2.3, an accurate assessment of current progress towards Kyoto targets in the EU must be based on a comparison of non-ETS emissions (calculated as the difference between total GHG emissions and verified emissions under the EU ETS during the 2008–2012 period) with the relevant 'non-ETS target' for Member States (calculated as the difference between initial AAUs and the quantity of allowances actually allocated — for free or sold — to operators under the EU ETS between 2008 and 2012 ([26])).

4.2.1 2008–2012 emission trends of the EU-15

Total GHG emissions were higher in 2008 than the annual average Kyoto target and lower in the years from 2009 to 2012. This is true both for the EU ETS and the non-EU ETS sector, from 2009 onwards aggregated emissions in both sectors remained below their maximum permissible level (Figure 4.2). In 2009, there was a very sharp 7 % decrease of GHG emissions in the EU-15 compared to 2008. Alongside falling emissions linked to the economic recession,

Figure 4.2 Total, ETS and non-ETS emission trends in the EU-15 compared to their respective targets, 2008–2012



Note: Only data of stationary installations under the EU-ETS have been considered because the sector of aviation was not included in the initial Kyoto fulfilment plans.

Source: EEA, 2013a; EEA, 2013b; EEA, 2013c; EEA, 2013d.

([26]) See Section 2.3 for details on allocated allowances to EU ETS sectors.

an important reason was the strong growth in renewable energy deployment, particularly wind, solar and biomass, leading to a significant increase in the share of renewables in electricity production. Hence, although emissions decreased in all emitting sectors between 2008 and 2009, the largest emission reductions occurred in sectors covered by the EU ETS, where the decrease reached 11 %. By contrast, non-ETS emissions decreased by 4 %. In absolute values, the ETS reduction was twice that of non-ETS sectors. For further analysis on developments of emissions in ETS and non-ETS sector see Section 2.4 and Section 5.3.

4.2.2 Domestic gaps to targets

By the end of 2012, six EU-15 Member States, ten EU-13 Member States and two EEA member countries had reached an average non-ETS emissions level below their respective average Kyoto targets (i.e. domestic emissions in the sectors not covered by the EU ETS) (see Table 4.1 and Figure 4.3).

For the EU-13 Member States, the current situation is mainly due to the substantial emission reductions that took place in the 1990s in these countries and the fact that Kyoto targets are based on emissions before this decline. Since the end of the 1990s emissions have mostly increased in these countries but without reaching former levels.

At the EU-15 level, average annual emissions for the period from 2008 to 2012 in the sectors not covered by the ETS were lower than the corresponding 'non-ETS target' by 95.4 Mt CO_2-equivalent per year on

Table 4.1 Current progress towards Kyoto or burden-sharing targets based on historic domestic GHG emissions (assuming no use of flexible mechanisms or LULUCF)

Country grouping	Average 2008–2012 emissions in sectors not covered by the EU ETS < Target for sectors not covered by the EU ETS	Average 2008–2012 emissions in sectors not covered by the EU ETS > Target for sectors not covered by the EU ETS
EU-15	EU-15 Finland France Germany Greece Sweden United Kingdom	EU-15 (no overachievement) Austria Belgium Denmark Ireland Italy Luxembourg Netherlands Portugal Spain
EU-13 Member States with Kyoto targets	Bulgaria Croatia ([a]) Czech Republic Estonia Hungary Latvia Lithuania Poland Romania Slovakia	Slovenia
Other EEA member countries with Kyoto targets	Iceland ([a]) ([b]) Norway	Liechtenstein ([b]) Switzerland ([c])

Note: Target = (average annual Kyoto or burden-sharing target — average annual allocation in the EU ETS between 2008 and 2012), excluding planned use of Kyoto mechanisms by governments and carbon sinks. The Kyoto or burden-sharing target corresponds to the initial assigned amount of each country.

Allocation: allowances freely allocated or auctioned/sold under the EU ETS in the years from 2008 to 2012.

'EU-15 (no overachievement)' corresponds to the situation of the EU-15 where all surplus AAUs from target overachievement in the EU-15 are not taken into account, to reflect the possibility that Member States with a surplus could use any remaining allowances for their own purposes, and not necessarily make them available to compensate for Member States with a shortfall.

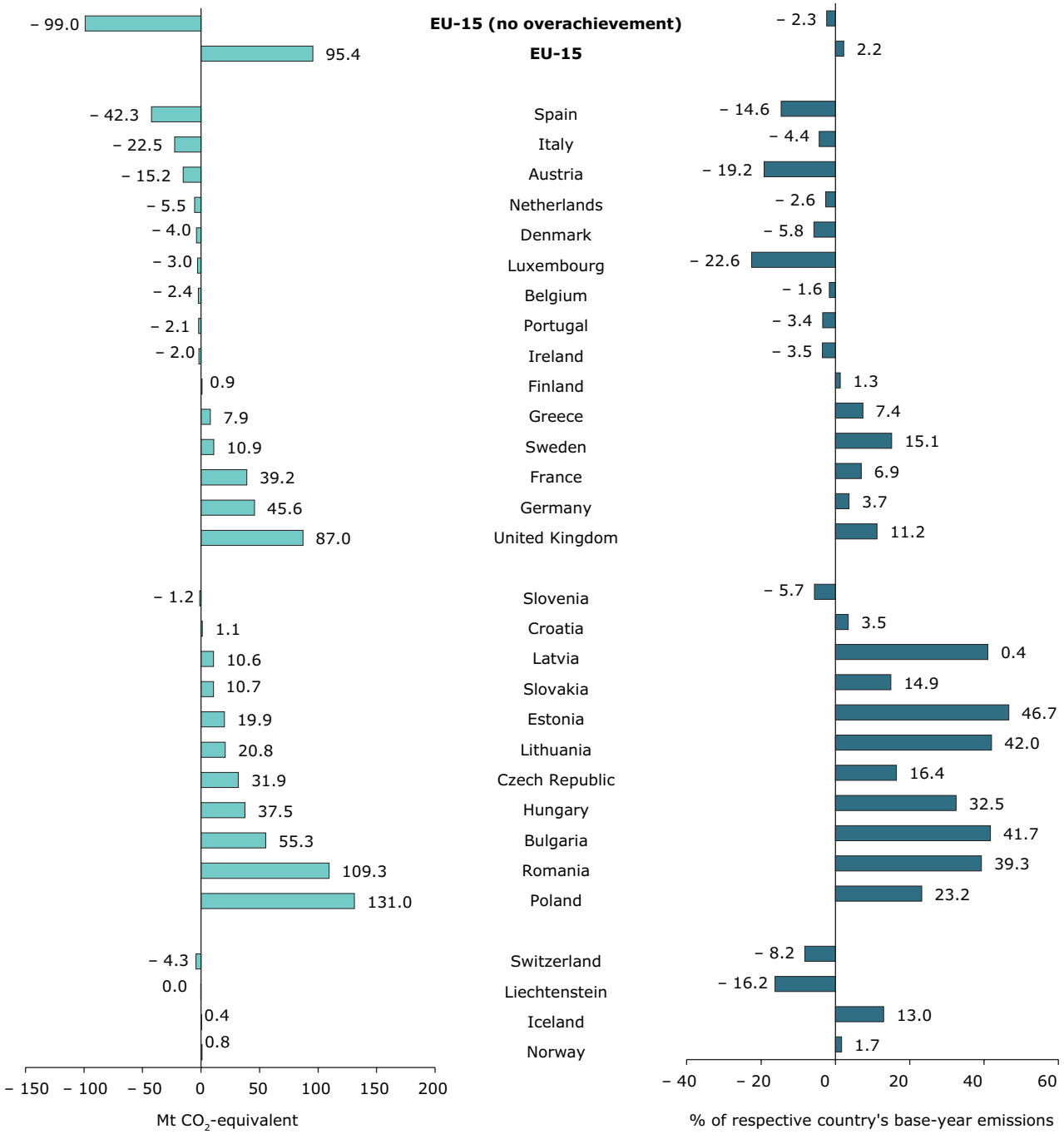
([a]) Assessment based on total emissions (no allocation to stationary installations under the EU ETS).

([b]) Assessment based on assumption that total GHG emissions 2012 (Iceland) or non-ETS emissions (Liechtenstein) did not change compared to 2011 (as no approximated 2012 GHG estimates are available).

([c]) Switzerland has an Emission Trading System similar to the European System, therefore these ETS data have been treated in the same manner.

Source: EEA, 2013a; EEA, 2013b, EEA, 2013c, EEA, 2013d; Norway, 2013; Switzerland, 2013a; Switzerland, 2013b.

Figure 4.3 Average gaps between non-ETS emissions and Kyoto or burden-sharing targets (without the use of carbon sinks and flexible mechanisms), 2008–2012



Note: Absolute values in the left bar chart represent the gap between average 2008–2012 emissions in the non-ETS sectors and the relevant target (without accounting for the use of carbon sinks and Kyoto mechanisms).

Percentages in the right bar chart represent the same gap expressed as a share of base-year emissions.

A positive value indicates that average 2008-to-2012 emissions in the non-ETS sectors were lower than the average annual target.

For Croatia and Iceland, total emissions are used as these countries had no installations under the EU ETS during the period 2008–2012.

The data used in these calculations and the calculation process are presented in Section 4.7. The relevant numbers for this figure are presented in row 7 'Difference between target and GHG emissions (non-ETS, domestic)', column 'Average 2008–2012'.

Source: EEA, 2013a; EEA, 2013b; EEA, 2013c; EEA, 2013d; Norway, 2013; Switzerland, 2013a; Switzerland, 2013b.

average (see Figure 4.3), which represents an overachievement equivalent to 2.2 % of the EU-15 base-year emissions.

Figure 4.6 in Section 4.5 provides underpinning data for the gap calculation, also including data and results related to the use of flexible mechanisms and carbon sinks. The detailed data per country is provided in Section 4.7.

An overview of the countries with average emissions in non-ETS sectors below and above the target is presented in Section 4.1.

4.3 Contribution from carbon sinks

4.3.1 Reported information

The expected effect of LULUCF in the EU-15 corresponds to the average removal of an actual 64 Mt CO_2 per year of the commitment period (around 1.5 % of EU-15 base-year emissions (see Table 1.1 and tables in Section 4.7).

The actual values reported in the LULUCF inventories under the KP to the UNFCCC in May 2013 cover the period from 2008 until 2011. The assessment of actual progress towards Kyoto targets uses these 2008–2011 average values as approximated values for the five-year commitment period 2008–2012 (see Table 4.2 ([27])).

Data quality on the actual accounting of CO_2 emissions/removals from LULUCF has been rather poor in the first years of the first commitment period, as land use inventories were typically only conducted every few years. It is therefore possible that the estimates of the actual emissions/removals might therefore undergo some changes in the next inventory submissions. Nevertheless, the data quality of the LULUCF inventories under the KP has improved considerably.

The total EU-28 net removals from Article 3.3 activities from the 2013 KP LULUCF submissions (the accounting quantities for the period) amount to – 23 Mt CO_2-equivalent per year (average amount for the 2008–2011 period). The net sink from Article 3.4 activities amounts to – 61 Mt CO_2-equivalent per year. For these activities, the accounting quantities of forest management, cropland management, grazing land management and revegetation are considered, as described in Section 3.4.1. To account for removals under forest management activities, the allocation period of five years, together with the offset maximum of CO_2 sinks from forest management up to a country-specific upper limit (cap) have been taken into account.

The total accounting quantity of removals amounts to 64 Mt CO_2-equivalent per year for the EU-15 and 84 Mt CO_2-equivalent for the EU-28. The largest removals from actual LULUCF activities have been reported by Italy (17 Mt CO_2), Spain (11 Mt CO_2), Germany and Portugal (10 Mt CO_2 each) whereas net sources from this sector have been reported by Estonia, Netherlands, Belgium and Luxembourg.

4.3.2 Contribution to progress to targets

Taking into account the effect of carbon sinks and sources will allow three Member States (Ireland, Portugal and Slovenia) to close the gap existing between their domestic emissions in the non-ETS sectors and their respective targets (see Figure 4.3 and Table 4.3).

Four countries (Belgium, Estonia, Luxembourg and the Netherlands) reported net sources from this sector. For three of them (Belgium, Luxembourg and the Netherlands), current gaps are increasing while Estonia remains on track to meet its Kyoto target.

The average gap to target for EU-15 including the effect of carbon sinks and sources increases to 159 Mt CO_2-equivalent per year.

([27]) Estimated 'actual' annual accounting during the first commitment period is based on latest KP LULUCF submissions (updated May 2013). All LULUCF accounting rules have been applied in the calculation of the actual use of LULUCF (see application of the cap for Forest Management as contained in the appendix to decision 16/CMP.1).

Table 4.2 Actual (2008–2011) average annual emissions and removals from LULUCF activities

	Article 3.3	Article 3.4					Average used for calculation (2008–2012)
	Average net carbon stock change during 2008–2011	Forest Management [a]	Cropland Management	Grazing Land Management	Revegetation	Average net carbon stock change during 2008–2011	
	Mt CO_2-eq. per year	Mt CO_2-equivalent per year					
EU-28							
Austria	– 1.22	NA	NA	NA	NA	0.00	– 1.22
Belgium	0.22	NA	NA	NA	NA	0.00	0.22
Bulgaria	– 0.53	NA, NO	NA, NO	NA, NO	NA, NO	0.00	– 0.53
Croatia	0.25	– 1.22	NA	NA	NA	– 1.22	– 0.97
Cyprus	–	–	–	–	–	–	–
Czech Republic	– 0.14	– 1.17	NA	NA	NA	– 1.17	– 1.31
Denmark [b]	0.02	– 0.20	– 1.63	0.04	NA	– 1.79	– 1.78
Estonia	0.43	NA	NA	NA	NA	0.00	0.43
Finland	3.61	– 4.20	NA	NA	NA	– 4.20	– 0.59
France [b]	4.93	– 8.15	NA	NA	NA	– 8.15	– 3.23
Germany	– 5.44	– 4.55	NA	NA	NA	– 4.55	– 9.98
Greece	– 0.30	– 0.33	NA	NA	NA	– 0.33	– 0.63
Hungary [b]	– 1.15	– 1.06	NA	NA	NA	– 1.06	– 2.21
Ireland	– 3.40	NA	NA	NA	NA	0.00	– 3.40
Italy	– 6.59	– 10.19	NA	NA	NA	– 10.19	– 16.79
Latvia	0.08	– 1.32	NA	NA	NA	– 1.32	– 1.25
Lithuania	– 0.09	– 1.03	NA	NA	NA	– 1.03	– 1.12
Luxembourg	0.05	NA	NA	NA	NA	0.00	0.05
Malta	–	–	–	–	–	–	–
Netherlands	0.36	NA	NA	NA	NA	0.00	0.36
Poland	– 5.42	– 3.01	NA	NA	NA	– 3.01	– 8.43
Portugal	– 2.58	– 0.74	– 4.03	– 2.46	NA	– 7.23	– 9.81
Romania	0.52	– 4.56	NA	NA	1.01	– 3.54	– 3.02
Slovakia	– 0.36	NA	NA	NA	NA	0.00	– 0.36
Slovenia	0.23	– 1.55	NA	NA	NA	– 1.55	– 1.32
Spain	– 6.34	– 2.46	– 2.54	NA	NA	– 5.00	– 11.33
Sweden	1.82	– 3.94	NA	NA	NA	– 3.94	– 2.13
United Kingdom	– 2.29	– 1.36	NA	NA	NA	– 1.36	– 3.64
EU-15	**– 17.14**	**– 36.12**	**– 8.20**	**– 2.43**	**0.00**	**– 46.74**	**– 63.88**
EU-28	**– 23.33**	**– 51.04**	**– 8.20**	**– 2.43**	**1.01**	**– 60.65**	**– 83.97**
Other EEA member countries							
Iceland	– 0.13	NA	NA	NA	– 0.16	– 0.16	– 0.29
Liechtenstein [b]	0.00	NA	NA	NA	NA, NO	0.00	0.00
Norway	2.02	– 1.47	NA	NA	NA	– 1.47	0.55
Switzerland [b]	0.17	– 1.83	NA	NA	NA	– 1.83	– 1.66

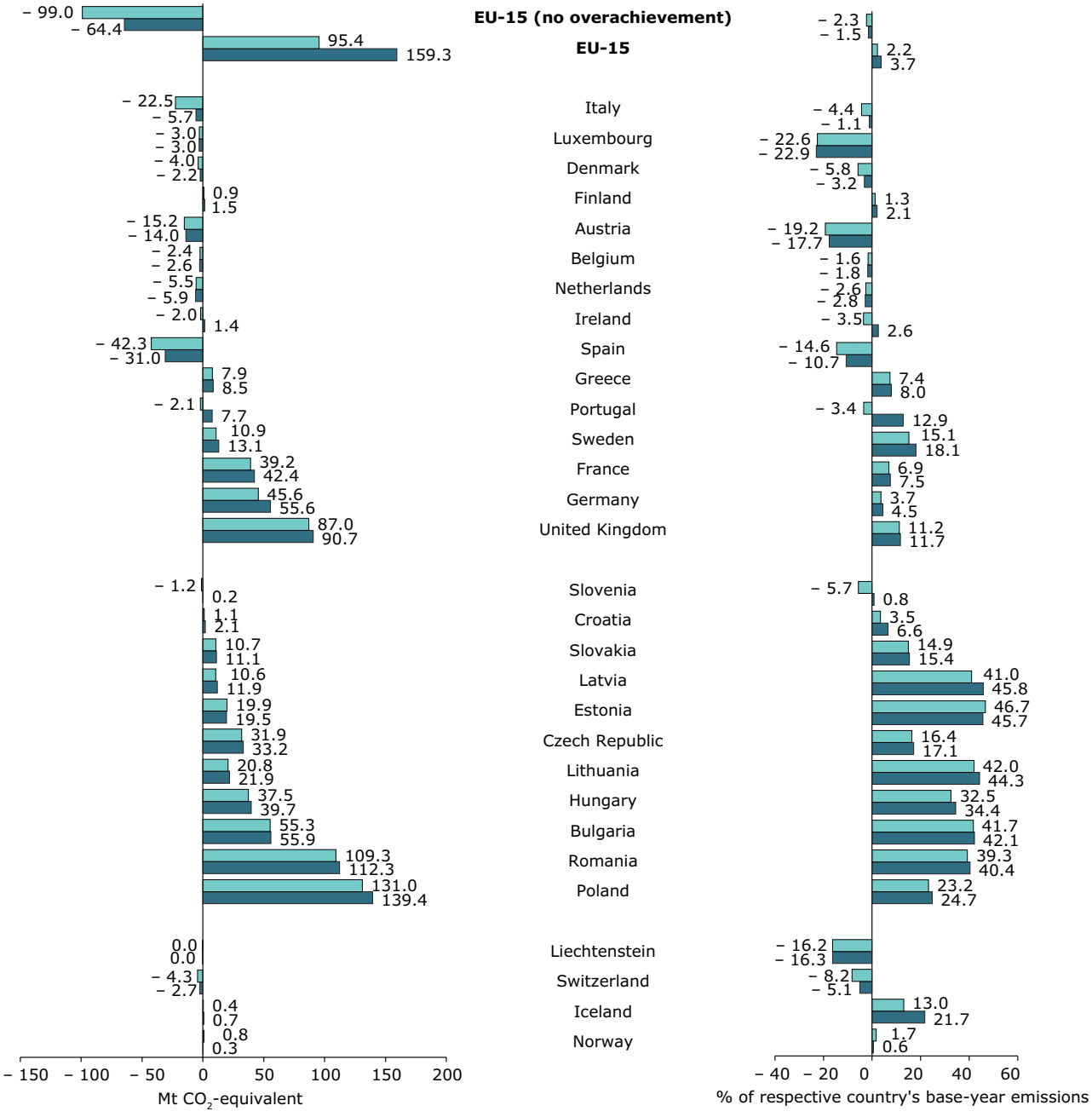
Note: Consistent with the reporting of emission inventories, a negative sign '–' is used for removals and a positive sign '+' for emissions. NA: not applicable; NE: not estimated, NO: not occurring.

([a]) Including Forest Management cap and debit compensation: If Parties have net emissions from activities under Article 3.3 (afforestation and deforestation), they can increase their FM cap by this amount of net emissions. This is the case for Sweden, Finland, and France (and to a smaller extent for Denmark, Romania, and Slovenia). Croatia and Latvia did not use this offset-possibility in their latest submissions but as this will be done in future submissions, these offsets have been already taken into account in this analysis.

([b]) According to Art. 3.3 and 3.4, Denmark, France, Hungary, Liechtenstein and Switzerland have decided to choose the annual accounting option.

Source: 2008–2011 data on LULUCF reported under the KP, 2013.

Figure 4.4 Absolute and relative gaps between average non-ETS 2008–2012 emissions and Kyoto targets with the use of carbon sinks



Note: Subsequent to the effect of allocation of allowances to the EU ETS, the target and annual emissions are those of the sectors not covered by the EU ETS. For each country, the top bar represents the gap between domestic emissions and the Kyoto target, while the bar below includes in addition the effect of carbon sinks. A positive value with dark blue bars indicates a country for which average 2008–2012 non-ETS emissions including the effect of sinks were lower than the annual target. The assessment is based on average 2008–2012 emissions and the expected effect of LULUCF activities, the latter based on the assumption that the 2008–2011 annual average applies to all years in the period 2008–2012. EU-15 values are the sum of the gaps/surplus for the 15 EU Member States party to Burden-Sharing Agreement. 'EU-15 (no overachievement)' corresponds to the situation of the EU-15 where all surplus AAUs from target overachievement in the EU-15 are not taken into account, to reflect the possibility that Member States with a surplus could use any remaining allowances for their own purposes and not necessarily make them available to compensate for Member States with a shortfall. For Croatia and Iceland, total emissions are used as these countries had no installations under the EU ETS during the period 2008–2012. The data used in the calculations are presented in Section 4.7 (rows 7 and 9 in the tables for each country).

Source: EEA, 2013a; EEA, 2013b; EEA, 2013c; EEA, 2013d; Norway, 2013; Switzerland, 2013a; Switzerland, 2013b; 2008–2011 data on LULUCF reported under the KP, 2013.

Table 4.3 Current progress towards Kyoto or burden-sharing targets based on historic domestic GHG emissions with carbon sinks (assuming no use of flexible mechanisms)

Country grouping	Average 2008–2012 emissions in sectors not covered by the EU ETS, including effect of carbon sinks < Target for sectors not covered by the EU ETS	Average 2008–2012 emissions in sectors not covered by the EU ETS, including effect of carbon sinks > Target for sectors not covered by the EU ETS
EU-15	EU-15 Finland France Germany Greece Ireland Portugal Sweden United Kingdom	EU-15 (no overachievement) Austria Belgium Denmark Italy Luxembourg Netherlands Spain
EU-13 Member States	Bulgaria Croatia ([a]) Czech Republic Estonia Hungary Latvia Lithuania Poland Romania Slovakia Slovenia	
Other EEA member countries, EU candidate country	Iceland ([a]) ([b]) Norway	Liechtenstein ([b]) Switzerland ([b]) ([c])

Note: Target = [average annual Kyoto or burden-sharing target — average annual allocation in the EU ETS between 2008 and 2012], excluding planned use of Kyoto mechanisms by governments and carbon sinks. The Kyoto or burden-sharing target corresponds to the initial assigned amount of each country.

Allocation: allowances freely allocated or auctioned/sold under the EU ETS in the years from 2008 to 2012.

'EU-15 (no overachievement)' corresponds to the situation of the EU-15 where all surplus AAUs from target overachievement in the EU-15 are not taken into account, to reflect the possibility that Member States with a surplus could use any remaining allowances for their own purposes, and not necessarily make them available to compensate for Member States with a shortfall.

([a]) Assessment based on total emissions (no allocation to stationary installations under the EU ETS)

([b]) Assessment based on assumption that total GHG emissions 2012 (Iceland) or non-ETS emissions (Liechtenstein) did not change compared to 2011 (as no approximated 2012 GHG estimates are available)

([c]) Switzerland has an Emission Trading System similar to the European System, therefore these ETS data have been treated in the same manner.

Source: EEA, 2013a; EEA, 2013b; EEA, 2013c; EEA, 2013d; Norway, 2013; Switzerland, 2013a; Switzerland, 2013b; 2008–2011 data on LULUCF reported under the KP, 2013.

4.4 Use of flexible mechanisms

4.4.1 Reported information

In 2013, 24 EEA member countries (all except Croatia, the Czech Republic, Germany, Hungary, Liechtenstein, Lithuania, Slovenia and the United Kingdom) updated information on their planned use of Kyoto mechanisms with the submission of their questionnaires in 2013, their projection reports or by other publications (e.g. BAFU, 2013). Croatia, Finland, France, Germany, Greece, Iceland, Sweden and the United Kingdom reported to not have any intention to use Kyoto mechanisms at governmental level and did not report on any sale of units under the EU Monitoring Mechanism to date (see Table 4.4).

Nine EU-15 Member States (Austria, Belgium, Denmark, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain) intend to make use of flexible mechanisms under the KP to achieve their burden-sharing target. Overall, the intended net acquisition of Kyoto units in the EU-15 amounts to buy a total of 403 million Kyoto units for the whole commitment period, or 81 million units per year of the commitment period (1.9 % of EU-15 base-year emissions).

Eight of these Member States have reported information on allocated financial resources for using the Kyoto mechanisms, with a total of EUR 2 351 for the whole first commitment period. Spain, Austria and the Netherlands are the countries (in decreasing order) that intend to acquire the

largest quantities of units (up to 194, up to 80 and 46 million units for the whole period, respectively). These three countries have also allocated the largest financial resources for using the Kyoto mechanisms (EUR 611 million for Austria, EUR 365 million for the Netherlands and EUR 382 million ([28]) for Spain). Italy has not reported any information on the amount of financial allocation for the use of flexible mechanisms but on administrative arrangements which are already met.

Compared to 2012, the most important change is that Finland no longer intends to use flexible mechanisms, as its targets could be reached with domestic reductions alone. Some Member States reported a lower amount of international credits they expect to use compared to previous years (Belgium, Denmark and the Netherlands), whereas increases have been reported by Ireland, Italy and Portugal. The reported budget for the acquisition of AAUs decreased compared to last year for Belgium, Denmark, Luxembourg and the Netherlands, whereas an increase has been estimated by Portugal. Reported values from Italy are referring to the actual amount already acquired, not to the amount which is planned to be used to reach the target. In Denmark and Portugal there is an increase of the expected specific costs for the acquisition of certificates, whereas in the other countries these have been stable or lower than in former years.

Nine EU-13 Member States (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia) have reported on their intention to sell a net amount of Kyoto units to other parties. This is due to the significant emission reductions which occurred in the 1990s with the transition to market economies, compared to their Kyoto reduction targets. Compared to 2012, Estonia increased considerably the amount of Kyoto units it is planning to sell. Slovakia did so to a smaller extent. Romania reported for the first time on plans to sell Kyoto units. Poland did not report on planned amounts.

Of the four further EEA member countries, all, except Iceland, intend to use flexible mechanisms to reach their targets.

A comparison of the intended use of Kyoto mechanisms (annual average during the commitment period based on reported questionnaires) with the actual use of these mechanisms (annual average for the period 2008–2012, based on the quantities of allowances delivered to the Member States' holding account in their Kyoto registries) was not possible for the purpose of this report. This was due to a change in the reporting of SEF tables under the UNFCCC, whereby the separation between entities holding accounts (EHA) and operator holding accounts (OHA) is no longer reliable, making it impossible to distinguish between governmental use of flexible mechanisms and changes to the number of units induced by operators in the EU ETS.

4.4.2 Contribution to progress to targets

When the intended effect of the use of flexible mechanisms is taken into account (in addition to domestic emission reductions in the non-ETS sectors and additional contribution from carbon sinks), all EEA member countries with a Kyoto target (except Italy and Luxembourg) are on track towards their KP target for the first commitment period (see Figure 4.5 and Table 4.4). This represents an additional seven countries (Austria, Belgium, Denmark, the Netherlands, Spain, Liechtenstein and Switzerland) compared to the assessment where this means to achieve targets is not taken into account. The intended use of flexible mechanisms of Italy and Luxembourg, as currently reported, would not be sufficient to fill the gap.

The average gap to target for EU-15 of 159 Mt CO_2-equivalent per year after the inclusion of sinks is increased by 79 Mt (81 Mt from the purchase of units minus 4 Mt from the issuance of ERUs), resulting in an average gap to target of 236 Mt CO_2-equivalent per year.

In four countries, the intended purchase of international credits represents more than 10 % of base-year emissions (see Table 4.4): 21 % (Luxembourg), 20 % (Austria and Liechtenstein) and 13 % (Spain). This indicates a significant contribution of the flexible mechanisms in these countries to achieve KP targets. Annex I Parties to the KP with a reduction or limitation target must provide information under the Protocol to demonstrate that their use of the mechanisms remains 'supplemental to domestic action' to achieve their targets.

([28]) This amount does not include budget allocated to bilateral acquisitions.

Table 4.4 Planned average annual Kyoto units from flexible mechanism, 2008–2012

	Planned use of Kyoto mechanisms at government level	Type of Kyoto mechanisms (IET, JI, CDM)	Intended total use of flexible mechanisms at government level	Intended average use of flexible mechanisms at government level	Intended average use of flexible mechanisms at government level as percent of base-year emissions	Allocated budget (if intended acquisition)
			Mt CO_2-eq.	Mt CO_2-eq. per year	% of base-year emissions	Mio EUR for CP1
EU-28						
Austria	Yes	IET, JI, CDM	80.0	16.0	20.2 %	611.0
Belgium	Yes	IET, JI, CDM	29.4	5.9	4.0 %	240.6
Bulgaria	Yes	IET, JI	– 7.0	– 1.4	– 1.1 %	–
Croatia	No	–	–	–	–	–
Cyprus	Not applicable	–	–	–	–	–
Czech Republic	Yes	–	– 125.0	– 25.0	– 12.9 %	–
Denmark	Yes	IET, JI, CDM	12.0	2.4	3.5 %	187.7
Estonia	Yes	JI, IET	– 73.6	– 14.7	– 34.5 %	–
Finland	No	JI, CDM	–	–	–	–
France	No	–	–	–	–	–
Germany	No	–	–	–	–	–
Greece	No	–	–	–	–	–
Hungary	Yes	–	– 20.0	– 4.0	– 3.5 %	–
Ireland	Yes	IET, JI, CDM	9.7	1.9	3.5 %	290.0
Italy ([a])	Yes	IET, JI, CDM	10.2	2.0	0.4 %	–
Latvia	Yes	JI, IET	– 40.4	– 8.1	– 31.2 %	– 191.1
Lithuania	Yes	JI	– 70.7	– 14.1	– 28.6 %	–
Luxembourg ([b])	Yes	IET, JI, CDM	14.0	2.8	21.3 %	150.0
Malta	Not applicable	–	–	–	–	–
Netherlands ([c])	Yes	IET, JI, CDM	46.0	9.2	4.3 %	364.5
Poland	Yes	IET, JI	–	–	–	–
Portugal	Yes	IET, JI, CDM	8.1	1.6	2.7 %	124.8
Romania	Yes	IET, JI	– 13.0	– 2.6	– 0.9 %	–
Slovakia	Yes	IET, JI	– 42.0	– 8.4	– 11.7 %	–
Slovenia	Yes	IET, JI, CDM	5.0	1.0	4.9 %	80.0
Spain ([c])	Yes	IET, JI, CDM	194.0	38.8	13.4 %	382.2
Sweden	No	–	–	–	–	–
United Kingdom	No	–	–	–	–	–
EU-15			**403.4**	**80.7**	**1.9 %**	**2 350.7**
EU-28			**16.7**	**3.3**		**2 430.7**
Other EEA member countries						
Iceland	No	–	–	–	–	–
Liechtenstein	Yes	IET, JI, CDM	0.23	0.05	20.0 %	–
Norway	Yes	IET, JI, CDM	21.00	4.20	8.5 %	191.0
Switzerland	Yes	JI, CDM	15.00	3.00	5.7 %	–

Note: IET: International Emissions Trading; JI: joint implementation; CDM: clean development mechanism.

The total budget calculated for the EU-15 and the EU-28 do not include the expected benefits of AAU sales.

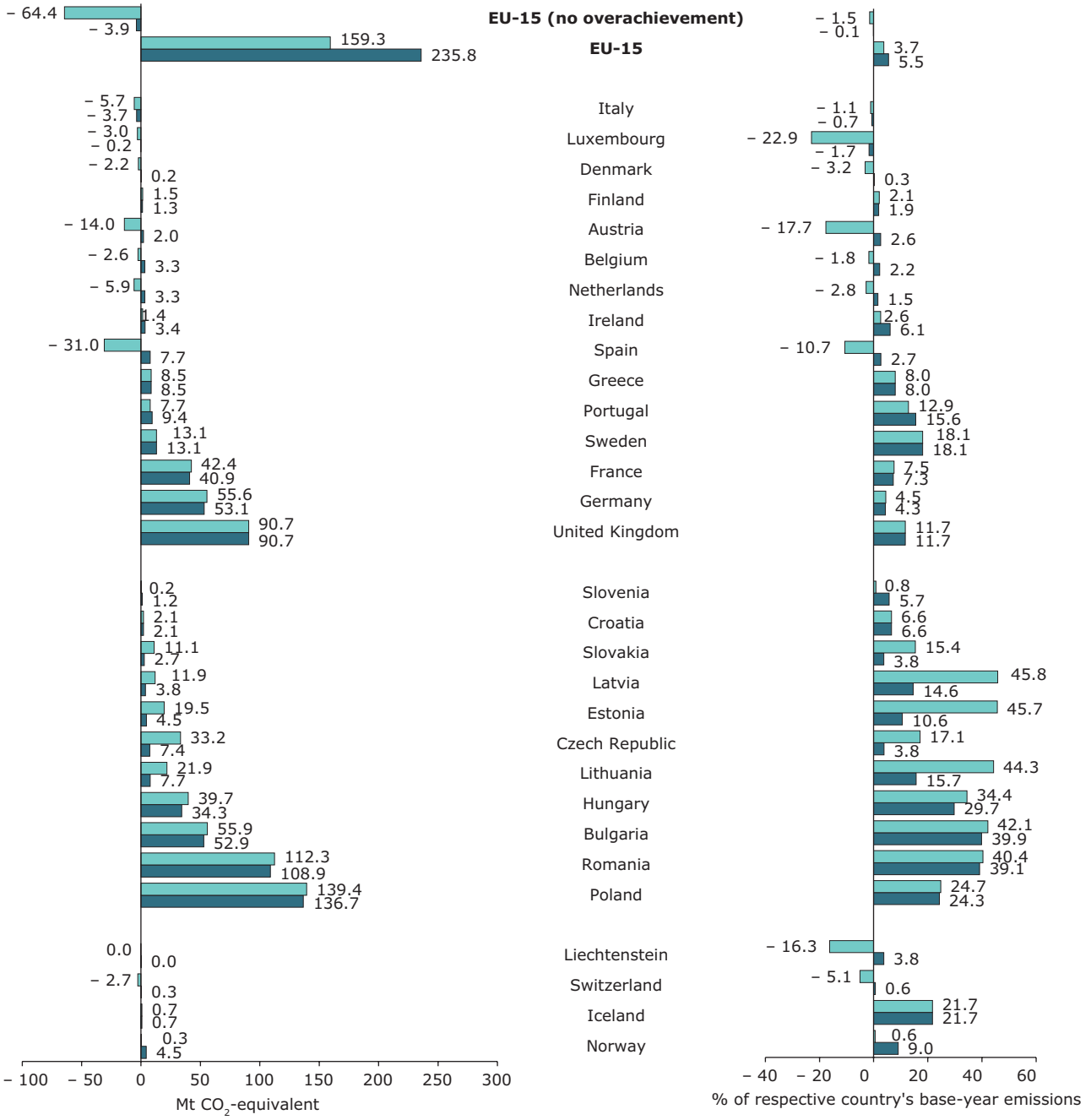
([a]) Italy reported that it can buy up to 13.4 Mt of CERs/ERUs per year in order to comply with the supplementarity principle and that no limitation is foreseen for AAUs.

([b]) Luxembourg has a financial reserve and is committed to buy the extra units needed to fill the gap by 2015 when the first phase of Kyoto accounting will be closed.

([c]) The Netherlands and Spain reported a total planned use of 30–46 and 159–194 Mt CO_2-equivalent, respectively. The budget of Spain does not include budget allocated to bilateral acquisitions.

Source: EEA, 2013e.

Figure 4.5 Absolute and relative gaps between average non-ETS 2008–2012 emissions and Kyoto targets with the use of carbon sinks and flexible mechanisms



Gap to target (non-ETS emissions and carbon sinks or sources) average 2008–2012

Gap to target (non-ETS emissions including plans on Kyoto mechanisms, carbon sinks and sources and ERU) average 2008–2012

Note: Subsequent to the effect of allocation of allowances to the EU ETS, the target and annual emissions are those of the sectors not covered by the EU ETS. For each country, the top bar represents the gap between domestic emissions and the Kyoto target, including the effect of carbon sinks, while the bar below includes in addition the planned effect of Kyoto mechanisms. A positive value in dark blue bars indicates a country for which average 2008–2012 non-ETS emissions including the effect of sinks and Kyoto mechanisms were lower than the annual target. The assessment is based on average 2008–2012 emissions and the planned use of flexible mechanisms, as well as the expected effect of LULUCF activities, the latter based on the assumption that the 2008–2011 annual average applies to all years in the period 2008–2012. EU-15 values are the sum of the gaps/surplus for the 15 EU Member States party to Burden-Sharing Agreement. 'EU-15 (no over-achievement)' corresponds to the situation of the EU-15 where all surplus AAUs from target overachievement in the EU-15 are not taken into account, to reflect the possibility that Member States with a surplus could use any remaining allowances for their own purposes and not necessarily make them available to compensate for Member States with a shortfall. For Croatia and Iceland, total emissions are used as these countries had no installations under the EU ETS during the period 2008–2012. The data used in the calculations are presented in Section 4.7 (rows 9 and 12).

Source: EEA, 2013a; EEA, 2013b, EEA, 2013c, EEA, 2013d, EEA, 2013e, Norway, 2013; Switzerland, 2013a; Switzerland, 2013b; 2008–2011 data on LULUCF reported under the KP, 2013.

4.5 Progress of European countries

Nearly all Member States and all other EEA member countries were on track to achieving their Kyoto targets by the end of the KP's first commitment period ([29]) (see Figure 4.6), based on:

- average 2008–2012 emissions in the sectors not covered by the EU ETS (see Section 3.3), taking into account early estimates of 2012 GHG emissions;
- average removals from carbon sinks in 2008 to 2011;
- the planned use of Kyoto mechanisms as projected by governments for the full commitment period.

From a legal perspective, it makes no difference whether compliance is achieved through the limitation or reduction of domestic emissions alone, or with the contribution of flexible mechanisms (provided that the latter remains supplemental to domestic action).

The information used for this 2013 assessment is subject to further change. In 2014 will be submitted under the UNFCCC new GHG inventories, including KP tables for LULUCF emissions and removals, covering the full period 2008–2012. The actual use of flexible mechanisms will only be known at the end of the true-up period in 2015.

Italy, Luxembourg and Spain stand out in the assessment due to their specific situation.

As in previous years, **Italy** remains considered off track towards its target primarily due to lack of information on its planned use of flexible mechanisms.

