The Next EU Climate and Energy Package – EU Climate Policies after 2020

Study

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List of abbreviations

Billion	-	bn
Carbon Capture and Storage	-	CCS
Carbon Dioxide	-	CO_2
Carbon Dioxide Equivalent	-	CO_2-eqv
Climate Action Network	-	CAN
Contracts for Difference	-	CfD
Effort Sharing Decision	-	ESD
Emission Performance Standard	-	EPS
Emissions Trading Scheme	-	ETS
Energy Efficiency Directive	-	EED
Energy Performance of Buildings Directive	-	EPBD
European Renewable Energy Council	-	EREC
European Commission	-	EC
European Energy Programme for Recovery	-	EEPR
European Environmental Agency	-	EEA
European Industrial Initiative	-	EII
European Parliament	-	EP
European Union	-	EU
European Union Allowance	-	EUA
Greenhouse gas	-	GHG
Gross Domestic Product	-	GDP
Independent Carbon Market Authority	-	ICMA
Industrial Emissions Directive	-	IED
International Panel on Climate Change	-	IPCC
Integrated Pollution Prevent and Control Directive	-	IPPCD
Kilowatt hour	-	kWh
Large Combustion Plant Directive	-	LCPD
Linear Reduction Factor	-	LRF
Land Use, Land-Use Change and Forestry	-	LULUCF

Market stability reserve		MSR
Megatonne of oil equivalent	-	Mtoe
Member State(s)	-	MS
Million	-	m
Million tonnes	-	Mt
National Renewable Energy Action Plan	-	NREAP
Nitrous Oxide	-	N_2O
Non-Governmental Organisation	-	NGO
Regional Greenhouse Gas Initiative	-	RGGI
Renewable Energy Directive	-	RED
Renewable Energy Sources	-	RES
Strategic Energy Technology Plan	-	SET Plan
Ultra-Low Carbon dioxide Steelmaking	-	ULCOS
United Kingdom	-	UK
United Nations	-	UN
UN Framework Convention on Climate Change		UNFCCC
United States of America	-	USA
World Wide Fund for Nature	-	WWF

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Introduction: context, objectives, methodology

In March 2007, the **European Council** agreed to reduce the European Union's (EU) Greenhouse gas (GHG) emissions by (at least) 20% by 2020 (compared to 1990 levels). If a global and comprehensive agreement were adopted for the period after 2012, the EU would be ready to reduce GHG emissions by 30% in 2020. The European Council also adopted a target to increase the share of renewable energy in final energy consumption to 20% and agreed to improve energy efficiency by 20%, both targets to be met by 2020 (European Council 2007).

To implement these targets, the EU **Climate and Energy Package** was adopted in April 2009, following political agreement between Council and Parliament in December 2008. The package encompasses a number of measures, including the Effort Sharing Decision (ESD), a reform of Emissions Trading Scheme (ETS), a reformed Renewable Energy Directive, the Carbon Capture and Storage (CCS) directive, the Fuel Quality Directive and the regulation on CO_2 emissions of cars.[1]

This 2020 **package was the first step towards achieving dramatically higher GHG reductions** of 80–95% in 2050, which EU Heads of State and Government agreed in 2009, as the contribution of developed countries to the global effort needed to stay within the limit of 2°C warming over preindustrial levels (European Council 2009). The European Parliament (EP) also endorsed a long-term reduction target of at least 80% by 2050 for the EU and other developed countries (European Parliament 2009). This target is in line with the required reductions that the International Panel on Climate Change (IPCC) considers necessary to have a realistic chance to avoid a temperature increase above 2°C (Intergovernmental Panel on Climate Change 2007).

With the exception of the emission cap set under the EU Emissions Trading System (ETS), the current targets will **expire in 2020**, less than seven years from today. For this reason, the EU has started discussions on how to design climate and energy policies after 2020. In the spring of 2013, the European Commission (EC) launched a Green Paper entitled "A 2030 framework for climate and energy policies" to prepare a dialogue on the basis of common facts and key questions. In response to the Green Paper, over 550 stakeholders sent in submissions (DG Energy 2013). Their views on the future of EU climate policy differ considerably. While NGOs have called for maintaining the current architecture of three separate targets, other groups have supported a single GHG reduction target only or even called for abandoning targets altogether if international negotiations fail to achieve an agreement.

[1] See i.a.: 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

Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community

Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006

Regulation (EC) No 443/2009 of the European Parliament and the European Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles

In response to the consultation on the Green Paper, the EC proposed a new EU framework on climate and energy for 2030 on 22 January 2014.[2] The proposed framework calls for reductions in greenhouse gas emissions of 40% (domestic) in 2030 (against 1990 levels) and a binding EU target for renewable energies of at least 27% in 2030. The proposal does not include specific 2030 targets for energy efficiency or any sectoral targets such as for transport emissions or the share of renewables in transport. As another essential element, the EC has put forward a specific reform of the ETS, which includes a more ambitious linear reduction factor and a new mechanism called the market stability reserve.

Reactions to the proposal have been mixed. The European Parliament in its resolution on a 2030 Framework for Climate and Energy Policies called the EC proposal "short-sighted and unambitious on a number of levels" (European Parliament 2014a). BusinessEurope warned against hurting industrial competitiveness by assuming a role as "a lone frontrunner without followers" (BusinessEurope 2014). Environmental organization Greenpeace criticized the targets as too low to cost-effectively reach the EU's long-term goals (Greenpeace Europe 2014), and utility association Eurelectric called the proposal a step "in the right direction" and emphasized that Europe should focus more on the ETS and less on national policies to regulate renewables and mitigation (Eurelectric 2014). The proposal marks an important milestone in adopting a new framework; the final decision on the content of the climate framework for 2030 will be the result of negotiation between the Council and Parliament.

The 2030 discussions take place in a **political environment that differs significantly from 2007 and 2008**. Today, many EU Member States (MS) are or have been in a deep and long economic recession. Many MS are grappling with enormous budget deficits. The future of the Euro is a source of continuous concern. Back in 2007, climate change was high on the political agenda – at all levels, including heads of states and government. This was true in Europe but also internationally where climate change featured high on the agenda of, for example, the UN and the G8. This has changed. Today, energy prices and their alleged impact on the competiveness of the EU dominate the debate. EU climate policy appears to be an agenda taker, unable to push required reform and merely able to react to challenges to the climate *acquis*. Europe's economic crisis is an obvious reason why climate change is not high on the agenda anymore, but limited public awareness, deeply entrenched "carbon interests" and a lack of political clout of environmental politics are equally important factors.

This study discusses EU climate and energy policies for the decade after 2020: what should EU climate and energy policies look like between 2020 and 2030? Obviously, this is a very broad question. There are many possible answers to this question. They will differ depending on the context of those providing the answers, their interests and perception, political and economic circumstances, or assessment of technological innovation. Regardless of these differences, any response must keep one thing in mind: climate and energy policies of the next decade must put the EU on a path of decarbonising its economies and societies. Climate change makes decarbonisation indispensable; energy security, competiveness and innovation – to name a few aspects – are other key considerations.

[2] The framework consists of the Communication "A policy framework for climate and energy policies in the period from 2020 and 2030", which is accompanied by an impact assessment and a communication and report on energy prices and costs in Europe. For more information and all documentation see http://ec.europa.eu/clima/policies/2030/documentation_en.htm. Not officially part of the Framework but also an important step for EU energy and climate policy is the reform proposal for the ETS, published in January 2014 along with an impact assessment and available here http://ec.europa.eu/clima/policies/ets/reform/documentation_en.htm .

Importantly**, this study exclusively analyses particularly relevant EU policies**. The study does not addresses MS policies or the implementation of EU measures by MS or issues of modelling the economic effects of specific policies. Given the size and complexity of the subject matter, the study is bound to concentrate on key aspects of EU policies addressing energy-related GHG emissions after 2020.

This study consists of three parts. Part 1 analyses the implementation and progress of EU climate and energy policies, in particular the climate and energy package of 2008. It does so in an effort to draw the **lessons learned**. Lessons learned will be indispensable for designing successful and meaningful climate and energy policy after 2020. Against the backdrop of the 2014 EC proposal on climate and energy policies after 2020, Part 2 discusses options for policies that are able to put the EU on a low carbon pathway in line with the overall objective to reduce GHG emissions by 80-95% in 2050. First, this part will discuss **targets** for GHG emission reduction, renewable energies and energy efficiency and a combination thereof. Second, it will discuss the **instruments** required to achieve these targets. Part 3 of the study draws conclusions and offers **recommendations** on what should be undertaken at EU level.

1 Status quo: Implementation and Progress of the Climate and Energy Package 2008

This chapter explores the implementation of the climate and energy package. It also presents briefly the expected progress up to 2020, on the basis of projections produced by the European Environment Agency in October 2013 (EEA 2013c) and the EC in January 2014 (EC, IA, 2014). Reflecting the architecture of the 2008 climate and energy package, the chapter is divided in three subsections: (1) progress in meeting the 20% GHG reduction target, (2) progress in achieving the 20% renewable energy target and (3) progress in implementing the 20% energy efficiency target. This section focuses on data that should help inform the formulation of climate and energy policies after 2020. The annexes to this report contain additional information on the lessons learned.

1.1 Target: Reducing Greenhouse Gas Emissions

Overall, the EU has already reduced its GHG emissions substantially over the past 25 years. In 2012, total GHG emissions in the **EU-28**[3] **were 18% below 1990 levels, i.e. the EU has almost achieved its 20% reduction target 8 years ahead of time** (EEA 2013c, 94).[4] This figure includes emissions from international aviation, but excludes LULUCF emissions as does the EU 20% reduction target. Without emissions from international aviation the reduction equals around 19%, the lowest emission level since before 1990 (EEA 2013c, 94). Between 2011 and 2012, emissions decreased by 1%; between 2010 and 2011 by 3.1% (EEA 2013c, 5), the third largest annual reduction since 1990. These figures include only GHGs emitted in the EU territory; they do not include 'embedded emissions' caused by EU consumption of imported goods produced in third countries (Eurostat 2011a).