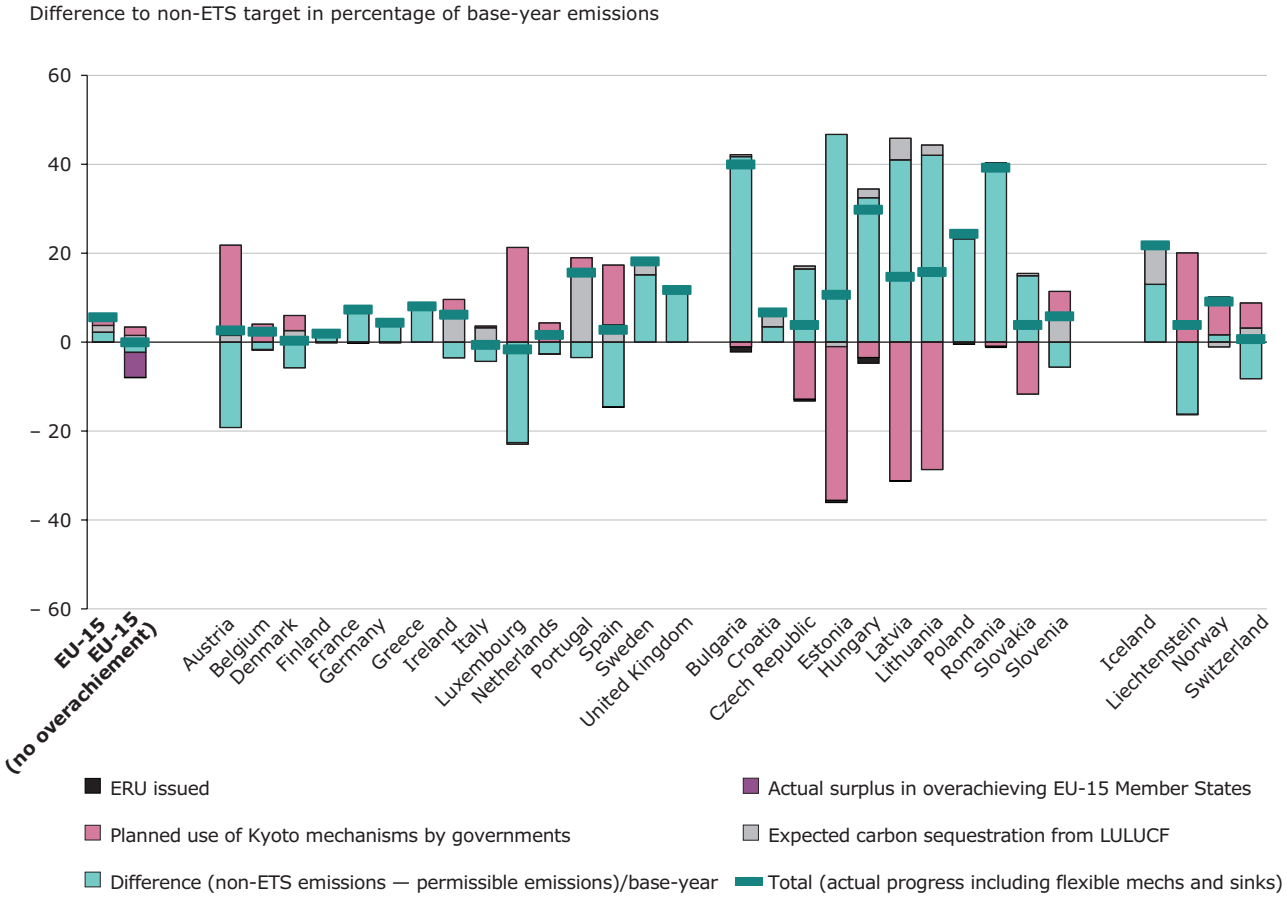
- By the end of 2012, average domestic emissions in the non-ETS sectors were higher than their corresponding target by a gap of 22.5 Mt CO_2-equivalent per year between average non-ETS emissions and target (4.4 % of base-year emissions compared to a 6.5 % Kyoto reduction target for all emissions).
- This gap is currently not fully compensated by the expected removals from carbon sink activities (16.8 Mt CO_2-equivalent per year or 3.3 % of base-year emissions) and the quantity of units that the Italian Government expects will contribute to achieve the KP targets under the flexible mechanisms (2 Mt CO_2-equivalent per year, 0.4 % of base-year emissions). This leaves Italy with an average annual shortfall of 3.7 Mt CO_2-equivalent per year, resulting in a total shortfall of about 18.5 Mt CO_2-equivalent for the whole period.
- Italy did not put a threshold on the use of flexible mechanisms in its national climate change strategy ([30]), but administrative arrangements are being taken for purchases ([31]). Furthermore, Italy is the only EU-15 Member State intending to use flexible mechanisms that has not reported any information on the amount of financial resources allocated for this purpose.

Luxembourg is almost on track towards its target, with a gap of 0.2 Mt CO_2-equivalent per year (1.7 % of base-year emissions compared to a – 28 % Kyoto limitation target for all emissions) between domestic emissions and target in the non-ETS sectors, when the expected use of flexible mechanisms of 2.8 Mt CO_2-equivalent per year (21.3 % of base-year emissions) is taken into account. A financial reserve exists and Luxembourg is committed to buy the extra units needed to fill the gap by 2015 when the first phase of Kyoto accounting will be closed. Compared to the 2012 assessment, a recalculation of the GHG emissions time series resulted in slightly higher emissions. In addition, the 2013 assessment takes into account additional emissions resulting from net carbon stock change under Article 3.3 as reported in KP tables, leading to a net carbon source of 0.1 Mt CO_2-equivalent per year.

Spain is now considered on track towards its target, something that was not the case in the 2012 assessment (although by a very small margin). This is mainly the result of a decrease in emissions in 2012 as well as a recalculation of total GHG emissions for the period 2008–2011, leading to a

([29]) For Iceland and Liechtenstein, no information about the proxy data for the year 2012 is available, therefore total (Iceland) or non-ETS (Liechtenstein) GHG emissions have been assumed to be constant from 2011 to 2012.
([30]) Except the one relating to the implementation of the supplementarity principle that is considered above the quantity of credits needed to comply with the KP target.
([31]) According to latest Italian climate change plan for GHG emissions reductions approved by the Interministerial Committee for Economic Planning (CIPE Deliberation n. 17/2013 of 8 March 2013) by 30 November 2013 the Italian Ministry of the Environment, Land and Sea will transmit to the Interministerial Committee for Economic Planning the possible options to meet the KP target with particular reference to the AAUs/ERUs/CERs portfolio and related financial resources needed to buy such units.

Figure 4.6 Breakdown of current progress achieved by European countries towards their Kyoto targets by the end of 2012



Note: Subsequent to the effect of allocation of allowances to the EU ETS, the target and annual emissions are those of the sectors not covered by the EU ETS.

The assessment is based on emissions and the targets of the sectors not covered under the EU ETS, the planned use of flexible mechanisms as well as the average historic effect of LULUCF activities. A positive sign signifies a favourable contribution towards target achievement.

'EU-15 (no overachievement)' corresponds to the situation of the EU-15 where all surplus AAUs from target overachievement in the EU-15 are not taken into account, to reflect the possibility that Member States with a surplus could use any remaining allowances for their own purposes, and not necessarily make them available to compensate for Member States with a shortfall.

For Croatia and Iceland, total emissions are used as these countries had no installations under the EU ETS during the period 2008–2012.

Source: EEA, 2013a; EEA, 2013b; EEA, 2013c, EEA 2013d, EEA 2013e, Norway, 2013; Switzerland, 2013a; Switzerland, 2013b; 2008–2011 data on LULUCF reported under the KP, 2013.

substantial decrease of average non-ETS emissions. Such recalculations can take place because of revised methodologies or the use of better data sources and are subject to independent scrutiny by expert review teams under the UNFCCC.

Carbon sinks will play an important role in Kyoto compliance of European countries, as already discussed in Section 4.3. In Ireland, Portugal and Slovenia, carbon sequestration from sinks as currently projected for the full commitment period could fully cover the gap existing between current domestic emission levels in the sectors not covered by the EU ETS and their corresponding targets, whereas in Austria, Belgium, Denmark, Italy, Liechtenstein, Luxembourg, the Netherlands, Spain and Switzerland, using the flexible mechanisms is crucial to reach the target.

Thirteen European countries intend to use the flexible mechanisms provided under the KP to achieve their respective targets. In addition to Italy, Luxembourg and Spain mentioned above, the other countries concerned are: Austria, Belgium,

Denmark, Ireland, Liechtenstein, the Netherlands, Norway, Portugal, Slovenia and Switzerland. Slovenia is the only EU-13 Member States which is planning to use flexible mechanisms to reach its Kyoto target. In Ireland, Norway, Portugal and Slovenia, the additional use of flexible mechanisms may not be necessary, given in particular the contribution of carbon sinks.

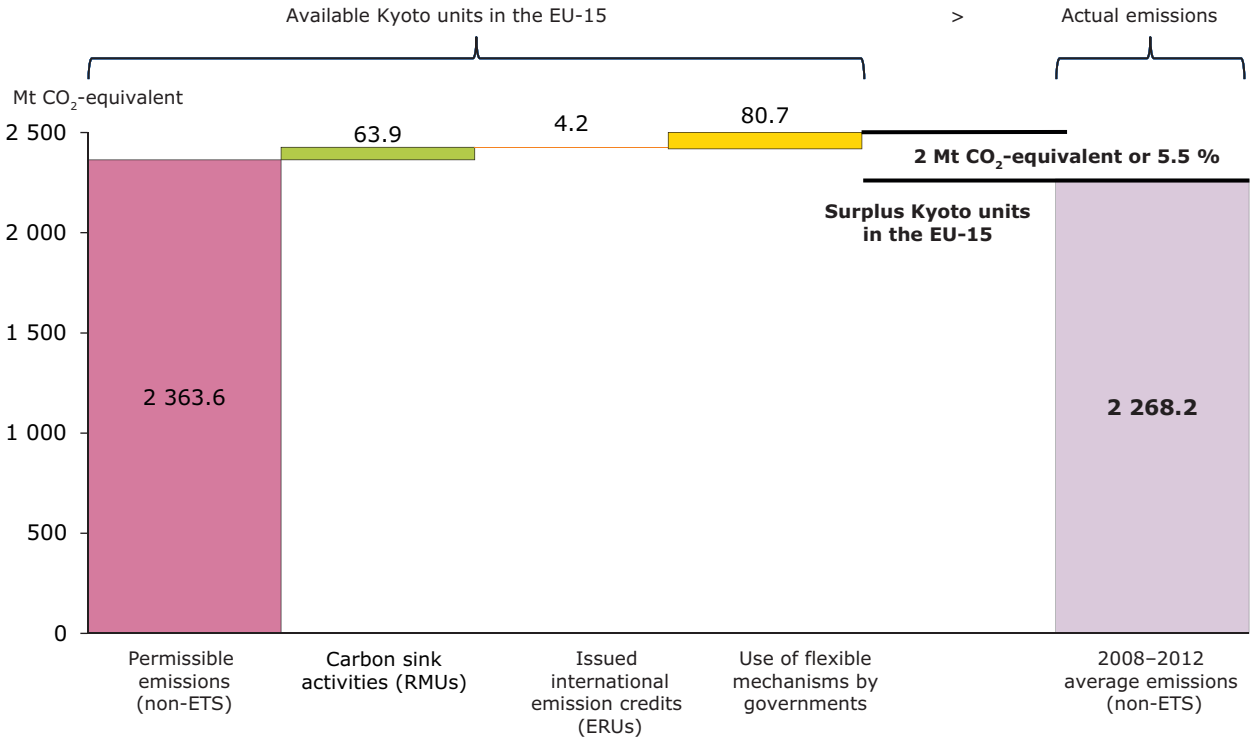
The use of flexible mechanisms is expected to play a significant role in bridging the gaps between emissions and targets in Austria, Liechtenstein, Luxembourg and Spain. The quantity of Kyoto units that these four Member States intend to acquire to achieve compliance (excluding the quantities actually used by EU ETS operators) represents 20 %, 20 %, 21 % and 13 % of their respective base-year emissions, to be compared with Kyoto targets of – 13 %, – 8 %, – 28 % and + 15 %, respectively. For Italy, the use of flexible mechanisms is also crucial to reach the target, but the amount which would be necessary to reach the target represents only 1.1 % of base-year emissions.

4.6 Progress of the EU-15

On average, with preliminary data for the complete KP's first commitment period, EU-15 total GHG emissions were 12.2 % below base-year emissions. Taking into account the effect of allowance allocations under the ETS, the use of carbon sinks and flexible mechanisms, the combined average over-delivery is equivalent to approximately 235.8 Mt CO_2-equivalent per year (a quantity which represents 5.5 % of the EU-15's base-year emissions) (Figure 4.7, Table 4.5).

- Aggregated average non-ETS emissions from EU-15 Member States from 2008 to 2012 were lower than the relevant EU-15 target ([32]) by 95.4 Mt CO_2-equivalent per year. This domestic

Figure 4.7 Actual progress of the EU-15 towards its non-ETS KP target in absolute and relative terms



Note: The difference between target and GHG emissions concerns the sectors not covered by the EU ETS, which represent the right emissions and target to consider for the assessment of actual progress towards Kyoto targets.

The results are based on the assumption that any surplus by EU Member States could be used for EU compliance.

Source: EEA, 2013a; EEA, 2013b; EEA, 2013c; EEA, 2013d, EEA, 2013e; 2008–2011 data on LULUCF reported under the KP, 2013.

([32]) Calculated as the difference between the initial AAUs and allowances allocated under the EU ETS for the years from 2008 to 2012. for stationary installations.

Table 4.5 Overview of input data for the EU-15 for the calculation of the overachievement/ gap between 2008–2012 GHG emissions and targets for the sectors not covered by the EU ETS

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
EU-15	1	Total GHG emissions		3 989.3	3 710.2	3 790.2	3 630.7	3 614.6	**3 747.0**	**18 735.0**
	2	Verified emissions under the EU ETS		1 622.3	1 436.4	1 479.6	1 434.4	1 421.4	**1 478.8**	**7 394.0**
	3	Non-ETS GHG emissions	(1) – (2)	2 367.0	2 273.8	2 310.7	2 196.3	2 193.2	**2 268.2**	**11 341.0**
	4	Initial Assigned Amount (AAUs)		3 924.3	3 924.3	3 924.3	3 924.3	3 924.3	**3 924.3**	**19 621.4**
	5	Allowances issued under the EU ETS		1 514.3	1 536.6	1 565.0	1 571.6	1 615.7	**1 560.6**	**7 803.2**
	6	Non-ETS target	(4) – (5)	2 410.0	2 387.7	2 359.3	2 352.6	2 308.5	**2 363.6**	**11 818.2**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**42.9**	**113.9**	**48.6**	**156.3**	**115.3**	**95.4**	**477.1**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		63.9	63.9	63.9	63.9	63.9	**63.9**	**319.4**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**106.8**	**177.8**	**112.5**	**220.2**	**179.2**	**159.3**	**796.5**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		80.7	80.7	80.7	80.7	80.7	**80.7**	**403.4**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.6	2.9	6.3	11.3	**4.2**	**21.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**187.5**	**257.9**	**190.3**	**294.6**	**248.6**	**235.8**	**1 178.9**

Note: Colours in the first column represent the bars in Figure 4.7. The results are based on the assumption that any surplus by EU Member States could be used for EU compliance.
GHG emissions: 2013 EU GHG inventory submitted to UNFCCC (2008 to 2011 total emissions); the EEA proxy inventory and national proxies for 2012 emissions, non-ETS emissions based on total emissions minus verified emissions under the ETS.

Numbers are calculated as sums of EU-15 Member States apart from the Initial Assigned amount. The sum of AAUs of Member States amounts to 3 921 Mt CO_2-equivalent, which means that EU-15 as a Kyoto party can account for 14.4 Mt CO_2-equivalent more than the sum of all Member States in the first commitment period.

Verified emissions and allowances issued under the EU ETS take only into account stationary installations.

Source: EEA, 2013a; EEA, 2013b; EEA, 2013c; EEA, 2013d; EEA, 2013e; 2008–2011 data on LULUCF reported under the KP, 2013.

overachievement of the target represents 2.2 % of total EU-15 base-year emissions.

- Carbon sinks are expected to contribute towards an emission reduction of 63.9 Mt CO_2-equivalent per year (1.5 % of EU-15 base-year emissions)

- Flexible mechanisms are expected to contribute towards a reduction of 76.5 Mt CO_2-equivalent per year (1.8 % of EU-15 base-year emissions), representing the sum of the intended use of flexible mechanisms and ERU issued (80.7 and – 4.2 Mt CO_2-equivalent per year).

At the same time, a potential average shortfall of 3.9 Mt CO_2-equivalent per year (0.1 % of the EU-15's base-year emissions) exists as a result of the gaps currently observed in Italy (3.7 Mt CO_2-equivalent per year) and Luxembourg (0.2 Mt CO_2-equivalent per year). These gaps, amounting in total to 19.6 Mt CO_2-equivalent for the complete period if not addressed by the end of the true-up period in 2015, could hinder the EU-15 from achieving its target.

The difference between the assigned amount units issued by the EU-15 as a whole and the sum of units which have been issued by the fifteen Member States results in an amount of 14.4 Mt CO_2-equivalent for the total period. Until now it has not been finally decided if this difference will be used to bridge potential gaps.

Tables for the individual countries are provided in this assessment in the Section 4.7.

4.7 Calculation of current progress towards Kyoto targets for individual countries

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Austria	1	Total GHG emissions		87.0	80.0	85.0	82.8	80.0	**83.0**	**414.8**
	2	Verified emissions under the EU ETS		32.1	27.4	30.9	30.6	28.4	**29.9**	**149.3**
	3	Non-ETS GHG emissions	(1) – (2)	54.9	52.6	54.1	52.2	51.6	**53.1**	**265.4**
	4	Initial Assigned Amount (AAUs)		68.8	68.8	68.8	68.8	68.8	**68.8**	**343.9**
	5	Allowances issued under the EU ETS		30.7	30.7	31.0	31.0	31.0	**30.9**	**154.4**
	6	Non-ETS target	(4) – (5)	38.0	38.0	37.8	37.8	37.8	**37.9**	**189.5**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**– 16.8**	**– 14.6**	**– 16.3**	**– 14.4**	**– 13.8**	**– 15.2**	**– 76.0**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**6.1**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	(7) + (8)	– 15.6	– 13.3	– 15.1	– 13.2	– 12.6	**– 14.0**	**– 69.8**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		16.0	16.0	16.0	16.0	16.0	**16.0**	**80.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**0.4**	**2.7**	**0.9**	**2.8**	**3.4**	**2.0**	**10.2**
		Corrections		Allowances issued under the EU ETS: Downward correction as free allocation recorded in the EUTL includes allocations to new entrants that Austria bought on the market (7.9 million EUA in total).						
Belgium	1	Total GHG emissions		136.6	124.5	131.8	120.2	121.0	**126.8**	**634.1**
	2	Verified emissions under the EU ETS		55.5	46.2	50.1	46.2	43.0	**48.2**	**241.0**
	3	Non-ETS GHG emissions	(1) – (2)	81.2	78.3	81.7	74.0	78.0	**78.6**	**393.1**
	4	Initial Assigned Amount (AAUs)		134.8	134.8	134.8	134.8	134.8	**134.8**	**674.0**
	5	Allowances issued under the EU ETS		55.4	56.8	56.0	56.6	68.1	**58.6**	**292.9**
	6	Non-ETS target	(4) – (5)	79.4	78.0	78.8	78.2	66.7	**76.2**	**381.1**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	(6) – (3)	**– 1.8**	**– 0.3**	**– 2.9**	**4.3**	**– 11.3**	**– 2.4**	**– 12.0**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		– 0.2	– 0.2	– 0.2	– 0.2	– 0.2	**– 0.2**	**– 1.1**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 2.0**	**– 0.5**	**– 3.1**	**4.1**	**– 11.5**	**– 2.6**	**– 13.1**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		5.9	5.9	5.9	5.9	5.9	**5.9**	**29.4**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	(9) + (10) – (11)	**3.9**	**5.4**	**2.8**	**9.9**	**– 5.6**	**3.3**	**16.4**
		Corrections		None						

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Bulgaria	1	Total GHG emissions		66.9	57.8	60.4	66.1	62.4	**62.7**	**313.6**
	2	Verified emissions under the EU ETS		38.3	32.0	33.5	40.0	35.0	**35.8**	**178.9**
	3	Non-ETS GHG emissions	(1) – (2)	28.6	25.8	26.8	26.1	27.3	**26.9**	**134.7**
	4	Initial Assigned Amount (AAUs)		122.0	122.0	122.0	122.0	122.0	**122.0**	**610.0**
	5	Allowances issued under the EU ETS		38.3	40.6	35.3	41.5	42.9	**39.7**	**198.6**
	6	Non-ETS target	(4) – (5)	83.7	81.4	86.7	80.5	79.1	**82.3**	**411.4**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**55.1**	**55.6**	**59.9**	**54.3**	**51.7**	**55.3**	**276.7**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		0.5	0.5	0.5	0.5	0.5	**0.5**	**2.7**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**55.6**	**56.2**	**60.4**	**54.9**	**52.3**	**55.9**	**279.3**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		– 1.4	– 1.4	– 1.4	– 1.4	– 1.4	**– 1.4**	**– 7.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	3.3	2.3	2.4	**1.6**	**8.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**54.2**	**54.8**	**55.7**	**51.1**	**48.5**	**52.9**	**264.3**
		Corrections					None			
Croatia	1	Total GHG emissions		31.17	29.16	28.62	28.26	26.15	**28.67**	**143.35**
	2	Verified emissions under the EU ETS		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	3	Non-ETS GHG emissions	(1) – (2)	31.17	29.16	28.62	28.26	26.15	**28.67**	**143.35**
	4	Initial Assigned Amount (AAUs)		29.76	29.76	29.76	29.76	29.76	**29.76**	**148.78**
	5	Allowances issued under the EU ETS		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	6	Non-ETS target	(4) – (5)	29.76	29.76	29.76	29.76	29.76	**29.76**	**148.78**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**– 1.41**	**0.60**	**1.14**	**1.50**	**3.61**	**1.09**	**5.43**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		0.97	0.97	0.97	0.97	0.97	**0.97**	**4.86**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 0.4**	**1.6**	**2.1**	**2.5**	**4.6**	**2.1**	**10.3**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	11	Emission reduction units (ERUs issued under JI projects)		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**– 0.44**	**1.57**	**2.11**	**2.47**	**4.58**	**2.06**	**10.29**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Czech Republic	1	Total GHG emissions		142.1	133.5	137.4	133.5	127.7	**134.8**	**674.2**
	2	Verified emissions under the EU ETS		80.4	73.8	75.6	74.2	69.3	**74.7**	**373.3**
	3	Non-ETS GHG emissions	(1) – (2)	61.7	59.7	61.8	59.3	58.3	**60.2**	**300.9**
	4	Initial Assigned Amount (AAUs)		178.7	178.7	178.7	178.7	178.7	**178.7**	**893.5**
	5	Allowances issued under the EU ETS		85.6	85.9	86.1	86.4	89.0	**86.6**	**433.0**
	6	Non-ETS target	(4) – (5)	93.1	92.8	92.6	92.3	89.7	**92.1**	**460.6**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	(6) – (3)	31.4	33.1	30.8	33.0	31.4	**31.9**	**159.6**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		1.3	1.3	1.3	1.3	1.3	**1.3**	**6.5**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**32.7**	**34.4**	**32.1**	**34.3**	**32.7**	**33.2**	**166.2**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		– 25.0	– 25.0	– 25.0	– 25.0	– 25.0	**– 25.0**	**– 125.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.3	1.4	1.0	1.6	**0.9**	**4.3**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**7.7**	**9.1**	**5.7**	**8.3**	**6.1**	**7.4**	**36.9**
		Corrections		None						
Denmark	1	Total GHG emissions		63.8	60.8	61.2	56.2	51.4	**58.7**	**293.5**
	2	Verified emissions under the EU ETS		26.5	25.5	25.3	21.5	18.2	**23.4**	**116.9**
	3	Non-ETS GHG emissions	(1) – (2)	37.2	35.4	36.0	34.8	33.2	**35.3**	**176.5**
	4	Initial Assigned Amount (AAUs)		55.8	55.8	55.8	55.8	55.8	**55.8**	**278.8**
	5	Allowances issued under the EU ETS		23.9	23.8	23.8	23.8	26.9	**24.5**	**122.3**
	6	Non-ETS target	(4) – (5)	31.9	31.9	31.9	31.9	28.9	**31.3**	**156.6**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**– 5.4**	**– 3.4**	**– 4.0**	**– 2.8**	**– 4.3**	**– 4.0**	**– 20.0**
	8	**Expected carbon sequestration from LULUCF activities (RMUs)**		**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**8.9**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 3.6**	**– 1.7**	**– 2.2**	**– 1.1**	**– 2.5**	**– 2.2**	**– 11.1**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		2.4	2.4	2.4	2.4	2.4	**2.4**	**12.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**– 1.2**	**0.7**	**0.2**	**1.3**	**– 0.1**	**0.2**	**0.9**
		Corrections		Initial Assigned Amount: Correction of AAU initial to EU territory and inclusion of base year compensation. Ilowances issued under the EU ETS: Downward correction because deleted EUA (0.07 million EUA/year) had are not recorded in the EUTL.						

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Estonia (a)	1	Total GHG emissions		19.6	16.3	20.0	21.0	21.0	**19.6**	**97.8**
	2	Verified emissions under the EU ETS		13.5	10.4	14.5	14.8	13.5	**13.4**	**66.8**
	3	Non-ETS GHG emissions	(1) – (2)	6.1	5.9	5.5	6.1	7.5	**6.2**	**31.0**
	4	Initial Assigned Amount (AAUs)		39.2	39.2	39.2	39.2	39.2	**39.2**	**196.1**
	5	Allowances issued under the EU ETS		11.7	11.9	11.9	15.9	14.2	**13.1**	**65.6**
	6	Non-ETS target	(4) – (5)	27.5	27.4	27.4	23.3	25.0	**26.1**	**130.5**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**21.5**	**21.5**	**21.9**	**17.1**	**17.5**	**19.9**	**99.4**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		– 0.4	– 0.4	– 0.4	– 0.4	– 0.4	**– 0.4**	**– 2.1**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**21.0**	**21.0**	**21.5**	**16.7**	**17.1**	**19.5**	**97.3**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		– 14.7	– 14.7	– 14.7	– 14.7	– 14.7	**– 14.7**	**– 73.6**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.2	0.3	0.6	**0.2**	**1.1**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**6.3**	**6.3**	**6.5**	**1.7**	**1.8**	**4.5**	**22.6**
		Corrections					None			
Finland	1	Total GHG emissions		70.2	66.1	74.5	67.0	61.4	**67.8**	**339.2**
	2	Verified emissions under the EU ETS		36.2	34.4	41.3	35.1	29.5	**35.3**	**176.4**
	3	Non-ETS GHG emissions	(1) – (2)	34.0	31.7	33.2	31.9	31.9	**32.6**	**162.8**
	4	Initial Assigned Amount (AAUs)		71.0	71.0	71.0	71.0	71.0	**71.0**	**355.0**
	5	Allowances issued under the EU ETS		36.5	37.1	37.9	38.0	38.2	**37.5**	**187.7**
	6	Non-ETS target	(4) – (5)	34.5	33.9	33.1	33.0	32.8	**33.5**	**167.3**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**0.4**	**2.2**	**– 0.2**	**1.1**	**1.0**	**0.9**	**4.6**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		0.6	0.6	0.6	0.6	0.6	**0.6**	**2.9**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**1.0**	**2.8**	**0.4**	**1.7**	**1.6**	**1.5**	**7.5**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.1	0.2	0.6	**0.2**	**0.9**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**1.0**	**2.8**	**0.4**	**1.4**	**1.0**	**1.3**	**6.6**
		Corrections					None			

Note: (a) Estonia updated its energy statistics in September 2013. As this information was not received by the EEA in time for the publishing deadline of the report *Approximated EU GHG inventory: proxy GHG estimates for 2012* (EEA, 2013a), 2012 emissions in non-ETS sectors appear to have been overestimated. The EEA has therefore not been able to take these new data into account for the assessments in the present report.

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
France	1	Total GHG emissions		531.2	507.9	514.2	485.5	485.1	**504.8**	**2 523.9**
	2	Verified emissions under the EU ETS		124.1	111.1	115.7	105.7	103.6	**112.0**	**560.2**
	3	Non-ETS GHG emissions	(1) – (2)	407.1	396.8	398.5	379.9	381.5	**392.7**	**1 963.7**
	4	Initial Assigned Amount (AAUs)		563.9	563.9	563.9	563.9	563.9	**563.9**	**2 819.6**
	5	Allowances issued under the EU ETS		132.0	132.0	132.0	132.0	132.0	**132.0**	**660.0**
	6	Non-ETS target	(4) – (5)	431.9	431.9	431.9	431.9	431.9	**431.9**	**2 159.7**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**24.8**	**35.1**	**33.4**	**52.1**	**50.4**	**39.2**	**195.9**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		3.2	3.2	3.2	3.2	3.2	**3.2**	**16.1**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**28.1**	**38.4**	**36.6**	**55.3**	**53.7**	**42.4**	**212.0**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.4	1.5	2.2	3.5	**1.5**	**7.6**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**28.1**	**37.9**	**35.1**	**53.1**	**50.2**	**40.9**	**204.4**
		Corrections		Allowances issued under the EU ETS: Downward correction to 132 million EUA as free allocation recorded in the EUTL includes allocations to new entrants that France bought on the market						
Germany	1	Total GHG emissions		975.0	911.3	943.5	916.5	931.1	**935.5**	**4 677.4**
	2	Verified emissions under the EU ETS		472.9	428.3	454.9	450.3	452.6	**451.8**	**2 258.9**
	3	Non-ETS GHG emissions	(1) – (2)	502.1	483.0	488.7	466.2	478.5	**483.7**	**2 418.5**
	4	Initial Assigned Amount (AAUs)		973.6	973.6	973.6	973.6	973.6	**973.6**	**4 868.1**
	5	Allowances issued under the EU ETS		436.9	431.9	440.7	440.5	471.6	**444.3**	**2 221.6**
	6	Non-ETS target	(4) – (5)	536.7	541.7	532.9	533.1	502.0	**529.3**	**2 646.5**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**34.6**	**58.7**	**44.3**	**67.0**	**23.4**	**45.6**	**228.0**
	8	**Expected carbon sequestration from LULUCF activities (RMUs)**		**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**49.9**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**44.5**	**68.7**	**54.3**	**76.9**	**33.4**	**55.6**	**277.9**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.1	1.3	3.7	7.0	**2.4**	**12.2**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**44.5**	**68.6**	**53.0**	**73.2**	**26.4**	**53.1**	**265.7**
		Corrections		Correction of allowances issued under the EU ETS in 2008 with 8.1 M EUAs for refinancing the KfW Mechanismus and correction of – 4 M EUAs in 2009 and 2010 due to recoveries from operators that are not recorded in the EUTL.						

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Greece	1	Total GHG emissions		130.3	123.6	117.3	115.0	115.2	**120.3**	**601.4**
	2	Verified emissions under the EU ETS		69.9	63.7	59.9	58.8	61.4	**62.7**	**313.7**
	3	Non-ETS GHG emissions	(1) – (2)	60.5	60.0	57.3	56.2	53.7	**57.5**	**287.7**
	4	Initial Assigned Amount (AAUs)		133.7	133.7	133.7	133.7	133.7	**133.7**	**668.7**
	5	Allowances issued under the EU ETS		63.7	63.2	64.6	76.0	74.0	**68.3**	**341.5**
	6	Non-ETS target	(4) – (5)	70.0	70.5	69.1	57.7	59.8	**65.4**	**327.1**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**9.6**	**10.5**	**11.7**	**1.5**	**6.1**	**7.9**	**39.4**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		0.6	0.6	0.6	0.6	0.6	**0.6**	**3.2**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**10.2**	**11.1**	**12.4**	**2.1**	**6.7**	**8.5**	**42.6**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**10.2**	**11.1**	**12.4**	**2.1**	**6.7**	**8.5**	**42.6**
		Corrections					None			
Hungary	1	Total GHG emissions		73.6	67.4	67.9	66.1	63.7	**67.7**	**338.7**
	2	Verified emissions under the EU ETS		27.2	22.4	23.0	22.5	21.3	**23.3**	**116.4**
	3	Non-ETS GHG emissions	(1) – (2)	46.4	45.0	45.0	43.7	42.4	**44.5**	**222.4**
	4	Initial Assigned Amount (AAUs)		108.5	108.5	108.5	108.5	108.5	**108.5**	**542.4**
	5	Allowances issued under the EU ETS		25.1	23.9	25.7	25.0	32.8	**26.5**	**132.5**
	6	Non-ETS target	(4) – (5)	83.3	84.6	82.8	83.5	75.7	**82.0**	**409.9**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	(6) – (3)	37.0	39.6	37.8	39.8	33.3	**37.5**	**187.5**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		2.2	2.2	2.2	2.2	2.2	**2.2**	**11.1**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**39.2**	**41.8**	**40.0**	**42.0**	**35.5**	**39.7**	**198.6**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		– 4.0	– 4.0	– 4.0	– 4.0	– 4.0	**– 4.0**	**– 20.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	1.2	1.4	1.6	3.1	**1.5**	**7.3**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**35.2**	**36.6**	**34.7**	**36.4**	**28.4**	**34.3**	**171.3**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Iceland	1	Total GHG emissions		3.46	3.37	3.23	3.14	3.14	**3.27**	**16.33**
	2	Verified emissions under the EU ETS		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	3	Non-ETS GHG emissions	(1) – (2)	3.46	3.37	3.23	3.14	3.14	**3.27**	**16.33**
	4	Initial Assigned Amount (AAUs)		3.70	3.70	3.70	3.70	3.70	**3.70**	**18.52**
	5	Allowances issued under the EU ETS		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	6	Non-ETS target	(4) – (5)	3.70	3.70	3.70	3.70	3.70	**3.70**	**18.52**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**0.25**	**0.34**	**0.47**	**0.57**	**0.57**	**0.44**	**2.19**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		0.29	0.29	0.29	0.29	0.29	**0.29**	**1.46**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**0.54**	**0.63**	**0.76**	**0.86**	**0.86**	**0.73**	**3.66**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	11	Emission reduction units (ERUs issued under JI projects)		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**0.54**	**0.63**	**0.76**	**0.86**	**0.86**	**0.73**	**3.66**
		Corrections			Correction of Total GHG emissions: Emissions from aluminium prodution are excluded according to 14/CP.7					
Ireland	1	Total GHG emissions		67.6	61.8	61.5	57.5	58.3	**61.3**	**306.7**
	2	Verified emissions under the EU ETS		20.4	17.2	17.4	15.8	16.9	**17.5**	**87.6**
	3	Non-ETS GHG emissions	(1) – (2)	47.2	44.6	44.1	41.7	41.4	**43.8**	**219.1**
	4	Initial Assigned Amount (AAUs)		62.8	62.8	62.8	62.8	62.8	**62.8**	**314.2**
	5	Allowances issued under the EU ETS		20.0	20.1	21.2	21.8	21.8	**21.0**	**104.8**
	6	Non-ETS target	(4) – (5)	42.9	42.7	41.6	41.1	41.1	**41.9**	**209.3**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**– 4.4**	**– 1.9**	**– 2.5**	**– 0.7**	**– 0.3**	**– 2.0**	**– 9.8**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		3.4	3.4	3.4	3.4	3.4	**3.4**	**17.0**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 1.0**	**1.5**	**0.9**	**2.7**	**3.1**	**1.4**	**7.2**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		1.9	1.9	1.9	1.9	1.9	**1.9**	**9.7**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**1.0**	**3.4**	**2.8**	**4.7**	**5.0**	**3.4**	**16.9**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Italy	1	Total GHG emissions		541.2	490.8	500.3	488.8	464.6	**497.1**	**2 485.6**
	2	Verified emissions under the EU ETS		220.7	184.9	191.5	190.0	179.1	**193.2**	**966.1**
	3	Non-ETS GHG emissions	(1) – (2)	320.5	305.9	308.8	298.8	285.5	**303.9**	**1 519.5**
	4	Initial Assigned Amount (AAUs)		483.3	483.3	483.3	483.3	483.3	**483.3**	**2 416.3**
	5	Allowances issued under the EU ETS		212.2	209.0	200.0	195.4	192.8	**201.9**	**1 009.3**
	6	Non-ETS target	(4) – (5)	271.1	274.2	283.3	287.9	290.5	**281.4**	**1 406.9**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**– 49.5**	**– 31.7**	**– 25.5**	**– 11.0**	**5.0**	**– 22.5**	**– 112.6**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		16.8	16.8	16.8	16.8	16.8	**16.8**	**83.9**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 32.7**	**– 14.9**	**– 8.8**	**5.8**	**21.8**	**– 5.7**	**– 28.6**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		2.0	2.0	2.0	2.0	2.0	**2.0**	**10.2**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**– 30.6**	**– 12.8**	**– 6.7**	**7.9**	**23.8**	**– 3.7**	**– 18.5**
		Corrections					None			
Latvia	1	Total GHG emissions		11.6	10.9	12.0	11.5	11.3	**11.4**	**57.2**
	2	Verified emissions under the EU ETS		2.7	2.5	3.2	2.9	2.7	**2.8**	**14.1**
	3	Non-ETS GHG emissions	(1) – (2)	8.8	8.4	8.8	8.6	8.5	**8.6**	**43.1**
	4	Initial Assigned Amount (AAUs)		23.8	23.8	23.8	23.8	23.8	**23.8**	**119.2**
	5	Allowances issued under the EU ETS		3.7	4.9	4.8	4.6	5.0	**4.6**	**23.0**
	6	Non-ETS target	(4) – (5)	20.1	19.0	19.1	19.2	18.8	**19.2**	**96.2**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**11.3**	**10.6**	**10.3**	**10.6**	**10.3**	**10.6**	**53.1**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		1.2	1.2	1.2	1.2	1.2	**1.2**	**6.2**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**12.5**	**11.8**	**11.5**	**11.9**	**11.6**	**11.9**	**59.4**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		– 8.1	– 8.1	– 8.1	– 8.1	– 8.1	**– 8.1**	**– 40.4**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**4.5**	**3.8**	**3.4**	**3.8**	**3.5**	**3.8**	**18.9**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Liechtenstein	1	Total GHG emissions		0.26	0.25	0.23	0.22	0.22	**0.24**	**1.19**
	2	Verified emissions under the EU ETS		0.02	0.01	0.00	0.00	0.00	**0.01**	**0.04**
	3	Non-ETS GHG emissions	(1) – (2)	0.24	0.23	0.23	0.22	0.22	**0.23**	**1.15**
	4	Initial Assigned Amount (AAUs)		0.21	0.21	0.21	0.21	0.21	**0.21**	**1.06**
	5	Allowances issued under the EU ETS		0.02	0.02	0.02	0.02	0.02	**0.02**	**0.09**
	6	Non-ETS target	(4) – (5)	0.19	0.19	0.19	0.20	0.20	**0.19**	**0.97**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**– 0.05**	**– 0.04**	**– 0.04**	**– 0.03**	**– 0.03**	**– 0.04**	**– 0.19**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 0.05**	**– 0.04**	**– 0.04**	**– 0.03**	**– 0.03**	**– 0.04**	**– 0.19**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.05	0.05	0.05	0.05	0.05	**0.05**	**0.23**
	11	Emission reduction units (ERUs issued under JI projects)		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**– 0.01**	**0.00**	**0.01**	**0.02**	**0.02**	**0.01**	**0.04**
		Corrections					None			
Lithuania	1	Total GHG emissions		24.9	20.4	21.1	21.6	22.0	**22.0**	**110.1**
	2	Verified emissions under the EU ETS		6.1	5.8	6.4	5.6	5.7	**5.9**	**29.6**
	3	Non-ETS GHG emissions	(1) – (2)	18.8	14.6	14.7	16.0	16.3	**16.1**	**80.5**
	4	Initial Assigned Amount (AAUs)		45.5	45.5	45.5	45.5	45.5	**45.5**	**227.3**
	5	Allowances issued under the EU ETS		7.5	7.6	8.2	8.9	10.9	**8.6**	**43.0**
	6	Non-ETS target	(4) – (5)	38.0	37.9	37.3	36.6	34.6	**36.9**	**184.3**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**19.1**	**23.3**	**22.6**	**20.6**	**18.3**	**20.8**	**103.8**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		1.1	1.1	1.1	1.1	1.1	**1.1**	**5.6**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**20.3**	**24.4**	**23.7**	**21.7**	**19.4**	**21.9**	**109.4**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		– 14.1	– 14.1	– 14.1	– 14.1	– 14.1	**– 14.1**	**– 70.7**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**6.1**	**10.2**	**9.6**	**7.5**	**5.3**	**7.7**	**38.7**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Luxembourg	1	Total GHG emissions		12.19	11.69	12.25	12.10	12.16	**12.08**	**60.39**
	2	Verified emissions under the EU ETS		2.10	2.18	2.25	2.05	1.99	**2.11**	**10.57**
	3	Non-ETS GHG emissions	(1) – (2)	10.09	9.51	10.00	10.05	10.17	**9.96**	**49.81**
	4	Initial Assigned Amount (AAUs)		9.48	9.48	9.48	9.48	9.48	**9.48**	**47.40**
	5	Allowances issued under the EU ETS		2.49	2.49	2.49	2.49	2.49	**2.49**	**12.44**
	6	Non-ETS target	(4) – (5)	6.99	6.99	6.99	6.99	6.99	**6.99**	**34.96**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	(6) – (3)	– 3.10	– 2.52	– 3.01	– 3.05	– 3.18	**– 2.97**	**– 14.85**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		– 0.05	– 0.05	– 0.05	– 0.05	– 0.05	**– 0.05**	**– 0.26**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 3.15**	**– 2.57**	**– 3.06**	**– 3.10**	**– 3.23**	**– 3.02**	**– 15.11**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		2.80	2.80	2.80	2.80	2.80	**2.80**	**14.00**
	11	Emission reduction units (ERUs issued under JI projects)		0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**– 0.35**	**0.23**	**– 0.26**	**– 0.30**	**– 0.43**	**– 0.22**	**– 1.11**
		Corrections					None			
Netherlands	1	Total GHG emissions		203.3	197.9	209.2	194.4	192.7	**199.5**	**997.4**
	2	Verified emissions under the EU ETS		83.5	81.0	84.7	80.0	76.4	**81.1**	**405.7**
	3	Non-ETS GHG emissions	(1) – (2)	119.8	116.8	124.4	114.4	116.2	**118.3**	**591.7**
	4	Initial Assigned Amount (AAUs)		200.3	200.3	200.3	200.3	200.3	**200.3**	**1 001.3**
	5	Allowances issued under the EU ETS		76.8	83.8	92.8	92.8	91.0	**87.5**	**437.3**
	6	Non-ETS target	(4) – (5)	123.5	116.4	107.4	107.4	109.3	**112.8**	**564.0**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**3.7**	**– 0.4**	**– 17.0**	**– 7.0**	**– 7.0**	**– 5.5**	**– 27.7**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		– 0.4	– 0.4	– 0.4	– 0.4	– 0.4	**– 0.4**	**– 1.8**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**3.3**	**– 0.8**	**– 17.4**	**– 7.4**	**– 7.4**	**– 5.9**	**– 29.5**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		9.2	9.2	9.2	9.2	9.2	**9.2**	**46.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**12.5**	**8.4**	**– 8.2**	**1.8**	**1.8**	**3.3**	**16.5**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Norway	1	Total GHG emissions		54.3	51.8	54.3	53.4	52.9	**53.3**	**266.7**
	2	Verified emissions under the EU ETS		19.3	19.2	19.3	19.2	18.6	**19.1**	**95.7**
	3	Non-ETS GHG emissions	(1) – (2)	35.0	32.6	35.0	34.1	34.3	**34.2**	**171.0**
	4	Initial Assigned Amount (AAUs)		50.1	50.1	50.1	50.1	50.1	**50.1**	**250.6**
	5	Allowances issued under the EU ETS		7.5	20.6	14.3	14.8	18.2	**15.1**	**75.4**
	6	Non-ETS target	(4) – (5)	42.6	29.5	35.8	35.4	31.9	**35.0**	**175.2**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	(6) – (3)	7.6	– 3.0	0.8	1.2	– 2.4	**0.8**	**4.2**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		– 0.5	– 0.5	– 0.5	– 0.5	– 0.5	**– 0.5**	**– 2.7**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**7.0**	**– 3.6**	**0.2**	**0.7**	**– 3.0**	**0.3**	**1.4**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		4.2	4.2	4.2	4.2	4.2	**4.2**	**21.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**11.2**	**0.6**	**4.4**	**4.9**	**1.2**	**4.5**	**22.4**
		Corrections					None			
Poland	1	Total GHG emissions		400.2	380.6	401.7	399.4	377.1	**391.8**	**1 959.0**
	2	Verified emissions under the EU ETS		204.1	191.2	199.7	203.0	196.6	**198.9**	**994.7**
	3	Non-ETS GHG emissions	(1) – (2)	196.1	189.4	201.9	196.4	180.5	**192.9**	**964.3**
	4	Initial Assigned Amount (AAUs)		529.6	529.6	529.6	529.6	529.6	**529.6**	**2 648.2**
	5	Allowances issued under the EU ETS		201.0	202.0	205.6	207.2	213.0	**205.8**	**1 028.9**
	6	Non-ETS target	(4) – (5)	328.6	327.6	324.0	322.4	316.6	**323.9**	**1 619.3**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**132.5**	**138.2**	**122.1**	**126.1**	**136.1**	**131.0**	**655.0**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		8.4	8.4	8.4	8.4	8.4	**8.4**	**42.2**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**141.0**	**146.6**	**130.5**	**134.5**	**144.6**	**139.4**	**697.1**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.1	3.8	4.0	5.8	**2.7**	**13.7**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**141.0**	**146.5**	**126.7**	**130.5**	**138.8**	**136.7**	**683.4**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Portugal	1	Total GHG emissions		78.5	75.2	71.4	70.0	69.8	**73.0**	**364.9**
	2	Verified emissions under the EU ETS		29.9	28.3	24.2	25.0	25.2	**26.5**	**132.6**
	3	Non-ETS GHG emissions	(1) – (2)	48.6	47.0	47.2	45.0	44.6	**46.5**	**232.3**
	4	Initial Assigned Amount (AAUs)		76.4	76.4	76.4	76.4	76.4	**76.4**	**381.9**
	5	Allowances issued under the EU ETS		30.5	30.9	32.5	33.1	33.0	**32.0**	**160.0**
	6	Non-ETS target	(4) – (5)	45.9	45.5	43.9	43.3	43.3	**44.4**	**222.0**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	(6) – (3)	– 2.7	– 1.4	– 3.3	– 1.7	– 1.2	**– 2.1**	**– 10.3**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		9.8	9.8	9.8	9.8	9.8	**9.8**	**49.0**
	9	Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration	(7) + (8)	7.1	8.4	6.5	8.1	8.6	**7.7**	**38.7**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		1.6	1.6	1.6	1.6	1.6	**1.6**	**8.1**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**8.7**	**10.0**	**8.1**	**9.7**	**10.2**	**9.4**	**46.8**
		Corrections					None			
Romania	1	Total GHG emissions		140.5	120.3	116.6	123.3	120.6	**124.3**	**621.3**
	2	Verified emissions under the EU ETS		63.8	49.1	47.3	51.2	47.9	**51.9**	**259.3**
	3	Non-ETS GHG emissions	(1) – (2)	76.6	71.2	69.3	72.1	72.7	**72.4**	**362.0**
	4	Initial Assigned Amount (AAUs)		256.0	256.0	256.0	256.0	256.0	**256.0**	**1 279.8**
	5	Allowances issued under the EU ETS		71.8	73.9	75.0	74.8	75.9	**74.3**	**371.4**
	6	Non-ETS target	(4) – (5)	184.2	182.0	181.0	181.2	180.1	**181.7**	**908.4**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	(6) – (3)	**107.5**	**110.8**	**111.7**	**109.0**	**107.4**	**109.3**	**546.5**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		3.0	3.0	3.0	3.0	3.0	**3.0**	**15.1**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**110.6**	**113.8**	**114.7**	**112.1**	**110.4**	**112.3**	**561.6**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		– 2.6	– 2.6	– 2.6	– 2.6	– 2.6	**– 2.6**	**– 13.0**
	11	Emission reduction units (ERUs issued under JI projects)		**0.0**	**0.0**	**0.4**	**1.0**	**2.8**	**0.8**	**4.2**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**108.0**	**111.2**	**111.7**	**108.4**	**105.0**	**108.9**	**544.3**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Slovakia	1	Total GHG emissions		49.1	44.0	45.9	45.3	42.5	**45.4**	**226.8**
	2	Verified emissions under the EU ETS		25.3	21.6	21.7	22.2	20.9	**22.4**	**111.8**
	3	Non-ETS GHG emissions	(1) – (2)	23.8	22.4	24.2	23.1	21.6	**23.0**	**115.0**
	4	Initial Assigned Amount (AAUs)		66.3	66.3	66.3	66.3	66.3	**66.3**	**331.4**
	5	Allowances issued under the EU ETS		32.2	32.1	32.4	32.6	33.4	**32.5**	**162.7**
	6	Non-ETS target	(4) – (5)	34.1	34.1	33.9	33.7	32.9	**33.7**	**168.7**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**10.3**	**11.8**	**9.7**	**10.6**	**11.3**	**10.7**	**53.7**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		0.4	0.4	0.4	0.4	0.4	**0.4**	**1.8**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**10.7**	**12.1**	**10.1**	**11.0**	**11.6**	**11.1**	**55.5**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		– 8.4	– 8.4	– 8.4	– 8.4	– 8.4	**– 8.4**	**– 42.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**2.3**	**3.7**	**1.7**	**2.6**	**3.2**	**2.7**	**13.5**
		Corrections					None			
Slovenia	1	Total GHG emissions		21.4	19.4	19.5	19.5	19.1	**19.8**	**98.9**
	2	Verified emissions under the EU ETS		8.9	8.1	8.1	8.0	7.6	**8.1**	**40.7**
	3	Non-ETS GHG emissions	(1) – (2)	12.5	11.4	11.4	11.5	11.5	**11.7**	**58.3**
	4	Initial Assigned Amount (AAUs)		18.7	18.7	18.7	18.7	18.7	**18.7**	**93.6**
	5	Allowances issued under the EU ETS		8.2	8.2	8.2	8.2	8.2	**8.2**	**41.1**
	6	Non-ETS target	(4) – (5)	10.5	10.5	10.5	10.5	10.5	**10.5**	**52.5**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**– 2.0**	**– 0.8**	**– 0.9**	**– 1.0**	**– 1.0**	**– 1.2**	**– 5.8**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		1.3	1.3	1.3	1.3	1.3	**1.3**	**6.6**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 0.7**	**0.5**	**0.5**	**0.3**	**0.3**	**0.2**	**0.8**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		1.0	1.0	1.0	1.0	1.0	**1.0**	**5.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**0.3**	**1.5**	**1.5**	**1.3**	**1.3**	**1.2**	**5.8**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Spain	1	Total GHG emissions		398.9	362.7	348.6	350.5	346.1	**361.4**	**1 806.8**
	2	Verified emissions under the EU ETS		163.5	136.9	121.5	132.7	135.6	**138.0**	**690.2**
	3	Non-ETS GHG emissions	(1) – (2)	235.4	225.8	227.2	217.8	210.4	**223.3**	**1 116.6**
	4	Initial Assigned Amount (AAUs)		333.2	333.2	333.2	333.2	333.2	**333.2**	**1 666.2**
	5	Allowances issued under the EU ETS		154.154	151.455	150.005	151.448	154.147	**152.2**	**761.2**
	6	Non-ETS target	(4) – (5)	179.1	181.8	183.2	181.8	179.1	**181.0**	**905.0**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**– 56.3**	**– 44.0**	**– 43.9**	**– 36.0**	**– 31.3**	**– 42.3**	**– 211.6**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		11.3	11.3	11.3	11.3	11.3	**11.3**	**56.7**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 45.0**	**– 32.7**	**– 32.6**	**– 24.7**	**– 20.0**	**– 31.0**	**– 155.0**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		38.8	38.8	38.8	38.8	38.8	**38.8**	**194.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.2	0.1	**0.1**	**0.3**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**– 6.2**	**6.1**	**6.2**	**13.9**	**18.7**	**7.7**	**38.7**
		Corrections					None			
Sweden	1	Total GHG emissions		63.4	59.3	65.5	61.4	58.3	**61.6**	**307.9**
	2	Verified emissions under the EU ETS		20.1	17.5	22.7	19.9	18.2	**19.7**	**98.3**
	3	Non-ETS GHG emissions	(1) – (2)	43.3	41.8	42.8	41.6	40.1	**41.9**	**209.7**
	4	Initial Assigned Amount (AAUs)		75.0	75.0	75.0	75.0	75.0	**75.0**	**375.2**
	5	Allowances issued under the EU ETS		20.8	21.1	23.5	22.7	22.7	**22.2**	**110.9**
	6	Non-ETS target	(4) – (5)	54.3	53.9	51.5	52.3	52.3	**52.9**	**264.3**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**10.9**	**12.1**	**8.7**	**10.7**	**12.2**	**10.9**	**54.6**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		2.1	2.1	2.1	2.1	2.1	**2.1**	**10.6**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**13.1**	**14.2**	**10.8**	**12.8**	**14.3**	**13.1**	**65.3**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**13.1**	**14.2**	**10.8**	**12.8**	**14.3**	**13.1**	**65.3**
		Corrections					None			

		Category	Operation	2008	2009	2010	2011	2012	Average 2008–2012	Total 2008–2012
				Mt CO_2-equivalent						
Switzerland	1	Total GHG emissions		53.7	52.3	54.1	50.0	51.5	**52.3**	**261.6**
	2	Verified emissions under the EU ETS *		2.9	2.6	2.8	2.7	2.6	**2.7**	**13.6**
	3	Non-ETS GHG emissions	(1) – (2)	50.8	49.7	51.3	47.3	48.9	**49.6**	**248.0**
	4	Initial Assigned Amount (AAUs)		48.6	48.6	48.6	48.6	48.6	**48.6**	**242.8**
	5	Allowances issued under the EU ETS *		3.3	3.1	3.4	3.4	3.4	**3.3**	**16.6**
	6	Non-ETS target	(4) – (5)	45.3	45.5	45.2	45.2	45.2	**45.2**	**226.2**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**– 5.5**	**– 4.3**	**– 6.1**	**– 2.1**	**– 3.7**	**– 4.3**	**– 21.7**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		1.7	1.7	1.7	1.7	1.7	**1.7**	**8.3**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**– 3.8**	**– 2.6**	**– 4.4**	**– 0.5**	**– 2.1**	**– 2.7**	**– 13.4**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		3.0	3.0	3.0	3.0	3.0	**3.0**	**15.0**
	11	Emission reduction units (ERUs issued under JI projects)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**– 0.8**	**0.4**	**– 1.4**	**2.5**	**0.9**	**0.3**	**1.6**
		Note			* Numbers for CH ETS are still provisional.					
United Kingdom	1	Total GHG emissions		630.1	576.6	593.9	552.6	567.7	**584.2**	**2 921.0**
	2	Verified emissions under the EU ETS		265.1	231.9	237.3	220.9	231.2	**237.3**	**1 186.4**
	3	Non-ETS GHG emissions	(1) – (2)	365.1	344.7	356.6	331.7	336.5	**346.9**	**1 734.5**
	4	Initial Assigned Amount (AAUs)		679.3	679.3	679.3	679.3	679.3	**679.3**	**3 396.5**
	5	Allowances issued under the EU ETS		218.3	242.1	256.3	254.1	256.1	**245.4**	**1 226.9**
	6	Non-ETS target	**(4) – (5)**	**461.0**	**437.2**	**423.0**	**425.2**	**423.2**	**433.9**	**2 169.6**
	7	**Difference between target and GHG emissions (non-ETS domestic)**	**(6) – (3)**	**95.9**	**92.5**	**66.4**	**93.5**	**86.8**	**87.0**	**435.1**
	8	Expected carbon sequestration from LULUCF activities (RMUs)		3.6	3.6	3.6	3.6	3.6	**3.6**	**18.2**
	9	**Difference between target and GHG emissions (non-ETS domestic) including effect of carbon sequestration**	**(7) + (8)**	**99.6**	**96.2**	**70.0**	**97.2**	**90.4**	**90.7**	**453.3**
	10	Planned use of Kyoto mechanisms by government (net transfer of AAUs + purchase of CERs + ERUs)		0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
	11	Emission reduction units (ERUs issued under JI projects)		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
	12	**Difference between target and GHG emissions (non-ETS domestic emissions including plans on Kyoto mechanisms and carbon sinks)**	**(9) + (10) – (11)**	**99.6**	**96.2**	**70.0**	**97.2**	**90.4**	**90.7**	**453.3**
		Corrections			Correction of AAU initial to EU territory					

5 Respective contributions of the ETS and non-ETS sectors towards achieving Kyoto targets in Europe

Key messages

1. For all countries participating in an emission trading scheme where emission allowances are linked to KP units, national Kyoto targets for the period 2008–2012 were subdivided into two emission budgets with different levels of ambition: ETS and non-ETS. These emission budgets depend directly on each other, given the limited overall amount of available units that can be allocated to the ETS and non-ETS sectors.

2. In the EU-15, the overall EU ETS cap (i.e. the maximum amount of emissions allowed) for the period 2008–2012 was 9 % below 2005 levels while the non-ETS sectors had an emission budget of 4 % below their 2005 levels. In Austria, Denmark, Italy, Luxembourg, Spain and Liechtenstein, non-ETS reduction needs were higher than 15 % compared to 2005 non-ETS emissions levels. For all these countries, the non-ETS emission targets for 2008–2012 were relatively more demanding than in the ETS sectors.

3. EU ETS emissions were reduced below ETS caps in most Member States during the period 2008–2012, while success in achieving emission budgets in the non-ETS sectors appeared more difficult. This may be partly explained by the fact that the crisis had a greater impact on emission trends in the ETS sectors as these sectors are more strongly linked to economic activity. The recession, unforeseen at the time ETS caps were set for the second trading period, drove down emissions in the EU ETS more than in the other sectors.

4. Previous EEA reports tracking progress towards Kyoto targets in Europe have on several occasions identified Austria, Denmark, Italy, Luxembourg and Spain as 'not being on track' towards their KP targets. Such results fit particularly well with the fact that these countries, to reach their Kyoto targets, had originally placed more emphasis on emission reductions in the non-ETS sectors.

5. Achieving important domestic emission reductions in these sectors may indeed have been more difficult than in the ETS due to the larger diffusion of sources (e.g. transport, agriculture) and typically higher marginal abatement costs than in the ETS sectors (essentially constituted of points sources).

The NAPs under the EU ETS for the second trading period aimed at distributing the national emission reductions needed to achieve the KP targets between sectors covered by the EU ETS and sectors not covered by the EU ETS (see Section 3.3). With the availability of emission data for the whole period 2008–2012, it is now possible to compare retrospectively the levels of reduction effort in the ETS and non-ETS sectors, both ex-ante — comparing 2008–2012 reduction targets to 2005 emissions levels, and ex-post, comparing the targets to actual emissions in 2008–2012. This analysis focuses on domestic emission limitations and reductions alone, and does not take into account the use of flexible mechanisms and the effect of carbon sinks to achieve emission targets.

The following discussion focuses on EU-15, EU-10, Liechtenstein and Norway. Cyprus and Malta are not included in this analysis as they have no Kyoto targets. Croatia joined the EU ETS in 2013 and is therefore not included. Iceland had no stationary

installations under the EU ETS and, although it has a national ETS in place, Switzerland is not included in the EU ETS.

Verified EU ETS emissions for the year 2005 have been complemented with so called 'scope change' emissions (or scope correction) which reflect the expansion of the EU ETS scope between 2005 and the second trading period (Section 2.2.3).

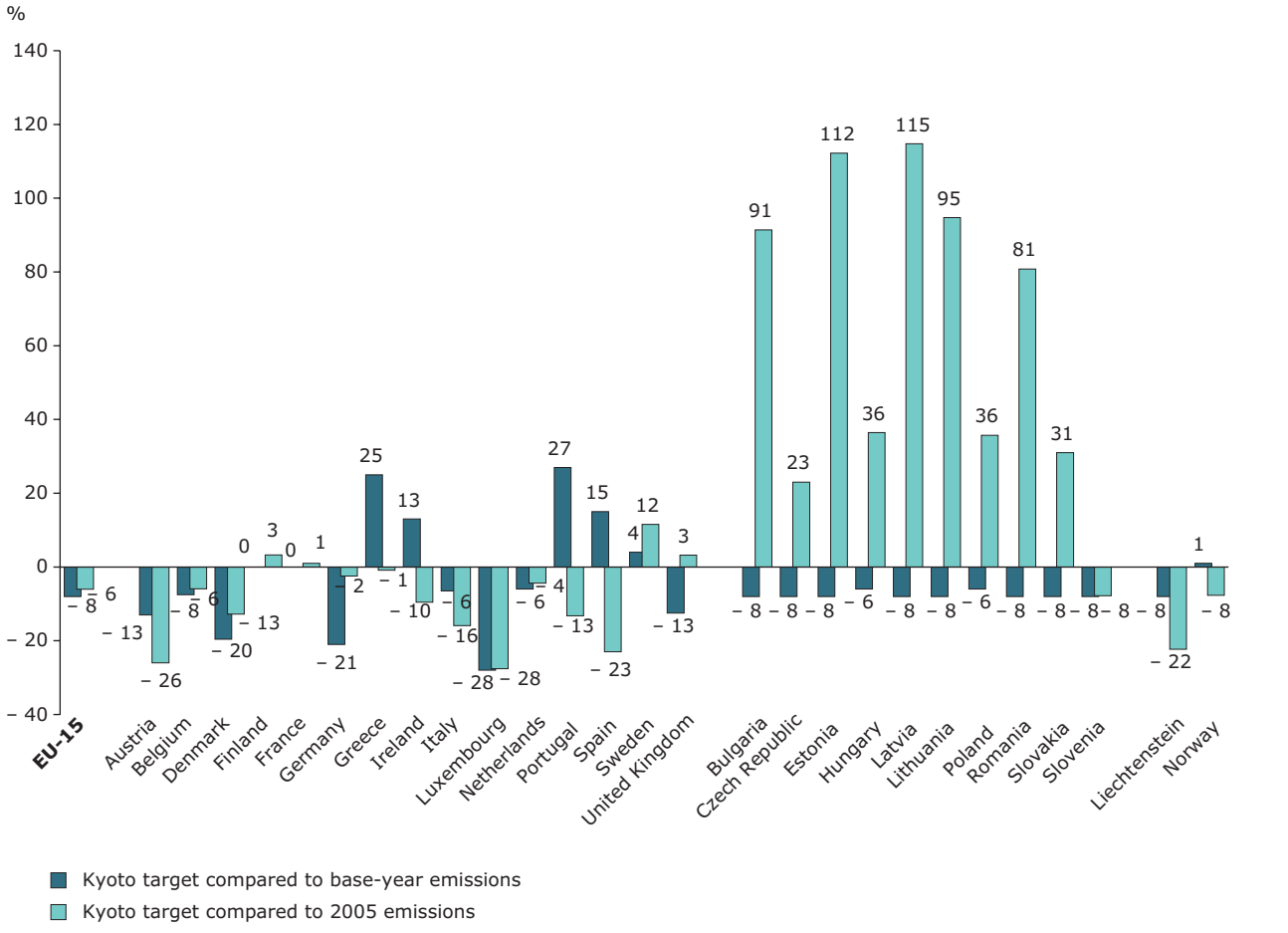
5.1 Kyoto targets compared to 2005 levels

In the rest of this chapter, targets and emission levels are compared against emission levels in the year 2005 and not to the KP base-year emissions. This is because 2005 is the relevant year for the cap-setting in the EU ETS for the period 2008–2012 and the first year of operation of the EU ETS. Furthermore, the division of emissions into ETS and non-ETS emissions is not possible prior to that year. However, an initial comparison of Kyoto targets with base-year levels and 2005 levels puts in perspective the efforts required in the ETS and non-ETS sectors compared to 2005 levels, in order to achieve Kyoto targets.

As shown in Figure 5.1, most EU-15 Member States needed to reduce overall emissions compared to 2005 levels in order to meet their burden-sharing targets. Austria, Denmark, Italy, Luxembourg, Portugal and Spain had the largest gap to close (in relative terms) between 2005 levels and the targets for the first commitment period of the KP. On the other hand, Finland, France, Sweden and the United Kingdom had the possibility to increase their emissions and still reach their targets.

In eight Member States (Austria, Greece, Ireland, Italy, Portugal, Spain, Liechtenstein and Norway), 2005 total GHG emissions were above the KP base-year emissions, making it more ambitious to reach the defined Kyoto targets (see Figure 5.1).

Figure 5.1 Kyoto targets compared to base-year and to 2005 emissions



Source: EEA, 2006; EC, 2006b; EC, 2010b, EEA, 2013d.

Apart from Slovenia, all EU-10 Member States had room to increase their total emissions substantially during the period 2008–2012 compared to 2005, as 2005 emissions were substantially (more than 23 %) below the emissions in the Kyoto base year.

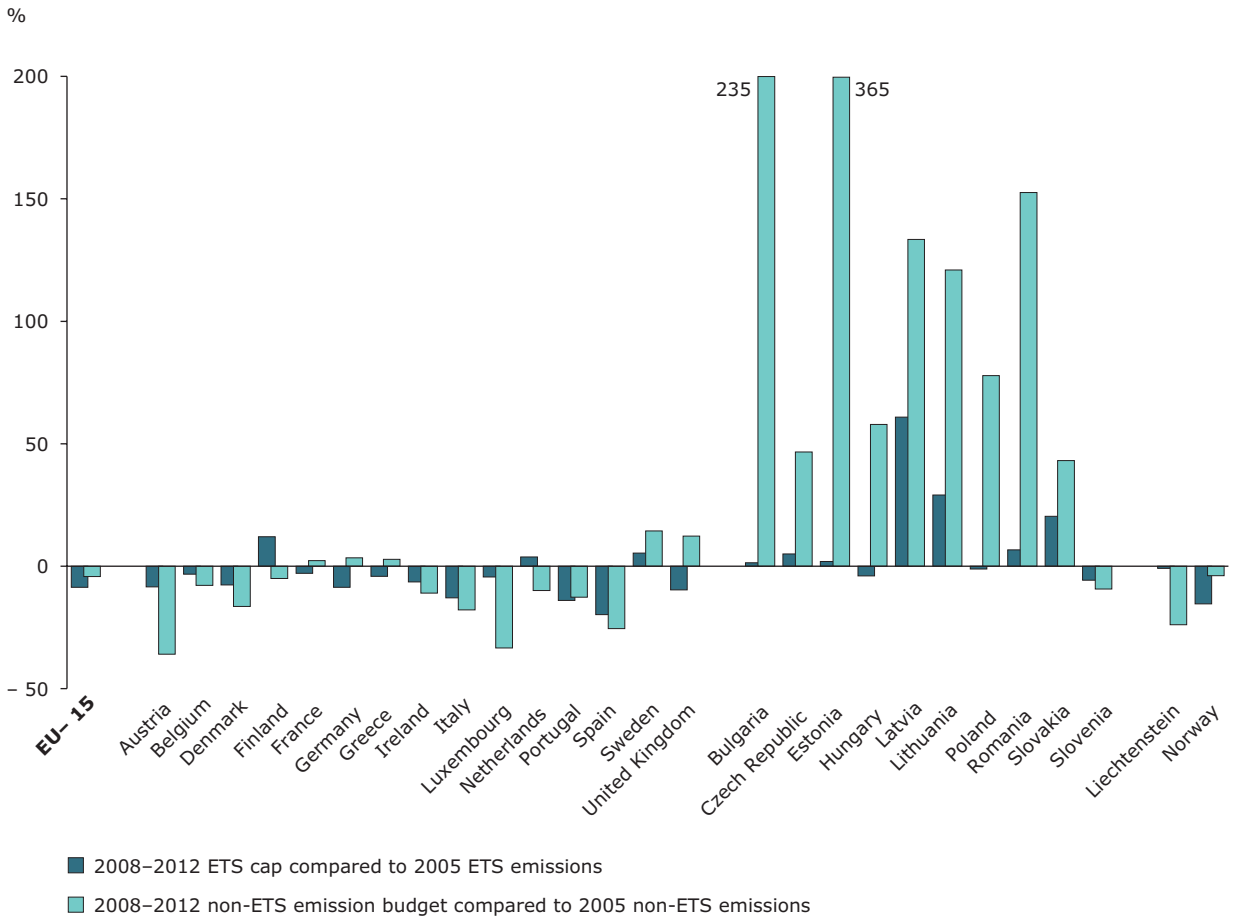
5.2 Emission budgets for the ETS and non-ETS sectors compared to 2005 emissions (ex-ante)

A parallel comparison between the 2008–2012 emission budgets in the ETS and non-ETS sectors, respectively, with 2005 emissions levels shows how the reduction effort needed in ETS and non-ETS sectors was distributed (Figure 5.2 and Table 5.1). As previously pointed out, these emission budgets are directly related since they form together the national Kyoto targets for total GHG emissions. For example, reducing an ETS cap makes a number of Kyoto units available to cover emissions in the non-ETS sectors, and vice-versa.

When all ETS-participating countries are considered, the cap in the EU ETS for the period from 2008 to 2012 was 6 % below 2005 emissions.

In the EU-15, the EU ETS sectors took on a 9 % reduction target for the period 2008–2012 while the non-ETS sectors had an emission budget 4 % below their 2005 levels. Sweden could allow emission increases in both ETS and non-ETS sectors on average during the period 2008–2012 compared to 2005. The reduction effort attributed to the ETS sectors in France, Germany, Greece and the United Kingdom left room for emissions to increase in the non-ETS while still meeting the national burden-sharing target.

Figure 5.2 2008–2012 emission budgets in the ETS and non-ETS sectors compared to respective 2005 emission levels



Note: For this calculation scope corrected verified emissions have been used to take into account the different scope of the EU-ETS in the trading periods 2005–2007 and 2008–2012 (see EEA, 2013f).

Source: EEA, 2013b; EEA, 2013c; EEA, 2013d.

Table 5.1 2008–2012 reduction targets compared to 2005 emissions

	Historic emissions 2005		Emission budgets 2008–2012		Emission budgets 2008–2012 compared to 2005 emissions			
	ETS [a]	non-ETS	ETS	non-ETS	ETS	non-ETS	ETS	non-ETS
	Mt CO_2-eq./year		Mt CO_2-eq./year		Mt CO_2-eq./year		%	
Austria	33.7	59.2	30.9	37.9	– 2.8	– 21.3	– 8 %	– 36 %
Belgium	60.6	82.7	58.6	76.2	– 2.0	– 6.5	– 3 %	– 8 %
Denmark	26.5	37.5	24.5	31.3	– 2.0	– 6.1	– 8 %	– 16 %
Finland	33.5	35.2	37.5	33.5	4.0	– 1.8	12 %	– 5 %
France	136.0	422.3	132.0	431.9	– 4.0	9.6	– 3 %	2 %
Germany	486.1	511.9	444.3	529.3	– 41.7	17.4	– 9 %	3 %
Greece	71.3	63.7	68.3	65.4	– 3.0	1.8	– 4 %	3 %
Ireland	22.4	47.1	21.0	41.9	– 1.4	– 5.2	– 6 %	– 11 %
Italy	231.9	342.5	201.9	281.4	– 30.0	– 61.1	– 13 %	– 18 %
Luxembourg	2.6	10.5	2.5	7.0	– 0.1	– 3.5	– 4 %	– 33 %
Netherlands	84.3	125.2	87.5	112.8	3.2	– 12.4	4 %	– 10 %
Portugal	37.2	50.8	32.0	44.4	– 5.2	– 6.4	– 14 %	– 13 %
Spain	189.9	243.0	152.2	181.0	– 37.6	– 62.0	– 20 %	– 26 %
Sweden	21.1	46.2	22.2	52.9	1.1	6.6	5 %	14 %
United Kingdom	271.7	386.5	245.4	433.9	– 26.3	47.4	– 10 %	12 %
Bulgaria	39.2	24.6	39.7	82.3	0.5	57.7	1 %	235 %
Czech Republic	82.5	62.8	86.6	92.1	4.1	29.3	5 %	47 %
Estonia	12.9	5.6	13.1	26.1	0.2	20.5	2 %	365 %
Hungary	27.6	51.9	26.5	82.0	– 1.1	30.1	– 4 %	58 %
Latvia	2.9	8.2	4.6	19.2	1.7	11.0	61 %	133 %
Lithuania	6.7	16.7	8.6	36.9	1.9	20.2	29 %	121 %
Poland	208.1	182.1	205.8	323.9	– 2.3	141.7	– 1 %	78 %
Romania	69.6	71.9	74.3	181.7	4.7	109.7	7 %	153 %
Slovakia	27.0	23.6	32.5	33.7	5.5	10.2	20 %	43 %
Slovenia	8.7	11.6	8.2	10.5	– 0.5	– 1.1	– 6 %	– 9 %
Liechtenstein	0.0	0.3	0.0	0.2	0.0	– 0.1	– 1 %	– 24 %
Norway	17.8	36.5	15.1	35.0	– 2.7	– 1.4	– 15 %	– 4 %
EU-15	**1 708.5**	**2 464.3**	**1 560.6**	**2 360.8**	**– 147.8**	**– 103.5**	**– 9 %**	**– 4 %**
EU-10	**485.1**	**459.1**	**499.9**	**888.4**	**14.9**	**429.3**	**3 %**	**94 %**
All countries	**2 211.4**	**2 960.1**	**2 075.7**	**3 284.4**	**– 135.7**	**324.3**	**– 6 %**	**11 %**

Note: [a] For this calculation, 'scope corrected' verified emissions were used in order to take into account the different scope of the EU-ETS in the trading periods 2005–2007 and 2008–2012 (see Section 2.2.3), EEA, 2013d.

Source: EEA, 2013b; EEA, 2013c; EEA, 2013d; scope correction (Section 2.2.3).

In the EU-10, the EU ETS sectors had a net possibility to increase emissions by 3 % while the non-ETS sectors could increase emissions by as much as 94 % on average compared to 2005 levels. Poland, Slovenia and Hungary were the only non-EU-15 countries who required a net reduction from their ETS sectors.

In relative terms, Spain had the most stringent ETS cap with a 20 % reduction compared to 2005 ETS emissions, followed by Norway with 15 % and Portugal with 14 %. Slovakia, Lithuania and Latvia had caps that allowed their emissions in the ETS sectors to grow by 20 % or more compared to 2005 ETS emissions during the second trading period.

As a result of relatively low ETS caps in comparison with 2005 ETS levels, the necessary emission reductions in non-ETS sectors in Austria, Belgium, Denmark, Ireland, Italy, Luxembourg, the Netherlands, Spain, Slovenia and Liechtenstein are larger and sometimes much more demanding than

in the ETS sectors. Non-ETS reduction needs of more than 15 % compared to 2005 non-ETS emissions levels can be observed for Austria, Denmark, Italy, Luxembourg, Spain and Liechtenstein.

5.3 Comparison of 2008–2012 emissions with reductions targets in the ETS and non-ETS sectors

In all European countries participating in the EU ETS except three (Estonia, Germany and Norway), average ETS emissions were lower than the caps decided in 2007 (see Table 5.5 and Figure 5.3). In Estonia and Germany, ETS emissions were 2 % above respective caps, while in Norway they were significantly above (17 % shortfall). In these countries operators made use of the possibility to acquire EUAs issued in other Member States or credits from flexible mechanisms. Emissions substantially below caps in the ETS sector can be observed in Liechtenstein (58 %), Latvia (38 %), Lithuania (31 %), Slovakia (31 %) and Romania (30 %).

At the same time, in nine EU-15 Member States as well as Slovenia and Liechtenstein, non-ETS emissions remained higher than their respective budgets. The relative gaps between average 2008–2012 non-ETS emissions and remaining AAUs were the largest in Austria, Denmark, Luxembourg and Spain. These Member States intend to close the gap by making use of flexible mechanisms of the KP.

At the EU-15 level, both aggregated ETS and non-ETS targets were achieved, but larger emission reductions occurred in the EU ETS than in the non-ETS sectors. The overall ETS cap within EU-15 countries was set to 9 % below 2005 levels, whereas actual emissions in the years 2008–2012 were 13 % below 2005 levels. The non-ETS emission budget was 4 % below 2005 levels, whereas actual average emissions for the years 2008–2012 were 8 % below 2005 levels.

Overall, ETS emissions were mostly below ETS caps, while success in achieving emission budgets in the non-ETS sectors appeared more difficult. One possible reason is the difference of impacts that the economic crisis has had on these sectors. Emissions in sectors covered by the EU ETS are more strongly linked to GDP and economic fluctuations than in the non-ETS sectors. For example, ETS emissions in the cement, iron and steel sectors decreased sharply between 2008 and 2009 (see Section 2.4.1). As a consequence of the recession, ETS emissions decreased more than those from the other sectors (see also Section 2.4.1).

As mentioned in the previous section, non-ETS targets of more than 15 % compared to 2005 levels can be observed for Austria, Denmark, Italy, Luxembourg and Spain. It is interesting to note that previous EEA reports tracking progress towards Kyoto targets (EEA, annual publication 2006–2012) have often identified these countries as 'not being on track' towards their KP targets on the basis of their projections for the period 2008–2012 (and intended use of flexible mechanisms and carbon sinks). Such results could retrospectively be related to the relatively limited emission budgets for the non-ETS sectors in these countries in comparison with other Member States. Achieving important emission reductions in these sectors may be more difficult than in the ETS due to the larger diffusion of sources (e.g. transport, agriculture) and typically higher marginal abatement costs than in the ETS sectors (essentially constituted of points sources). For example, the individual situation of Italy, Luxembourg (considered again in 2013 as not on track towards their burden-sharing target — see Section 4.5) and Spain can be further assessed:

- Italy decided to reduce emissions in the ETS sectors by 30 Mt CO_2-equivalent compared to 2005 levels (– 13 %) ([33]). This resulted in an emission budget of 281 Mt CO_2-equivalent per year, corresponding to necessary reduction of 61 Mt CO_2-equivalent per year compared to 2005 levels (– 18 %) in the non-ETS sectors. The observed reductions achieved were 39 Mt CO_2-equivalent in both the ETS sector and the non-ETS sector compared to emissions in 2005, which created a surplus of 9 Mt CO_2-equivalent in the ETS sector and a gap of 23 Mt CO_2-equivalent in the non-ETS sector. Both emission budgets were demanding, in relative terms, but the non-ETS target turned out to be more difficult to achieve.

- The NAP for Luxembourg required to reduce emissions by only 4 % in the ETS sector compared to 2005 emissions, while the resulting reduction required in the non-ETS sector was of – 33 % compared to 2005 emissions. Actual 2008–2012 emissions show that the ETS target was well reached with emissions 15 %, below the

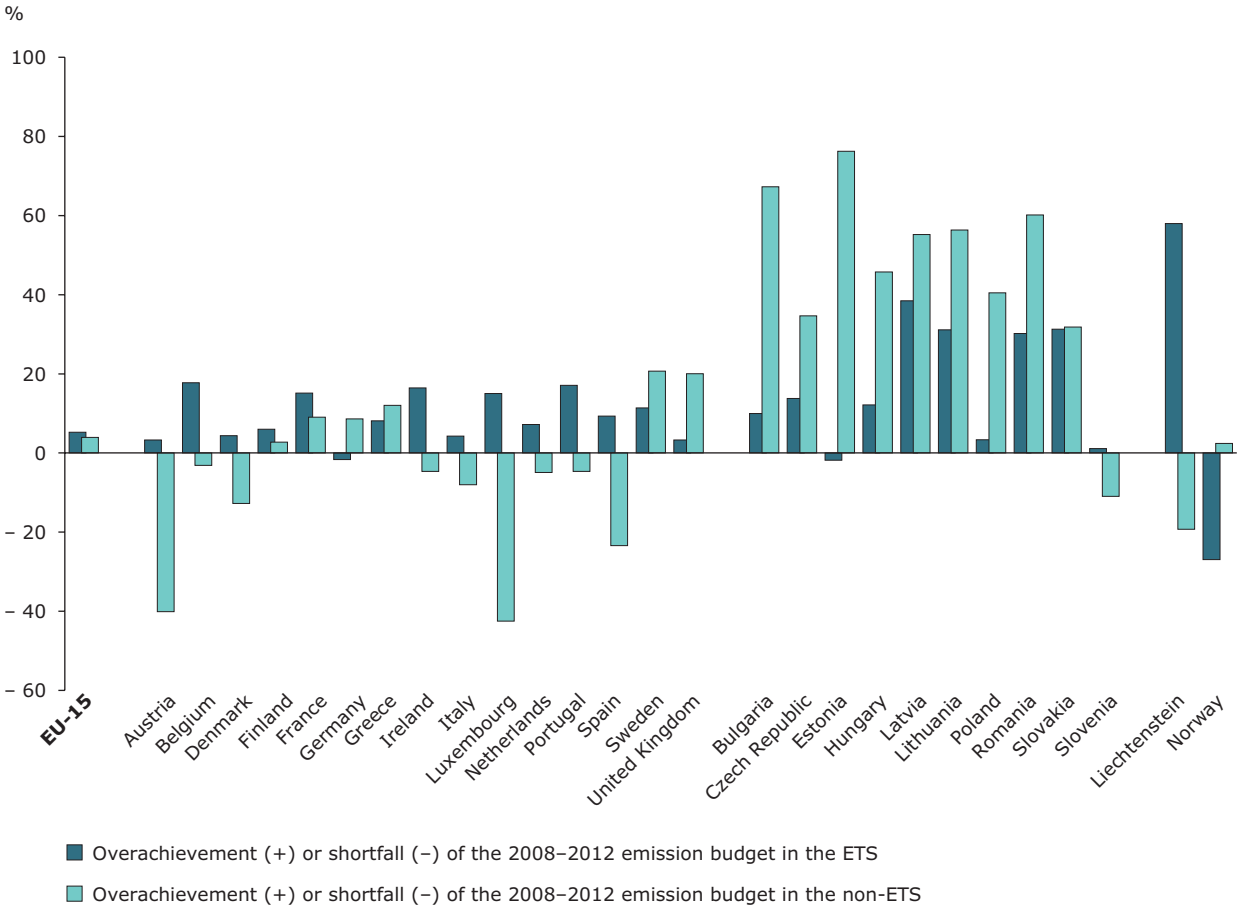
([33]) According to the Commission Decision of 15 May 2007 concerning the national allocation plan for the allocation of greenhouse gas emission allowances notified by Italy in accordance with the Emissions Trading Directive.

cap whereas non-ETS emissions remained nearly stable compared to 2005 level of emissions, leading to a large gap of 42 %.