However, without additional effort the EU might not be going much further. Based on information provided by Member States, the EEA has calculated a reduction to 21% in 2020 (including emissions from international aviation) with existing measures (EEA 2013c, 94). Although this is an actual domestic reduction and beyond the 20% target, it implies that in the eight years between 2013-2020 only an additional 2% would be achieved or 0.25% per year, which does not seem to square with recent years. With additional measures as planned by MS the EEA projects that the EU could be at - 24% in 2020 (EEA 2013c, 94). The updated Reference Scenario towards 2050, published by the EC in December 2013, on which the EC bases its 2014 communication, projects that even with current measures GHG emissions in 2020 would be reduced by -24% (European Commission 2013g, 59). **A reduction of –21 to -24% in 2020, however, is still less than what the European Commission's Low Carbon Roadmap considers to be a cost-effective reduction pathway** (which would be -25%)

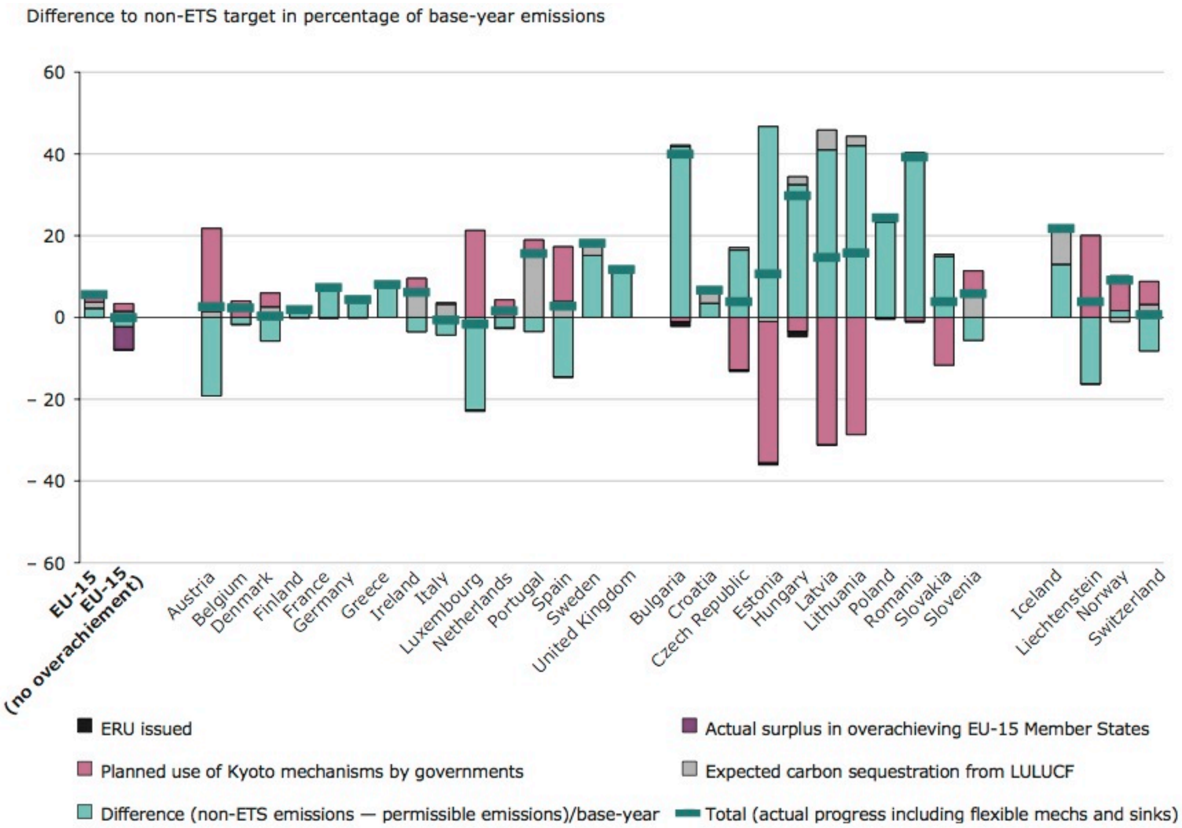
[3] As data is only available for the EU-28 in few cases, most of the figures in this report refer to the EU-27, excluding Croatia (which joined in mid-2013). Unless otherwise indicated, data refers to the EU-27. When figures refer to the EU-28 including Croatia, this is explicitly noted.

[4] At the time of writing, 2012 GHG figures are still subject to change – data for a number of Member States had not been complete for the respective EEA publications.

(see European Commission 2011e). It is also a substantially higher emission level than what other scenarios deem to be a cost-effective pathway towards 2050 (see below).

Emission trends differ considerably between MS, as indicated in the figure below. In 2011, more European countries are considered on track towards their targets than in previous years (EEA 2012b, 7).[5] Below we will look briefly at the performance of the various sectors of the economy, and evaluate the developments emissions covered by the EU Emissions Trading System (ETS) and those outside of it.

Figure 1: Progress in European countries towards their Kyoto targets by the end of 2011



Source: (EEA 2013d, 62)

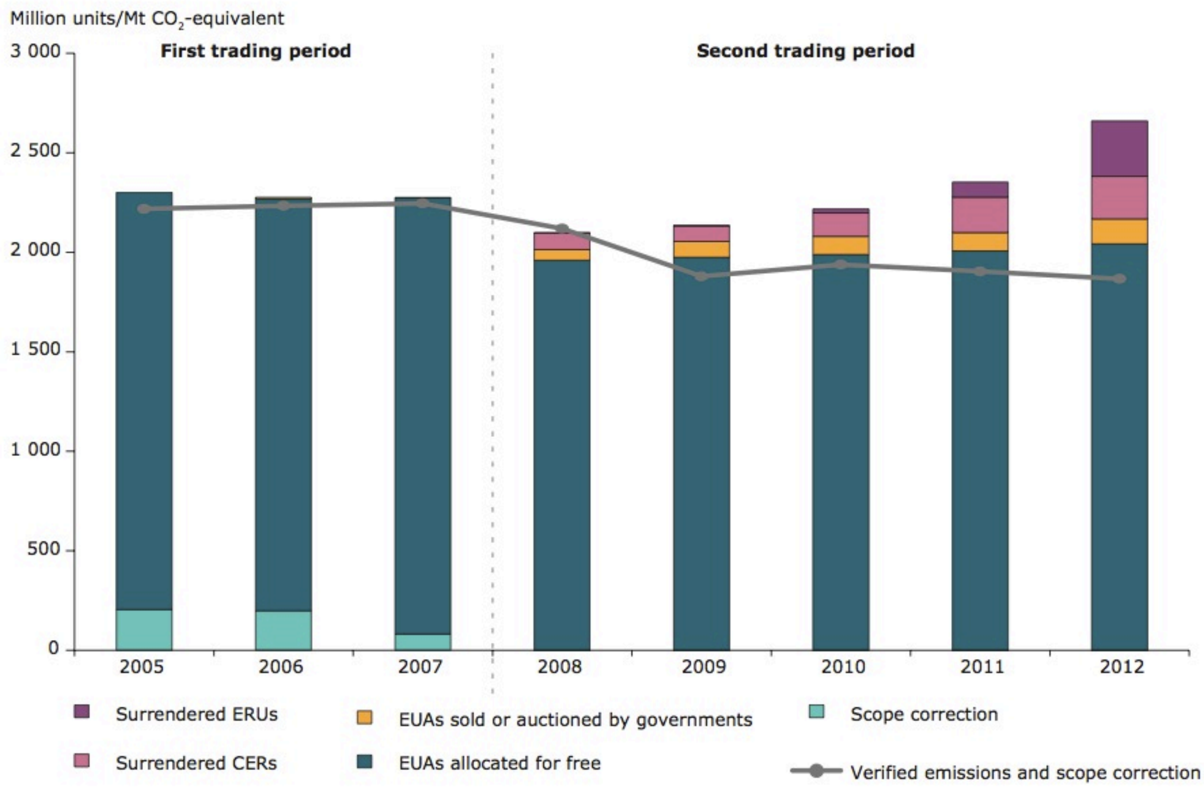
All economic sectors have reduced their emissions since 1990, except transport. While energy supply and use (excluding transport), agriculture, industrial processes and waste have experienced a decline in emissions, transport emissions have increased between 1990 and 2010. In 2012, however, the main emission reductions occurred in the transport sector (EEA 2013c, 94). The largest reductions were achieved in manufacturing industries and construction, industrial processes and the energy sector, while absolute reductions within the other sectors have been small since 1990 (Eurostat 2011b, 226). With around 80% of GHG emissions in 2008, the energy system remains the single largest source of emissions in the EU: the energy sector itself accounts for 31% of all emissions, transport for 22%, industry for

[5] For a country by country analysis of recent progress, see Country Reports on climate and energy target progress published by DG CLIMA and produced by Ecologic Institute and eclareon, available at http://ec.europa.eu/clima/policies/g-gas/progress/studies_en.htm

11% and heating for housing for another 11% (European Commission 2011a). Sectoral trends are essential for understanding the lessons learned from the current policies. Annex A contains more detailed information on emission trends by sector.

The **EU ETS** is a key element in the current EU climate policy mix, as it covers sectors that are important economically and contribute a high share of overall emission. The market system itself is functioning well; price variations show that market actors react to relevant developments. The system is already set up for the long term, it does not end in 2020 (contrary to support for renewables under the Directive on the promotion of the use of energy from renewable sources, or Renewable Energy Directive (RED)). The EU ETS can in principle deliver any cap it is given. Emissions covered by the ETS increased slightly between 2005 and 2007, declined in 2008, and have since stabilised below 2008 levels (EEA 2012b, 41); between 2011 and 2012, emissions covered by the ETS fell by an additional 2% (EEA 2013c, 94), staying well below the cap from 2009 onwards (see Figure 2 below). By 2020, the EC's new reference scenario projects an actual reduction of -24% from 2005, 3 percentage points beyond the cap (EC 2013 2030 trends page 59).

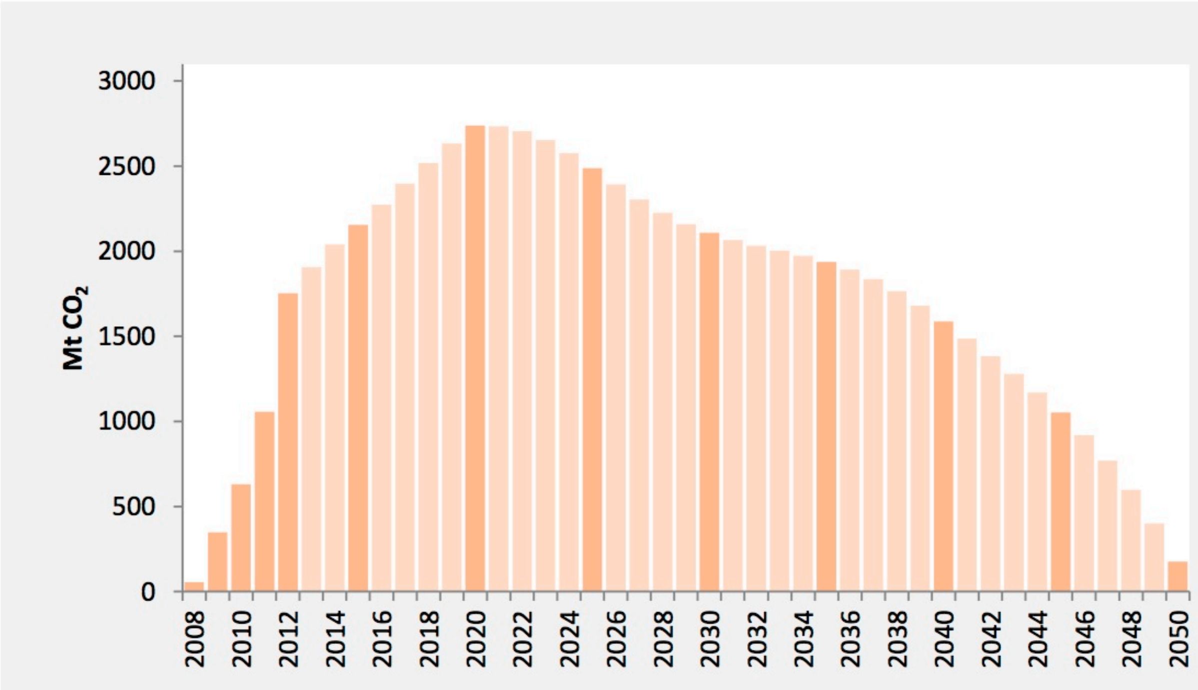
Figure 2 EU ETS supply and demand in phase I and II



Source: (EEA 2013d, 38)

The lower than anticipated emissions have led to the steady build-up of a significant surplus of EUAs, around 1.75 billion allowances at the start of phase 3 in 2013 (EEA 2013c, 39). Even excluding the part of the surplus arising from the use of international credits for compliance, the surplus would still have been 705 m allowances. The EC's 2013 Reference Scenario projects that **the surplus could stay in place until 2050, peaking in 2020 and remaining at 2 billion allowances in 2030** if the cap trajectory remains unchanged (see also Figure 3 below). This would likely keep the price signal insignificant for the near- and mid-term. As a result, the ETS reduction incentive could be nullified for close to half the time between now and 2050, rendering the instrument ineffective. Some analysts suggest that the oversupply is in fact such, that it is essentially allowing the **"re-emission" of reductions** made through other policies, such as renewables support and efficiency improvements (Morris 2013).

Figure 3 EC projection of EUA surplus under reference scenario to 2050

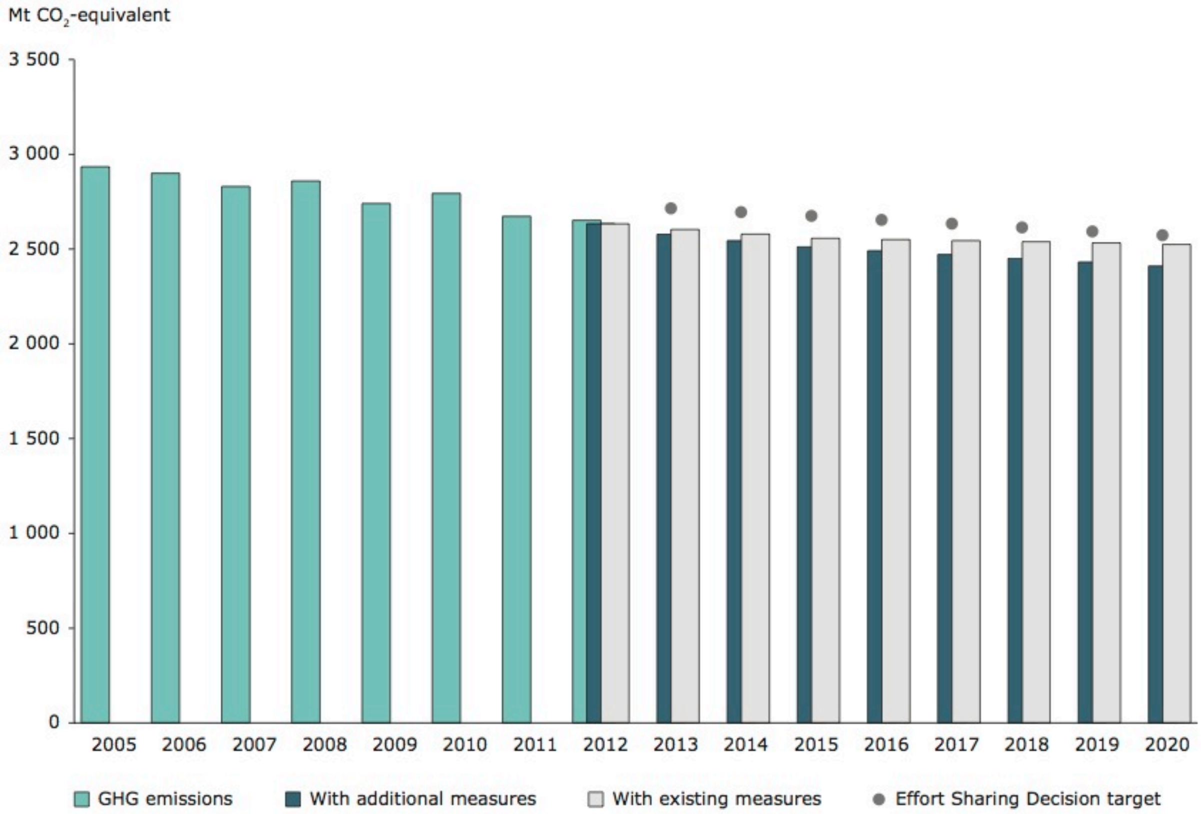


Source: (European Commission 2013g, 33)

Overachievement is also likely in the sectors not covered by the ETS. In 2012, aggregated **non-ETS emissions** were at 2629.3 $MtCO_{2\text{-eqv}}$ or 10% below 2005 emission levels (EEA 2013b, 105) meaning that **the EU has already achieved the 2020 Non-ETS reduction target of 10%, eight years early**. In projections for 2020, emissions under the ESD are currently expected to be even 1-2 percentage points lower with existing measures and even 6 percentage points lower with additional measures (EEA 2013c, 110).

Emission trends also reveal considerable differences between Member States: as per the latest projections compiled by the EEA (published in October 2013), the majority of MS would meet their respective 2020 targets with existing measures and without the use of flexible mechanisms; 7 MS could meet their targets for 2020 with the implementation of additional measures being planned; a further six countries would meet their target only through measures beyond what is planned so far or through the purchase of international credits (EEA 2013c, 93). Annex A provides an overview of GHG trends and projections for ETS and non-ETS emissions up to 2030.

Figure 4 Projected Non-ETS emissions towards 2020 and annual allocation



Source: (EEA 2013d, 106)

Importantly, these projections deviate substantially from the previous expectations: In 2011, the EEA expected 13 MS to meet their 2020 target with existing measures; only eight were believed to be required to implement planned measures or to buy offsets (EEA 2012b). In 2010, the Commission expected that the non-ETS target would not be achieved. With measures in place mid-2009, PRIMES/GAINS analysis suggests for the EU-27 a 'policy gap' equivalent to 5.8% of the 2005 emissions (AEA et al. 2012). These are **significant changes** that occurred **over the course of only two years.**

1.2 Evaluation of EU policies: contributions of instruments and other factors

Many factors have contributed to these reductions. EU climate and energy policies have helped reduce emissions. The EU27 economy has become more energy- and carbon-efficient because of the increasing importance of the services sector.[6] Reductions are partly due to larger imports of consumer goods, which have led to decreased production of these goods (and corresponding emissions) within the EU but contributed to the rise of emissions in third countries (Eurostat 2011a). The economic crisis in 2009 had a pronounced impact on emission trends, when emissions fell by more than 7% in one single year (EEA 2012b).

[6] With the notable exception of transport, the gross value added (GVA) services sectors are higher than their emissions: in 2006 their combined GVA was nearly 42% of the EU total, while their CO2 emissions accounted for a mere 4.6% (Eurostat 2011a)

Temperature and energy prices also influence emission trends. For example, the 3.1% drop of emissions between 2010 and 2011 is in large part the result of warm winter temperatures in Northern and Western Europe (EEA 2012b); the colder winter in 2012 increased emissions from the residential and services sectors (EEA 2013c, 94).

This wide range of factors makes it difficult to attribute exact quantified reductions to individual factors. However, rough quantified or qualitative estimates of reduction **contributions by EU climate and energy policies** are possible and available.

- **Climate and energy policies and instruments:** There is no detailed and quantified breakdown of reduction contributions per individual instruments for the period 2008 – 2012. There are, however, estimates of potential contributions by new and pending instruments as well as instruments that are set to be reformed or re-evaluated at the EU level for the period up to 2020. According to 2012 estimates by the EC, new and pending instruments would reduce emissions in the EU by an additional 8% compared to 1990 levels, scaling up the EU reduction to about 27% in 2020 (Trio 2012; based on European Commission 2012d). However, these estimates should be treated with care because there are considerable risks of double counting, especially between ETS and Non-ETS sectors. In addition, quantifications of the effects of individual policies and measures generally use a variety of bottom-up methods or sectoral models, which makes aggregation of effects even more challenging (EEA 2013c, 98).
- Reductions between 2004 and 2009 correlate with an expansion of **renewable energies resulting from introduction of national support schemes, triggered by EU RES support**. Until the financial crisis began in 2008, there was a very similar development in GHG emission reductions, the share of renewables in energy production, and the emissions intensity of energy production. More specifically, the EEA estimates that existing renewable policies in EU-28 Member States would reduce 119 Mt CO2-equivalent in 2020, over half of which is explicitly from biofuel-policies (EEA 2013c, 99). Measures supporting wind power are expected to cut emissions by nearly 18 Mt across the EU-28 by 2020, whilst policies on solar and hydro power are expected to deliver savings just over 5 Mt by 2020 (EEA 2013c, 99).
- **Emission trading:** attributing reductions to individual instruments is not straight-forward, but it has been attempted for the EU ETS. Studies have found that abatement in Phase I falls in the range of 2-4% of emissions in the regulated sectors, which is more than is attributable to any other single instrument. Studies agree that abatement in the first years of Phase II has fallen within the same range, although reliable data is not yet available for the period after 2011 when allowance prices drastically fell (Laing et al. 2013). There is strong evidence that the EU ETS has led to emissions reductions in the power sector, but evidence of the impact of the ETS in other individual sectors remains inconclusive since results in most studies are aggregated (Martin, Muuls, and Wagner 2012).
- **Non-ETS sectors:** 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 policies and measures 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 sectors. Planned additional measures will mainly deliver reductions in the residential and services sectors and in the transport sector (EEA 2013c).