- Spain decided to reduce emissions by 38 million tonnes CO_2 in the ETS sectors (– 20 %) compared to 2005 levels, leading to a required average reduction of 62 Mt CO_2-equivalent per year in the non-ETS sectors during the period 2008–2012 compared to 2005. The observed average reductions during that period compared to 2005 were 52 Mt CO_2-equivalent per year in the ETS and 20 Mt CO_2-equivalent per year in the non-ETS sectors. This resulted in a surplus of 14 million EUAs in the EU ETS and a deficit of 42 million AAUs in the non-ETS sectors.

For the EU-10 Member States, the ETS cap was set 3 % above 2005 levels, whereas actual ETS emissions were 10 % below the level of emissions in the ETS-sector in 2005. As most EU-10 Member States had already overachieved their Kyoto target before 2005, the resulting emission budgets in the non-ETS sector were far above the estimated emissions (94 % above 2005 levels). Actual emissions in the years 2008 to 2012 in the non-ETS sector for the EU-10 were on average 1 % above 2005 levels. This analysis indicates that for the EU-10 as a group the ETS cap was considerable higher than actual emissions. Emissions in the non-ETS sectors of the EU-10 show only a slightly increasing trend and levels remained far below the respective non-ETS emission budgets.

Figure 5.3 Emissions in ETS and non-ETS sectors compared to their respective emission budgets, 2008–2012



Note: Positive bars show emissions below their respective budgets. Negative bars show emissions above their respective budget, which requires the acquisition of additional allowances or emission certificates (by operators in the ETS sector and by Member States in the non-ETS sector).

Source: EEA, 2013a; EEA, 2013b; EEA, 2013d, EEA, 2013f, EEA, 2013g, scope correction (Section 2.2.3).

Slovenia is the only EU-10 Member State in a situation comparable to most EU-15 Member States, although its ETS target was reached with difficulty. For all other EU-10 Member States except Estonia, both ETS and non-ETS emission budgets were largely met. In these countries the ETS did not play any specific role in achieving Kyoto targets, because there were sufficient units both in ETS and non-ETS sectors. Estonia is the only EU-10 Member State where EU ETS emissions were above the gap.

Ultimately, overachievements in the ETS cannot be used to counter-act shortfalls in the non-ETS (as discussed in Section 3.3), apart from the possibility to use remaining NER allowances for compliance in the non-ETS sector.

Table 5.2 Emissions in ETS and non-ETS sectors compared to their respective emission budgets, 2008–2012

	Emission budgets 2008–2012		Actual average emissions 2008–2012		Comparison of average emissions with their 2008–2012 emission budgets (emissions minus emission budgets)			
	ETS	non-ETS	ETS	non-ETS	ETS	non-ETS	ETS	non-ETS
	Mt CO_2-eq./year		Mt CO_2-eq./year		Mt CO_2-eq./year		%	
Austria	30.9	37.9	29.9	53.1	1.0	– 15.2	3 %	– 40 %
Belgium	58.6	76.2	48.2	78.6	10.4	– 2.4	18 %	– 3 %
Denmark	24.5	31.3	23.4	35.3	1.1	– 4.0	4 %	– 13 %
Finland	37.5	33.5	35.3	32.6	2.3	0.9	6 %	3 %
France	132.0	431.9	112.0	392.7	20.0	39.2	15 %	9 %
Germany	444.3	529.3	451.8	483.7	– 7.5	45.6	– 2 %	9 %
Greece	68.3	65.4	62.7	57.5	5.6	7.9	8 %	12 %
Ireland	21.0	41.9	17.5	43.8	3.4	– 2.0	16 %	– 5 %
Italy	201.9	281.4	193.2	303.9	8.6	– 22.5	4 %	– 8 %
Luxembourg	2.5	7.0	2.1	10.0	0.4	– 3.0	15 %	– 42 %
Netherlands	87.5	112.8	81.1	118.3	6.3	– 5.5	7 %	– 5 %
Portugal	32.0	44.4	26.5	46.5	5.5	– 2.1	17 %	– 5 %
Spain	152.2	181.0	138.0	223.3	14.2	– 42.3	9 %	– 23 %
Sweden	22.2	52.9	19.7	41.9	2.5	10.9	11 %	21 %
United Kingdom	245.4	433.9	237.3	346.9	8.1	87.0	3 %	20 %
Bulgaria	39.7	82.3	35.8	26.9	4.0	55.3	10 %	67 %
Czech Republic	86.6	92.1	74.7	60.2	11.9	31.9	14 %	35 %
Estonia	13.1	26.1	13.4	6.2	– 0.2	19.9	– 2 %	76 %
Hungary	26.5	82.0	23.3	44.5	3.2	37.5	12 %	46 %
Latvia	4.6	19.2	2.8	8.6	1.8	10.6	38 %	55 %
Lithuania	8.6	36.9	5.9	16.1	2.7	20.8	31 %	56 %
Poland	205.8	323.9	198.9	192.9	6.8	131.0	3 %	40 %
Romania	74.3	181.7	51.9	72.4	22.4	109.3	30 %	60 %
Slovakia	32.5	33.7	22.4	23.0	10.2	10.7	31 %	32 %
Slovenia	8.2	10.5	8.1	11.7	0.1	– 1.2	1 %	– 11 %
Liechtenstein	0.0	0.2	0.0	0.2	0.0	0.0	58 %	– 19 %
Norway	15.1	35.0	19.1	34.2	– 4.1	0.8	– 27 %	2 %
EU-15	**1 560.6**	**2 360.8**	**1 478.8**	**2 268.2**	**81.9**	**92.6**	**5 %**	**4 %**
EU-10	**499.9**	**888.4**	**437.1**	**462.4**	**62.8**	**425.9**	**13 %**	**48 %**
All countries	**2 075.7**	**3 284.4**	**1 935.0**	**2 765.1**	**140.6**	**519.3**	**7 %**	**16 %**

Source: EEA, 2013a; EEA, 2013b; EEA, 2013d, EEA, 2013f, EEA, 2013g, scope correction (Section 2.2.3).

Part B — 2020:

Progress towards Europe's 20/20/20 objectives (GHG emissions, renewable energy and energy efficiency)

This part presents an analysis of the progress achieved in the EU towards the triple objective to achieve by 2020:

- a 20 % reduction of the EU's GHG emissions compared to 1990;
- a 20 % share of renewable energy in the EU's final energy consumption;
- a 20 % increase of the EU's energy efficiency.

These targets represent also altogether one of the five headline targets agreed for the whole EU to measure progress in meeting the EU's growth strategy until 2020 ('Europe 2020').

These integrated climate and energy targets require the deployment of an equally integrated approach for monitoring the progress to these targets which is the main objective of this Part B.

6 2020 climate and energy targets in the EU

Key messages

1. Five headline targets have been agreed to measure progress in meeting the goals of the EU's ten-year growth strategy 'Europe 2020'. One of these five targets is the triple '20-20-20' climate and energy target by 2020, which corresponds to a 20 % reduction in EU GHG emissions from 1990 levels, a 20 % share of EU gross final energy consumption from RES and a 20 % improvement in the EU's energy efficiency (compared to the baseline). The other headline targets cover employment, education, research and innovation and, social inclusion and poverty reduction.

2. The 2020 climate and energy targets were enacted through the amended ETS Directive, the ESD and the RED, which address the GHG and renewables targets and were included in the EU's climate and energy package in 2009 as well as the Energy Efficiency Plan and the EED in 2011 and 2012.

3. The EED sets a non-binding target for EU's primary energy consumption by 2020. The implementation of the EED and additional measures in the transport sector are expected to lead to a 17 % reduction in primary energy consumption, going a long way to meet the 20 % energy efficiency target.

6.1 EU's climate and energy targets for 2020

In March 2007, the European Council committed the EU to become a highly energy-efficient, low carbon economy by:

- reducing its GHG emissions by 20 % from 1990 levels ([34]);
- raising to 20 % the share of RES in EU's gross final energy consumption;
- improving the EU's energy efficiency by 20 %.

These three key objectives for 2020 are known as the 20-20-20 targets and represent an integrated approach to climate and energy policy that aims to combat climate change, increase the EU's energy security and strengthen its competitiveness.

The 20-20-20 targets are also headline targets of the Europe 2020 strategy which is the EU's ten-year growth strategy for smart, sustainable and inclusive growth ([35]).

This reflects the recognition that tackling the climate and energy challenge contributes to the creation of jobs, the generation of 'green' growth and a strengthening of Europe's competitiveness.

6.2 The EU climate and energy package

To support the achievement of its 20-20-20 objectives, the EU adopted in 2009 the climate and energy

([34]) The EU also stands by offer to move from a 20 % to a 30 % reduction by 2020 compared to 1990 levels, as part of a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and developing countries contribute adequately according to their responsibilities and respective capabilities.
([35]) More details at: http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/targets/index_en.htm.

package ([36]), a set of legally binding legislation related to the GHG and renewable energy targets.

Under the package, the 20 % reduction target for total GHG emissions, which is equivalent to a 14 % reduction in GHG emissions between 2005 and 2020, was divided into two sub-targets:

- a 21 % reduction target compared to 2005 for the emissions covered by the EU ETS (including domestic and international aviation);
- a 10 % reduction target compared to 2005 for the remaining non-ETS emissions, shared between the 28 Member States through differentiated national GHG targets.

The climate and energy package mainly consists of three legislative initiatives:

- the amended ETS Directive to revise and strengthen the EU ETS;
- the ESD to determine national annual GHG reduction targets for the sectors not covered by the ETS covering the period from 2013 to 2020 and;
- the RED to determine national renewable energy targets to raise the share of renewable energy in their energy consumption by 2020.

The package also includes the carbon capture and storage (CCS) Directive to establish a legal framework to lay down requirements for environmentally safe geological storage of CO_2.

6.3 Energy efficiency objectives and related policy framework

6.3.1 Defining the EU's political objective for energy efficiency

The Green Paper 'Doing more with less' (EC, 2005b) established the EU political objective for energy efficiency by stating that 'the EU could save up to 20 % of its current energy use in a cost-effective manner'. The spring 2006 European Council called for an ambitious and realistic EU action plan on energy efficiency, listing specific actions ([37]).

The political objective for energy efficiency was subsequently quantified for the first time in the 'Energy Efficiency Action Plan 2006: Realising the potential' (EU, 2006b). According to the Impact Assessment accompanying the Energy Efficiency Action Plan 2006 (EC, 2006c), realising 20 % energy savings by 2020 would mean a saving of around 390 million tonnes of oil equivalent (hereinafter Mtoe) by 2020. 2005 was considered as the base year.

The European Council from 8–9 March 2007 called for an integrated climate and energy policy and endorsed the political objective of saving 20 % of the EU's energy consumption compared to projections for 2020 ([38]). The EED was adopted in October 2012 (EU, 2012). Croatia's accession to the EU led to a revision of the EED in March 2013 (EU, 2013d) and of the EU's 2020 targets on energy consumption: the Union's 2020 energy consumption has to be no more than 1 483 Mtoe for primary energy or no more than 1 086 Mtoe of final energy ([39]).

6.3.2 Implementing legislation to achieve the EU's energy efficiency objective

The climate and energy package does not address the energy efficiency target directly. This is mainly being done through the 2011 Energy Efficiency Plan and the 2012 EED.

The analysis supporting the climate and energy package took into account the energy efficiency political objective to a large extent. In particular, the impact assessment of the renewables target (EC, 2008a) assumed the implementation of yet unimplemented energy efficiency policies, such as those stipulated in the 2006 Energy Efficiency Action Plan. These measures are mainly aimed at implementation, enforcement and improvement of legislative frameworks already in place at the time when the analysis was conducted, namely: the Eco-design Directive (EU, 2009d), the Energy Star Regulation (EU, 2001), the Labelling Directive (EU, 2010b), the Directive on end-use efficiency and energy services (EU, 2006) and the EPBD.

Since the adoption of the climate and energy package, the EU energy efficiency policy

([36]) More details at http://ec.europa.eu/clima/policies/package/index_en.htm.
([37]) Presidency Conclusions of 23/24 March 2006. 7775/1/06 REV1.
([38]) Presidency Conclusions of 8/9 March 2007 7224/1/07 REV 1 18.05.2006.
([39]) Article 3(1)(a).

framework has evolved along the priorities identified in the Action Plan for Energy Efficiency 2006 and beyond. Table 6.1 summarises some of the most important and recent developments.

The impact assessment for the EED (EC, 2011) establishes that PRIMES 2007 is the baseline against which the energy efficiency goal is to be measured. The European Commission's 2007 Baseline Scenario, based on the PRIMES energy model already assumes a certain level of autonomous energy efficiency ([40]), some effects of relatively high energy prices and energy efficiency policies implemented in the Member States up to the end of 2006.

The implementation of the EED is expected to lead to a 15 % reduction in primary energy consumption compared to baseline (assuming a relatively quick economic recovery in Europe), with an additional 2 % reduction expected to come from the transport sector ([41]). Therefore, the measures provided in the EED will go a long way to meet the 20 % energy efficiency target.

Apart from the measures included in Table 6.1, a whole host of other measures have also been adopted to promote energy efficiency in the new Member States via a more coherent Regional Policy and improve access to financing for Small and Medium Sized Enterprises (SMEs) and energy Service Companies (ESCOs). One of the main challenges in implementation remains however financing.

Despite good progress in setting up a comprehensive and coherent EU policy framework for energy efficiency, some priorities identified in the 2006 Energy Efficiency Action Plan did not materialise. The most significant of all (from the point of view of its potential to lead to important energy saving and environmental benefits) is the revision of the Energy Taxation Directive (EU, 2003). The revision of the Energy Taxation Directive is relevant because the EED provides as an alternative to setting up energy efficiency obligation schemes, Member States could opt for other measures to achieve energy savings. Energy and CO_2 taxes that have the effect of reducing end-use energy consumption can be part of such measures (Art. 7 and Annex V). Box 6.1 summarises the state-of-play concerning the revision of this directive.

([40]) The term autonomous energy efficiency refers to energy efficiency improvements due to replacements of capital stock with more efficient equipment as a result of developments other than specific energy efficiency policies.
([41]) http://www.ecofys.com/en/blog/the-energy-efficiency-directive-save-energy-create-jobs-and-compete.

Table 6.1 Evolution of the EU policy framework relevant to energy over the period 2009–2013

Policy	Action	Year
Energy and energy-using products		
Eco-Design Directive (2009/125/EC)	Recast of the Eco-Design Directive 2005/32/EC to extend the scope to other energy-using products	2009
Labelling Directive 2010/30/EU	Recast of the Council Directive 92/75/EEC to extent the scope and align it with the scope of the recast Eco-Design Directive	2010
Directive 2010/31/EU on energy performance of buildings	Recast of the Buildings Directive 2002/91/EC to expand the scope to cover a much larger share of the building stock, to set harmonised MEPS requirements and initiate the development of an EU strategy for low energy buildings	2010
Industrial Emissions Directive 2010/75/EU	The Directive replaces the Integrated pollution prevention and control (IPPC) Directive and several sectoral directives as of 7 January 2014. It creates incentives for the application of best available techniques (BAT) in energy generation.	2010
Energy Efficiency Action Plan 2011	• Leadership role of the public sector to promote energy efficiency • Low energy buildings • Measures in energy generation and energy consumption in industry • Adequate financial support • Energy saving measures for consumers	2011
Energy Efficiency Directive (EED) 2012/27/EU	Repeals Directives 2004/8/EC on Cogeneration and Directive 2006/32/EC on end-use energy efficiency and energy services. Main provisions include: • A requirement for the Member States to establish a long-term strategy for residential and commercial buildings stock; • A requirement for Member States to set up energy efficiency obligation schemes for energy distributors or suppliers, or alternative measures, e.g. a carbon tax, financing schemes, regulations or voluntary agreements; • A requirement to introduce smart metering where proven feasible and financially cost-effective; • A requirement to base energy billing on real consumption and provide complementary information on historical energy consumption; • A requirement to identify the potential for the application of high-efficiency cogeneration as well as for district heating and cooling; • A requirement for Member States to ensure that national energy regulators encourage demand response programmes, and that network tariffs take into account the costs and benefits of energy efficiency measures.	2012
Transport		
Regulation (EC) No 443/2009 setting emission performance standards for new passenger cars	For cars, manufacturers are obliged to ensure that their new car fleet does not emit more than an average of 130 grams of CO_2 per kilometre (g CO_2/Km) by 2015 and 95 g by 2020. In terms of fuel consumption, the 2015 target is approximately equivalent to 5.6 litres per 100 km (l/100 km) of petrol or 4.9 l/100 km of diesel. The 2020 target equates approximately to 4.1 l/100 km of petrol or 3.6 l/100 km of diesel. After 2020, this regulation sets a target of 95 g CO_2/km for all new car fleet.	2009
Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles	It aims at a broad market introduction of environmentally-friendly vehicles. It requires that energy and environmental impacts linked to the operation of vehicles over their whole lifetime are taken into account in all purchases of road transport vehicles, as covered by the public procurement Directives and the public service Regulation.	2009
Regulation 510/2011 setting emissions performance standards for light duty vehicles	For vans, the mandatory target is 175 g CO_2/Km by 2017 and 147 g by 2020. In terms of fuel consumption, the 2017 target is approximately equivalent to 7.5 litres per 100 km (l/100 km) of petrol or 6.6 l/100 km of diesel. The 2020 target equates approximately to 6.3 l/100 km of petrol or 5.5 l/100 km of diesel.	2011
Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system White Paper 2011	Main goals by 2050: • Phase-out 'conventionally-fuelled' cars in cities • 40 % use of sustainable low carbon fuels in aviation; at least 40 % cut in EU CO_2 emissions from maritime bunker fuels • 50 % of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2050 • By 2050 the majority of medium-distance passenger transport should go by rail All of these will contribute to a 60 % cut in transport emissions by the middle of the century with respect to 1990.	2011
Clean Power for Transport Package	Aims at gradually reducing the EU oil dependence through the use of alternative fuels in transport and the build-up of the necessary infrastructure, as well as contributing to GHG emission reduction.	2013

Box 6.1 The revision of the Energy Taxation Directive

On 13 April 2011 the European Commission tabled a proposal to overhaul the outdated Energy Taxation Directive. The proposal aims to introduce new ways in which energy products are being taxed to take into account both the carbon and the energy content, to create a level playing field for all energy products by removing existing tax differentiations and review the existing exemption provisions. The most contentious of the provisions included in the proposal is the issue of minimum rates. The structure of the minimum rates is split in two parts:

1. The CO_2 part will be calculated in Euro/tCO_2 taking into account emission factors stipulated in the Commission Decision 2007/589/EC establishing guidelines for the monitoring and reporting of GHG emissions pursuant to Directive 2003/87/EC (Annex I, Section 11, Table 4);

2. The energy part will be calculated in Euro/GJ. The values for the energy content at net calorific value for fossil fuels are stipulated in the Directive on energy end-use efficiency and energy services (Annex II) and for biofuels in the RED (Annex III).

According to an Irish Presidency Note from June 2013 (EU, 2013b), the structure of the proposal has been agreed by most Member States. Work is, however, required to address the remaining concerns of the Member States with respect to the minimum rates applicable for LPG, natural gas, coal and kerosene as heating fuels for business use as well as the use of certain products as motor fuels. In addition, the issues of tax reliefs under Art. 17, the tax treatment of commercial gasoil, the arrangements for transitional periods, the tax treatment of the installations falling under the EU ETS and the tax treatment of biofuels and bioliquids will require further attention.

7 Progress towards 2020 GHG targets

Key messages

1. Total GHG emissions of the EU-28 decreased by 1 % between 2011 and 2012, based on approximated GHG inventories from 18 Member States and the EEA. When considering the scope of the EU's climate and energy package, which includes emissions from international aviation, the reduction of 2012 EU emissions is about 18 % compared to 1990 levels. The EU is therefore very close to reaching its 20 % reduction target, 8 years ahead of 2020.

2. Aggregated projections from Member States indicate that total EU-28 emissions will further decrease between 2012 and 2020. With the current set of national domestic measures in place, EU emissions are expected to reach a level in 2020 which is 21 % below 1990 levels (including emissions from international aviation). Implementing the additional measures at planning stage in Member States is expected to achieve a reduction of 24 % below 1990 levels in 2020.

3. The projected reductions are to be achieved both in the sectors covered by the EU ETS (mostly energy supply and industry), where an emission cap is determined at EU level, and in the other sectors covered by national emission targets under the ESD. Beyond the EU ETS itself, the largest reductions are expected via measures supporting renewable energy to ensure that requirements under the RED are met as well as implementation of the IED, which covers large combustion plants.

4. The majority of Member States expect that their individual emission targets for the non-trading sectors under the ESD will be met through those policy measures already in place. 13 Member States, however, will need to implement additional measures or use flexibility mechanisms to achieve their targets by 2020. The main additional measures, currently in the planning stage, or use flexibility mechanisms to achieve their targets by 2020. In particular, energy efficiency measures in the residential and services sectors will deliver key contributions towards further emission reductions by 2020.

5. For six Member States (Austria, Belgium, Finland, Ireland, Luxembourg and Spain), the latest projections indicate that even additional measures planned at national level will not be sufficient to bring 2020 emissions below their respective 2020 target under the ESD. These Member States must therefore increase their efforts to design, adopt and implement emission-reducing policies and measures, and will need to consider the use of flexibility mechanisms.

6. Looking beyond 2020, the aggregation of national projections indicates that EU GHG emissions are expected to continue to decrease, although at a slower rate. With the current existing measures, GHG emissions would decrease by only one percentage point between 2020 and 2030 (reaching a level 22 % below 1990). Implementing the additional measures currently planned by Member States would reduce emissions in the period 2020 to 2030 to 28 % below 1990 levels. These anticipated reductions between 2020 and 2030 are largely insufficient when compared to the cost effective 2030 milestone of reducing EU emissions by 40 % indicated by the European Commission in March 2013. The EU's commitment to achieving a reduction of emissions by 80 % to 95 % by 2050 compared to 1990, as agreed by European heads of state and government, will require enhanced efforts from Member States.

7.1 EU GHG emission trends and projections

7.1.1 2011–2012 emission trends

Approximated GHG emissions for the year 2012 were available from 18 Member States ([42]) and the EEA as of August 2013. According to these proxy estimates, GHG emissions from the EU-28 ([43]) fell by 1% from 2011 to 2012. Emissions under the EU ETS were cut by about 2 % in 2012 while the economic sectors not covered by the EU ETS reduced their emissions by approximately 1 %. The main reductions in emissions occurred in the transport sector (not covered by the EU ETS) and smaller reductions were observed in emissions from the energy industries and in emissions from industrial processes. These reductions were partially offset by increases in emissions from fuel combustion in the residential and services sectors, due to a relatively colder winter in 2012 leading to higher heating demand.

When considering the scope of the KP, which excludes emissions from international aviation, 2012 EU emissions stood approximately 19 % below their 1990 levels. This represents the lowest emission level observed in the EU since before 1990, the beginning for the time series covered by the EU GHG inventory. When emissions from international aviation are taken into account, as in line with the scope of the EU's climate and energy package, the reduction is about 18 %.

7.1.2 Projections of total GHG emissions for 2020 and 2030

In 2013, Member States reported updated GHG emission projections under the biennial requirement set by the MMD. Member States projections of GHG emissions were available from all Member States except Croatia ([44]). According to the MMD, Member States ought to provide two projected scenarios — a 'with existing measures' scenario (WEM) and a 'with additional measures' scenario (WAM).

2020 projections

The emissions estimated by Member States have been compiled by the EEA to assess the expected future trend for the EU-28 (see Box 7.1). On the basis of the currently implemented — existing — measures, the expected trend indicates a moderate decrease until 2020, with a total reduction of approximately 21 % compared to 1990 levels by 2020, to 4 502 Mt CO_2-equivalent. When the impacts of additional policies and measures — those currently being planned by Member States — are taken into account, emissions projections show that GHG emissions could be approximately reduced by 24 % in comparison to 1990 levels by 2020 (see Figure 7.1).

A – 21 % emissions level in 2020 (compared to 1990) remains higher than the cost-effective pathway of the European Commission's Roadmap for moving to a competitive low carbon economy in 2050 (EC, 2011d). Since obtaining the full environmental benefit from the implementation of GHG mitigation policies may take time, Member States should adopt and implement all those policies currently at the planning stage, such as policies supporting renewables and energy efficiency measures.

2030 projections

National projections for 2030 were available from 20 Member States and for 2025 from 19 Member States. For eight Member States where 2025 or 2030 projections were not reported, results from the recent Commission's 'baseline with adopted meaures' climate policy scenario (EC, 2013b) ([45]) were used. The aggregated national projections (WEM) indicate that the EU-28 GHG emissions could decrease by an average 0.2 % per year between 2020 and 2030. This decrease would be even slower than the projected decrease for the period up to 2020 (average annual decrease of 0.5 % per year between 2015 and 2020). Projections show that with existing measures, emissions in 2030 would be 22 % lower than in 1990 (compared to – 21 % in 2020). With the implementation of additional measures, 2030 emissions would decrease to a level 28 % below 1990 levels (compared to – 24 % in 2020).

([42]) Eighteen Member States provided approximated estimates of emissions for 2012: Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Poland, Slovenia, Spain, Sweden, and the United Kingdom). For other EU Member States approximated estimates were produced by the EEA.
([43]) Excluding LULUCF and international aviation and shipping as well as emission reductions achieved through the KP's flexible mechanisms.
([44]) Croatia is planning on publishing GHG emission projections towards the end of 2013.
([45]) The 2020–2025 and 2025–2030 relative trends from the Commission's 2013 'baseline with adopted meaures' scenario were applied to 2020 projections reported by Member States.

Box 7.1 Member States' national GHG emission projections

The GHG projection information reported by Member States under the MMD is assessed and compiled by the European Environment Agency (EEA), with the support of its European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM) ([46]).

The initial purpose of the reporting requirements stipulated in the MMD was to enable the EU to meet its reporting requirements under the UNFCCC and to evaluate the projected progress of the EU and its Member States towards fulfilling their GHG mitigation commitments under the KP in annual reports prepared by the EC and the EEA.

As the end of the first commitment period under the KP has been reached and the commitment period under the ESD has started approaching, the assessment of Member States' projections focuses on the years beyond 2012. The corresponding revised reporting requirements for the post-2012 commitment period were adopted in the EU Regulation No 525/2013 (the Monitoring Mechanism Regulation, MMR).

In order to ensure timeliness, completeness, consistency, comparability, accuracy and transparency of the reporting of projections by the EU and its Member States, the quality of this information was assessed by the ETC/ACM on behalf of the EEA. In certain cases, projections were adjusted to ensure full consistency with historic GHG emission data from the latest GHG inventories and missing data was gap filled by the ETC/ACM.

This reduction would not put the EU on the pathway necessary to achieve the long-term objective of reducing emissions by 80–95 % by 2050 compared to 1990, as agreed by European heads of states and governments. According the Commission's Roadmap for moving to a competitive low-carbon economy in 2050, cost-effective emissions reductions consistent with the long-term target could result in domestic emission reductions of approximately 40 % by 2030 ([47]).

Comparison with European Commission's baseline 'with adopted measures' scenario

In 2013, the European Commission finalised the update of its baseline scenario 'with adopted measures' (see Box 7.2) which projects GHG emissions ([48]) of EU Member States until 2050. The '2013 EU baseline with adopted measures' climate policy scenario focuses on the impacts of existing measures in particular until 2020. It includes adopted measures in climate, energy and transport-related areas up to spring 2012. The EED, which was politically agreed late spring 2012 and adopted in autumn 2012, is not included insofar as effects on GHG, ETS and non-ETS depend on the way in which transposition into national measures will take place.

A comparison of these results with the aggregated national projections from Member States (WEM) indicates that up to 2020, trajectories appear relatively similar. However, in the period 2020 to 2030, the baseline scenario from the European Commission shows a more rapid decrease in emissions than aggregated projections from Member States. This may be due to the fact that not all Member States appropriately took into account the continued decrease of the EU ETS linear factor also post 2020 and the EED, which will also have important energy savings effects post 2020.

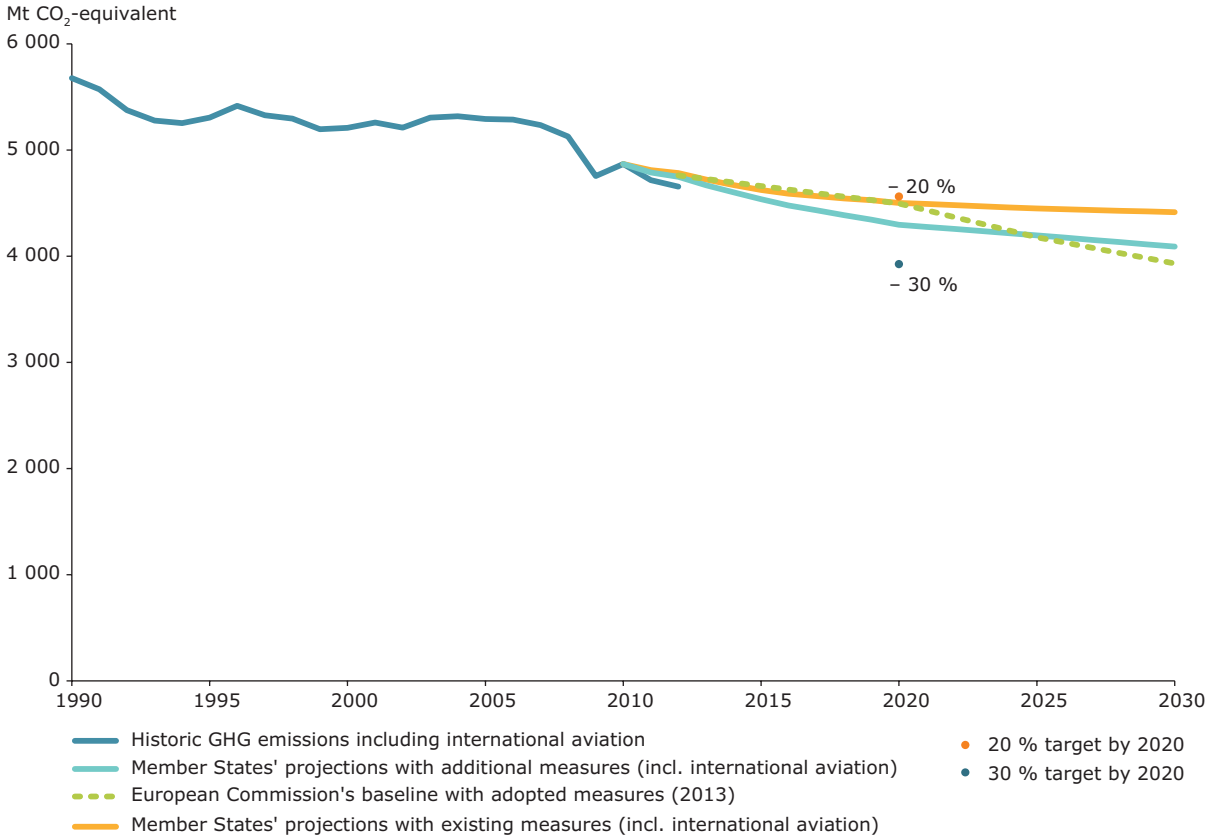
7.1.3 Sectoral projections and key policies and measures for 2020

Member States projections show that emissions from the non-ETS sectors are expected to decline by 0.6 % per year on average between 2012 and 2020 while emissions from the ETS sectors would only decrease by an average 0.2 % per year (see Figure 7.2). However, in the period to 2030, non-ETS emissions would barely decrease any further (– 0.04 % per year on average).

Projections by sector (see Figure 7.2) indicate that with existing measures currently in place, emissions

([46]) The European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM) is a consortium of European institutes assisting the EEA in its support to EU policy in the field of air pollution and climate change mitigation.
([47]) The scope of emissions covered includes international aviation.
([48]) Including international aviation.

Figure 7.1 Trends and projections of EU total GHG emissions



Note: The projections presented on this figure include international aviation. The projected emissions do not include LULUCF, and neither do the Primes/Gains scenarios.

Source: EEA, 2013a; EEA, 2013d; EEA, 2013f; EC, 2013b.

Box 7.2 EU 2013 GHG baseline with adopted measures policy scenario

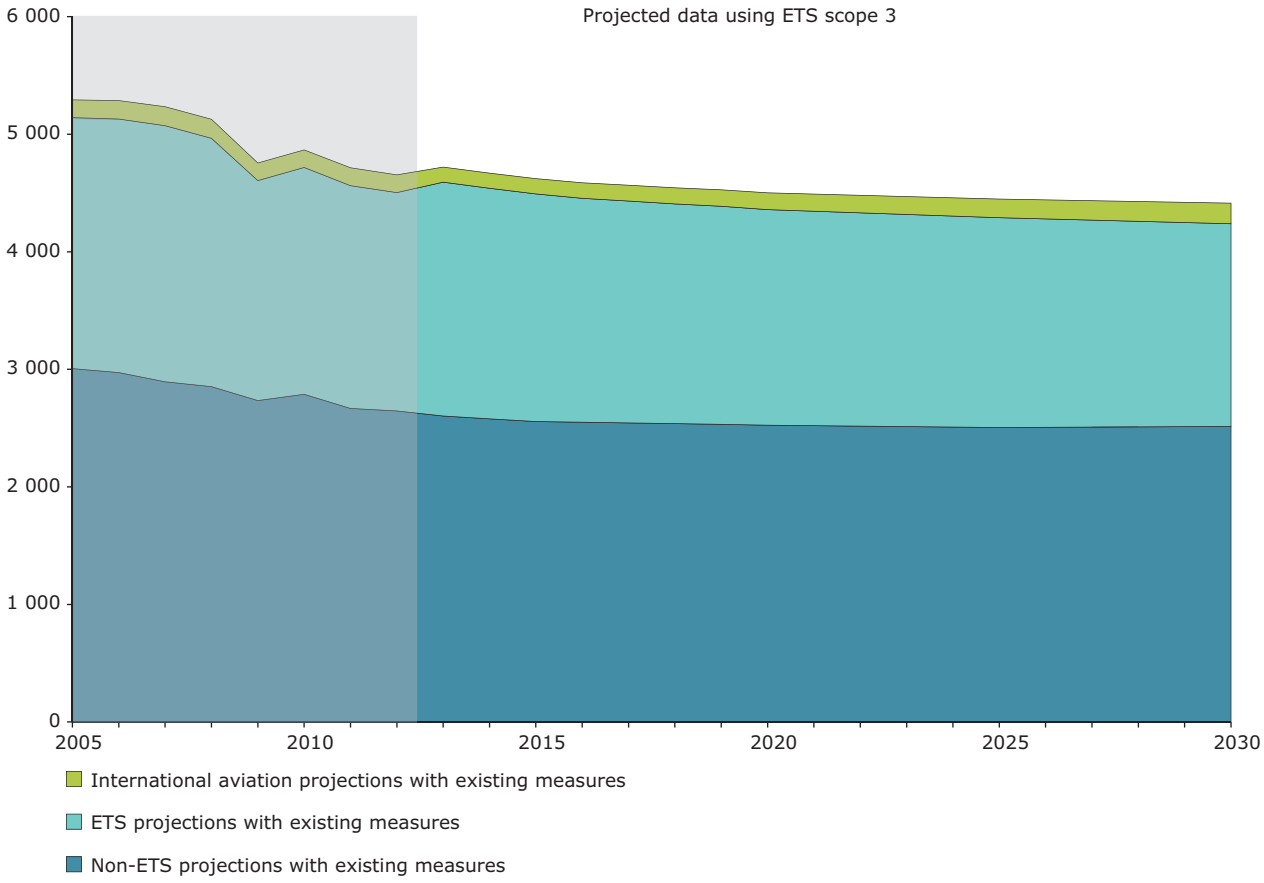
The European Commission's GHG baseline scenario with adopted measures was updated in 2013.

The specific model-based scenario quantifications to support climate-relevant policies in the EU were performed by applying a suite of mathematical models linked together.

GHG emissions, removals and possible ways of emission reductions are covered and can be projected up to the year 2050 in 5-year time steps. The emissions covered by this modelling approach are: CO_2 emissions from energy and processes via the PRIMES model, CH_4, N_2O, the fluorinated GHGs via the GAINS model, GHG from LULUCF via the GLOBIOM-G4M model, air pollution SO_2, NOx, $PM_{2.5}$–PM_{10}, ground level ozone, VOC, NH_3 via the GAINS model. See for more details on each of the models: www.euclimit.eu.

The '2013 EU baseline with adopted measures' climate policy scenario constructed by this PRIMES/GAINS-based model framework includes EU policies and measures that are currently implemented just like the 'with existing measures' scenario reported under the MMD by Member States. The results are therefore to a certain extent comparable and the Commission's baseline scenario is used in the QA/QC procedure of Member States' national emission projections performed by the EEA's European Topic Centre (ETC/ACM).

Figure 7.2 GHG trends and projections for ETS and non-ETS emissions, 2005–2030



Source: EEA, 2013a; EEA, 2013b; EEA, 2013d; EEA, 2013f.

will decrease between 2012 and 2020 in the main emitting sectors except for emissions from industrial processes, which derive from specific chemical processes and are not related to the combustion of fossil fuels.

The largest reductions (238 Mt CO_2-equivalent) are expected to occur in the energy supply sector. This sector consists mostly of public electricity and heat production by energy industries and is to a very large extent covered by the EU ETS. This absolute reduction is expected to be much larger than the reductions expected in the energy use sector, excluding transport (54 Mt CO_2-equivalent) and the waste sector (19 Mt CO_2-equivalent). The energy use sector covers direct use of fuel in industry and construction, residential, commercial and agriculture but is not accounting for electricity consumption which is produced by the energy supply sector. Energy consumed in the transport sector was assessed separately in this context.