- **Emission reductions in agriculture and waste** were partly driven by regulation, such as the implementation of the Landfill Directive or Nitrates Directive. Despite the increase in waste generation improved waste treatment resulted in the largest proportional emission cut among all sectors. The Nitrates Directive added to reductions achieved through the reform of the Common Agriculture Policy (cross-compliance), and decreased numbers of livestock.
- **Transport emissions** had been growing significantly between 1990 and 2007 due to an increase in passenger and freight transport volume. Fuel efficiency gains and the partial shift to biofuels were overcompensated by increased demand for transport (Eurostat 2011a). Since 2007, however, EU transport emissions show a downward trend, but remain nonetheless at 19% above 1990 levels in 2011. Even though EU mitigation policies might have played a (minor) role, the recent positive trend is in large parts a result of the stagnant economy, which has lowered transport volumes. In addition, high fuel prices might have also contributed to lowering demand.

Although emissions have gone down significantly in most sectors, **none of these sectoral trends are in line with the long-term target for 2050**. To meet the long-term target, emission reduction efforts have to be scaled up in all sectors.

1.3 Target: Expanding renewable energy

The 1997 White Paper set a first target for doubling the share of gross inland energy consumption provided from renewable sources from 6% in 1996 to 12% in 2010 (European Commission 1997). The **2009 Renewable Energy Directive**[7] **(RED)** updated this target: the EU committed itself to increase the share of renewable energies in gross final energy consumption[8] to 20% by 2020 (European Parliament and European Commission 2009). According to the directive, all MS have to achieve a binding target of 10% renewable energy in final energy consumption in transport as well as individual targets for the total share of renewable in final energy consumption. The differentiated MS targets reflect differences in starting points, resource bases and capacity to invest. All MS developed national renewable energy action plans (NREAPs) in 2010 detailing how they were planning to achieve their target, including trajectories per sector and technology. Based on this planned development they have to report on their progress to the Commission every two years.

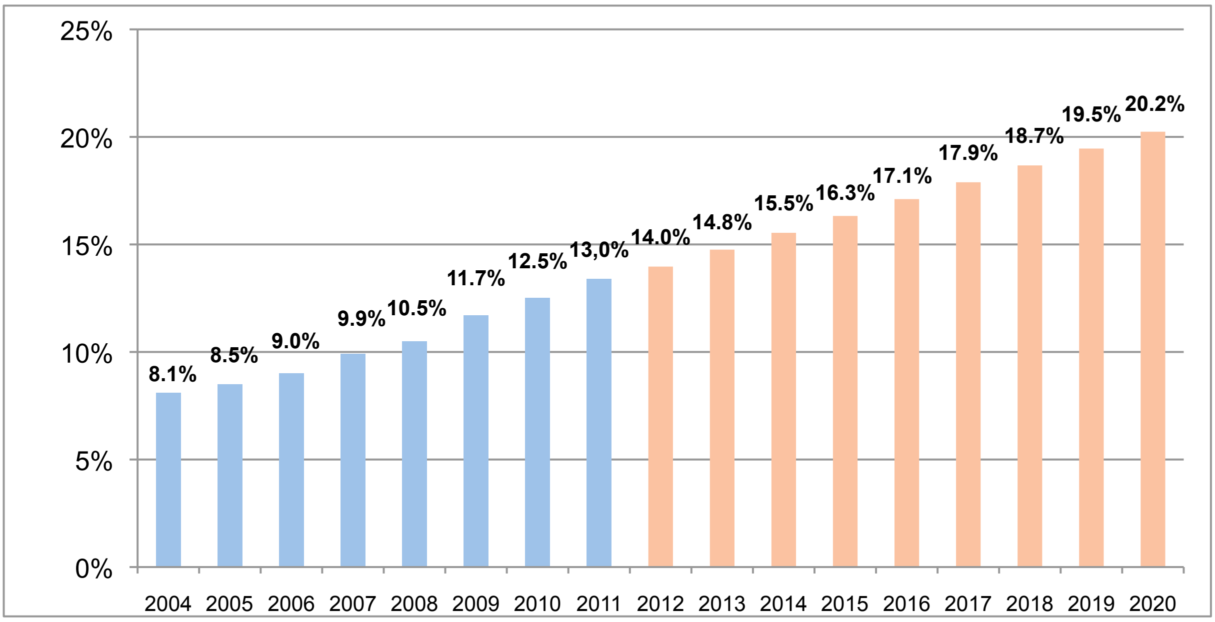
While the EU did not achieve the 2010 target – with renewables only providing 9.8% of inland energy consumption in 2010 (Eurostat 2013a) – initial progress on the 2020 target is more

[7] Directive 2009/28/EC on the promotion of the use of energy from renewable sources.

[8] The change in metric from gross inland energy consumption to gross final energy consumption reflects the fact that renewables have low to no transmission losses (which are not included in final energy consumption). For a given level of renewable energy production, the share is thus higher when expressed as a fraction of final energy consumption than relative to inland energy consumption.

promising. With a share of 13% in 2011, the EU has overachieved its interim 2011/2012 target of 10.7% (EEA 2013c). Moreover, a simple extrapolation of the annual average growth rate of 8.9% between 2004 and 2011 up to 2020 indicates that the target could be slightly overachieved if the current trend continues (see Figure 5).

Figure 5: Progress towards 2020 renewable energy target



Source: Eurostat 2013d (2004 to 2011), post-2011 projection by Ecologic Institute linear extrapolation based on historical trend 2004-2011

Nonetheless, continued progress should not be seen as a given. In its recent Renewable Energy Progress Report (European Commission 2013b), the Commission warns that further efforts will be needed to ensure that investments in renewable energy projects remain at the necessary level for reaching the target. One reason is that the Renewable Energy Directive's indicative trajectory of renewables expansion becomes increasingly steeper towards 2020. The average growth rate of renewable energy needs to be 4.7% per year between 2011 and 2020. This is lower than the average increase during the 2000s, but given that expansion started from a low level, absolute growth to be achieved is more than double the absolute growth achieved between 2005 and 2011 (EEA 2013c, 118).

Moreover, fundamental changes to the support schemes in some MS in the last two years have raised the regulatory risk for investors, adding to an already difficult financing environment due to the ongoing economic crisis.[9] Also, the Commission concludes that the removal of administrative barriers with respect to planning and licensing is not progressing fast enough. Taking these factors into account, the Commission's modelling of future investments indicates that **the 2020 RES target will be missed unless MS implement additional measures**, a finding supported by the EEA (EEA 2013c) and EurObserv'ER Report (EurObserv'er 2012). Annex Annex C: Renewable Energy trends by sector and

[9] For further information see the individual country reports of the Assessment of Climate Change Policies in the Context of the European Semester, compiled by Ecologic Institute for the European Commission and available for download at http://www.ecologic.eu/de/9924

Member States contains more detailed information on performance by MS and trends of specific sources of renewable energies.

Comparing expected results for 2012 based on existing policy measures against planned trajectories, the Commission finds that the heating and cooling sector has performed best to date (14% above trajectory), while both the transport sector (7.8% below trajectory) and the electricity sector (2.8% below) are not likely to achieve planned renewable energy production levels (European Commission 2013c, 6–7). Based on current information, this trend is likely to worsen going forward to 2020 when all three sectors are expected to miss their projected renewable production levels by 20 to 26%.

MS performance on promoting renewables varies. Fourteen countries have reached or exceeded the 2010 targets they set themselves in the NREAPs and the Directive's 2011/2012 interim target. Seven Member States have met their indicative interim target, but not their NREAP target, while the renewable energy share of the remaining six countries is below the 2011/2012 target (EEA 2013c, 113). Annex D contains more detailed information.

1.4 Evaluation of Instruments: Renewable Energy Directive

The Renewable Energy Directive sets a framework for renewable energy promotion by providing:

- Mandatory targets;
- Detailed planning and regular monitoring requirements for MS;
- A common framework for sustainability certification of biofuels;
- Rules on simplification of administrative procedures to be implemented by MS.

Within this framework MS have leeway to develop country-specific support schemes, promoting types of renewable technologies appropriate with respect to national resources and existing infrastructures. Table 1: Instruments used for promoting renewable energy in electricity and heating and cooling sectors in EU-27 in order of popularity

Instrument	Number of MS employing it in the electricity sector	Number of MS employing it in the heating & cooling sector
Grants	17	20
Feed-in tariffs	18	4
Tax incentives	13	13
Obligation to use renewable energy in buildings	-	15
Soft Loans	8	8
Premium on market prices	10	-
Tenders	3	-
Quota systems	6	1 (CHP only)
Net metering	6	-

Source: Renewable energy policy database and support 2012

Table 1 shows the most **commonly applied instruments in the electricity and heating sectors by order of popularity**. Grants, feed-in tariffs and tax exemptions have been applied in the majority of MS, even though the common labels hide a wide variety in approaches with respect to the level of support and technologies included.

Judging from progress to date, **the Renewable Energy Directive has proven effective in kick-starting renewable energy development in most MS**. By creating the world's biggest market for modern renewable energy technologies, it has contributed to driving down technology costs for wind, solar and biomass technologies and heat pumps. Mandatory targets and effective support schemes that give long-term investment security to investors have been crucial for pulling niche technologies onto the mass market. Upholding installation rates on the target path to 2020 will be more challenging given the difficult economic environment. Budget-independent financial incentives such as feed-in tariffs or earmarked funds from emission trading proceeds have proven to be appropriate solutions to secure financial incentives in times of austerity. However, as funding volumes increase, these approaches also meet increasing opposition.

One area where the effectiveness of the Renewable Energy Directive needs to be critically reflected is the **transport sector**. Despite the mandatory sustainability criteria implemented by the Directive, concerns over the sustainability and also the actual GHG emission reductions achieved by first generation biofuels remain and have recently resulted in a Commission proposal to adapt the 10% target for 2020 (European Parliament and European Council 2012).