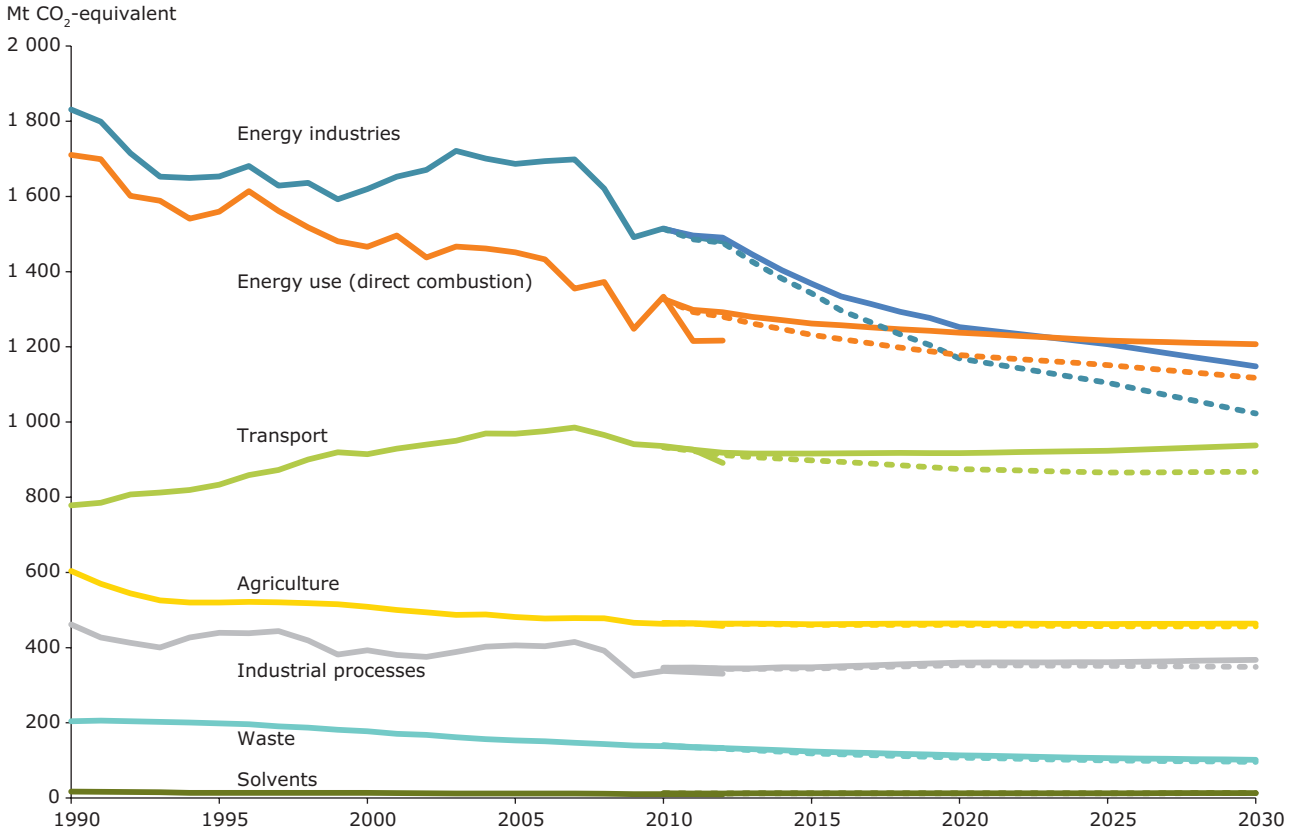
Additional measures will mostly target the energy supply and use sectors (excluding transport) and are projected to deliver additional reductions of 70 and 48 Mt CO_2-equivalent respectively. Additional measures in the transport sector are expected to deliver a further emission reduction of 36 Mt CO_2-equivalent. Additional measures targeting the agriculture and waste sectors as well as industrial processes are currently not expected to contribute significantly towards absolute reductions.

According to Member States projections, the GHG emission trajectories of the energy supply and the energy use sectors (excluding transport) would cross each other betwteen 2020 and 2025 with existing measures or even by 2020 with additional measures.

Contribution of policies and measures to projected emission trends

National and EU key policies and measures (PAM) per sector underpinning the aggregated EU projected sectoral trends were reported by Member States in 2013 under the MMD. The reported PAMs may act upon emissions across a range of emission sources and sectors. The distribution of PAMs

Figure 7.3 Sectoral trends and projections of EU GHG emissions



Note: Solid lines represent historic GHG emissions up to 2012 and with existing measures projections from 2010 onwards. Dashed lines represent with additional measures projections.
The projected trends were calibrated to the 2010 year of the latest inventory data, which is the base year for the projections for most Member States.

Source: EEA, 2013a; EEA, 2013d; EEA, 2013f.

by sector is shown in Figure 7.4. When planned, adopted, implemented, and expired policies and measures are taken into account, more than 50 % of all reported PAMs relate to the energy-related emissions. This includes 31 % of the total PAMs relating to energy use (excluding transport), 25 % of the PAMs relating to transport and 20% relating to energy supply. Only 2 % of the reported PAMs relate to LULUCF. Policies marked mainly as cross cutting represents only 1 % of the total, but if all policies with more than one sector targeted are considered, these account for 18 % of the total (288 PAMs).

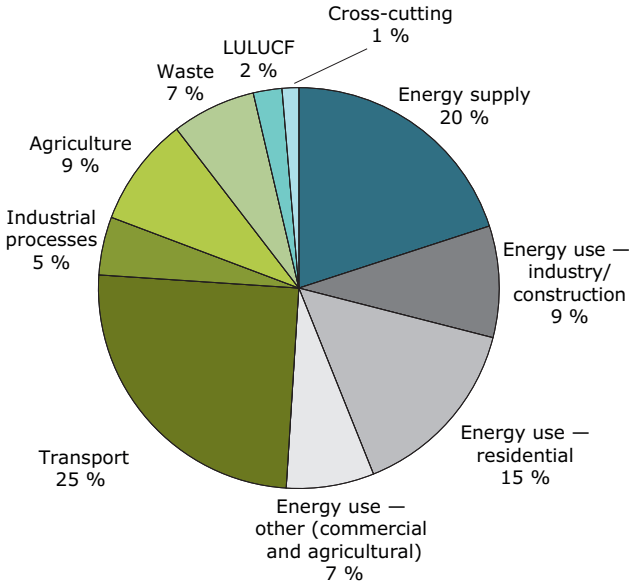
Member States reported the savings expected by 2020 from a number of PAMs. Quantifications of the effects of individual policies and measures were performed at Member State level, using a variety of bottom-up methods or sectoral models. Such estimates may only be comparable to a limited extent across Member States. The aggregation of bottom-up effects and the individual results should therefore be interpreted and compared cautiously.

Furthermore, the reported effects of existing PAMs correspond to savings in relation to counterfactual scenarios and the implementation of PAMs represents only one of several drivers (such as economic development or climatic conditions) underpinning sectoral emission projections. The reported savings from PAMs cannot therefore be directly compared with projected emission changes between 2012 and 2020.

Energy supply

The energy supply sector covers GHG emissions from energy industries. Public electricity and heat production represents the largest share of these emissions. With the existing measures, emissions in the energy supply sector are expected to decrease by

Figure 7.4 Share of reported policies and measures by affected sector



Note: All planned, adopted, implemented and expired policies are taken into account.

Source: EEA, 2013e.

238 Mt CO_2-equivalent between 2012 and 2020 in the EU-28 (see Figure 7.5).

Policies aiming to reduce the emissions intensity of large combustion plants covered by the EU ETS are expected to provide important contributions to this trend. In particular, national policies related to the implementation of the IPPC Directives 2010/75/EU and 2008/1/EC, and of the Large Combustion Directive 2001/80/EC are expected to deliver GHG savings of 119 Mt across the EU. The implementation of the Industrial Emissions Directive for large combustion plants in the United Kingdom alone is expected to reduce GHG emissions by 68 Mt in 2020.

Substantial reductions are also expected from renewable subsidies, such as the 'SDE' (*Subsidieregeling duurzame energieproductie*) incentives scheme in the Netherlands, and feed-in tariffs promoting the use of renewable fuel, such as wood-chips for electricity production in Finland. Overall, existing measures concerned with renewables in EU-28 Member States are expected to result in savings of 119 Mt CO_2-equivalent in 2020, over half of which is from explicitly biofuel-related policies. Measures associated with wind power alone are expected to deliver emission savings of nearly 18 Mt across the EU-28 by 2020, whilst policies enacted specifically to encourage solar and hydro power are expected to deliver savings just over 5 Mt by 2020.

Additional measures reported by Member States indicate a potential for further reductions of 70 Mt CO_2-equivalent by 2020 (see Figure 7.5). Contributions to this reductions would be delivered by PAMs such as the promotion of renewable energy, further developments of the EU ETS and the taxation of the energy products.

Energy use (excluding transport)

The energy use sector includes energy consumption in industry and construction, residential, commercial and agriculture. For the purpose of this analysis, emissions from the transport sector are considered separately. Projected emission trends in the energy use sector indicate an expected a reduction of 54 Mt CO_2-equivalent between 2012 and 2020 in the EU-28 (see Figure 7.5).

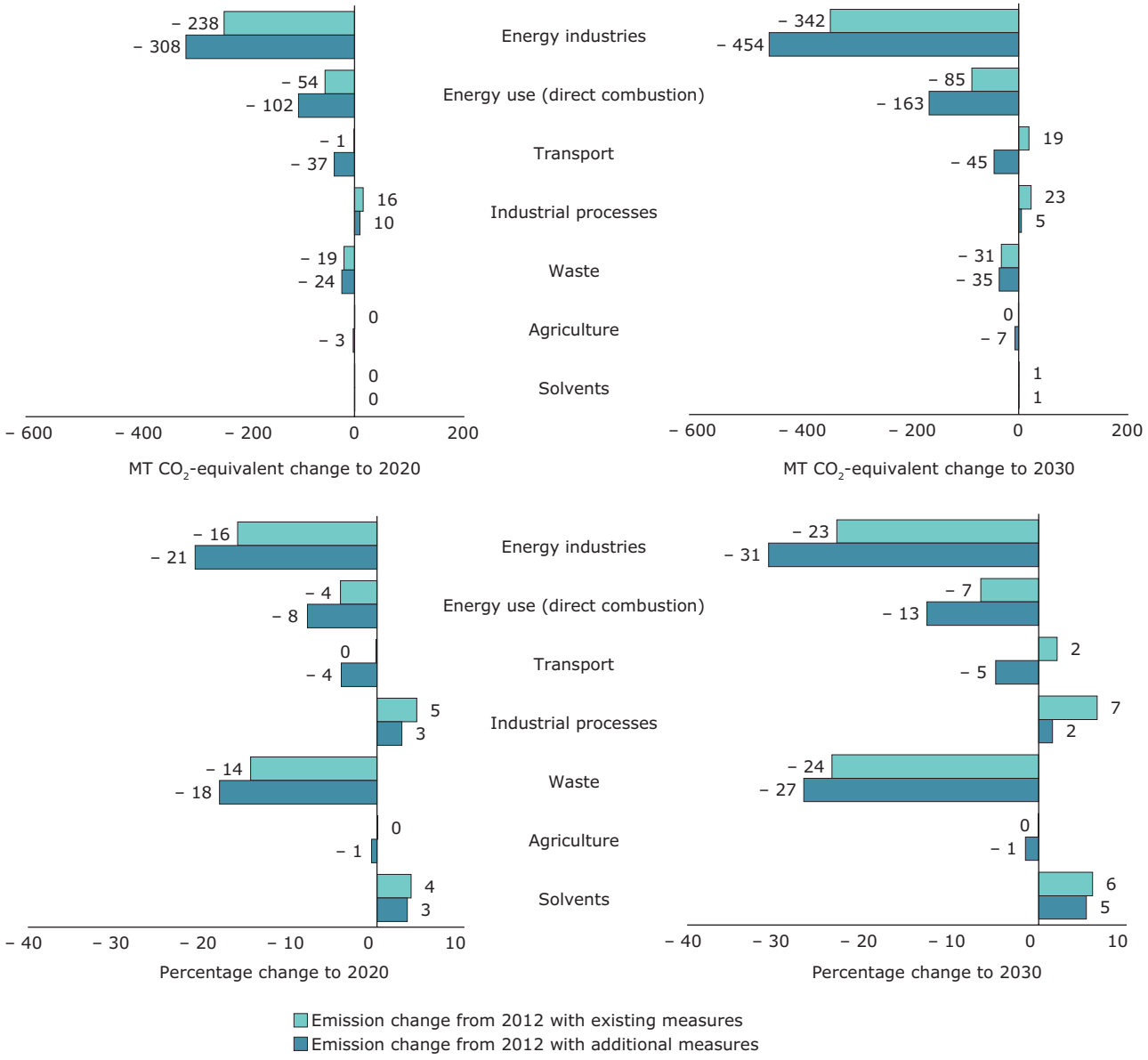
PAMs targeting energy savings are expected to provide the largest contribution towards this trend. For example, in Romania, the modernisation of the industrial sector is expected to reduce energy intensity and deliver annual savings of more than 15 Mt CO_2-equivalent per year. The United Kingdom reported on a group of policies targeting energy efficiency in the residential sector. These policies predominantly focus on improved building regulations that set standards for energy efficiency in new and existing buildings and energy efficiency labelling in household appliances. In addition, the United Kingdom government is offering financial incentives for the generation of renewable heat to users ranging from large industrial sites to households.

Transport

The most significant savings from PAMs in the transport sector are driven by the implementation of EU policies and measures such as the Regulation on CO_2 from cars (2009/443/EC) which sets CO_2 emissions levels for new cars, the Regulation on CO_2 from light commercial vehicles (2011/510/EU) setting CO_2 emissions standards for new vans, and the RED which sets for each Member State a 10 % a target for the use of RES (such as biofuels and electricity from renewable sources) in the transport sector.

Some Member States (Denmark, Italy and the United Kingdom) have placed their focus on fuel and vehicle efficiency to reduce the amount of CO_2

Figure 7.5 Projected emissions reductions by sector



Source: EEA, 2013f.

emitted per kilometre or per unit of fuel consumed. In Italy, this is expected to deliver annual savings of 10 Mt CO_2-equivalent by 2020. Meanwhile, other countries have also introduced differentiated taxation for road vehicles based on fuel efficiency or CO_2 emissions to encourage a switch to lower emitting vehicles. Some Member States (such as Austria) have reported on the introduction of higher fuel taxes to create an economic incentive for a modal shift from individual vehicle use towards public transport.

In implementing the RED, several Member States (including Austria, Greece, Italy, Spain, Sweden and the United Kingdom) have pledged to increase biofuel content of standard fuels to a level of 7 to 10 %. Spain, in particular, is relying on the use of biofuels to reduce emissions in the transportation sector. Achieving the EU's objective of having 10 % of energy consumption in transport by 2020 supplied by RES is expected to deliver an annual reduction of 10 Mt CO_2-equivalent. National policies have also been introduced to support the uptake of electric vehicles. These include for example a funding programme for electric mobility in Germany, and policies in Ireland to increase the share of electric vehicles to 10 % of the transport fleet by 2020.

Other non-ETS sectors
Policies primarily related to agriculture are expected to result in savings of 49 Mt in 2020. The largest reductions are expected from measures specifically related to fertiliser and water resource use (around 22 Mt CO_2-equivalent by 2020).

Policies linked primarily to the F-gas regulation (Regulation 842/2006) and Landfill directive (1999/31/EC) are expected to result in savings by 2020 of 16 and 23 Mt CO_2-equivalent respectively.

7.2 National 2020 GHG emission targets under the ESD

Under the Climate and Energy package, the 20 % reduction target for total GHG emissions, which is equivalent to a 14 % reduction in GHG emissions between 2005 and 2020, was divided into two sub-targets (see Figure 7.6):

- a 21 % reduction target compared to 2005 for the emissions covered by the EU ETS (including domestic and international aviation);
- a 10 % reduction target compared to 2005 for the remaining non-ETS emissions.

In order to achieve a 21 % reduction of ETS emissions in 2020, the EU-wide cap will decrease annually by 1.74 % starting from the average level of allowances issued by Member States for the second trading period (2008–2012) (see also Section 6.2).

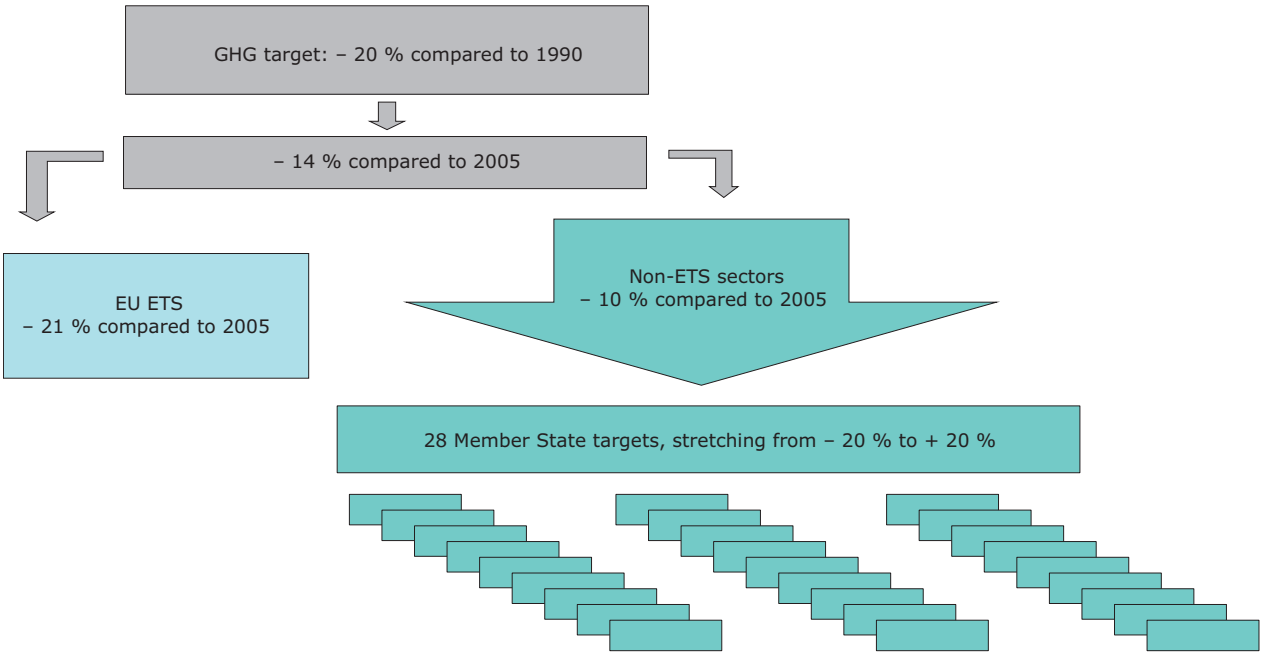
The ESD establishes binding annual targets for GHG emissions not covered by the EU ETS for all Member States for the period 2013–2020. At EU level, this will deliver an approximate 9–10 % reduction of emissions, from those sectors covered by the decision, in 2020 compared with 2005 levels.

Non-trading emissions addressed under the ESD cover emissions from all sources outside the EU ETS, except for emissions from international maritime and emissions and removals from LULUCF. It thus includes a diverse range of small-scale emitters in a wide range of sectors such as transport (cars, trucks), buildings (in particular heating), services, small industrial installations, agriculture and waste. Such sources currently account for about 60 % of total GHG emissions in the EU.

While the EU ETS target is to be achieved by the EU as a whole, the non-ETS target was divided into national targets to be achieved individually by each Member State.

Each Member State will contribute to this effort according to its relative wealth in terms of GDP per capita. The national emission targets range from a

Figure 7.6 GHG targets under the climate and energy package



20 % reduction for the richest Member States to a 20 % increase for poorer ones in 2020 compared with 2005 levels (see Figure 7.7). Less wealthy countries are allowed emission increases in these sectors because their relatively higher economic growth is likely to be accompanied by higher emissions. Nevertheless their targets still represent a limit on emissions and a reduction effort will be required in all Member States.

Pursuant to Article 3.2 of the ESD, the European Commission determined in 2012 the AEAs of Member States for the period from 2013 to 2020, using reviewed and verified emission data for the years 2005, 2008, 2009 and 2010. To support this process, a technical review of the relevant emission inventories of all Member States and Croatia was conducted in 2012. This was carried out in accordance with specific review guidelines (EC, 2012d) prepared for the Commission by the EEA in close consultation with Member State experts in the EU Climate Change Committee ([49]).

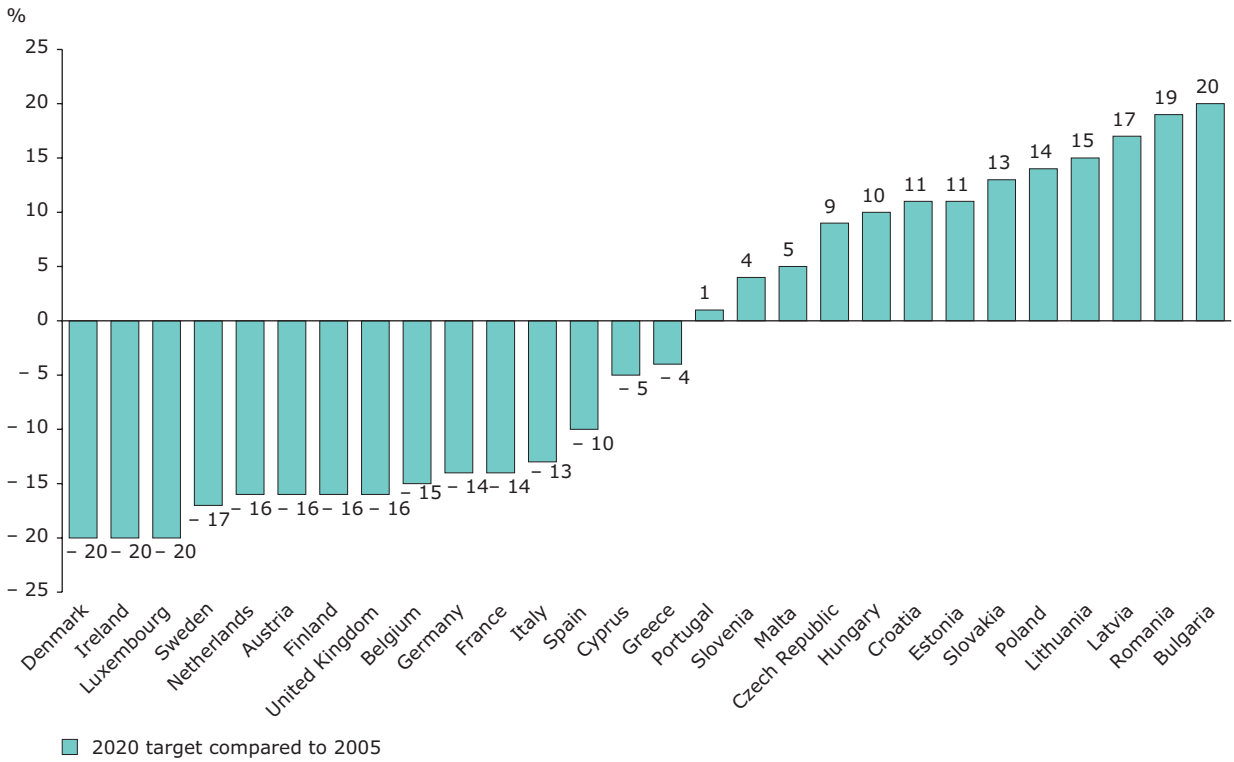
With respect to the annual compliance cycle, Member State will need to introduce policies and measures to limit or lower their emissions in the various non-ETS sectors.

The ESD also allows Member States to make use of flexibility provisions for meeting their targets:

- Within the Member State itself, any overachievement in a year of the period 2013–2019 can be carried over to subsequent years, up to 2020. An emission allocation of up to 5 % during 2013–2019 may be carried forward from the following year.

- Between Member States, Member States may transfer up to 5 % of their AEAs to other Member States, which may use this emission allocation until 2020 (ex-ante). Any overachievement in a year of the period 2013–2019 may also be transferred to other Member States, which may use this emission allocation until 2020 (ex-post).

Figure 7.7 National 2020 GHG emission limits under the ESD relative to 2005 emissions levels



Source: EU, 2009a (Annex II), Croatia included by EEA.

([49]) The Climate Change Committee was set up under the MMD.

Member States may use JI/CDM credits according to the following provisions:

- The use of project-based emission credits is capped on a yearly basis up to 3 % of 2005 non-ETS emissions in Member State.
- Member States that do not use their 3 % limit for the use of project based credits in any specific year can transfer their unused part for that year to other Member States or bank it for own use until 2020.
- Member States, which fulfil additional criteria (Austria, Belgium, Cyprus, Denmark, Finland, Ireland, Italy, Luxembourg, Portugal, Slovenia, Spain and Sweden) may use credits from projects in Least Developed Countries and Small Island Developing States (LDCs and SIDS) up to an additional 1 % of their verified emissions in 2005. These credits are not bankable and transferable.

Overall, up to 750 Mt JI/CDM credits can be used during the period from 2013 to 2020.

Any Member State exceeding its annual AEA, even after taking into account the flexibility provisions and the use of JI/CDM credits, will face an infringement procedure from the Commission, as well as the following consequences:

- Deduction from the AEA for the next year of the excess non-ETS emissions multiplied by 1.08 (8 % interest rate).
- Development of a corrective action plan; the Commission may issue an opinion based on comments from Climate Change Committee.
- Transfer of emission allocations and project-based credits from the account of that Member State will be temporarily suspended.

7.3 Progress towards annual targets in non-ETS sectors in the EU

7.3.1 Current progress to 2013 targets in the non-ETS sectors

Twentyfive Member States are well on track towards meeting their first target under the ESD in 2013.

According to approximated estimates of 2012 GHG emissions, emissions from non-ETS sectors in these Member States were already less in 2012 than their AEA for 2013 (see Figure 7.8). For two Member States (Estonia and Luxembourg), 2012 non-ETS emissions were above the respective 2013 ESD targets. As Croatia was not part of the EU ETS until 2013, no assessment of non-ETS emission levels in 2012 was possible for that Member State. Member States for which 2013 non-ETS emissions from non-ETS sectors would be higher than their AEA in 2013 could still meet their ESD target by using flexibility options.

7.3.2 Data and methodology (current progress)

The assessment of current progress towards 2013 ESD targets is based on a comparison between estimated domestic non-ETS emissions in 2012 and ESD targets (AEAs) for 2013. It does not take into account the possible use of flexibility options as allowed under the ESD. All the data used for this assessment are consistent with the scope of the EU ETS for the period 2008–2012.

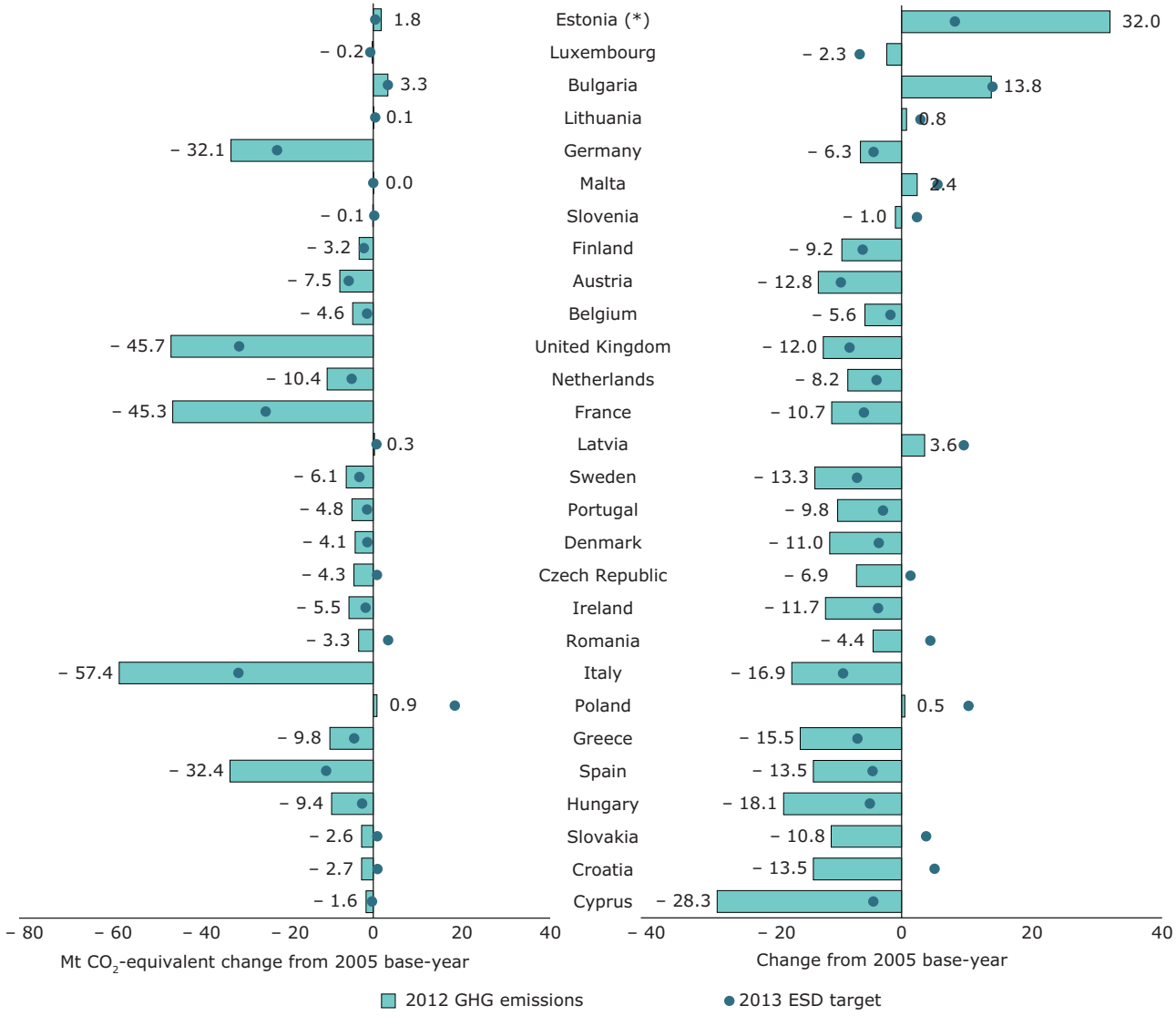
2012 non-ETS emissions were calculated based on approximated estimates of 2012 total GHG emissions (excluding LULUCF) available from 18 Member States ([50]) and the EEA as of September 2013. 2012 verified emissions from installations covered by the ETS (stationary installations only) and CO_2 emissions from domestic aviation were subtracted from these national totals.

The absolute annual ESD targets (AEAs) considered for the assessment of current progress are consistent with the scope of the EU ETS during the second trading period (2013–2020). These targets are defined in Commission Decision 2013/162/EU determining Member States' AEAs (EC, 2013a) annual emission allocations for the period from 2013 to 2020, adopted in March 2013.

In the assessment, 2012 non-ETS emissions and 2013 ESD targets were compared with 2005 base-year emissions. In addition, in order o express the gaps between emissions and targets in relative terms, absolute gaps were divided by 2005 base-year emissions to allow for comparison with the percentage target reductions set under the ESD. The 2005 base-year emissions were estimated by EEA based on 2020 ESD targets published in the Decision determining Member States' AEAs and percentage

([50]) Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Luxembourg, Malta, the Netherlands, Poland, Slovenia, Spain, Sweden, and the United Kingdom.

Figure 7.8 Current progress in meeting national targets in 2013 in the sectors not covered by the EU ETS



Note: 2012 emissions are based on approximated emissions inventories for Member States. Targets and emissions are consistent with the scope of Phase 2 of the ETS. Member States are ordered according to the gap between approximated emissions in 2012 and the 2013 target.

The bars and bullet points on the left side represent the absolute changes between 2005 base-year emissions and 2012 non-ETS emissions and between 2005 base-year emissions and 2013 ESD targets, respectively. The bars and bullet points on the left represent the same respective changes expressed as a percentage of 2005 base-year emissions.

Further methodological details and information on data sources are provided in Section 7.3.2.

(*) Estonia updated its energy statistics in September 2013. As this information was not received by the EEA in time for the publishing deadline of the report *Approximated EU GHG inventory: proxy GHG estimates for 2012* (EEA, 2013a), 2012 emissions in non-ETS sectors appear to have been overestimated. The EEA has therefore not been able to take these new data into account for the assessments in the present report.

Source: EC, 2013a; EEA, 2013a; EEA, 2013b; EEA, 2013d; EU, 2009a.

reduction targets for 2020 defined in the ESD. These estimates do not include CO_2 emissions from domestic aviation.

The detailed figures used in the assessment of current and projected progress are presented in Table 7.1.

7.3.3 Projected progress to 2020 targets in the non-ETS sectors

EU progress

Taking into account all existing measures implemented in Member States (WEM scenario), GHG emissions which are covered by the ESD are

Table 7.1 Calculation of current progress towards 2013 ESD targets — difference between 2012 emissions and 2013 ESD target

	2005 base-year non-ETS emissions	2013 ESD target		2020 ESD target		2012 non-ETS emissions		Gap 2012 vs. 2013	
Unit	**Mt CO_2-eq.**	**Mt CO_2-eq.**	**% change compared to 2005**	**Mt CO_2-eq.**	**% change compared to 2005**	**Mt CO_2-eq.**	**% change compared to 2005**	**Absolute (Mt CO_2-eq.)**	**Percentage points (share of 2005 base-year emissions)**
Formula			**(2013–2005) /2005**		**(2020–2005) /2005**		**(2012–2005) /2005**	**2012–2013**	**(2012–2013) /2005**
Austria	59.1	53.6	– 9 %	49.6	– 16 %	51.6	– 13 %	– 2.0	– 3 %
Belgium	82.6	81.2	– 2 %	70.2	– 15 %	77.9	– 6 %	– 3.3	– 4 %
Bulgaria	24.0	27.3	14 %	28.8	20 %	27.3	14 %	– 0.1	0 %
Croatia	19.6	20.6	5 %	21.8	11 %	n.a	n.a	n.a	n.a
Cyprus	5.8	5.6	– 4 %	5.5	– 5 %	4.2	– 28 %	– 1.4	– 24 %
Czech Republic	62.7	63.6	1 %	68.3	9 %	58.3	– 7 %	– 5.2	– 8 %
Denmark	37.2	35.9	– 3 %	29.7	– 20 %	33.1	– 11 %	– 2.8	– 8 %
Estonia [a]	5.6	6.1	8 %	6.3	11 %	7.5	32 %	1.3	23.8 %
Finland	34.8	32.7	– 6 %	29.2	– 16 %	31.6	– 9 %	– 1.1	– 3 %
France	422.2	397.9	– 6 %	363.1	– 14 %	376.9	– 11 %	– 21.1	– 5 %
Germany	508.8	487.1	– 4 %	437.6	– 14 %	476.7	– 6 %	– 10.4	– 2 %
Greece	63.2	58.9	– 7 %	60.7	– 4 %	53.4	– 16 %	– 5.5	– 9 %
Hungary	51.8	49.3	– 5 %	57.0	10 %	42.4	– 18 %	– 6.9	– 13 %
Ireland	46.9	45.2	– 4 %	37.5	– 20 %	41.4	– 12 %	– 3.8	– 8 %
Italy	340.6	310.1	– 9 %	296.3	– 13 %	283.2	– 17 %	– 27.0	– 8 %
Latvia	8.2	9.0	10 %	9.6	17 %	8.5	4 %	– 0.5	– 6 %
Lithuania	16.2	16.7	3 %	18.6	15 %	16.3	1 %	– 0.3	– 2 %
Luxembourg	10.4	9.7	– 6 %	8.3	– 20 %	10.2	– 2 %	0.4	4.1 %
Malta	1.055	1.114	6 %	1.108	5 %	1.081	2 %	– 0.033	– 3 %
Netherlands	126.6	121.8	– 4 %	106.4	– 16 %	116.2	– 8 %	– 5.6	– 4 %
Poland	179.5	198.0	10 %	204.6	14 %	180.4	0 %	– 17.6	– 10 %
Portugal	49.0	47.7	– 3 %	49.5	1 %	44.2	– 10 %	– 3.4	– 7 %
Romania	75.7	79.1	4 %	90.1	19 %	72.4	– 4 %	– 6.7	– 9 %
Slovakia	24.2	25.1	4 %	27.3	13 %	21.6	– 11 %	– 3.5	– 15 %
Slovenia	11.6	11.9	2 %	12.1	4 %	11.5	– 1 %	– 0.4	– 3 %
Spain	239.5	228.9	– 4 %	215.5	– 10 %	207.1	– 14 %	– 21.8	– 9 %
Sweden	45.6	42.5	– 7 %	37.9	– 17 %	39.6	– 13 %	– 3.0	– 6 %
United Kingdom	380.7	350.4	– 8 %	319.8	– 16 %	335.0	– 12 %	– 15.4	– 4 %
EU-27	**2 913.5**	**2 796.4**	**– 4 %**	**2 640.6**	**– 9 %**	**2 629.3**	**– 10 %**	**– 167.1**	**– 6 %**
EU-28	**2 933.1**	**2 817.0**	**– 4 %**	**2 662.4**	**– 9 %**	**n.a**	**n.a**	**n.a**	**n.a**

Note: Absolute gaps calculated as the difference between emissions and targets and expressed in Mt CO_2-equivalent.

Relative gaps calculated as the ratio between absolute gaps (2012 vs. 2013) and 2005 base-year emissions and expressed as percentage points, comparable with the percentage target reductions.

Further methodological details and information on data sources are provided in Section 7.3.2.

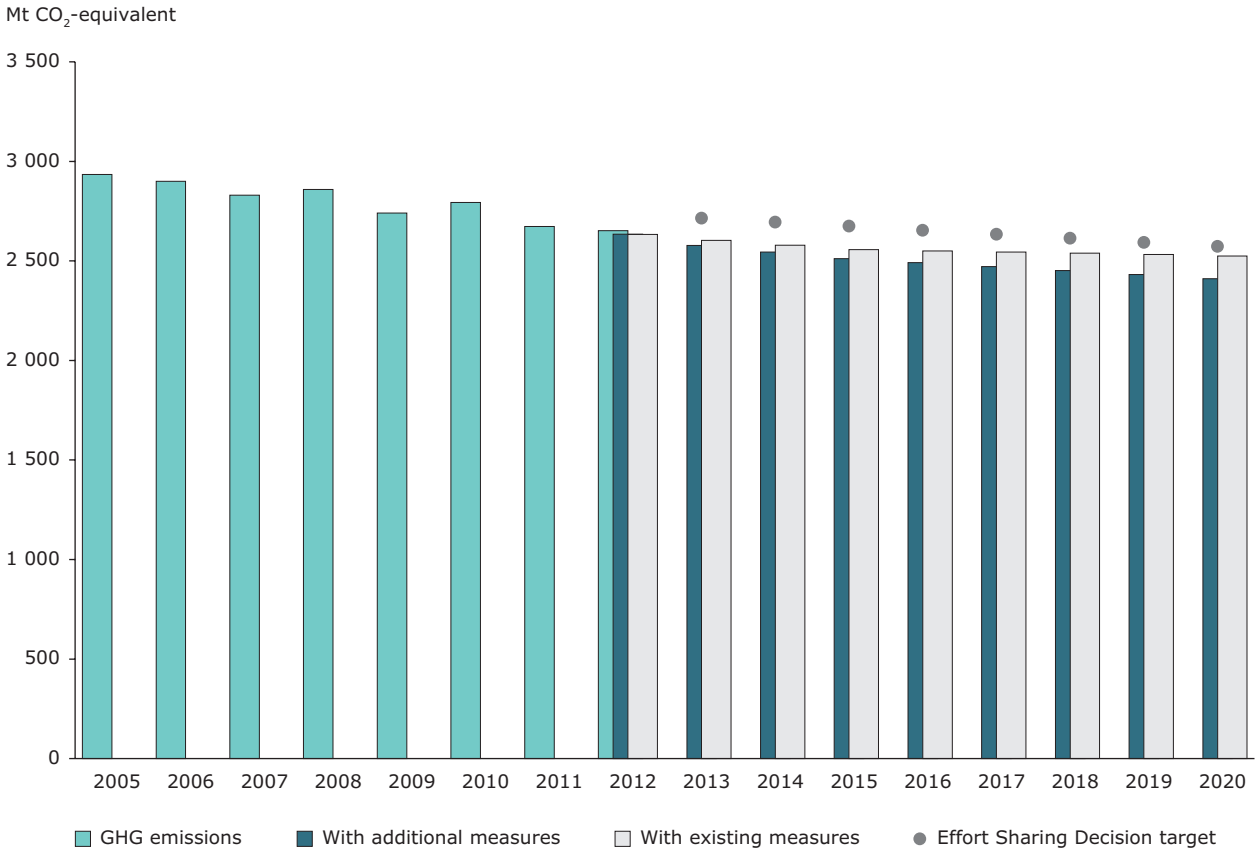
[a] Estonia updated its energy statistics in September 2013. As this information was not received by the EEA in time for the publishing deadline of the report *Approximated EU GHG inventory: proxy GHG estimates for 2012* (EEA, 2013a), 2012 emissions in non-ETS sectors appear to have been overestimated. The EEA has therefore not been able to take these new data into account for the assessments in the present report.

Source: EC, 2013a; EEA, 2013a; EEA, 2013b; EEA, 2013d; EU, 2009a.

projected to decrease by 108 Mt CO_2-equivalent between 2012 and 2020 in the EU (see Figure 7.9). Projected emissions in 2020 in these non-ETS sectors will therefore be lower than the sum of the AEAs set for Member States under the ESD ([51]). The total amount of annual emissions in the EU-28 is forecast to be smaller than the AEAs in all years.

However, under the 'with existing measures' scenario, the gap between emissions and AEAs is

Figure 7.9 EU-28 GHG emissions from sectors covered by the ESD



Note: Progress calculated based on domestic projected emissions only, without accounting for possible use of flexibility options as allowed under the ESD. All the data presented in this table are consistent with the scope of the EU ETS for the period 2013–2020.

The ESD relative targets for 2020 are defined in the ESD.

The ESD absolute targets represent tentative estimates by the EEA of ESD targets consistent with the ESD/EU ETS scope for the period 2013–2020. While ESD targets consistent with the EU ETS scope 2008–2012 were published in the March 2013 Decision determining Member States' AEAs (see note to Table 7.1), ESD targets consistent with the EU ETS scope 2013–2020 will only be available after the Commission publishes a Decision on the adjustments to be made to AEAs under Article 10 of the ESD (i.e. related to changes in EU ETS scope). Such Decision is expected to be published in autumn 2013. The EEA estimates are based on ESD targets as included in the Decision determining Member States' AEAs published in March 2013 (consistent with ETS scope 2008–2012) and preliminary data on adjustments under Article 10 of the ESD, as provided by the European Commission. These data should be considered as preliminary.

2005 base-year emissions are estimated based on 2020 ESD targets as estimated by EEA (see above) and percentage reduction targets for 2020 defined in the ESD. These estimates do not include CO_2 emissions from domestic aviation.

2020 projections based on Member States 2013 submissions under the MMD and further adjustments performed by EEA consistently with its QA/QC procedure (such adjustment aim for example to ensure consistency between projected and historic emission trends).

Absolute gaps calculated as the difference between emissions and targets and expressed in Mt CO_2-equivalent.

Relative gaps calculated as the ratio between absolute gaps (2012 vs. 2013) and 2005 base-year emissions and expressed as percentage points, comparable with the percentage target reductions.

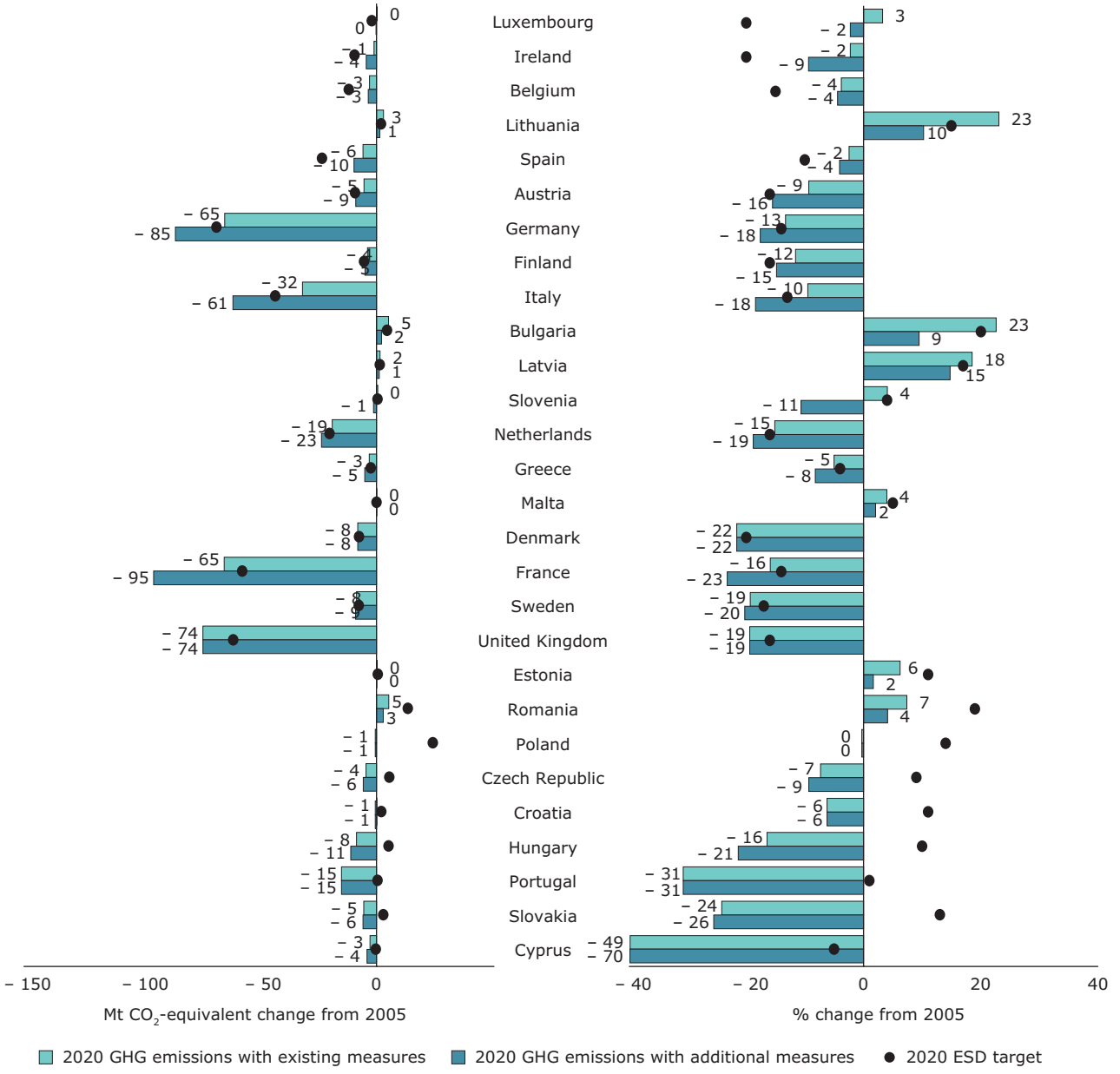
Source: EC, 2013a; EEA, 2013a; EEA, 2013b, EEA, 2013d; EEA, 2013f; EC, 2013a; EU, 2009a; preliminary information provided by the European Commission on adjustments under Article 10 of the ESD (these data might be subject to further change).

([51]) There is no overall aggregate target for the EU in the ESD only individual targets for Member States.

expected to reduce continuously during the period 2013–2020, the decrease in non-ETS emissions slowing down progressively. Additional measures in the non-ETS sectors are therefore needed to ensure that non-ETS emissions will continue decreasing beyond 2020.

The emission reductions in the non-ETS sectors account for one third of total emission reductions projected by Member States between 2013 and 2020. Information reported by Member States on policies and measures and their expected effects on GHG emissions shows that around three-quarters of the projected savings from PAMs in the non-ETS sectors are expected to come from energy efficiency measures in the residential and service sectors, with much smaller contributions from the waste, transport, industrial processes and energy supply

Figure 7.10 Projected emissions in 2020 in non-EU ETS sectors compared to targets for 2020



Note: Targets and emissions are consistent with the scope of Phase 3 of the ETS, Member States are ordered according to the gap between projected emissions in 2020 and the 2020 target.

Further methodological details and information on data sources are provided in Section 7.3.4.

Source: EC, 2013a; EEA, 2013a; EEA, 2013b, EEA, 2013d; EEA, 2013f; EU, 2009a; preliminary information provided by the European Commission on adjustments under Article 10 of the ESD (these data might be subject to further change).

sectors. Planned additional measures will mainly deliver reductions in the residential and services sectors and in the transport sector.

Member States progress

At national level, 15 Member States (Croatia, Cyprus, Czech Republic, Denmark, Estonia, France, Greece, Hungary, Malta, Poland, Portugal, Romania, Slovakia, Sweden, and the United Kingdom) project to have 2020 non-ETS emissions below their 2020 annual targets with the current set of existing measures (see Figure 7.10).

National projections indicate that implementation of currently planned (additional) measures in seven Member States (Bulgaria, Italy, Germany, Latvia, Lithuania, the Netherlands and Slovenia) could reduce 2020 emissions below target levels, albeit for some of them only narrowly. The main additional measures planned by these countries are presented in Table 7.2.

The remaining seven Member States (Austria, Belgium, Finland, Ireland, Luxembourg and Spain) would not achieve their 2020 annual target through domestic emissions reductions, despite the implementation of currently planned measures, although the estimated gap is small for Austria and Finland. These Member States would therefore need to consider additional domestic measures or make use of flexibility options to achieve their targets.

7.3.4 Data and methodology (projected progress)

The assessment of projected progress towards 2020 ESD targets is based on a comparison between

Table 7.2 Planned policies and measures in Bulgaria, Germany, Italy, Latvia, the Netherlands and Slovenia

Member State	Policy/measure	Projected annual reduction (Mt CO_2)
Bulgaria	Introduction of intelligent transport systems	1.0
	Mechanical and biological treatment and treatment and recovery of compost and biogas	0.7
	Use of biomass in the combustion units of installations	0.7
	Capture and burning of biogas in all new and in the existing regional landfills	0.6
	Road improvement to allow efficient driving	0.5
Germany	Electricity savings	7.9
	Revision of fuel taxation (Transport sector)	5.5
	Extension of HDV road pricing	2.7
	National protein consumption (Koalitionsvertrag der 17. Legislaturperiode)	2.3
	HFC substitution in many application sectors	2.2
Italy	National Action Plan for Renewable Energy 2010 and National Action Plan for Energy Efficiency 2011	10.6
	New measure of promoting and supporting RES-E	10.0
	National Action Plan for Renewable Energy 2010 — Legislative decree 28/2001 — Kyoto fund	6.3
	Legislative decree 28/2011	4.7
	Directive 2010/31/EC — New standards of efficiency in buildings	4.0
Latvia	Latvia National Renewable Action Plan	0.6
	Promotion of recycling of municipal solid waste	Not reported
	National Development Plan of Latvia for 2014–2020	Not reported
Netherlands ([a])	Sectoral emission trading system horticulture	Not reported
Slovenia	Emissions from transit transport	1.3
	Rational use of N fertilisers	0.1
	Increase the proportion of grazed animals	0.1
	Efficient animal production	0.1

Note: ([a]) No reported effect of such measure is visible in the 'with additional measures' projections for agriculture.

Source: EEA, 2013f.

projections of domestic non-ETS emissions the under WEM and WAM scenarios and ESD targets (AEAs) for 2020. It does not take into account the possible use of flexibility options as allowed under the ESD. All the data used for this assessment are consistent with the scope of the EU ETS for the period 2013–2020.

The non-ETS projection data used for the assessment of projected progress towards 2020 targets were reported by Member States on a voluntary basis. Twentythree Member States provided a split of their projections between ETS and non-ETS emissions until 2020. Eighteen Member States reported non-ETS emission projections consistent with the scope of the ETS for the third trading period 2013–2020. For two Member States, quality checks indicated that the reported projections were consistent with the scope of the ETS for the second trading period 2008–2012. These projections were therefore adjusted by the EEA, based on the annual ratio between AEAs consistent with the two different scopes of the EU ETS. Four Member States reported incomplete or no projections of non-ETS emissions. These projections were gap filled by the EEA, by applying the share of non-ETS emissions in total emissions by 2020 available from the European Commission's 2013 baseline 'with adopted measures' scenario to the total emissions for 2020 as reported by the Member States. In the case of Croatia, the 2005–2020 relative growth of non-ETS emissions available from the Commission's baseline was applied to Croatia's 2005 base-year emissions.

The absolute annual ESD targets (AEAs) considered for the assessment of projected progress are consistent with the scope of the EU ETS during the third trading period (2013–2020). They represent tentative estimates by the EEA of ESD targets consistent with the ESD/EU ETS scope for the period 2013–2020. While ESD targets consistent with the EU ETS scope 2008–2012 were published in the Commission Decision of March 2013 determining Member States' AEAs (see note to Table 7.1), ESD targets consistent with the EU ETS scope 2013–2020 will only be available after the Commission publishes a Decision on the adjustments to be made to AEAs under Article 10 of the ESD (i.e. related to changes in EU ETS scope). Such Decision is expected to be published in autumn 2013. The EEA estimates are based on ESD targets as included in the Decision determining Member States' AEAs from March 2013 and preliminary data on adjustments under Article 10 of the ESD, as provided by the European Commission. These data should be considered as preliminary.

In the assessment of projected progress, 2020 non-ETS projections and 2020 ESD targets were compared with 2005 base-year emissions. In addition, in order to express the gaps between emissions and targets in relative terms, absolute gaps were divided by 2005 base-year emissions to allow for comparison with the percentage target reductions set under the ESD. The 2005 base-year emissions were estimated by EEA based on 2020 ESD targets as estimated by EEA (see above) and percentage reduction targets for 2020 defined in the ESD. These estimates do not include CO_2 emissions from domestic aviation.

The detailed figures used in the assessment of current and projected progress are presented in Table 7.3.

7.3.5 Overall performance towards their national GHG targets under the ESD

Bringing together the results of the assessment of current progress towards 2013 targets (based on 2012 proxy data) and projected progress to 2020 targets (based on Member States projections) allows for an overall assessment of the progress achieved so far by Member States towards their objectives under the ESD.

The second column of Table 7.4 indicates whether Member States are considered currently on track (arrows pointing up) towards their respective 2013 ESD targets, i.e. for which 2012 non-ETS emissions were below these targets. For two Member States (Luxembourg and Estonia), 2012 non-ETS emissions were above the 2013 ESD targets (arrows pointing down). Luxembourg and Estonia may need to use flexibility options from the very beginning of the ESD period.

The third and fourth column of Table 7.4 indicate whether projections indicate that non-ETS emissions for 2020 will be above or below the national ESD targets for 2020. 15 Member States are expected to reach their 2020 target with their current set of policies and measures through domestic emission reductions alone (third column, arrows pointing up) and six Member States are not expected to reach their 2020 ESD target through domestic emission reductions alone (fourth column, arrows pointing down), even if the implementation of additional measures is considered. These six Member States would therefore need to design and implement more additional domestic measures or to make use of flexibility options.

Table 7.3 Calculation of projected progress towards 2020 ESD targets — difference between non-ETS WEM and WAM projections and ESD targets

	2005 base year (adjusted Art. 10)	% 2020 target	2020 ESD target	2020 projections WEM	2020 vs. 2005 (%)	Gap (% of 2005 emissions)	2020 projections WAM	2020 vs. 2005 (%)	Gap (%)
Austria	57	– 16 %	48	52	– 9 %	6.6 %	48	– 16 %	0.5 %
Belgium	78	– 15 %	67	75	– 4 %	11.2 %	75	– 4 %	11 %
Bulgaria	23	20 %	27	28	23 %	2.6 %	25	9 %	– 11 %
Croatia	18	11 %	20	17	– 6 %	– 16.9 %	17	– 6 %	– 17 %
Cyprus	6	– 5 %	6	3	– 49 %	– 43.5 %	2	– 70 %	– 65 %
Czech Republic	60	9 %	66	56	– 7 %	– 16.4 %	55	– 9 %	– 18 %
Denmark	37	– 20 %	30	29	– 22 %	– 1.6 %	29	– 22 %	– 2 %
Estonia	6	11 %	6	6	6 %	– 4.8 %	5.7	2 %	– 9 %
Finland	33	– 16 %	28	29	– 12 %	4.4 %	28	– 15 %	1 %
France	407	– 14 %	350	342	– 16 %	– 1.9 %	312	– 23 %	– 9 %
Germany	485	– 14 %	417	421	– 13 %	0.7 %	400	– 18 %	– 4 %
Greece	61	– 4 %	59	58	– 5 %	– 1.0 %	56	– 8 %	– 4 %
Hungary	51	10 %	57	43	– 16 %	– 26.5 %	40	– 21 %	– 31 %
Ireland	46	– 20 %	37	45	– 2 %	17.7 %	42	– 9 %	11 %
Italy	330	– 13 %	288	299	– 9 %	3.5 %	270	– 18 %	– 5 %
Latvia	8	17 %	10	10	18 %	1.5 %	9	15 %	– 2 %
Lithuania	13	15 %	15	16	23 %	8.1 %	14	10 %	– 5 %
Luxembourg	10	– 20 %	8	10	3 %	23.2 %	10	– 2 %	17.7 %
Malta	1	5 %	1	1.1	4 %	– 1.0 %	1.08	2 %	– 3 %
Netherlands	124	– 16 %	104	106	– 15 %	0.8 %	101	– 19 %	– 3 %
Poland	171	14 %	195	170	0 %	– 14.3 %	170	0 %	– 14 %
Portugal	49	1 %	49	34	– 31 %	– 31.7 %	34	– 31 %	– 32 %
Romania	70	19 %	84	75	7 %	– 11.6 %	73	4 %	– 15 %
Slovakia	22	13 %	25	17	– 24 %	– 37.2 %	17	– 26 %	– 39 %
Slovenia	12	4 %	12	12	4 %	0.1 %	10	– 11 %	– 15 %
Spain	232	– 10 %	209	226	– 2 %	7.5 %	222	– 4 %	6 %
Sweden	44	– 17 %	36	35	– 19 %	– 2.3 %	35	– 20 %	– 3 %
United Kingdom	380	– 16 %	320	307	– 19 %	– 3.4 %	307	– 19 %	– 3 %
EU-27	**2 818**	**– 9 %**	**2 553**	**2 507**	**– 11 %**	**– 1.6 %**	**2 392**	**– 15 %**	**– 6 %**
EU-28	**2 837**	**– 9 %**	**2 573**	**2 525**	**– 11 %**	**– 1.7 %**	**2 410**	**– 15 %**	**– 6 %**

Note: Absolute gaps calculated as the difference between emissions and targets and expressed in Mt CO_2-equivalent.

Relative gaps calculated as the ratio between absolute gaps (2012 vs. 2013) and 2005 base-year emissions and expressed as percentage points, comparable with the percentage target reductions.

Further methodological details and information on data sources are provided in Section 7.3.4.

Source: EC, 2013a; EEA, 2013a; EEA, 2013b; EEA, 2013d; EEA, 2013f; EU, 2009a; preliminary information provided by the European Commission on adjustments under Article 10 of the ESD (these data might be subject to further change).

Table 7.4 EU Member States according to their current and projected progress towards ESD GHG emission targets

Countries	Current progress to 2013 ESD targets based on 2012 proxy data	Projected progress to 2020 ESD targets based on Member States WEM projections	Projected progress to 2020 ESD targets based on Member States WAM projections	Synopsis of current and projected progress towards non-ETS GHG emission targets
Croatia	n.a.	↗	↗	↗
Cyprus	↗	↗	↗	↗
Czech Republic	↗	↗	↗	↗
Denmark	↗	↗	↗	↗
France	↗	↗	↗	↗
Greece	↗	↗	↗	↗
Hungary	↗	↗	↗	↗
Malta	↗	↗	↗	↗
Poland	↗	↗	↗	↗
Portugal	↗	↗	↗	↗
Romania	↗	↗	↗	↗
Slovakia	↗	↗	↗	↗
Sweden	↗	↗	↗	↗
United Kingdom	↗	↗	↗	↗
Bulgaria	↗	↘	↗	↘
Germany	↗	↘	↗	→
Italy	↗	↘	↗	→
Latvia	↗	↘	↗	→
Lithuania	↗	↘	↗	→
Netherlands	↗	↘	↗	→
Slovenia	↗	↘	↗	→
Austria	↗	↘	↘	↘
Belgium	↗	↘	↘	↘
Estonia	↘	↗	↗	↘
Finland	↗	↘	↘	↘
Ireland	↗	↘	↘	↘
Luxembourg	↘	↘	↘	↘
Spain	↗	↘	↘	↘
EU-28	↗ [a]	↗	↗	↗

Note: [a] The current progress of the EU towards its aggregated 2013 ESD targets is assessed for the EU-27 because 2012 non-ETS emissions are not available for Croatia, which joined the EU ETS in 2013.

Source: EEA.

An overall result emerges for each country when the three results are combined (last column):

- Fourteen Member States (Croatia, Cyprus, the Czech Republic, Denmark, France, Greece, Hungary, Malta, Poland, Portugal, Romania, Slovakia, Sweden and the United Kingdom) are well on track towards their ESD targets (arrows pointing up), with 2012 emissions below their 2013 ESD targets and current policies and measures being sufficient to achieve their 2020 targets through domestic emission limitations or reductions only.
- Seven Member States (Bulgaria, Germany, Italy, Latvia, Lithuania, the Netherlands and Slovenia) are partially on track towards their ESD targets (horizontal arrows), with 2012 emissions below their 2013 ESD targets and additional policies and measures being needed to achieve their 2020

targets through domestic emission limitations or reductions only.

- Seven Member States (Austria, Belgium, Estonia, Finland, Ireland, Luxembourg and Spain) are overall not on track towards their ESD targets (arrows pointing down), with either 2012 emissions above their ESD targets or, existing and additional measures not being sufficient to achieve their 2020 targets through domestic emission limitations or reductions only.

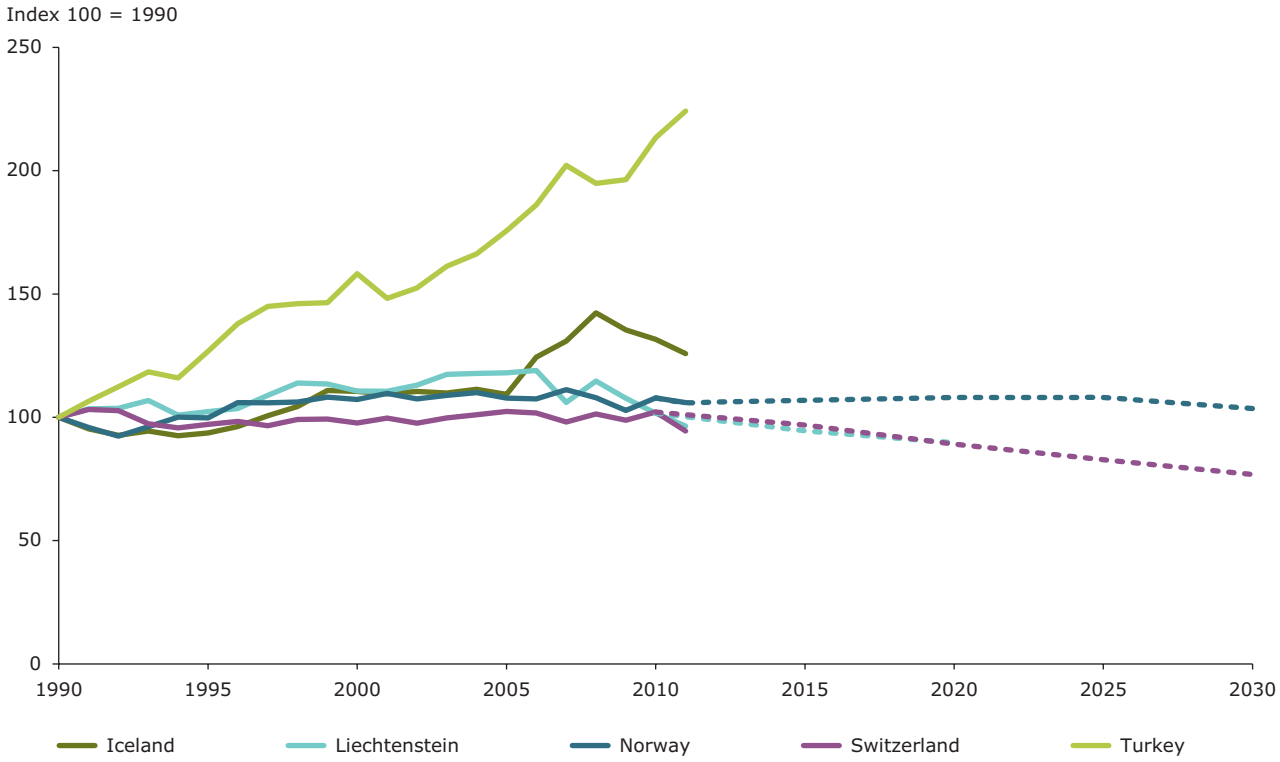
An aggregation of all the results at national level indicates that overall, the EU can be considered on track towards its 2013–2020 reduction objectives for non-ETS emissions.

7.4 Projected emissions of other EEA member countries

Of the remaining EEA member countries not included in the EU-28, Switzerland and Norway provided updated information on emissions projections in 2013, and Liechtenstein in 2010. Iceland and Turkey have not produced projections since 2007 and 2006 respectively so only historic emissions are shown for these countries in Figure 7.11.

Iceland was very severely affected by the economic crisis, and emissions have yet to return to the pre-crisis 2008 levels. In Norway, emissions are expected to rise slightly to 2020 and then return to current levels by 2030. Switzerland and Liechtenstein are both expecting emissions to decline.

Figure 7.11 Historic GHG trends and emission projections in EEA member countries which are not EU Member States, 1990–2030



Note: 2013 information on GHG projections available from Switzerland and Norway, 2010 information available from Liechtenstein. All projections have been adjusted to bring the 2010 data in line with the latest emissions inventories.

Source: EEA, 2013d,; EEA, 2013f.

8 Progress towards 2020 renewable energy targets

Key messages

1. RES contributed 13 % of gross final energy consumption in the EU-28 in 2011. The EU has therefore met its 10.8 % indicative target for 2011–2012 and is therefore currently on track towards its target of 20 % of renewable energy consumption in 2020.
2. The RED and Member States' 2010 NREAPs outline two sets of interim targets for the share of RES in gross final energy consumption (referred to as indicative trajectories) towards final 2020 RES targets. These include in particular average target values for the two-year period 2011 to 2012.
3. In 2011, fourteen Member States (Bulgaria, Germany, Estonia, Finland, Greece, Hungary, Italy, Lithuania, Luxembourg, Romania, Slovakia, Slovenia, Spain and Sweden), as well as Norway, had met or exceeded their average 2011–2012 indicative trajectories from both the RED and their NREAP from 2010. Seven Member States (Austria, Cyprus, the Czech Republic, Denmark, Ireland, Poland and Portugal) had reached or exceeded their average 2011–2012 indicative trajectory from the RED but not the one from their NREAP. In six Member States (Belgium, France, Latvia, Malta, the Netherlands and the United Kingdom), the 2011 RES shares remained below both average 2011–2012 indicative trajectories. For some of these countries, this can be explained to a large extent by the fact that the systems for certifying sustainable biofuels were not fully operational in 2011 (Belgium, the Czech Republic, and France).
4. In 2011, Estonia had even already reached its legally binding target for 2020, whilst Austria, Bulgaria, Lithuania, Romania and Sweden were close to their 2020 targets. Austria, Finland, Latvia and Sweden had the highest renewable energy shares among the EU Member States. The lowest RES shares in 2011 were reported in Belgium, Luxembourg, Malta and the United Kingdom.
5. The indicative renewable energy trajectory outlined in the RED becomes increasingly steeper towards 2020. Member States need to double their use of renewable energy by 2020 compared to the 2005–2011 period to reach the legally binding renewable energy target. This corresponds to an increase in the overall EU share of renewable energy consumption by 4.7 % per year between 2011 and 2020. Further efforts are needed to ensure that Member States and the EU as a whole will meet their binding renewable energy targets in 2020.

8.1 Progress of EU Member States towards renewable energy targets

8.1.1 2020 targets and interim indicative and expected trajectories

The RED puts forward legally *binding national renewable energy targets for 2020,* and *indicative trajectories* for the Member States, to ensure the achievement of a 20 % EU-wide RES share in gross final energy consumption by 2020 ([52]) and of a 10 % RES share in transport by the same year. In accordance with the RED, Member States had to submit in 2010 NREAPs (EEA, 2011). These plans outline the pathways foreseen by Member States (i.e. the expected trajectories) to reach their legally

([52]) This share is also a headline target under the Europe 2020 Strategy for smart, sustainable and inclusive growth (COM(2010) 2020 final).

binding national renewable energy targets in 2020. In 2011 (and every two years thereafter), Member States had to report on national progress towards the interim RED and NREAP targets.

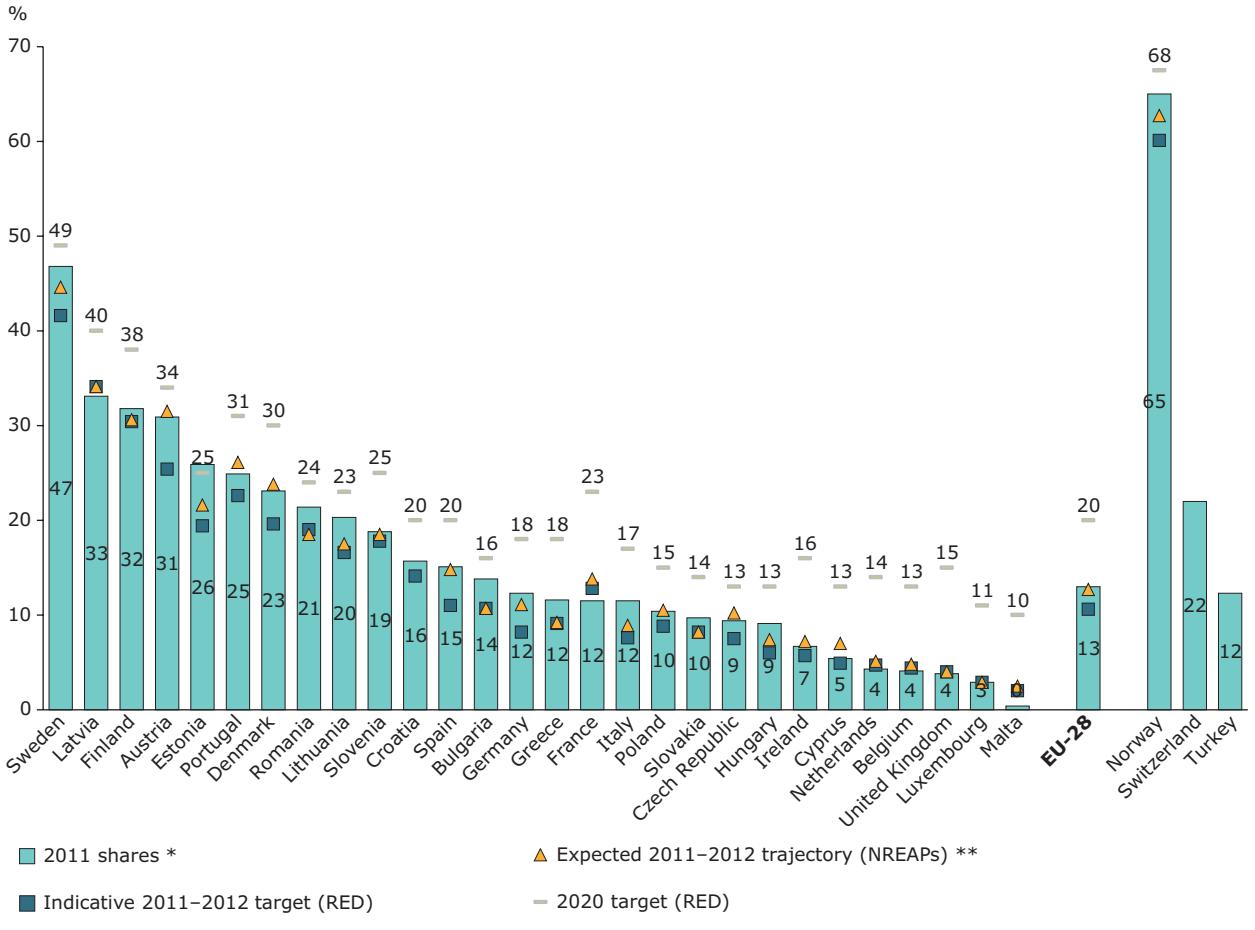
8.1.2 Current progress towards RES targets

In 2011, fourteen Member States (Bulgaria, Germany, Estonia, Finland, Greece, Hungary, Italy, Lithuania, Luxembourg, Romania, Slovakia, Slovenia, Spain and Sweden), as well as Norway, were well on track towards their 2020 RES targets. These countries had met or exceeded both their indicative national trajectories for 2011–2012 outlined in the RED and the average 2011–2012 level from their expected national NREAP trajectories (see Figure 8.1 and Table 8.1).

Seven Member States (Austria, Cyprus, the Czech Republic, Denmark, Ireland, Poland and Portugal) reached or exceeded their indicative national trajectories for 2011–2012 outlined in the RED but did not reach the average 2011–2012 level from their expected national NREAP trajectories (horizontal arrows in Table 8.1).

Six Member States (Belgium, France, Latvia, Malta, the Netherlands and the United Kingdom) had not yet reached in 2011 any of the national trajectory for

Figure 8.1 Share of renewable energy in gross final energy consumption in EEA countries



Note: * Values for Norway and Switzerland are for 2010 shares

** Value for EU-28 assumed to be identical to that of the EU-27

The 2020 targets are set in the RED. In accordance with the accounting rules in the RED, electricity generated by hydro and wind were normalised for annual variations (hydro 15 years and wind 5 years). For details on the normalisation rule, please see the SHARES manual provided by Eurostat: http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/other_documents.

The target for Norway is part of Annex IV to the EEA Agreement.

Underlying data for this figure are provided in Table 8.1.

Source: Eurostat SHARES2011 (22 July 2013); Eurostat (28 June 2013); EEA.

Table 8.1 Actual and planned RES contributions to gross final consumption

	RES shares in 2011 (%)				2011–2012 trajectories		2020 target (RED)	Progress towards 2011–2012 trajectories
	RES-E	RES-H/C	RES-T	RES-Total	RED indicative level	NREAP expected level		
Bulgaria	12.9 %	23.8 %	0.4 %	13.8 %	10.7 %	10.7 %	16 %	↗
Estonia	12.3 %	46.0 %	0.2 %	25.9 %	19.4 %	21.6 %	25 %	↗
Finland	29.2 %	44.3 %	0.4 %	31.8 %	30.4 %	30.6 %	38 %	↗
Germany	21.3 %	12.0 %	6.1 %	12.3 %	8.2 %	11.1 %	18 %	↗
Greece	14.6 %	20.1 %	1.8 %	11.6 %	9.1 %	9.2 %	18 %	↗
Hungary	6.4 %	12.3 %	4.5 %	9.1 %	6.0 %	7.4 %	13 %	↗
Italy	23.5 %	11.0 %	4.7 %	11.5 %	7.6 %	8.9 %	17 %	↗
Lithuania	9.0 %	33.8 %	3.7 %	20.3 %	16.6 %	17.5 %	23 %	↗
Luxembourg	4.1 %	5.0 %	2.0 %	2.9 %	2.9 %	2.9 %	11 %	↗
Romania	31.1 %	24.3 %	2.1 %	21.4 %	19.0 %	18.5 %	24 %	↗
Slovakia	19.8 %	9.6 %	0.4 %	9.7 %	8.2 %	8.2 %	14 %	↗
Slovenia	30.8 %	27.3 %	2.1 %	18.8 %	17.8 %	18.5 %	25 %	↗
Spain	31.5 %	13.5 %	5.9 %	15.1 %	11.0 %	14.8 %	20 %	↗
Sweden	59.6 %	64.5 %	8.8 %	46.8 %	41.6 %	44.6 %	49 %	↗
Austria	66.1 %	31.1 %	7.6 %	30.9 %	25.4 %	31.5 %	34 %	→
Cyprus	3.4 %	18.1 %	0.0 %	5.4 %	4.9 %	7.0 %	13 %	→
Czech Republic	10.6 %	12.8 %	0.6 %	9.4 %	7.5 %	10.2 %	13 %	→
Denmark	35.9 %	33.6 %	0.2 %	23.1 %	19.6 %	23.8 %	30 %	→
Ireland	17.6 %	5.0 %	2.8 %	6.7 %	5.7 %	7.2 %	16 %	→
Poland	8.2 %	13.3 %	6.5 %	10.4 %	8.8 %	10.5 %	15 %	→
Portugal	46.5 %	35.5 %	0.4 %	24.9 %	22.6 %	26.1 %	31 %	→
Belgium	8.8 %	4.3 %	0.3 %	4.1 %	4.4 %	4.8 %	13 %	↘
France	16.5 %	16.7 %	0.5 %	11.5 %	12.8 %	13.8 %	23 %	↘
Latvia	44.7 %	44.7 %	4.8 %	33.1 %	34.1 %	34.1 %	40 %	↘
Malta	0.1 %	5.6 %	0.0 %	0.4 %	2.0 %	2.5 %	10 %	↘
Netherlands	9.8 %	3.3 %	4.6 %	4.3 %	4.7 %	5.1 %	14 %	↘
United Kingdom	8.7 %	2.2 %	2.9 %	3.8 %	4.0 %	4.0 %	15 %	↘
EU-27	**21.7 %**	**15.1 %**	**3.8 %**	**13.0 %**	**10.8 %** (a)	**12.7 %** (b)	**20 %**	↗
Croatia	35.5 %	15.6 %	0.2 %	15.7 %	14.1 %	n.a.	20 %	n.a.
EU-28	**21.8 %**	**15.1 %**	**3.8 %**	**13.0 %**	**10.8 %** (a)	**n.a.**	**20 %**	n.a
Norway	104.8 %	38.6 %	4.2 %	65.0 %	60.1 %	62.7 %	67.5 %	↗

Note: Progress is assessed based on the actual RES share in 2011 and the indicative and expected trajectories for 2011–2012, according to the RED and the NREAPs.

↗ Both the indicative (RED) trajectory and the expected (NREAP) trajectory, averaged for 2011–2012, were met.

→ The indicative (RED) trajectory for 2011–2012 was achieved, but the average of the expected (NREAP) trajectory for 2011–2012 was not met.

↘ Neither the indicative (RED) trajectory nor the expected (NREAP) trajectory, averaged for 2011–2012, were met.

(a) The EU indicative trajectory was calculated from the indicative national trajectories provided in Part B of Annex I of the RED and Eurostat data for the year 2005 (see also Table 8.2).

(b) The EU expected trajectory was calculated based on the expected national trajectories (NREAP, using gross final energy consumption after reduction for aviation in the energy efficiency scenario) and Eurostat data (see also Table 8.2).

Source: RED; Eurostat SHARES2011 (22 July 2013); Eurostat (28 June 2013); National Renewable Energy Action Plans; EEA.

2011–2012 outlined in the RED or in their respective NREAP (arrows pointing down in Table 8.1).

Croatia reached its indicative national trajectory for 2011–2012 outlined in the RED but since it did not reported any NREAP, no national trajectory currently exists against which progress could also be assessed.

The fact that the systems for certifying sustainable biofuels were not fully operational in 2011 may explain to a large extent why Member States such as Belgium, the Czech Republic and France did not meet their expected NREAP trajectories in 2011.

Sweden, Latvia, Finland and Austria had the highest shares of renewable energy in the EU (46.8 %, 33.1 %, 31.8 % and 30.9 % of RES in gross final consumption, respectively). Moreover, Estonia reached its legally binding target for 2020 already in 2011, while Austria, Bulgaria, Lithuania, Romania and Sweden were close to reaching their 2020 targets. The lowest renewable energy shares in gross final energy consumption in 2011 were reported in Malta (0.4 %), Luxembourg (2.9 %), the United Kingdom (3.8 %) and Belgium (4.1 %).

The fastest progression in the share of renewable energy in gross final energy consumption between 2005 and 2011 was observed in Estonia (+ 8.5 %, or 0.09 Mtoe), followed by Austria (+ 7.2 %, or 0.4 Mtoe), Spain (+ 6.7 %, or 2.9 Mtoe) and Italy (+ 6.2 %, or 2.1 Mtoe).