Many actors, particularly from the business sector, criticise the Renewable Energy Directive for a lack of **efficiency,** pointing to high abatement costs per tonne of GHG emission reduction compared to other climate mitigation measures (Marcu 2013). However, a purely static analysis underestimates the need for developing cost-effective technologies for achieving ambitious emissions reductions in the long-term. In addition to the market failure of not internalising social costs of carbon, which can be addressed by carbon pricing in an emissions trading scheme, new technologies also face market failures in the field of innovation. Positive externalities of innovation can often not be fully captured by those who innovate (despite the existence of patents), thus leading to sub-optimal levels of innovation under market conditions (Görlach 2013). The Renewable Energy Directive addresses this second market failure. With new technologies reaching maturity, this argument will lose in importance and adaptations of the system to ensure full competiveness of renewable will become the central challenge.

Another criticism with respect to efficiency points to the diverse support schemes at the national level, calling for **harmonisation** across Member States as a means of simplifying rules and reducing cost. There clearly is room for improvement through best practice exchange between MS and more detailed guidance from the Commission on how best to design effective and efficient support schemes. However, diversity has also proven to be an advantage as it has allowed for trial and error and adaptation of support schemes to national circumstances (see section 2.2.7 for more detail).

1.5 Target: Increasing Energy Efficiency

The EU aims to improve **energy efficiency by 20% by 2020**. According to the 2012 Energy Efficiency Directive (EED), the target is measured as a 20% saving compared to a hypothetical projection for EU primary energy consumption. Starting with 2005 as the base year, this business-as-usual projection carried out in 2007 expected a primary energy consumption of 1,842 Mtoe in 2020. It assumed continuous economic growth and no additional energy efficiency policies above and beyond those in place in 2005. The envisaged 20% saving amounts to an absolute saving of 368 Mtoe, resulting in a target value of no more than 1,474 Mtoe of primary energy consumption for 2020. Compared to the level of primary energy consumption in 2005, this is equivalent to a reduction of 13.5%.

It is important to note that economic growth in the EU since 2008 has been much lower than the projections underlying the energy efficiency target assumed. Given that growth is a key driver of energy consumption, the savings expressed in relation to the virtual projection need to be treated with caution. They do not necessarily mean that EU products and services are produced with less energy input per unit and are thus more energy-efficient, but relative savings can also result from lower production levels.

Projections made in 2009 and 2010 indicated that with the implementation of the existing energy efficiency policies in MS only half of the envisaged savings might be achieved by 2020. More recent data suggest that the EU is closer to meeting the 20% target, which is primarily due to Europe's economic crisis. To achieve its 2020 target, the EU needs to reduce its primary energy consumption by an additional 6.9% in the nine years between 2011 and 2020. The new 2013 reference scenario model results published by the Commission including partial implementation of the 2012 EED show that **Europe's energy consumption could be about 17% lower in 2020** than the 2007 baseline (European Commission 2013g, 30). The EEA estimates that implementation of the EED will lead to a 15% reduction in primary energy consumption; an additional 2% could come from the transport sector (EEA 2013c, 124). The Commission will report on progress towards the 20% target by June 2014.

Between 1990 and 2011, **economic sectors developed differently with respect to final energy consumption**. The agriculture and forestry sector as well as industry have reduced final energy consumption by 27.7% and 21.7% respectively. By contrast, energy consumption in the services and transport sectors has gone up by about a third over the same time period. The residential sector's consumption has remained more or less stable (Eurostat 2013a). Importantly, gains in energy efficiency do not automatically lead to emission reductions: About 25% of energy efficiency progress for space heating, for example, has been offset by buildings becoming larger and a wider diffusion of central heating. Although appliance efficiency has improved since 1990, an increase in equipment ownership has offset these gains (Lapillonne, Pollier, and Sebi 2013, v).

There are also **considerable differences between MS**. Only four Member States (Bulgaria, Denmark, France and Germany) are making "good progress" in reducing energy consumption and primary energy intensity. Current policies in most MS, however, are not sufficiently developed and / or implemented (EEA 2013c, 124).

1.6 Evaluation of instruments

EU energy efficiency policies are characterised by sector specific approaches and a great number of different instruments, ranging from taxation measures, standards to information tools. MS have considerable discretion in choosing their approaches to energy efficiency. EU **energy efficiency policy is defined by a diverse and somewhat fragmented policy**

framework and the absence of a binding target. The main instruments in this policy area are the following:

- **Product Standards:** The Ecodesign Directive (2009/125/EC) defines minimum performance standards for energy using products such as televisions, domestic cold appliances, and domestic washing machines. Ex-ante impact assessments estimated that the first 12 Ecodesign Regulations would lead to savings of 385 TWh per year by 2020, which is equivalent to 14% of EU households' electricity consumption in 2009. There is no data on the progress to date (European Commission 2012a).
- **Energy Performance Standards for Buildings (EPBD):** In its impact assessment, the EU-Commission quantifies the minimum total impact of the EPBD 60 – 80 Mtoe/year energy savings by 2020, resulting in a reduction of 5-6% of the EU final energy consumption in 2020 and a 160 to 210 Mt/year CO_2 savings by 2020. Additionally it claims that the target can be reached with low or even negative CO_2 abatement costs (European Commission 2008). According to the EEA, the building sector received particular attention in recent years, largely driven by the implementation of the EPBD (EEA 2013c, 124).
- **Efficiency Standards for Cars:** The Fuel Quality Directive specifies that the GHG intensity of energy supplied for road transport be reduced by 10% by 2020 (Low Carbon Fuel Standard) (Article 7a). A separate regulation requires automobile manufacturers to reduce fleet emissions of new cars to 130 g CO_2/km by 2015 and 95 g CO_2/km by 2020, from 135 g in 2011 (European Parliament and European Council 2009). For vans, the binding target is 175 g CO_2/km by 2017 and 147g by 2020. This compares with an average of 203 g in 2007 and 181 g in 2010. The main instrument to increase efficiency in air travel would be the ETS.
- **Energy Taxation Directive (2003/96/EC):** The Energy Taxation Directive (2003/96/EC) establishes minimum tax rates for energy products, including mineral oils, coal, natural gas, and electricity; thereby providing incentives for improving energy efficiency. The effects of the Energy Taxation Directive on energy consumption cannot be isolated but experiences from some MS, such as Denmark or Germany, prove that energy taxes are effective instruments in reducing the energy consumption.
- **EED:** As the EED was adopted only in late 2012, no evaluation of its impact is possible at this point in time. However, analysis of existing National Energy Efficiency Action Plans required by its predecessor, the Directive on energy end-use efficiency and energy services (2006/32/EC), has shown that national implementation of energy efficiency policy lacks the necessary harmonisation and coherence. National implementation is presently fragmented, lacks a coherent design, and does not adequately harmonise policy between sectors and states (Schüle et al. 2013). It remains to be seen if the EED can help overcome these shortcomings.

2 EU Climate and Energy Policies after 2020 – Targets and Instruments

This part discusses the content and scope of EU climate and energy policies after 2020. There are many possibilities for how to design these policies. It is conceivable to envisage a policy mix similar to the current set of instruments; it is also possible to imagine a radical overhaul which would abandon key elements of the current policies, such as the division between the traded and non-traded sectors or a system that would not build on GHG reduction targets. Reflecting the political discussions in the EU, in particular the comprehensive EC proposal of January 2014, this chapter discusses future EU climate and energy policies along the lines of the current system and political discussions: specific **targets** and **instruments** designed to implement them.

2.1 Targets

A key point of controversy in the political debate on post-2020 climate policy is whether the EU should maintain the current architecture of three targets, or adopt a new one. This debate is still in flux. In essence, the debate is taking place along these questions:

- **How many targets** and **for what objective:** Should there be a single GHG reductions targets only or should there also be targets for renewable energy and / or energy efficiency? Should there be more specifically targeted sectoral renewables targets, technology targets, or even completely different additional targets on competitiveness and energy security?
- **Level of ambition:** What is an adequate level of commitment for any possible target? What are the parameters that should inform the setting of targets?
- **Legal status of targets:** Should targets be enshrined in legislation and be legally binding or merely indicative? Should they be broken down to the national level or not?
- **Conditionality:** Should targets be conditional on action outside of Europe or to the conclusion of an international agreement, or should the EU decide independently?

2.1.1 How many targets: one, two, three or more?

The number of targets to be pursued for 2030, as a quantitative expression of the general policy objectives, is a central issue of contention in the current debate.

Minimum consensus: There seems to be a general consensus that the EU should adopt a GHG emissions target for 2030 and beyond (regardless if and what other targets there might be). The need to having a climate target as such is not being challenged openly. It is also widely agreed that the ETS should continue, which implies that it also will have a quantitative target in the form of a cap.

Nature of the GHG target: What that target's nature should be is not agreed that widely. Out of 14 MS that participated in the Green Paper consultation in 2013, four MS (Denmark, France, UK and Spain) called for a legally binding GHG reduction target; Cyprus and

Lithuania favour indicative targets, the remaining MS did not specify their preference.[10] In a letter sent in January 2014, prior to the release of the Commission's package, energy and environment ministers from Germany, France, the UK and Italy also called for a target of at least 40%, though the letter did not mention whether it should be legally binding (Hendricks et al. 2014) In March, however, a much larger set of 13 Member States (the above four plus Belgium, Denmark, Estonia, Finland, the Netherlands, Portugal, Slovenia, Spain, Sweden) issued a statement as the "Green Growth Group", stating very clearly their demand for a "binding domestic greenhouse gas target of at least 40%". [11]

Timing? There is also debate over when the EU should set a new climate target, a question that is often linked with progress in the on-going UN negotiations. The EU had, in fact, asked in the international negotiations that all parties bring forward their specific commitments in 2014.[12] The 2013 COP in Warsaw did not decide a specific timeline, but opted instead to invite all Parties to prepare their national contributions for a new agreement, communicating them by the first quarter of 2015, if they were "ready to do so" (UNFCCC 2013). The European Parliament has nevertheless called for new EU targets to be adopted before the summit hosted by the UN Secretary General in September 2014 (European Parliament 2014a).

How many targets? Regardless of the nature and timing of a new GHG reduction target, fundamental disagreement exists at present on whether it should be complemented by specific targets for renewable energies and/or energy efficiency. The UK advocates a single GHG target of -40% (domestic) in 2030 (-50% in case an international agreement is reached). Poland also supports having only a GHG reduction target, but is making it dependent on a number of conditions. Several Member States have reaffirmed in 2014 that they would want to see the inclusion of a renewables target; they cite the instrumentality of the binding renewables target for 2020 (Mitterlehner et al. 2013). Other MS have indicated a preference for a decision on efficiency and renewable targets at a later stage (European Commission 2013d). The decision adopted by the European Parliament on February 5th calls for three binding targets – (40% GHG reduction, 40% efficiency increase, and 30% renewables – to be implemented by means of individual national targets (European Parliament 2014a).

The EC aimed to find some common ground between the various positions in its communication of January 2014. Its proposal features a 40% (domestic) reduction target for greenhouse gases (European Commission 2014a) and combines this with a renewable energy target of at least 27% that would be binding at the EU level, but which would not be broken down into individual binding MS targets. Regarding energy efficiency, the EC has

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[10] For submissions of Member States refer to: http://ec.europa.eu/energy/consultations/20130702_green_paper_2030_en.htm

[11] Gemeinsame Stellungnahme der Green Growth Group zu den EU Energie- und Klimazielen (März 2014) http://www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Europa___International/green_growth_group_erklaerung_en_bf.pdf

[12] The Environment Council's Conclusions of October 2013 stated that the Council "CALLS on the Warsaw Conference to agree a process for all Parties to formulate ambitious mitigation commitments for the 2015 agreement, including: a timetable to prepare their proposed commitments in 2014; the provision of the necessary up front information in order to ensure proposed commitments are transparent, quantifiable, verifiable, comparable and ambitious; as well as a process to assess proposed commitments before the conclusion of the 2015 agreement so as to ensure that the collective level of ambition is informed by science and consistent with the below 2°C objective." (Council of the European Union 2013a)

opted to not add a specific recommendation, pointing to the upcoming review of the Energy Efficiency Directive, which is scheduled to be published mid-2014.

In the midst of the various perspectives and possible combinations, it important to consider what the merits of the respective propositions are.

Advocates of a single reduction target have brought forward a number of arguments, in particular:

- **GHG reductions are what matters:** Climate change mitigation is the overriding concern – which means that GHG emissions have to be brought to a level that gives sufficient certainty of avoiding dangerous impacts. For the EU, this means bringing emissions to minus 80 – 95% by 2050 – as agreed by EU Heads of State and Government. There are many technological options to decarbonise an economy. As long as the reductions are sufficient, it is irrelevant which technologies are applied. Singling out individual ones is not necessary – and can be more costly than a technology neutral approach. MS should be free to choose how to achieve required reductions, chiefly because they understand best how to reduce emissions cost-effectively at home. There should be a level playing field for all low carbon technologies; none should get a competitive advantage through specific target.
- **Inconsistencies between existing targets:** There is a discrepancy between the current 20-20-20 targets. The combined impact of the 20% renewable energy share and the 20% energy efficiency target for 2020 leads to an emission reduction of 25 to 30% below 1990 levels, substantially more than the 20% reduction target (Höhne 2013). Given existing uncertainties, it is very likely that these inconsistencies will remain and that the targets will not add up.
- **Expensive and inefficient:** These inconsistencies are bound to lead (and have led) to inefficiency and – ultimately – higher costs for achieving the climate protection objective. In contrast, one target is inherently consistent and cannot be in conflict with other targets.

Even though a single target might on that basis appear to be the most efficient way to decarbonise the economy, there are a number of **arguments in favour of separate targets** for renewable energy and energy efficiency:

- **The renewable energy target has effectively addressed the multiple barriers facing renewables:** The current target has been the key force in encouraging investment in renewable energies (Donald 2013). It has forced MS to develop support instruments and to address the barriers facing renewables. While carbon pricing only (and often insufficiently) addresses financial barriers to renewables deployment, the policies underlying the renewable energy target have also addressed administrative barriers and market failures linked to innovation. Moreover, the target has provided investment security. The target has clarified that the EU is committed to increasing the share of renewable energies, and not other low carbon sources of energy. As a result, prices of renewable energy technologies have come down much more than anticipated. If the EU decides on emissions cuts without setting targets for renewable technologies, gas and nuclear power are more likely to play an important role in the future energy mix. Abandoning renewable energy and energy efficiency targets would be a strong signal of divestment in these areas.

- **More cost effective in the long term:** Most scenarios, if not all, suggest that required GHG reductions are only possible with drastically improved energy efficiency and much larger shares of renewable energies in the power mix. For this reason, setting an interim target for GHG reduction only and implementing policies to achieve this target against the lowest costs may lead to higher costs in the long term (Koelemeijer et al. 2013). Separate targets would provide guidance and certainty for investors and in turn reduce costs due to reduced perceived investment risks.
- **Renewable energy development and efficiency are justified on their own**: Renewable energies and energy saving not only serve the purpose of reducing GHG emissions. Both targets support additional, similarly important policy goals: they lower energy imports and bills; they enhance security of energy supply; they help create jobs; they promote innovation, and they are critical to improve air quality and health – to name a few but important goals. As targets have been an effective driver, they should be maintained.
- **Targets are mutually supportive:** As such, the three targets are mutually supportive. Renewable energy and energy saving targets are essential to reducing GHG emissions; energy savings are crucial to meeting renewable energy targets which are relative to the energy consumption.[13]

In combination, these arguments make a **strong case for maintaining three separate targets**. They make a compelling case, considering that decarbonising the EU's economy is an extremely complex undertaking, which will require many adjustments and political choices over time. Given different views on nuclear energy and CCS, for example, it becomes clear that the EU's decarbonisation strategy must rest on the expansion of renewable energies and energy savings. Decarbonisation is bound to fail without drastic improvements in energy efficiency and expansion of renewable energies, which will require the effective underpinning through credible targets. In addition, multiple targets are a hedging strategy against political failure.

2.1.2 Legal obligation or just a political commitment?

There is a **qualitative difference between legally binding obligations and political commitments**. Legally binding obligations commit countries regardless of their political ambitions and preferences – a change in government, for example, does not allow a country to disregard a legal obligation. Ignoring a legal obligation entails a breach of law and can lead to international accountability under international law, for instance. A court of law, if mandated, can adjudicate. In contrast, a breach of a political commitment does not lead to international responsibility and no court of law is entitled to rule on such a violation. Despite this difference, political commitments can generally have a high normative value, occasionally higher than a legal obligation.

[13] No such interlinkages exist, however, between the target on GHG reduction and renewable energy on the one hand and energy efficiency on the other: The Commission estimates, for example, that meeting the targets on renewable energy and GHG emissions would not have a significant effect on progress towards the achievement of the savings objective – savings would increase only by an additional 0.8 percentage points or 14 Mtoe compared to baseline with efficiency policies (European Commission 2011d, 14).

The EU climate and energy package is a good illustration of these differences and how they affect impacts on the ground. It is widely agreed that having a **legally binding renewables targets at the EU level for all MS has drastically strengthened national action**: Between 1995 and 2000, when there was no regulatory framework in place, the share of renewable energy in the EU grew by only 1.9% per year, while the growth rate increased to 4.5% between 2001 and 2010 when the indicative and voluntary targets was adopted. With legally binding national targets (from 2009 onwards), the growth accelerated further (Vos, Winkel, and Klessmann 2013). The EC has modelled that a binding target for energy efficiency would lead to reductions of 142 Mt of GHG emissions (by 2020), in contrast to 113 Mt in case of an indicative target (European Commission 2011d, 29). This shows that legally binding targets tend to have a stronger effect than political commitments, although indicative targets can provide momentum to political discussion and can facilitate agreement on stronger targets at a later stage (European Commission 2014b). In light of this experience and efficiency's essential importance for decarbonisation of the economy, **targets on energy efficiency should be equally legally binding**.

Without the legally binding nature of the target, it would have remained at the discretion of MS able to meet their renewable energy ambitions. In the absence of binding national targets, MS may become less ambitious; expansion of renewable energies may only be driven by a small number of MS and sectors, as in the past. An EU target helps drive expansion in all MS and all sectors. In addition, an EU-wide target provides more opportunities for balancing national renewables targets and policy instruments (Vos, Winkel, and Klessmann 2013). Binding EU targets also help align the ETS with the renewable energy and energy efficiency policies: targets, in particular legally binding targets, support calculating the ETS caps in way that explicitly takes into account projected reductions from renewable energy and gains in energy savings.

For these reasons, **legally binding targets should frame climate and energy policies after 2020**. Naturally, legally binding targets are likely to meet stronger opposition, in particular from certain MS, but should be pursued as an important element of a future climate and energy policy.

The January 2014 EC proposal contains a legally binding GHG reduction target (to be broken down for ETS and non-ETS sectors, the latter with national targets) and a so-called "headline target" for renewable energies, which should be binding at EU level, but not prescribe national targets top-down. The EC has, however, indicated that it might propose MS targets if the proposed system is insufficient to meet the overall EU target of 27%. The up-coming review of the EED is meant to evaluate specifically whether the existing setup with non-binding targets is effective - and this could result in principle in a proposal for a legally binding target for energy saving.

2.1.3 Level of ambition

Beyond the architectural issues concerning the number and formats of targets to be pursued for 2030, a decisive factor and naturally a main point of controversy is the level of ambition for any of the possible respective targets, meaning the quantification of the objective to be reached.

The EU has committed to the goal of keeping global warming below 2°C, both inside the UN negotiations as well as independent of UN decisions. For a realistic chance of staying within the 2°C limit, global emissions have to be halved by 2050. This requires developed countries to reduce their emissions even more, based on their historical responsibility for the problem. The EU has set for itself the objective to reduce emissions by 80-95% by 2050 (European Council 2009), a target which was taken from the IPCC's Fourth Assessment Report (published in 2007). According to the IPCC, reductions in the range of 80-95% constitute the share that reflects historic responsibilities, capacities and projected shares of total global emissions of the EU and the other Annex I countries (IPCC 2007). While there is agreement that early reductions are generally cheaper than later and steeper reductions, there is a political debate on the level of ambition for intermediate reductions.

In its low carbon economy roadmap, the EC suggested interim targets (or milestones) for 2020, 2030 and 2040 on the EU's path to the 2050 target; accordingly, the EU should reduce its domestic GHG emissions by 25% (2020), 40% (in 2030) and 60% in (2040). In 2050, these reductions should amount to at least minus 80% (domestic). These milestones correspond to annual reductions of 1% up to 2020, 1.5% up to 2030 and 2% for the following two decades (European Commission 2011e). In line with the analysis published in the roadmap in 2011, the **EC proposed a 2030 target of minus 40% (domestic) in early January 2014**.