The largest shares of renewable electricity (RES-E) in gross final electricity consumption in 2011 were recorded in Austria (66 %), Sweden (59 %) and Portugal (46 %), as indicated in Table 8.1. Sweden also had the largest share of renewable heating (RES-H/C) in gross final energy consumption for heating and cooling (64 %), followed by Estonia (46 %) and Latvia (45 %). The largest shares of renewable energy in transport (RES-T) were recorded in Sweden (8.8 %), Austria (7.5 %) and Poland (6.5 %). In 2011:

- France, Germany, Spain and Sweden accounted for 54 % of all renewable electricity consumed in the EU-27 (altogether 33 Mtoe);
- France, Germany, Italy and Sweden accounted for 48 % of all renewable heating and cooling (altogether 37 Mtoe);
- Germany, Italy, Spain and the United Kingdom accounted for 73 % of all transport biofuels for which compliance with the sustainability criteria was demonstrated (altogether 7 Mtoe).

8.1.3 Expected progress towards 2020 targets

According to the Member States' own forecasts in the 2010 NREAP reports ([53]), 23 out of 27 countries were expecting in 2010 to reach their binding renewable energy target for 2020 (RED) on their own, without using the cooperation mechanisms provided for under the RED. Ten countries were expecting to have a surplus in 2020 compared to their binding renewable energy target (RED) and four countries were expecting to have a deficit in 2020 compared to their binding renewable energy target (Belgium, Italy, Luxembourg, Malta). If achieved, the surplus (estimated at around 5.5 Mtoe, or around 2 % of the total renewables needed in 2020) could be available for transfer to other Member States through the use of the Directive's cooperation mechanisms ([54]). These national forecasts however were superseded by a more recent analysis of the progress in renewable energy in the EU, which found that Member States need further sustained efforts in order to achieve their binding targets for 2020 (EC, 2013c).

Most EU Member States provide financial incentives (subsidies, soft loans for investments/equipment) or fiscal incentives (tax reduction for energy/CO_2 efficient equipment/investments, tax credit/deduction) to promote renewable energy sources, especially in the household sector ([55]). Most countries have implemented feed-in tariffs and/or green certificates to increase the electricity production from renewable sources. The RED provides also for specific cooperation mechanisms (joint projects/statistical transfers) to allow Member States to achieve their renewable energy targets.

([53]) Results from the European Commission (2010), 'Summary of the Member States Forecast documents' available on the website http://ec.europa.eu/energy/renewables/action_plan_en.htm and information provided by Denmark to the EEA.
([54]) Total transfers required by Member States with expected deficit shares of renewable energy in gross final energy consumption in 2020 was estimated to be around 2 Mtoe, or less than 1 % of the total RES in 2020 based on the NREAP roadmaps.
([55]) More information available in the MURE II database (http//www.mure2.com and in the data base of the World Energy Council on policies and measures (http://www.wec-policies.enerdata.eu).

8.2 EU progress towards renewable energy targets

8.2.1 Current EU progress towards 2011 indicative target

Table 8.2 provides indicative and expected trajectories for the share of energy from renewable sources in the EU-28 until 2020 ([56]). The trajectories are based on the indicative national trajectories required by the RED and the national roadmaps set in the NREAPs reported by Member States.

In 2011, the share of renewable energy in gross final energy consumption in the EU reached 13.0 % (147 296 ktoe in the EU-27, respectively 148 307 ktoe in the EU-28). This level represents over 60 % of the mandatory RES target (20 %) for 2020 and slightly exceeds the indicative EU trajectory for the period 2011–2012 (10.8 %) corresponding to Annex I of the RED ([57]), as well as the expected EU trajectory for 2011–2012 (12.7 %) that corresponds to the sum of the expected national renewable energy shares according to the NREAPs, averaged for 2011 and 2012 (Figure 8.2). The EU is therefore currently on track towards meeting its 2020 target of energy consumption from renewable sources.

Renewable energy consumption increased rapidly from 2005 to 2011 both in absolute and in relative terms, with the average growth rate at 6.1 % per year over this period (6.6 %/year if only biofuels complying with RED sustainability criteria are taken into consideration). With normalised hydro and wind, renewable energy consumption increased by 2.6 % between 2010 and 2011 ([58]). Total gross final energy consumption in the EU-27 decreased, on average, by 1.3 % per year between 2005 and 2010, and by 4.2 % in 2011 compared to 2010 ([59]). This contributed to lower demand for heating in the energy sector whilst helping to increase the share of RES in final energy consumption.

8.2.2 Expected EU progress towards the 2020 target

According to the NREAP roadmaps submitted in 2010, Member States expect that the share of renewable energy consumption will increase faster over the period 2011 to 2018 compared to the indicative trajectory given by the RED. According to national expectations, in 2020 the share of renewable energy will reach 20.7 % of gross final energy consumption in the EU-27 (see Table 8.2). However, these roadmaps do not necessarily constitute

Table 8.2 Indicative EU-28 trajectory (RED), and expected trajectory (NREAP)

	2005	2010	2011	2011–2012	2013–2014	2015–2016	2017–2018	2020 Target
Indicative trajectory				10.8 %	11.9 %	13.6 %	16.0 %	20 %
Actual and expected trajectory	8.2 %	12.1 %	13.0 %	12.7 %	14.1 %	15.7 %	17.7 %	20.6 %
(all biofuels)	(8.5 %)	(12.5 %)	(13.3 %)					

Note: For calculating the share of renewable energy sources in gross final energy consumption, Eurostat (SHARES 2011, of 22 July 2011) takes into account all biofuels consumed in transport for the period 2005–2010, and only biofuels complying with RED sustainability criteria for the year 2011. For a consistent comparison across years, this table provides two different sets of values, as follows: the share of renewable energy sources accounting only for biofuels complying with RED sustainability criteria and, respectively, the share of renewable energy sources including all biofuels consumed in transport.

Because the final country NREAP report for Croatia was not available at the time of this report, the value for the expected EU-28 trajectory for 2011–2012 is assumed to be identical to that of the EU-27.

Source: RED and Eurostat SHARES (22 July 2013) for the indicative trajectory period 2011–2020. Eurostat SHARES (22 July 2013) for the expected trajectory for period 2005–2011; country reports (NREAP, using gross final energy consumption after reduction for aviation in the energy efficiency scenario) for 2011–2020; EEA.

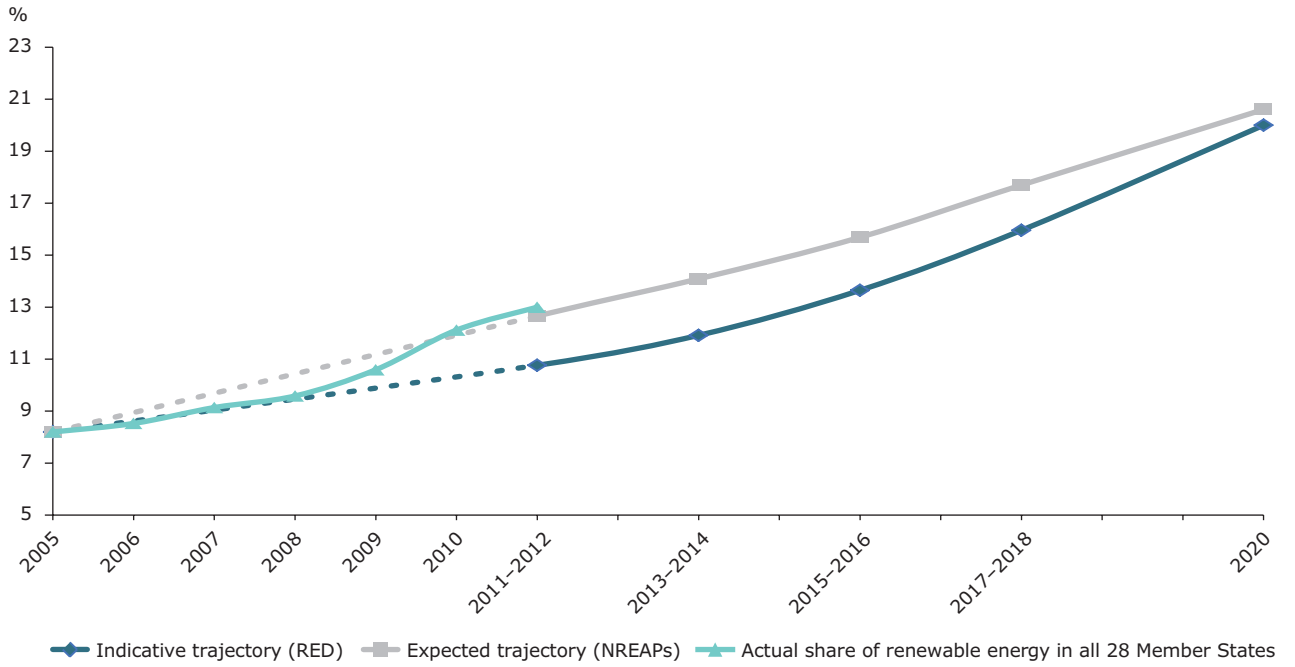
([56]) Because the final country NREAP report for Croatia was not available at the time of this report, the value for the expected EU-28 trajectory for 2011–2012 is assumed to be identical to that of the EU-27.

([57]) Indeed, the EU-27 had already reached in 2010 (12.1%) its indicative RES target for 2011–2012 (10.8%).

([58]) In accordance with the accounting rules in the RED, electricity generated by hydro and wind have to be normalised for annual variations (hydro 15 years and wind 5 years). Without normalisation, the share of renewable energy in 2011 would correspond to 144 086 toe, i.e. 3 050 toe less than with normalisation, mainly due to a decrease in hydropower production (– 16 %) between 2010 and 2011.

([59]) The latter mainly due to milder winter conditions, as well as to a general slow-down in economic activity. For further explanations see EEA (2013) *Why did greenhouse gas emissions decrease in the EU in 2011?* See: www.eea.europa.eu/publications/european-union-greenhouse-gas-inventory-2013/why-did-greenhouse-gas-emissions/view.

Figure 8.2 Actual RES progress in the EU-28, indicative trajectory (RED) and expected trajectories (NREAPs)



Note: For the period 2011–2020, the RED introduces indicative trajectories for the Member States, which should result in meeting the Member States' binding renewable energy targets by 2020 and on EU-level in achieving a 20 % share of renewable energy in gross final energy consumption by 2020. The EU indicative trajectory is calculated from the national indicative trajectories. Based on current realisations, the EU is in 2011 slightly above the average 2011–2012 value of its indicative trajectory. The cumulative expected realisations according to the Member States' NREAPs show a path towards 2020 that is more ambitious than the indicative trajectory.

Source: RED, Eurostat SHARES (22 July 2013), Eurostat (28 June 2013), country NREAP reports; EEA (see also Table 8.2).

projections; they represent desired long-range strategic pathways for the development of national renewable energy sources.

The indicative renewable energy trajectory according to the RED becomes increasingly steeper towards 2020. At the same time, back in 2010 almost all Member States expected to achieve higher interim shares of renewable energy in gross final energy consumption over the period 2011–2020, compared to their indicative national trajectories defined by the RED. This is reflected by the EU's expected trajectory for 2011–2020, which is higher than the EU indicative trajectory (see Figure 8.2)

To reach the legally binding renewable energy target by 2020, the EU needs to sustain an average growth rate of renewable energy of 4.7 % per year between 2011 and 2020. Although this growth rate may seem to be less demanding than the achieved average growth rate of 6.1 % per year between 2005 and 2011 (6.6 %/year if only biofuels complying with RED sustainability criteria are taken into consideration), in absolute terms the increase needed between 2011 and 2020 (96 Mtoe) is more than double the absolute growth achieved by the EU-27 between 2005 and 2011 (44 Mtoe). Thus, further efforts are needed to ensure that Member States and the EU as a whole will meet the binding renewable energy targets for 2020 — a conclusion reached also by the European Commission in the assessment of progress in renewable energy, of 2013 (EC, 2013c).

8.3 Contributions by renewable energy carriers (electricity, heating and cooling, and transport)

The main renewable energy carriers ([60]) considered were renewable electricity (RES-E, as share of the

([60]) Often referred to as 'sectors', these represent the forms of energy used by various sectors. Three energy carriers are discussed in this chapter: electricity (E), heating and cooling (H/C) and transport (T).

gross final consumption of electricity), renewable heating and cooling (RES-H/C, as share of gross final consumption of energy for heating and cooling) and renewable energy sources used in transport (RES-T, as share of total gross energy consumed in transport).

Renewable electricity (RES-E; 41 % of total RES share) and renewable heating and cooling (RES-H/C; 52 % of total RES share) were the most important energy carriers consumed in 2011. Renewable energy sources in transport (RES-T; 7 % of total RES share) was significantly smaller. Between 2005 and 2011, the share of RES-E registered a faster average annual growth rate (6.4 %/year) compared to RES-H/C (4.4 %/year). By 2020, RES-E is expected to contribute 42 %, RES-H/C 46 % and RES-T 12 % towards the expected EU-27 RES share (20.7 %), according to the national roadmaps outlined by Member States in their NREAP reports (Table 8.3).

Assuming that all biofuels consumed in the transport sector are taken into account, the fastest average annual growth rate between 2005 and 2011 corresponded to the share of RES used in transport (RES-T, 25 %/year). Renewable electricity and renewable heating and cooling recorded smaller average annual growth rates over this period. These rates amounted to 6.2 %/year and 4.3 %/year, respectively. In accordance with the expected EU trajectory (NREAPs), renewable electricity will have to grow on average by 6.1 %/year, renewable heating and cooling by 4.1 %/year and renewable transport by 8.3 %/year between 2011 and 2020 (see Table 8.3).

8.4 Main contributing technologies

The three main contributing technologies in 2011 in the EU-27 were solid biomass for heating (46 % of total RES share, or 67 Mtoe), hydropower (20 % of total RES share, or 30 Mtoe) and onshore wind (10 % of total RES share, or 14 Mtoe) ([61]). Together, remaining technologies represented only 24 % of the total RES share (36 Mtoe) in 2011.

Table 8.4 shows a summary of renewable energy technologies broken down into subcategories and their respective contributions towards specific energy carriers. Whilst hydropower still accounted for the largest RES-E share in 2011 (49 % of total RES-E, normalised), onshore wind ([62]) and solid biomass had each significant shares in the consumption of renewable electricity in the EU-27 (24 % of total RES-E, normalised, and respectively

Table 8.3 Contribution by renewable energy carriers (electricity, heating/cooling, transport)

	Energy (Mtoe)				Share (%)	Historic growth (%/year)	Indicative growth (%/year)
Year	**2005**	**2010**	**2011**	**2020**	**2020**	**2005–2011**	**2011–2020**
RES-E	41.4	55.9	60.7	104.2	42	6.4	6.1
RES-H/C	58.9	78.4	76.7	111.5	46	4.4	4.1
RES-T (including all biofuels)	1.0 (4.2)	10.5 (14.4)	11.5 (15.0)	29.5	12	25.0	8.3
Total RES (including all biofuels)	100.3 (103.4)	143.6 (147.6)	147.2 (151.2)	245.1	100	6.6 (6.1)	4.7

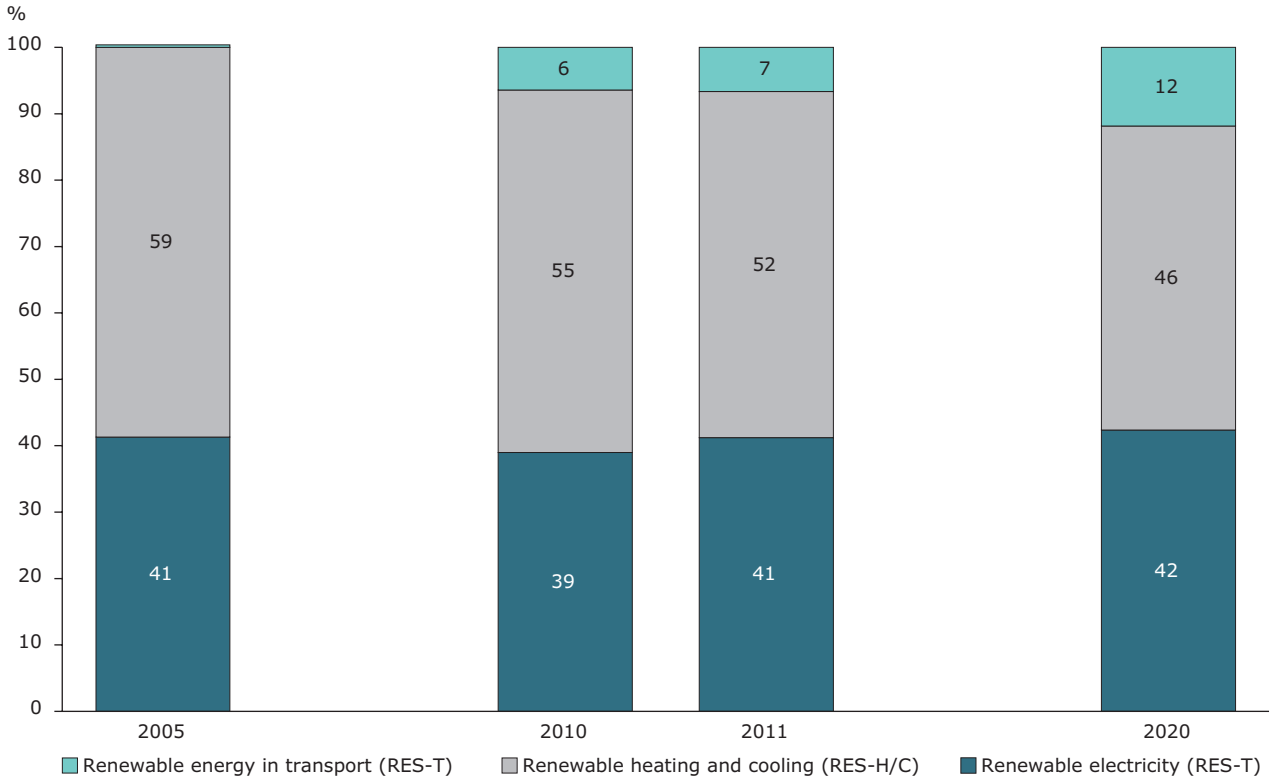
Note: The RES-T and total RES series from Eurostat SHARES (22 July 2011) take into account all biofuels consumed in transport for the period 2005–2010, and only biofuels complying with RED sustainability criteria for the year 2011. For a consistent comparison across years, this table provides two different sets of values, as follows: the share of renewable energy sources accounting only for biofuels complying with RED sustainability criteria (which is only possible from 2010 onwards and for countries that confirmed in due time full compliance with Article 17 'Sustainability criteria for biofuels and bioliquids' and Article 18 'Verification of compliance with the sustainability criteria for biofuels and bioliquids' of the RED) and, respectively, the share of renewable energy sources including all biofuels consumed in transport. In accordance with the RED, renewable electricity in electric road vehicles was accounted for 2.5 times the energy content of the input of electricity from RES and the contribution of biofuels produced from wastes, residues, non-food cellulosic material, and ligno-cellulosic material was considered twice that of other biofuels.

Source: Eurostat SHARES (22 July 2013) for the period 2005–2011; country NREAP reports for the 2020 shares (%) and absolute contributions; EEA.

([61]) 'Hydropower' refers to normalised hydropower, 'offshore wind' refers to (estimated) actual data and 'onshore wind' to (estimated) normalised data (calculated from total wind normalised minus estimated actual offshore wind). Shares have been calculated against 'Final consumption of renewable energy including flexibility mechanisms', which assumes normalised hydropower and wind power and includes renewable energy captured by heat pumps (ERES) and final energy consumption of biomethane blended with natural gas.

([62]) Wind farms located on land, as opposed to offshore wind.

Figure 8.3 Breakdown of EU renewable energy share into RES-E, RES-H/C and RES-T and comparison with NREAP 2020



Note: RES-T and total RES shares consider only biofuels in compliance with RED sustainability criteria.

Source: Eurostat SHARES (22 July 2013); Eurostat, 2013c; NREAP reports; EEA.

12 % of total RES-E). As regards renewable heating and cooling, solid biomass had by far the largest share in 2011 in the EU-27 (87 % of total RES-H/C), followed by heat from heat pumps (7 % of total RES-H/C) and biogas (3 % of total RES-H/C). In transport, biodiesel had the highest share (76 %) among all biofuels used in the EU-27, followed by biogasoline (21 %) and other liquid biofuels (3 %).

In 2020, the three main technologies projected by the country NREAP reports will be solid biomass for heating (33 % of total RES share, or 80 Mtoe), hydropower (13 % of total RES share, or 31 Mtoe) and onshore wind (12 % of total RES share, or 30 Mtoe). Together, remaining technologies are expected to contribute 42 % of the total RES share (103 Mtoe) in that year.

In order to meet the roadmaps outlined by Member States in their NREAPs, the diffusion rate ([63]) for solid biomass for heating should increase by an average of 121 % across the EU-27 as a whole between 2011 and 2020. This is equal to an increase from 133 toe/1 000 inhabitants to 161 toe/1 000 inhabitants. For onshore wind, the diffusion rate should increase by an average of more than 200 % across the EU-27 as a whole (from 29 toe/1 000 inhabitants to 60 toe/1 000 inhabitants). By contrast, hydropower penetration could remain roughly equal over this period.

([63]) Technology-specific diffusion, or penetration, expressed as technology-specific energy use per number of inhabitants.

Table 8.4 Breakdown by RES technologies for electricity (E), heating and cooling (H/C) and transport (T) for EU-27

RES technology	Actual contribution			Indicative targets		Annual growth		
	2005	2010	2011	2011 (t)	2020 (t)	2005–2011	2010–2011	2011–2020
	ktoe	ktoe	ktoe	ktoe	ktoe	% per year	% per year	% per year
Electricity								
Hydropower	29 168	29 596	29 733	29 203	31 192	0.3	0.4	0.5
Geothermal	464	481	506	529	937	1.4	5.0	6.8
Solar photovoltaic	126	1 932	3 864	2 489	7 167	57.0	69.3	6.8
Concentrated solar power	0	65	111	233	1 717	n.a.	53.5	30.4
Tidal, wave and ocean energy	46	46	46	43	559	0.0	0.0	27.7
Onshore wind	5 805	12 794	14 420	15 279	30 249	15.1	11.9	8.2
Offshore wind	145	523	663	1 056	12 250	25.2	23.6	32.4
Solid biomass	4 402	7 016	7 419	7 168	13 319	8.7	5.5	6.5
Biogas	1 168	2 624	3 099	2 696	5 501	16.2	16.6	6.3
Bioliquids	240	497	416	804	1 096	9.1	– 17.7	10.7
Heating and cooling								
Geothermal	673	1 008	1 091	786	2 631	8.0	7.9	9.7
Solar thermal	677	1 488	1 686	1 660	6 348	15.2	12.4	14.7
Solid biomass	55 910	69 826	67 033	58 168	80 993	3.0	– 4.0	2.1
Biogas	510	1 475	2 225	1 685	4 476	24.5	41.1	7.7
Bioliquids	72	191	91	3 857	4 416	3.9	– 74.1	43.1
Renewable energy from heat pumps	1 670	4 765	5 026	4 698	12 155	18.3	5.3	9.8
Biomethane blended with natural gas	7	5	8	51	582	3.3	46.7	47.4
Transport								
Biogasoline	559	2 834	2 892	3 805	7 308	27.3	2.0	10.3
Biodiesels	1 373	9 938	10 644	11 283	21 649	34.1	6.8	7.8
Other liquid biofuels	1 178	536	422	225	572	– 17.1	– 23.9	3.3
Road RE electricity consumption	4.9	6.6	13.2			18.04	100.76	
Non-road RE electricity consumption	1 091	1 197	1326			3.45	3.45	
Total (wind and hydro not normalised)	**101 447**	**149 102**	**148 343**	**n.a.**	**n.a.**			
Total (normalised)	**104 193**	**147 640**	**151 393**	**145 717**	**245 116**			

Note: Some deviations from Table 8.3 may arise due to rounding and differences in the statistical calculations used.

Source: Eurostat SHARES (22 July 2011) for 2005, 2010 and 2011 contributions; country NREAP reports for indicative targets for 2011 and 2020.

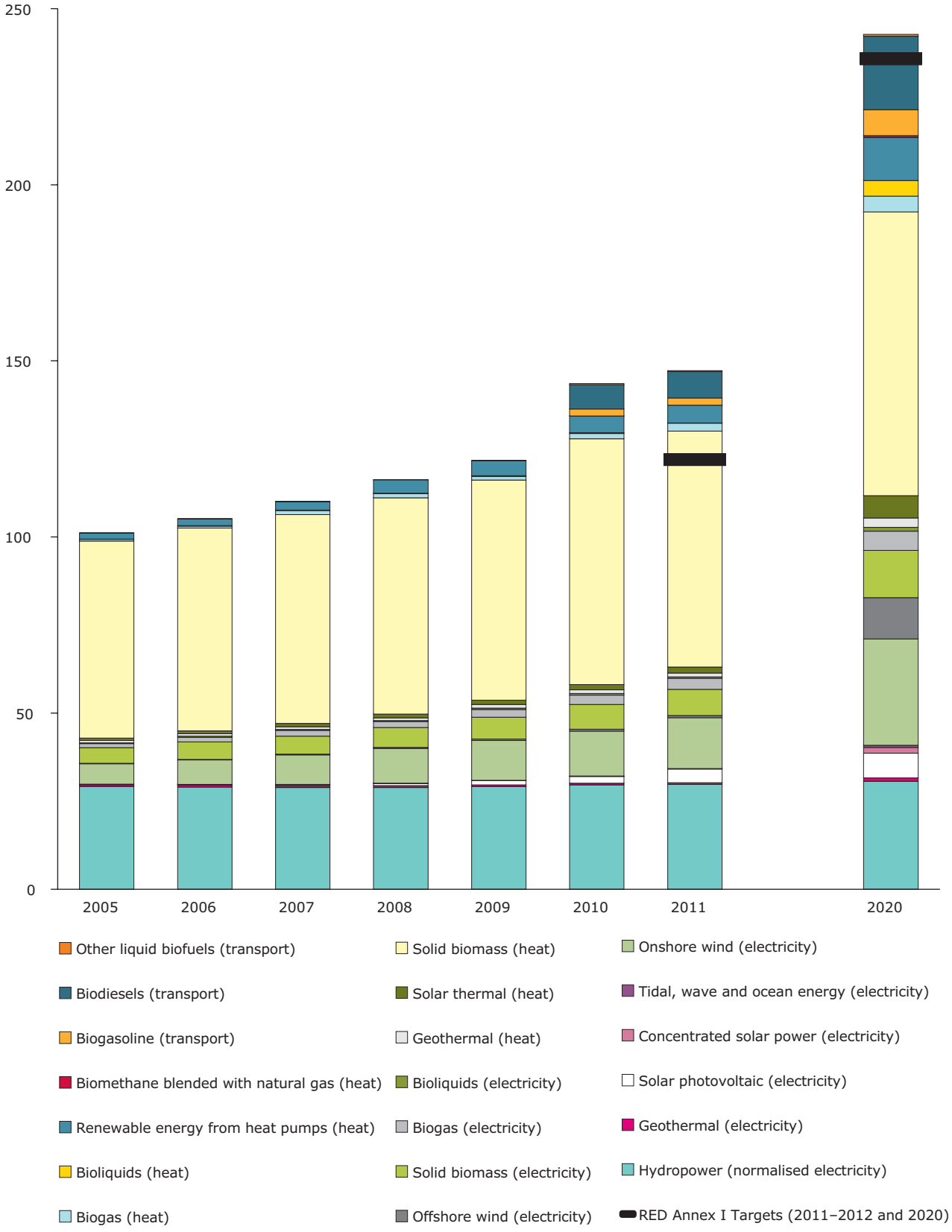
8.5 Recent market developments/ implementation challenges

The renewable energy sector has developed rapidly between 2005 and 2011, with a faster growth rate between 2008 and 2010. Between 2010 and 2011, a slower growth in the share of renewable energy in gross final energy consumption was observed across roughly half of all Member States (see Figure 8.2 and individual country profiles for more information). This may be attributed to the economic crisis leading to increased liquidity shortages on the side of investors and operators, and to adjustments of national support schemes for renewable energy projects.

In Europe's liberalised energy markets, the achievement of the EU's 20 % target for renewable energy consumption by 2020 hinges primarily on private sector investments. To materialise, investments in renewable energy projects need

Figure 8.4 Renewable energy technologies: historic and expected contributions

Million tonnes of oil equivalent



Source: Eurostat SHARES (22 July 2013); country NREAP reports; EurObserv'ER (2007–2009).

clear, stable and conducive frameworks — deemed to be largely in place at European level ([64]) and in the Member States. However, recurrent changes to support mechanisms for renewable energy in the Member States suggest that improvements in this area are needed to minimise market distortions (including sudden or retroactive changes and barriers for cross-border projects), to avoid over-compensation of operators, and to improve the transparency and long-term predictability of these instruments. These aspects were identified as salient also by the European Commission in its Communication Renewable Energy: a major player in the European energy market, of 2012 ([65]).

Reforms at local and regional level can help primarily the deployment of renewable heating and cooling, which typically is subject to local market conditions. In contrast, the deployment of renewable electricity and of renewable energy in transport occurs largely via the broader EU and national markets for electricity and transport fuels. Fine-tuning of existing policy frameworks at EU-level to enhance grid development, grid access conditions and grid operation and to fully implement a guarantee of origin system could play an important fostering role in the development of the renewable electricity market. A stronger, smarter, inter-connected transmission grid will be required to integrate renewable electricity, to mitigate increasing intermittency issues and to enhance cross-border electricity transfers. Efforts to speed up commercialisation of technological components that are still not fully commercially available today will be vital to accommodate for example the anticipated rapid increase in offshore wind generation across certain regions and Member States.

More broadly, the increase in the use of renewable energy sources may give rise to a number of sustainability concerns and trade-offs. These will require timely and appropriate solutions in order to underpin balanced policies and to ensure clarity and predictability for long-term investments. For instance, the expected increase in the use of biomass highlights the need to ensure a more efficient use of resources and to resolve potential social and environmental trade-off. A better, more integrated planning of renewable energy projects and infrastructures, and best practice sharing among Member States, will be essential to improve the speed and effectiveness of permitting procedures and to enhance public support.

([64]) The RED as well as administrative reforms, grid rules and the 10-year national renewable energy action plans.
([65]) COM(2012) 271 final.

9 Progress towards 2020 energy efficiency objectives

Key messages

1. All Member States except Croatia and Slovenia have set energy efficiency targets for 2020. The methodology behind these targets varies considerably.

2. EU Member States are moving towards the level of ambition required by the EED. Their collective primary energy consumption in 2020 is expected to be close to the level required by the EU political objective of 1 483 Mtoe but will remain insufficient to achieve the 20 % energy efficiency target.

3. The energy efficiency policy landscape has changed in many Member States in recent years but the different sectors are not addressed equally. The building sector received particular attention through a process driven by the implementation of the EPBD. Measures addressing appliances and the transport sector are limited to the minimum requirements set in European legislation in many countries.

4. A significant part of the effort is expected to come in many Member States from policies already implemented due to the repealed Energy Services Directive. Some countries expect that the continuous impact of the economic crisis will contribute towards the target.

5. Four Member States (Bulgaria, Denmark, France and Germany) are making good progress in reducing energy consumption and primary energy intensity through well-balanced policy packages across relevant sectors. For most Member States, however, the current policies are not sufficiently developed or implemented across the relevant sectors. This is due to insufficient enforcement (for instance in the buildings sector) as well as impacts arising from the economic crisis. Indeed, many of the energy efficiency measures rely on grants, soft loans and fiscal preferential treatment which have been scaled down or stopped altogether. In eight Member States (Cyprus, Estonia, Italy, Luxembourg, Malta, Romania, Slovakia and Spain), further improvements are necessary both in implementation as well as policy package.

6. The economic crisis influenced energy consumption patterns. In 2011, the EU-28 primary energy consumption was 14.4 % above the 2020 target of 1 483 Mtoe while final energy consumption was only 1.6 % above the 2020 target of 1 086 Mtoe.

9.1 Definition of energy efficiency targets in EU Member States

In October 2012, the European Union adopted the EED in reaction to the fact that EU Member States were not on track to meet the political objective of reducing EU's primary energy consumption by 20 % by 2020 compared to the baseline scenario.

The implementation of the EED is expected according to projections based on quite quick economic recovery to lead to a 15 % reduction in primary energy consumption compared to baseline with additional 2 % reductions expected to come from the transport sector ([66]). Therefore the 20 % energy efficiency target remains a political objective in the EU.

([66]) http://www.ecofys.com/en/blog/the-energy-efficiency-directive-save-energy-create-jobs-and-compete.

The implementation of this political objective is foreseen to take place in two stages. In the first stage, Member States are required to set indicative national targets. In a second stage, national targets will be analysed and if found to be insufficient to contribute significantly to the EU political objective for energy efficiency, binding targets will be proposed instead by the European Commission.

As required by the EED (Art. 3), all Member States have set indicative national targets for energy efficiency except three. At the time of writing (September 2013), Croatia and Slovenia were yet to set their national energy efficiency targets for 2020.

Article 24 of the EED requires Member States to report by 30 April each year, starting in 2013, on progress towards national targets. As of September 2013, 26 Member States complied with this requirement except Croatia and Slovakia ([67]).

In the following sections, a short assessment of these first progress reports ([68]) is provided together with a brief analysis on progress to date in Europe concerning energy efficiency based on historic data and the evaluation of the second National Energy Efficiency Action Plans submitted by Member States in June 2011 as required by the Directive on energy end-use efficiency and energy services. An in-depth analysis of the situation in selected countries brings about insights on specific challenges Member States are confronted with when implementing energy efficiency measures.

Figures 9.1 and 9.2 represent the national indicative targets expressed in primary ([69]) and final energy consumption ([70]). Member States adopted different base-years against which the progress towards improving energy efficiency will be measured. For comparability purposes, these targets are compared to the situation in 2011, which is the last year for which officially reported energy data was available.

Based on the data available from 25 Member States (Croatia, Lithuania and Slovenia do not yet have targets in primary energy consumption), Member States are collectively working towards a level of ambition that is close to the overall EU target for 2020.

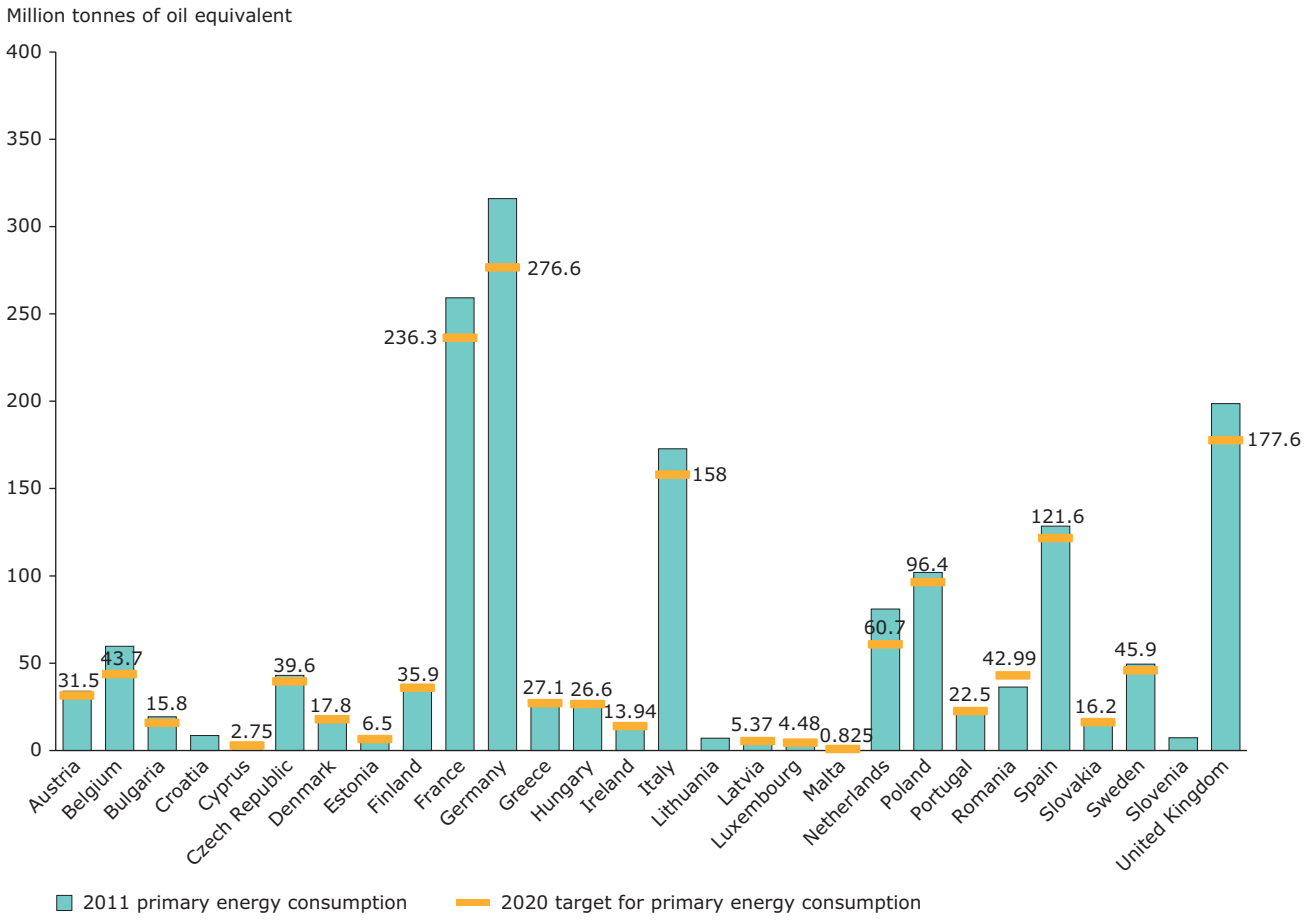
The total primary energy consumption in 2020 for these countries amounts to 1 527 Mtoe, a level which is 3 % higher than the EU target of 1 483 Mtoe. In other words, the level of ambition currently seen in the Member States will go a long way to meeting the 20 % energy efficiency target but will not be sufficient to achieve it.

Member States chose different approaches when setting the national target. Some Member States (Austria, Belgium, Cyprus, Denmark, Hungary, Italy, Latvia, Malta and Poland) chose to focus the target on primary energy consumption, while others (Estonia, Finland, France, Greece, Ireland, Lithuania, Luxembourg, Netherlands, Spain, Slovakia and the United Kingdom) chose to focus their national target on gross final energy consumption and two (Bulgaria and Sweden) on primary energy intensity.

Each national target reflects the specific situation of the Member State, and as a consequence, the ambitions vary greatly. For example, some countries have aimed for a stabilization of energy consumption while others have placed a cap on how much the final energy consumption could increase over the period. In Estonia, the aim is to have, by 2020, final consumption at the same level as it was in 2010. In Greece, primary energy consumption should remain in 2020 the same as in 2011. In Poland, the objective is to stabilise primary energy consumption so that in 2020 the level is the same with the level in 2005. At the same time, Lithuania aims for an increase in final energy consumption of approximately 15 % compared to 2011 levels. In Sweden, the target shows a reduction in both primary and final energy consumption. However, the target may have been based on a growth rate that is much higher than historic trends (the growth rate foreseen for 2020 is 5 %) or values currently forecasted by the Swedish government ([71]). It is interesting to notice that for example in the case of Italy, Poland and the United Kingdom, the final

([67]) Slovenia did submit a short report with data for 2011 and a letter about the target of 10.809 GWh energy savings by 2020 but which needs to be further clarified and translated into targets in primary and/or final energy consumption.
([68]) Progress reports are available at: http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm.
([69]) Primary energy in the context of the EED means Gross Inland Energy Consumption minus non-energy use.
([70]) Final energy consumption includes all energy delivered to the final consumer's door (in the industry, transport, households and other sectors) for all energy uses. It excludes deliveries for transformation and/or own use of the energy producing industries, as well as network losses.
([71]) Forecasts by the Swedish government show GDP rates ranging between 1.2 % in 2013 and 2.9 % in 2017 with a peak of 3.9 % in 2016 according to www.government.se/sb/d/9513/a/214313, accessed on 16.09.2013.

Figure 9.1 Primary energy consumption in 2011 and national targets for 2020 in EU Member States



Source: EEA based on Eurostat data extracted 17 August 2013.