Table 2: Positions of selected stakeholder towards 2030 energy targets

Name of stakeholder	Number of targets	GHGs	Renewable energy	Energy efficiency	Reference
European Commission	2 (to 3)	40% (domestic)	27% (Overall EU target, no MS targets)	no indication (subject to EED review)	(European Commission 2014a)
European Parliament	3 (all binding incl. for MS)	At least 40% domestic (more than 44% required)	At least 30% total final energy consumption	40% final energy	(European Parliament 2014a)
Eurelectric	3	At least 40%	Not specified, indicative at most	Not specified, indicative at most	(Eurelectric 2013)
WWF	3	55%	45% (necessary to reach 100%)	40% final energy	(WWF 2013)
Greenpeace	3	55% (30% in 2020)	45% (80% by 2050)	Not specified	(Greenpeace Europe and EREC 2012)
BusinessEurope	1	Not specified	None	None	(BusinessEurope 2013)
EREC	3	Not specified	42-48%	Not specified	(EREC 2013)
DONG Energy, EWE, EDP, Sorgenia, Eneco, AEH, SSE, Acciona ('coalition of progressive energy companies')	3	Not specified	Not specified	Not specified	(DONG Energy 2012)

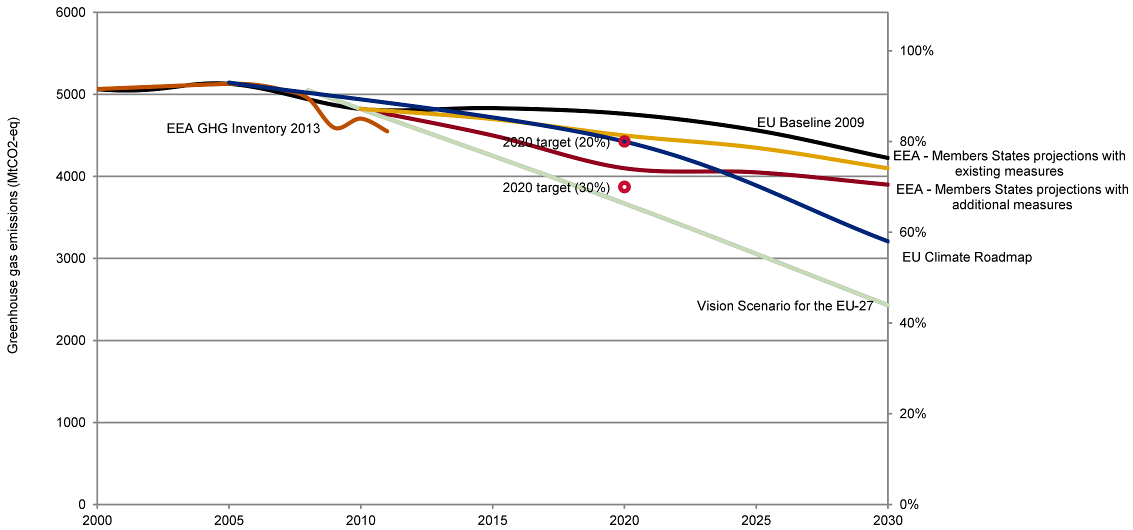
Other estimates suggest that steeper reductions are required by 2030. According to a study undertaken by Ecofys, the EU's 'fair share' by 2030 (based on specific assumptions about responsibility) would be an emissions reduction of around 49%; domestic reductions of 40 to 44% by 2030 suggested by the EC are within the "lower end of this range" of the 80–95% reduction path (Ecofys 2013a). According to a comparison of 13 different models, a 40% reduction of GHG emissions could be in line with the long-term effort to reduce emissions by 80% in 2050, but the model median would suggest setting a more ambitious target (Knopf et al. 2013), beyond 40%. Other stakeholders have called for even higher targets of up to 55% in 2030, while other actors have called for a conditional reduction target, i.e. the EU adopts a target only in case an international agreement is adopted (for references and more information see table below).

There is similar disagreement on the **level of ambition for renewable energies and energy efficiency** among those who support targets on renewable energy and energy saving. For renewable energies, some stakeholders have called for a share of 41-45% in 2030. In its low carbon economy roadmap Communication of 2011, the EC suggested – as a working assumption – a renewable energy share of 30% in 2030; in early 2014, the **EC proposed a binding EU target of 27%** which would not be broken down into MS targets (European Commission 2014a). The EP agreed in a resolution in February 2014 that the EU should set itself a binding target of producing at least 30% of all final energy consumption from renewables in 2030. The EP did not follow calls for a renewable target between 40% and 45%. Concerning energy saving, the EP has voted for a binding 40% target to be implemented through individual MS targets by 2030, other stakeholders have called for even 50% (see Table 2 below).

Stakeholder "2030 positions" are often based on or supported by findings from comprehensive modelling. A **comparison of these and additional scenarios** by Ecofys shows that scenarios arrive at drastically different results (Ecofys 2013b): projected GHG emissions range from -26% to -56% for 2030. Concerning energy consumption, in most scenarios final energy demand stabilises roughly at 2010 levels but the WWF 2030 and Vision Scenarios assume drastically more ambitious energy savings of 24% and 35% respectively. Regarding renewable energies, most scenarios have RES shares exceeding 25% but three scenarios arrive at considerably lower shares (but this relative value is strongly dependent on overall energy consumption). Scenario outputs range between 19% and 48% as a renewable energy share of final energy consumption.

The following two charts provide a more detailed overview of the difference in results between various scenarios.

Figure 6: Stakeholder projections GHG emissions reductions until 2030



Source: Ecofys 2013b

Figure 7: Selected (stakeholder) scenarios for 2030 final energy demand and RES shares

	Change in energy demand relative to 2010	RES share (in final consumption)
EU Baseline 2009	2%	19%
Green-X BAU (high demand)	5%	19%
WEO 2012 - New Policies Scenario	2%	22%
EU Energy Roadmap CPI	-5%	25%
EU Energy Roadmap Diversified supply technologies scenario	-10%	28%
Green-X Strenghtened national policies (SNP)	5%	31%
EU Energy RoadmapEFF	-14%	28%
EU Energy RoadmapHigh RES	-8%	31%
WWF 2030	-24%	41%
EREC 45% 2030	0%	48%
WEO 2012 - 450 Scenario	-7%	29%
Vision Scenario for the EU-27	-35%	34%
Greenpeace energy [r]evolution	-14%	38%
Fraunhofer BMU Efficiency	-40%	-

Source: Ecofys 2013b

It is not within the scope of this study to evaluate each scenario or to model the impact of specific targets and reduction scenarios. However, **the comparison of scenarios shows that assumptions (and uncertainties) strongly influence the respective outcome**. Depending on assumptions on energy prices, gains in energy efficiency or technological innovation, scenarios arrive at considerably different results. Their outcomes vary also considerably if large or small shares of CCS and/or nuclear energy are assumed. Similar variations exist if scenarios work with high share of electrification of transport and buildings (heat pumps). Last but not least, assumptions on the implementation of relevant policies and measures can impact the modelling outcome – although a number of models exclude political or technical obstacles (Knopf et al. 2013).

Because of these uncertainties, scenarios give (only) a rough indication or ranges of how to quantify targets. The quantification of targets should take scenarios into account but setting a quantified target is ultimately a normative and political decision. Following the analysis undertaken for this report, **the EU's 2030 GHG target should be at least minus 45% below 1990 levels in domestic emissions and around 50% if offsets are included**. This figure is based on the following considerations:

- **The precautionary principle requires reductions towards 95% in 2050:** a credible climate change mitigation strategy needs to steer on the side of caution and use the lower end of the IPCC range as its guiding marker for 2050. This means drawing a line from today towards 95%, which implies at least a goal of 45% in 2030. Considering the fact that domestic emissions in the EU are projected to be closer to 25% than 20% in 2020, a direct pathway from 2020 onwards would imply a 2030 target of 48% (see Table 3 below).

Table 3: Impacts of different 2020 starting points and 2050 targets on intermediate milestones and average reduction rates

	Pathways towards 80% in 2050			Pathways towards 95% in 2050		
Year	20 to 80%	25 to 80%	30 to 80%	20 to 95%	25 to 95%	30 to 95%
2020	20%	25.0%	30.0%	20.0%	25.0%	30.0%
2030	**40%**	**43.3%**	**46.7%**	**45.0%**	**48.3%**	**51.7%**
2040	60%	61.7%	63.3%	70.0%	71.7%	73.3%
2050	80%	80.0%	80.0%	95.0%	95.0%	95.0%
Annual reduction	***2.00%***	***1.83%***	***1.67%***	***2.5%***	***2.33%***	***2.17%***

Source: own calculation © Ecologic Institute. 2030 marked in bold.

- **A credible and realistic long-term reduction path at a feasible speed**: Since 1990, the EU has had average annual reductions of less than 1%. Over the last five to six years (including the impact of the economic crisis), reduction rates have been over 2%. Going from 20% to 80% would require those same 2% reductions every year; going to 95% would necessitate annual reductions of about 2.5%, as indicated in Table 4 below. These historic figures suggest that starting with a direct path to 2050 only later, and being more lenient towards 2030 for example, will require much steeper reductions than what the EU has been able to achieve so far. Other than during the economic crisis, **reductions faster than 2.5% per annum are historically unprecedented**. Depending on technological innovation and various other factors, it might be possible to achieve steeper emission reductions later but this is a **risky bet**

on uncertain future developments. If required developments were not to materialise, later and steeper reductions could imply stranded assets and higher costs. This implies that a 2030 target should be set to require annual rates of 2% and beyond (around 2.3% for a long-term goal of 95% (see Table 3)). Considering current projected 2020 reductions of over 20%, such a reduction rate would also suggest a 2030 target of over 40% (43-48%).