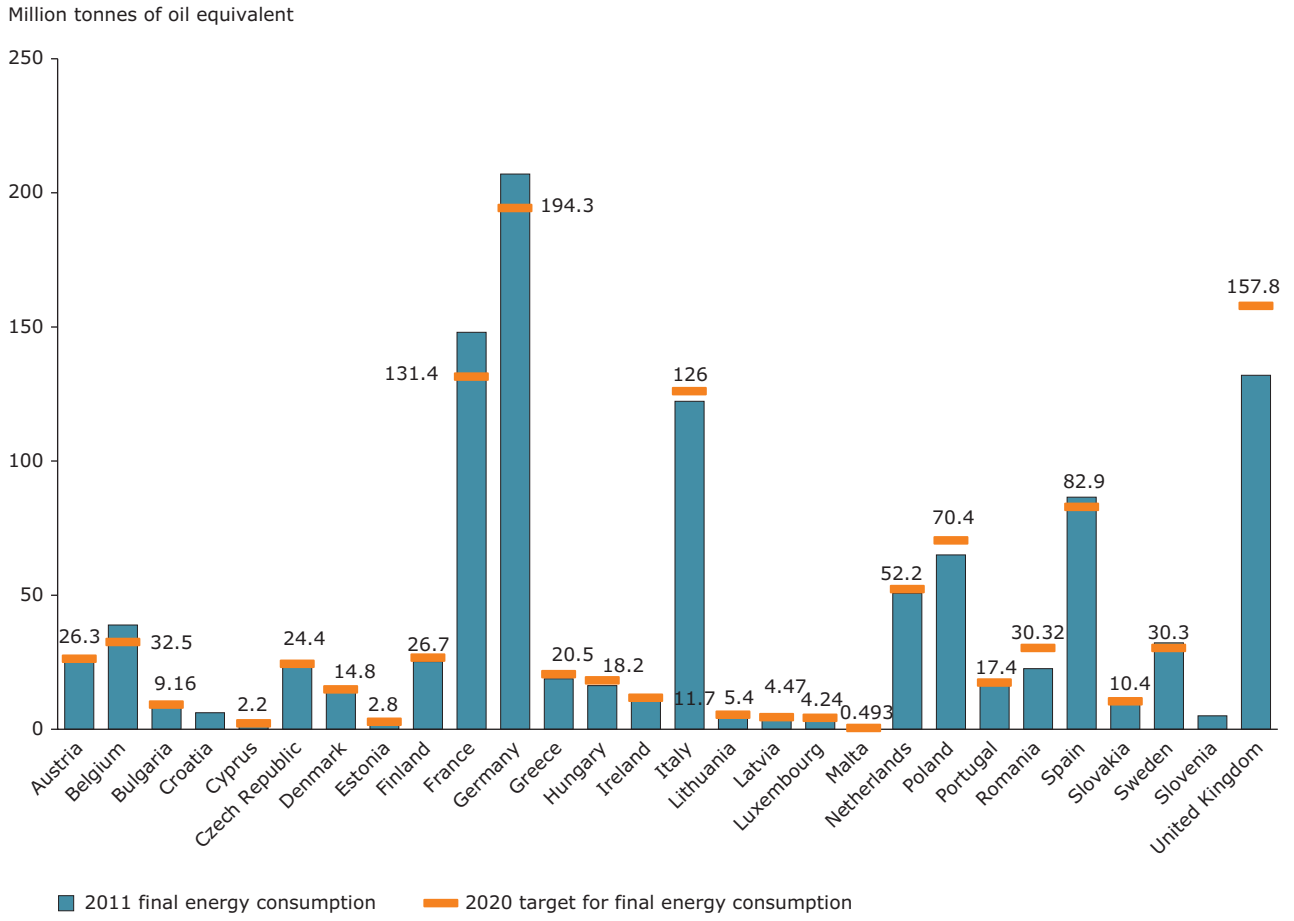
energy consumption rises while there are reductions foreseen in primary energy consumption (more significant for Italy and the United Kingdom). This means that in these countries, a large part of the effort is expected to come from improvements in the transformation sector ([72]).

The way targets are expressed also differs among Member States, with countries having chosen different base years against which the target should be measured: 2006 (Denmark), 2007 (the United Kingdom), 2008 (Germany and Sweden), 2009 (Lithuania) and 2010 (Malta). This may be in part because countries would like to take into account specific national circumstances and efforts that have been already done in recent years to improve energy efficiency. Indeed most countries assume that the benefits of the measures implemented to comply with the Energy end-use efficiency and energy services Directive will continue to bear fruit all the way to 2020. The Irish report mentions that the energy efficiency gains achieved until 2010 will account for 26 % of the overall target for 2020.

Some countries do not actually expect the EED to have a major contribution in fulfilling the target. For instance, in Belgium, the economic crisis is considered to have the highest impact, accounting for over 20 % of the required savings in primary as well as final consumption while the impact of the

([72]) The transformation sector comprises the conversion of primary forms of energy to secondary and further transformation (e.g. coking coal to coke, crude oil to petroleum products, and heavy fuel oil to electricity). The transformation can take place in various plants including: electricity plants, combined heat and power plants, heat plants, blast furnace/gas works, coke/patent fuel/BKB plants, petroleum refineries, petrochemical industry, liquefaction plants, and other plants.

Figure 9.2 Final energy consumption in 2011 and targets for 2020 in EU Member States



Source: EEA based on Eurostat data extracted 17 August 2013.

EED was estimated at around 2 % energy savings required in primary as well as final consumption. Similarly, in Cyprus almost 60 % of the overall energy savings is expected to come from higher penetration of natural gas in electricity sector after 2015 in light of new gas reserves discoveries and only 13 % of the estimated energy savings are directly attributed to the EED.

In some countries the targets are not yet stable and will be revised in the upcoming years. This is due to the fact that some countries are currently holding nationwide debates on the future of their energy system and the outcome of these debates is not yet evident. For instance Austria is preparing a new Energy Efficiency Act which will have an impact on current target. Cyprus indicated that the target will be revised in 2014 with the submission of the third National Energy Efficiency Action Plan. France started a debate on the long-term energy transition while Malta may revisit the target to include the results of the on-going work on the carbon footprint of the building sector. Work is currently on the way to establish post 2020 GHG emissions targets and design new energy efficiency policies in Netherlands while Slovenia may develop a new action plan in 2014. Poland and Spain indicated that the target may be revisited as further adjustments to take into account new economic developments may be necessary.

National specific circumstances are likely to play an important role in the way countries chose to implement the EED requirements. For instance, in Latvia, over 70 % of the energy savings are expected to come from the buildings sector while in Cyprus, almost 60 % of the target is expected to be met by one single measure of introducing natural gas in the electricity sector (should this goal not materialise, the target will be more than halved). Italy and Ireland rely heavily on the non-trading

sectors to meet the energy efficiency target. At the same time, despite planned interconnection with Italy, Malta did not consider improvements in the transformation efficiency in the electricity sector.

Finally, countries seemed to have used different modelling frameworks and different assumptions (for instance concerning the evolution of energy and carbon prices). National modelling frameworks have been used in Cyprus, Denmark, Estonia, France (MedPro and POLES), Greece (Time, WASP IV, COST 21), Malta, Spain (Promed 10), United Kingdom (DECC Energy and Emissions model). The information on energy and carbon prices came from international sources such as the World Energy Outlook 2011 from the International Energy Agency (used by France), the Commission guidance document 'Development of GHG projection guidelines 2012' (TNO et al., 2012) (Ireland), national sources (Malta and the United Kingdom).

In conclusion, the national indicative energy efficiency targets as they stand today strongly reflect different national circumstances (particularly concerning the economic outlook), different situations regarding early actions to improve energy efficiency and different analytical capabilities existing in Member States. The level of ambition at the moment set by the Member States will go a long way towards the political objective of 20 % but will not achieve it, particularly in the event of economic recovery in Europe.

As countries are moving forward with their national debates on the long-term energy transition, the energy efficiency targets may be changing as a result. On the one hand this could add to the already challenging task of monitoring the implementation of the EU energy efficiency political objective. On the other hand, this could also present an opportunity for countries to better align the three policy goals (GHG emissions, renewables and energy efficiency) as some countries have already done to various degrees or are in the process of doing so such as Cyprus, Denmark, Estonia, Germany, Greece, Malta, Netherlands, Poland, Slovenia, and the United Kingdom.

9.2 Energy consumption trends in the EU, 2005–2011

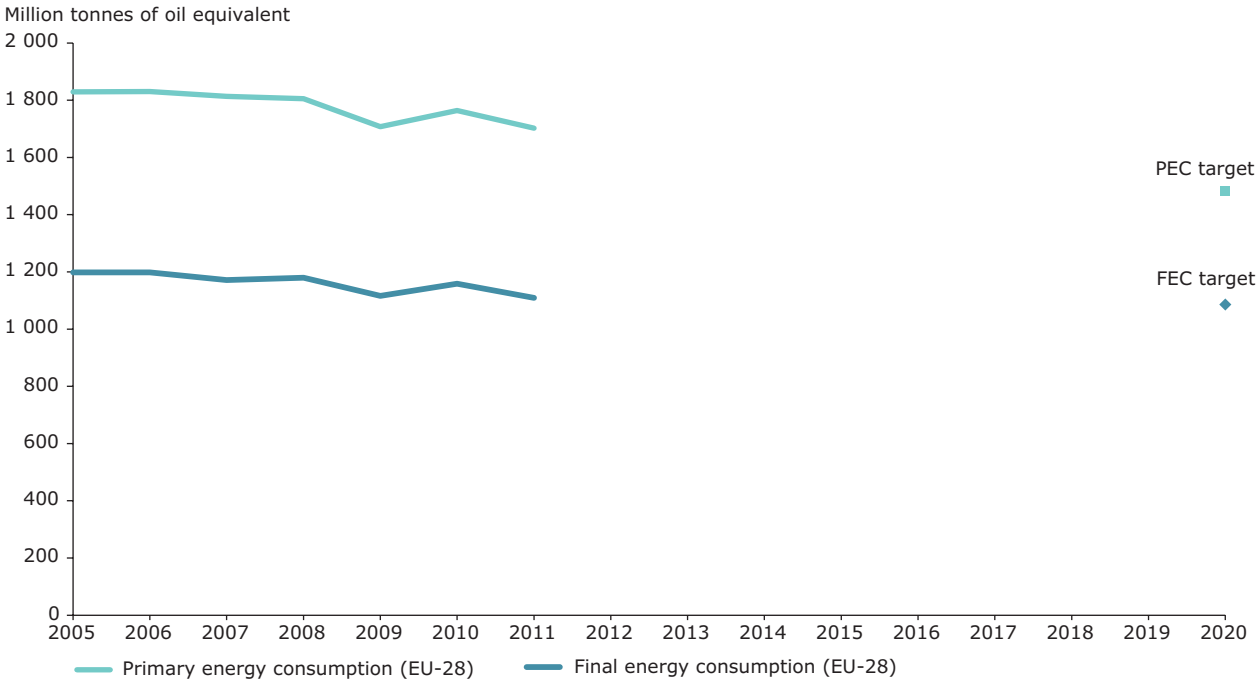
Energy consumption in Europe peaked in 2005 and has been declining since. Primary energy intensity was declining as well but progress slowed down until 2010, partly due to the economic crisis (capacity underutilisation) and limited economic recovery in 2010. While this is clearly the result of implementing energy efficiency and renewable energy policies, the economic crisis and structural changes also played a major role in the more recent trends together with milder winters except for 2010. As the economic situation in Europe recovers from the crisis, further efforts will be necessary to ensure adequate implementation and enforcement of energy efficiency policies (see Figures 9.3 and 9.4).

Primary energy consumption in Europe declined again in 2011 after a small increase in 2010 due to a mild economic recovery. EU primary energy consumption in 2011 was 2 % higher than the 1990 level but 6.9 % lower than 2005 (Figure 9.3). In 2011, the level of primary energy consumption in EU-28 was 14.4 % higher than the 2020 target of 1483 Mtoe (Figure 9.3). The most significant decrease in primary energy consumption compared to year 2005 occurred in Germany, France, Spain, Italy and the United Kingdom (by order of absolute decrease). In most of these countries, the effect of the economic crisis was more pronounced particularly in the industry and transport sectors. In addition structural changes played an important role in decreasing energy consumption particularly in France and the United Kingdom but also in Spain. Fuel switching also explains to some extent the trends observed. In Germany on the other hand, the industry and transport sectors brought about the highest contribution to energy savings (Schlomann, B., Eichhammer, W. et.al., 2012). In Poland there has been an increase in energy consumption due higher rates of economic growth compared to EU average.

Similar trends can be observed in final energy consumption. In 2011, final energy consumption was 2.5 % above 1990 levels but 7.4 % below the 2005 level due to energy efficiency improvements but also the economic crisis ([73]). The developments vary significantly between sectors. While the transport and the service sectors saw a huge increase in energy consumption compared to 1990 of 30.4 % and 29.4 % respectively, the industry decreased its energy consumption by 21.7 % over the same period. In 2011, the final energy consumption in EU-28 was only 2.4 % above the 2020 target of 1086 Mtoe (Figure 9.3).

([73]) For more details, see EEA indicator ENER 16, http://www.eea.europa.eu/data-and-maps/indicators/#c5=&c7=all&c0=10&b_start=0.

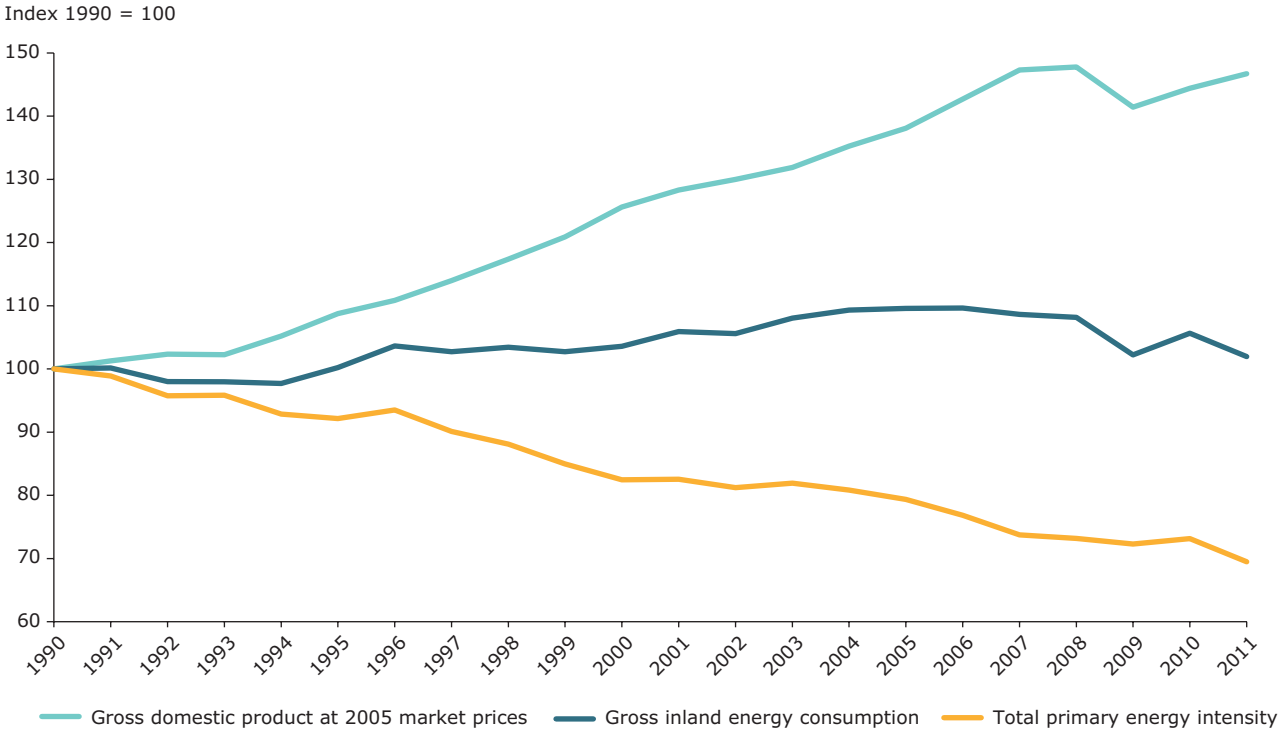
Figure 9.3 Primary and final energy consumption in EU-28 over the period 2005–2011 and target values for 2020



Note: Primary energy for this figure is calculated as gross inland energy consumption minus non-energy uses.

Source: EEA based on Eurostat data extracted on 17 August 2013.

Figure 9.4 Primary energy intensity trends in EU-27 from 1990–2011



Note: This graph does not include Croatia.

Source: EEA indicator ENER 17 based on Eurostat and World Bank data.

In 2011, the primary energy intensity in the EU-27 was 30 % below the 1990 level due to improvements in energy efficiency both in end-use sectors as well as energy transformation, higher penetration of renewable energy, continuing effect of the economic crisis and structural changes (Figure 9.4). Since 2005, the primary energy intensity decreased at annual average rate of 2.2 %, rate which needs to be maintained all the way through 2020 if the energy efficiency objective is to be achieved.

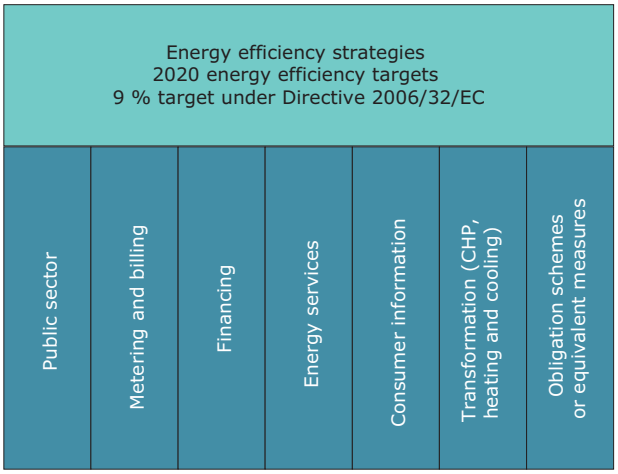
9.3 Progress in implementing energy efficiency policies in EU Member States and challenges ahead

While the overall energy efficiency policy frameworks have been largely developed at EU level, the challenge remains to transpose these policies into national legislation. Because the energy saving target of 9 % in final energy consumption by 2016 established under the energy end-use and energy services directive (Art. 4) counts against the 2020 energy efficiency objective, a significant part of the policies required to meet the 2020 target have already been included in the second national energy efficiency action plans submitted by Member States in 2011 ([74]). With the adoption of the EED, the scope of the national energy efficiency action plans has been expanded as shown in Figure 9.5.

A recent evaluation of these plans in the context of the Energy Efficiency Watch project (EEW, 2013) ([75]) reveals that: 'despite remarkable achievements, the overall picture of energy efficiency policy in Europe remains somewhat ambivalent […]. An effective implementation of the measures introduced by EU Directives will require a higher degree of harmonisation and integration. Up to now, measures in different sectors are not well aligned with each other or lack a clear design […]. Moreover, certain end-use areas are still not addressed sufficiently (e.g. modal shifts in transport, coherent policy packages for industry including carriage of goods, etc.).'

The expert survey conducted within the framework of the Energy Efficiency Watch project reveals that the level of ambition differs significantly from one country to another. While some countries developed a well-balanced package of measures across different sectors, others do very little beyond the minimum effort required by the EU directives. This can be explained in part by the fact that very few countries are well equipped to put in place supportive frameworks for energy efficiency policies.

Figure 9.5 The scope of National Energy Efficiency Action Plans



Significant progress can be observed in most countries in the public and buildings sectors but also in setting up appropriate governance frameworks for energy efficiency (e.g. institutional frameworks, long-term strategy, stakeholder involvement, etc.).

With respect to the public sector, many countries established well-balanced policy packages particularly with respect to demonstration projects and information. The picture becomes more mixed when it comes to setting-up a long-term strategy for this sector as well as implementing requirements and financing for energy efficiency. Good practice in this field can be found in Finland (coherent strategy for the public sector) and Belgium (public sector as a role model).

The buildings sector has received significant attention with many good results and advanced regulations implemented in most countries. In this sector, the enforcement of minimum energy

([74]) Art. 14(2) of Directive/2006/32/EC requires Member States to submit 3 National Energy Efficiency Action Plans by 30 June 2007, 30 June 2011 and 30 June 2014.
([75]) http://www.energy-efficiency-watch.org/fileadmin/eew_documents/images/Event_pictures/EEW2_Logos/EEW-Final_Report.pdf.

performance standards, as well as financing, remains a challenge in some cases. Provision of information and education could be improved. Germany can be considered as a good practice example for information, financing and setting up governance framework while France can be regarded as a good example for enforcement.

With respect to governance frameworks, most countries have created energy agencies and in many cases the coordination and financing function well. The situation is less positive when it comes to setting up a long-term, coherent strategy as well as provision for energy services and implementation of horizontal measures (e.g. taxation). Bulgaria offers an example of good practice in setting strategic objectives while Denmark can be considered as a positive example in creating the overall support framework (strong links between national and regional strategies, good coordination, transparency, information and education activities, and involvement of regional and local authorities in the policy framework).

When it comes to household appliances and transport sectors, it appears that countries rely heavily on EU measures (EU Labelling Directive, EU Eco-design Directive, Regulation (EC) No 443/2009 and Regulation (EU) 510/2011 setting emission performance standards for new passenger cars and light duty vehicles). Economic incentives for the uptake of new, more energy efficient products, information, education and R&D support (particularly for transport) remain a challenge in many countries. Netherlands can be considered as a good example on how to provide access to information for energy efficiency appliances while France can be seen as a positive example for governance framework. Slovenia provides good examples in promoting public transport.

The industrial sector seems to be given a low priority in many countries, with few countries having policies in addition to the relevant EU legislation (Eco-Design Directive, EU ETS, etc.). Economic incentives are in place in most countries but energy efficiency obligations and/or commitments are much less widespread. Further developments concerning the Energy Taxation Directive could create additional incentives for the industry to implement energy efficiency measures. Good practice concerning education, capacity building and energy audits are found in Austria, Estonia and Finland while Bulgaria represents a good example for setting targets for individual companies and Sweden for energy intensive industries.

9.4 EU Member States' progress towards improving energy efficiency

On the basis of the evaluation of the second national energy efficiency action plans detailed in Section 9.3, the EEA performed a combined assessment of the progress achieved by Member States in reducing their energy consumption between 2005 and 2011, reducing their primary energy intensity between 2005 and 2011 and implementing a balanced policy package across sectors to improve energy efficiency. This results in an overall assessment for each country as well as for the EU.

Four Member States (Bulgaria, Denmark, France and Germany) are considered to have a well-balanced policy package across sectors and to make good progress in reducing energy consumption and primary energy intensity (see Table 9.1, arrows pointing up).

Fifteen Member States (Austria, Belgium, the Czech Republic, Ireland, Finland, Greece, Hungary, Latvia, Lithuania, the Netherlands, Poland, Portugal, Slovenia, Sweden and the United Kingdom) are considered to have achieved some progress in reducing energy consumption. However, further improvements are necessary in order to further develop their policy package or to better implement the existing one (horizontal arrows). Further details are provided below to justify the assessment made for Lithuania, Poland and the United Kingdom.

- In Lithuania, the trends in primary energy intensity can be explained by the closure of nuclear power plant while the energy consumption trends are partly explained by the economic crisis; the policy package could be improved in several sectors.

- Poland enjoyed a rather high economic growth over the period which explains the energy consumption trends.

- In the United Kingdom, the significant decrease in energy consumption can be partly explained by the economic crisis; the policy package could be improved as well.

Eight Member States (Cyprus, Estonia, Italy, Luxembourg, Malta, Romania, Slovakia and Spain) have made limited progress so far and require further improvements to develop their policy package and implement it (arrows pointing down). Further details are provided below to justify the assessment made for Italy, Slovakia and Spain.

- In Italy, the trends in energy consumption are partly explained by the economic crisis; the policy package could be significantly improved.

- In Slovakia, the trends observed in primary energy intensity could be partly explained by the economic crisis. In addition, structural changes in the manufacturing industry towards less energy intensive industries such as machinery and automotive industry can explain why after 2009, the energy consumption did not pick up the same pace as prior to that year and which led to a significant decrease in primary energy intensity (the GDP grew twice as fast as primary energy consumption). Therefore the trend observed particularly in primary energy consumption is mainly due to other factors although some energy efficiency improvements did take place particularly during the period 2005–2008. The policy package as well needs significant improvements across sectors.

- In Spain, the significant decrease in energy consumption was due to the economic crisis more than due to the implementation of energy efficiency policies; the policy package is not ambitious and lacks long-term view.

Table 9.1 Implementation progress concerning energy efficiency in EU Member States

Countries	Absolute change PEC 2005–2011 (Mtoe)	Absolute change FEC 2005–2011 (Mtoe)	Annual average change in PEI 2005–2011 (%)	EEA assessment of progress towards improving energy efficiency
Bulgaria	– 1	– 1	– 3.2	↗
Denmark	– 1	– 1	– 0.8	↗
France	– 17	– 14	– 1.9	↗
Germany	– 30	– 22	– 3.1	↗
Austria	0	– 1	– 1.8	→
Belgium	+ 1	+ 2	– 1.1	→
Czech Republic	– 2	– 1	– 3.2	→
Finland	+ 1	0	– 0.8	→
Greece	– 3	– 2	– 0.8	→
Hungary	– 2	– 2	– 1.7	→
Ireland	– 1	– 2	– 2	→
Latvia	0	0	– 1.1	→
Lithuania	– 2	0	– 5.3	→
Netherlands	– 1	– 2	– 1.5	→
Poland	+ 9	+ 6	– 3	→
Portugal	– 3	– 2	– 2.4	→
Slovenia	0	0	– 1.6	→
Sweden	– 2	– 1	– 2.6	→
United Kingdom	– 35	– 20	– 3.3	→
Cyprus	0	0	– 1.1	↘
Estonia	+ 1	0	+ 0.3	↘
Italy	– 16	– 12	– 1.3	↘
Luxembourg	0	0	– 2.6	↘
Malta	0	0	+ 0.4	↘
Romania	– 3	– 3	– 3.7	↘
Slovakia	– 2	0	– 5.7	↘
Spain	– 16	– 11	– 2.7	↘
Croatia	0	0		

Note: PEI: primary energy intensity. Primary energy intensity is calculated as primary energy consumption per GDP (in constant prices, 2005 levels).

Progress is assessed based on the trend in energy consumption and primary energy intensity and the balance of packages of measures in the 2nd NEEAP:

↗ Well-balanced policy package across sectors and good progress in reducing energy consumption and primary energy intensity

→ Some progress in reducing energy consumption but further improvements are necessary either in the implementation or in the policy package or both

↘ Limited progress, further improvements are necessary both in implementation as well as policy package

Source: EEA based on Eurostat data 2013; EEA indicator ENER17 based on Eurostat and World Bank data 2013; evaluation of the 2nd NEEAPs within the Energy Efficiency Watch project

10 Integrated progress towards 20/20/20 climate and energy targets

Key messages

1. An assessment of Member States' progress at national level across the three policy areas shows that overall the EU is making relatively good progress towards its climate and energy targets set for 2020.
2. No Member State is on track towards meeting targets across all policy domains. Equally, no Member State underperforms in all three areas.
3. Fourteen Member States are overall performing positively across the three policy domains, four Member States have an overall neutral rating while nine Member States score negatively overall.
4. Sixteen Member States appear to achieve relatively similar progress across their three targets with eleven Member States receiving either positive or neutral ratings and five Member States scoring either negative or neutral. Eleven other Member States, however, received both positive and negative ratings.
5. These results vary across Member States irrespective of their GDP levels, geographic location, etc. This indicates an effort to take into account individual Member State situations in the different targets set under the ESD and the RED. Room for improvement remains in all three policy domains, in particular regarding energy efficiency.

10.1 The integration of climate and energy 2020 targets

Chapters 7, 8 and 9 of the present report present separately an assessment of the current progress of Member States towards this triple set of targets on GHG emissions, renewables and energy efficiency. The present chapter aims at integrating these assessments into a single horizontal overview of the progress achieved so far towards national objectives.

National targets and objectives have been set for each Member State for renewable energy and energy efficiency. These targets were developed and agreed so that their achievement would represent an equivalent level of effort for all Member States given the diversity of their individual situations. The 2020 targets on RES and the annual targets for the period 2013–2020 for emissions not covered by the EU ETS and set under the ESD are legally binding. Yet energy efficiency targets for 2020 remain non-binding and are subject to significant variations among Member States in the way they are defined.

It should, in theory, be expected that the progress observed towards one of the three targets set at national level should contribute, to a certain extent, towards the two other targets. For example, the development of RES results in gross avoided GHG emissions, essentially in the EU ETS sectors, while measures included in the EED are key to support the contribution of some of the sectors covered by the ESD (e.g. buildings, services, energy transformation) towards national ESD targets and may also affect the demand for electricity generated within the EU ETS.

10.2 Integrated overview of EU Member States' climate and energy performance

The assessments presented in Chapters 7, 8 and 9 allow for an integrated assessment of Member States' performance across the triple climate and energy perspective. Such assessment combines the analyses of:

- current (2012) and projected (2020) GHG emission levels in the sectors not covered by the EU ETS compared with 2013 and 2020 targets for these sectors, respectively. The assessment takes into account potential plans to adopt and implement additional measures (see Chapter 7);

- current (2011) RES shares compared to indicative 2011–2012 targets provided for in the RED as well as compared to average expected 2011 and 2012 levels outlined in Member States' NREAPs (see Chapter 8);

- progress achieved in reducing energy consumption as well as developing and implementing balanced energy efficiency policy packages (see Chapter 9).

The methodologies used to track progress in each of the policy domain are specific to these areas and do not rely on the same type of data and information, for which the availability and quality vary. The same method can therefore not be used for assessing progress in all three policy domains. The results are, however, based on the latest country-specific information available and reflect the current or projected situation in each Member State resulting from the implementation of existing national policies and measures.

The overview of the climate and energy performance of all Member States (Table 10.1) shows a diversified picture across the EU, with 15 different combinations of performances across the three policy domains.

While no Member State performs positively in all three policy domains (thereby indicating room for improvement even for the currently best performing countries), no Member States underperforms in all three perspectives either.

Room for improvement remains in all three policy domains, in particular regarding energy efficiency.

Countries can be grouped in several ways, depending on their ratings in each of the three policy domains:

- Fourteen Member States are overall performing positively across the three policy domains, four Member States have an overall neutral rating while nine Member States score negatively overall.

- For 22 Member States, two of the three ratings are similar (either positive, neutral or negative. For example, six Member States (Bulgaria, Denmark, Germany, Greece, Hungary and Sweden) perform positively in two areas and neutrally in the third one, while on the other end of the spectrum, Belgium performs negatively in two areas and neutrally in the third one.

- Sixteen Member States appear to achieve a relatively uniform progress across their three targets with eleven Member States scoring either positive or neutral and five Member States scoring either negative or neutral. Eleven other Member States, however, display a more contrasted situation with both positive and negative performances.

- Croatia cannot be directly compared with other countries due to lack of information on renewables, energy efficiency and, to some extent, GHG emissions.

These results vary across Member States irrespective of their GDP levels, geographic location, etc. This indicates an effort to take into account individual Member State situations in the different targets set under the ESD and the RED. For example under the ESD, the 2020 targets were set on the basis of Member States' relative wealth (measured by Gross Domestic Product per capita) and range from limiting the increase in GHG emissions to 20 % to reducing GHG emissions by 20% depending on GDP levels for each country.

Overall, the EU seems to be making relatively good progress towards its climate and energy targets set for 2020. Room for improvement remains in all three policy domains, in particular to improve energy efficiency.

Table 10.1 Progress towards 2020 climate and energy targets in the EU

Countries	EEA assessment of progress		
	National GHG targets under the ESD	National targets on RES share in gross final energy consumption	Improving energy efficiency
Austria	↘	→	→
Belgium	↘	↘	→
Bulgaria	→	↗	↗
Croatia	↗	n.a.	n.a.
Cyprus	↗	→	↘
Czech Republic	↗	→	→
Denmark	↗	→	↗
Estonia [a]	↘	↗	↘
Finland	↘	↗	→
France	↗	↘	↗
Germany	→	↗	↗
Greece	↗	↗	→
Hungary	↗	↗	→
Ireland	↘	→	→
Italy	→	↗	↘
Latvia	→	↘	→
Lithuania	→	↗	→
Luxembourg	↘	↗	↘
Malta	↗	↘	↘
Netherlands	→	↘	→
Poland	↗	→	→
Portugal	↗	→	→
Romania	↗	↗	↘
Slovakia	↗	↗	↘
Slovenia	→	↗	→
Spain	↘	↗	↘
Sweden	↗	↗	→
United Kingdom	↗	↘	→
EU	↗	↗	→

Note: 'National GHG targets under the ESD' (second column):
- ↗ 2012 non-ETS emissions were below the 2013 ESD targets and 2020 non-ETS emissions are projected to be lower than the 2020 ESD target with existing measures;
- → 2012 non-ETS emissions were below their 2013 ESD targets and 2020 non-ETS emissions are projected to be lower than the 2020 ESD target only if planned additional measures are implemented;
- ↘ 2012 non-ETS emissions were above the 2013 ESD targets or 2020 non-ETS emissions are projected to be higher than the 2020 ESD target even if the planned additional measures are implemented.

'National targets on RES share in gross final energy consumption' (third column):
- ↗ the 2011 RES share was above the RED and NREAP 2011–2012 trajectories;
- → the 2011 RES share was above the RED 2011–2012 trajectory, but below the NREAP 2011–2012 trajectory;
- ↘ the 2011 RES share was still below the RED and NREAP 2011–2012 trajectory values.

'Improving energy efficiency' (fourth column):
- ↗ a well-balanced policy package exists across relevant sectors and good progress is made in reducing energy consumption and primary energy intensity;
- → some progress is made in reducing energy consumption but further improvements are necessary to further develop policies or to better implement the existing ones;
- ↘ limited progress is made so far in improving energy efficiency and further efforts are needed to develop polices across the relevant sectors and to implement them.

[a] Estonia updated its energy statistics in September 2013. As this information was not received by the EEA in time for the publishing deadline of the report *Approximated EU GHG inventory: proxy GHG estimates for 2012* (EEA, 2013a), 2012 emissions in non-ETS sectors appear to have been overestimated. The EEA has therefore not been able to take these new data into account for the assessments in the present report.

See Chapters 7–9 for further details on the methodology used.

Source: EEA.

Acronyms, units and terms

AAU(s)	Assigned amount unit(s). A Kyoto unit representing an allowance to emit one metric tonne of carbon dioxide equivalent (CO_2-equivalent). AAUs are created (issued) up to a level of a party's initial assigned amount
AEA(s)	Annual emission allocation(s)
Annex I	The annex to the UNFCCC specifying which developed country parties and other parties to the UNFCCC have committed themselves to limiting anthropogenic emissions and enhancing their GHG sinks and reservoirs
Assigned amount	The total quantity of valid emission allowances (Kyoto units) held by a party within its national registry. The initial assigned amount for a party is determined by its base-year emissions, and its emission limitation and reduction objective contained in Annex B to the KP. Any Kyoto units that the party acquires through the Kyoto mechanisms, or issues for removals from LULUCF activities under Article 3, paragraphs 3 and 4, are added to the party's assigned amount; any units that the party transfers, or cancels for emissions from LULUCF activities under Article 3, paragraphs 3 and 4, are subtracted from the party's assigned amount. At the end of the commitment period, each party must ensure that its total emissions over the commitment period are less than or equal to its total assigned amount
Cancellation	The transfer of a unit to a cancellation account. Such units may not be further transferred, and may not be used towards meeting a party's Kyoto target
Carry-over	The authorisation for a unit that was issued in one commitment period to be used in a subsequent commitment period. Individual unit types are subject to different rules for carry-over
CDM	Clean Development Mechanism. A KP mechanism that allows Annex I parties to purchase emission allowances from projects in non-Annex I parties that reduce or remove emissions. The emission allowances from CDM projects are called Certified Emission Reductions (CERs)
CER(s)	Certified emission reduction(s). A Kyoto unit representing an allowance to emit 1 metric tonne of CO_2-equivalent. CERs are issued for emission reductions from CDM project activities
CHP	Combined heat and power (cogeneration)
CITL	Community Independent Transaction Log
CO_2	Carbon dioxide
CO_2-eq.	Carbon dioxide equivalent
COP	Conference of the Parties to the UNFCCC
Domestic	Pertaining to a country's or group of countries' own emissions or internal action to reduce emissions
EC	European Commission
EEA	European Environment Agency
EED	Energy Efficiency Directive (Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC)
EFTA countries	European Free Trade Association countries: Liechtenstein, Switzerland, Norway, Iceland

ERU(s)	Emission reduction unit(s). A Kyoto unit representing an allowance to emit 1 metric tonne of CO_2-equivalent. ERUs are issued for emission reductions or emission removals from JI project activities by converting an equivalent quantity of the party's existing AAUs or RMUs
ESD	Effort Sharing Decision (Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020)
ETC/ACM	European Topic Centre on Air Pollution and Climate Change Mitigation. The ETC/ACM is a consortium of European institutes contracted by the EEA to carry out specific tasks in the field of air pollution and climate change
EU ETS	European Union Emissions Trading System
EU	European Union
EU-10	Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia
EU-12	Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia
EU-13	Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia
EU-15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
EU-25	Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovenia, Slovakia, Spain, Sweden, United Kingdom
EU-27	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden, United Kingdom
EU-28	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden, United Kingdom
EUA	European Union allowance
EUAA	European Union aviation allowance
FM	Forest Management
GAINS	Greenhouse Gas and Air Pollution Interactions and Synergies
GDP	Gross domestic product
GHG(s)	Greenhouse gas(es)
IED	Industrial Emissions Directive (Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
IET	International emissions trading. One of the three KP emissions trading mechanisms by which an Annex I party may transfer Kyoto units to or acquire units from another Annex I party. A party must meet specific eligibility requirements to participate in emissions trading.
IPCC	Intergovernmental Panel on Climate Change
ITL	International Transaction Log. An electronic data system, administered by the UNFCCC Secretariat, which monitors and tracks parties' transactions of Kyoto units.

JI	Joint implementation. A KP mechanism that allows Annex I parties to purchase emission allowances from projects of other Annex I parties that reduce or remove emissions. The emission allowances from JI projects are called Emission Reduction Units (ERUs)
JRC	Joint Research Centre
KP	Kyoto Protocol
ktoe	kilotonnes of oil equivalent
LULUCF	Land Use, Land-Use Change, and Forestry. A GHG inventory sector subject to specific accounting rules.
MMD	Monitoring Mechanism Decision (Decision 28/2004/EC of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol)
MMR	Monitoring Mechanism Regulation (Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC)
MS	Member State
Mt	Mega (million) tonnes
Mtoe	million tonnes of oil equivalent
NAP	National allocation plan
National registry	An electronic database maintained by a party, or group of parties, for the transfer and tracking of units in accordance with the KP rules
NER	new entrants reserve
NF_3	nitrogen trifluoride
Non-Annex I parties	Parties not included in Annex I to the UNFCCC
Pledge	Emission reduction expressed as a percentage reduction, relative to the base year, which has to be achieved by a given year in the future
PRIMES	Price-driven and agent-based simulation of markets energy system models
QA/QC	Quality assurance/Quality control
QELRC(s)	Quantified Emission Limitation or Reduction Commitment(s), average level of anthropogenic carbon dioxide equivalent emissions of GHG expressed as a percentage in relation to the base year
RED	Renewable Energy Directive (Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC)
RES	Renewable Energy Sources
Retirement	The transfer of a unit to a retirement account to be used towards meeting a party's Kyoto commitment
RMU(s)	Removal unit(s). A Kyoto unit representing an allowance to emit 1 metric tonne of CO_2-equivalents. RMUs are issued for emission removals from LULUCF activities under Article 3, paragraphs 3 and 4
SEF	Standard electronic format for reporting KP units
True-up period	A 100-day period after final emissions have been reported for the commitment period during which parties have the opportunity to undertake final transactions necessary to achieve compliance with their Kyoto commitment
UNFCCC	United Nations Framework Convention on Climate Change
WAM	with additional measures
WEM	with existing measures

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