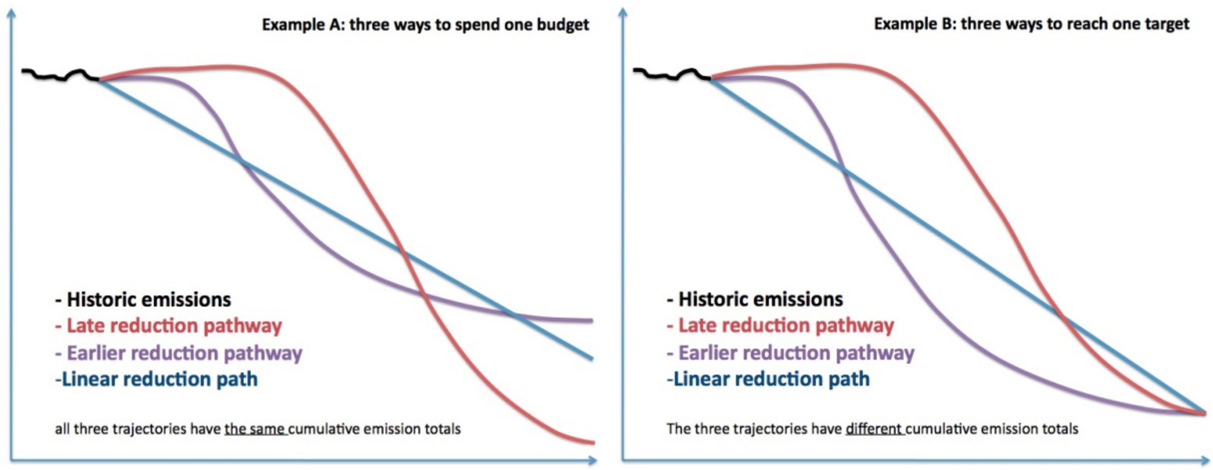
Table 4 Annual emission reduction rates over historic periods and towards 2050

Timeframe	1990-2011 average	1990s annual change	2000s annual change	Since 2005 (last six years), annual rate	2010-2011	2020 to 2050 (20% to 80%	2020 to 2050 (20% to 95%
Annual change	-0.87%	-0.27%	-0.84%	-2.04%	-3.29%	-2.0%	-2.5%

Source: own calculations, based on data extracted from the EEA greenhouse gas data viewer. Excludes LULUCF.

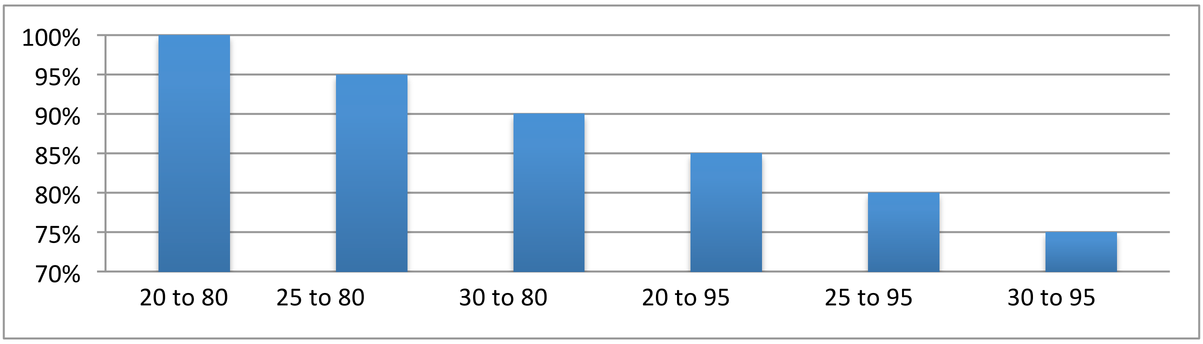
- **A linear pathway, because GHG emissions accumulate:** The shape below the emissions trajectory defines the overall quantity of emissions over the period covered. It therefore makes a large difference what the form of the shape is and what target it is aimed at (see Figure 8 below). Accordingly, the cumulative emissions for a linear pathway towards 80% would be 18% higher than those from going directly to 95% (measured in budgets of total cumulative emissions over the three decades). Figure 9 below shows the differences in total emissions budget for a variety of possible trajectories. For this reason a **sensible forward-looking target-setting sticks to a linear pathway.** This principle has also been adopted in the UK climate change act, as well as the Effort Sharing Decision and the linear reductions of the EU ETS cap.

Figure 8 Impact of different trajectories' shapes on cumulative emission totals



Source: © Ecologic Institute 2013

Figure 9 Difference in cumulative emissions between 2020 and 2050 under variety of linear target pathways



Source: own calculations. © Ecologic Institute 2013

- **Domestic reductions versus the use of offsets:** Experience with international offset credits raises a number of environmental concerns, while the concept of joint efforts to reduce emissions remains appealing.[14] From a climate protection perspective the "additionality" issue remains the most important concern, which refers to cases where offset credits may not represent an actual reduction over what would have happened anyway. Using such credits to replace a reduction obligation in Europe would in fact be releasing more emissions.[15] For this reason, offsets in the EU, especially from new mechanisms should be used with caution and guard against additionality problems or other unintended negative effects.[16] Any future GHG target should, therefore, take use of any offsets into account rather explicitly and count them separately, for example in the form of a double target figure – one with and without offsets. The use of any offsets could also be explicitly phrased not just as a means of reducing the domestic effort but at the same time as an **enabler of higher EU targets** as well. The target proposed by the EC in early 2014 is explicitly labelled as being domestic, meaning that no (additional) external credits should be allowed to count against it. That does leave the door open for adding the use of external credits on top.

[14] The EU has been advocating the establishment of a new market based mechanism in the contect of the UN climate negotiations. And a number of developing countries are preparing for domestic cap-and-trade systems, that could be linked to the EU in some form in the future (see also Castro et al. 2012).

[15] Other concerns are raised around the impacts of specific technologies, such as large hydro power dams, and related environmental and social and human rights issues, or the support to coal plants via the CDM – as well as the cheap generation of credits from the destruction of industrial gases and possible perverse incentives (see also Schneider 2007 and the information resources provided by CarbonMarketWatch at http://carbonmarketwatch.org/issues-in-the-cdm/). Furthermore, the surplus built up in the EU ETS is partly due to offsets (see also Section 2.2.3.2.)

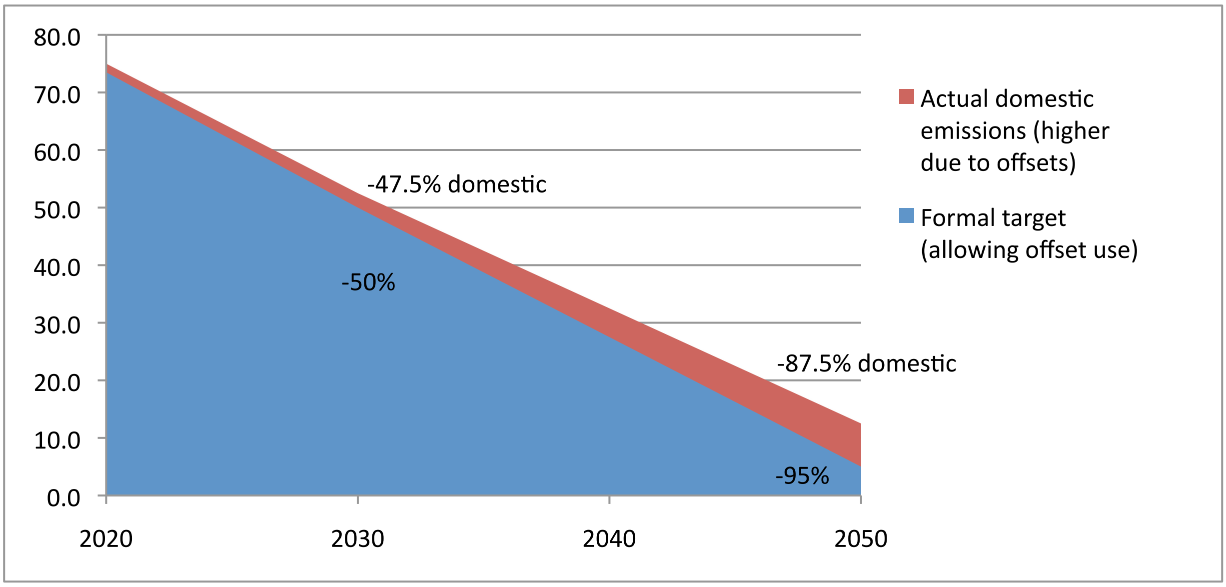
[16] A number of regulatory options exist to manage such concerns (incl. discounting). The EU has already introduced additional limitations on offset credit use in the EU ETS and the Member States over time to account for experience in the implementation of offset programmes.

Table 5 Possible combinations of domestic and offset targets (illustration)

	Formal target (% reduction from 1990) linear pathway from plausible 2020 reality to 2050 target	**Offsets** (% reduction from 1990) increased usage over time[17]	**Domestic target** (% reduction from 1990) from projected 2020 level to a somewhat higher 2050 value	**Offsets relative to remaining domestic emissions**
2020	**26.5**	*1.5*	25.0	2.0%
2030	**50.0**	*2.5*	47.5	4.8%
2040	**72.5**	*5.0*	67.5	15.4%
2050	**95.0**	*7.5*	87.5	60.0%

Source: own calculations. © Ecologic Institute 2013

Figure 10 Visualization of effect of possible offset use in double target towards 2050



Source: © Ecologic Institute 2013 (figures used as in Table 5)

- **Taking into account the pre-2020 build-up:** Since the formal target for the EU for 2020 still stands at 20% and projections suggest that this target will be overachieved, there is a head start in the system that in principle makes it easier for the EU to achieve a 2030 target (because of the lower starting point). Depending on how the rules are designed for the post-2020 UN climate regime, it might even be possible for the EU to take emission permits from before 2020 into the time thereafter, further reducing the need to make additional reductions towards 2030. This phenomenon has already been created in the EU ETS, where the instrument explicitly allows such early reductions beyond the cap to be "banked" into the future. The 2030 EU target should take this early achievement into account and be made more ambitious on this basis. This is not just necessary

[17] There are several ways of treating offset usage over time: increasing, decreasing or steady amounts and shares. Policy-makers may find an increased usage attractive, as is facilitates the long-term target.

to strengthen the ETS (see Section 2.2.3.2) but also to create an impulse for reduction efforts in the Non-ETS sectors. Not having a requirement for significant additional reductions in the period to 2030 could create the risk of a "lost decade" in the 2020s, which would make future reductions harder and more expensive.

2.1.4 Targets for competiveness and security of energy supply

Some stakeholders have called for **complementary targets on competiveness and security of energy supply** (DG Energy 2013). Energy security includes for many of these stakeholders some certainty on (low) energy prices. The price differential of energy prices to major competitors, in particular the US, but also China and India, has been advocated as another possible target. Advocates of these additional targets have argued that the existing targets have been one-sided and biased towards the environmental dimension of the climate and energy package. They are accused of failing to ensure progress towards other objectives of EU energy policies, such as diversification of energy imports, deployment of smart grids, liberalisation of energy markets or technology and innovation. Therefore, the argument goes, any future package should balance the different aspects of climate and energy policies and may not prioritise one objective at the expense of others.

Such **proposals are problematic for various reasons**: First, adding such targets would increase complexity of an already rather intricate system. Second, many other EU targets already include the objectives of competiveness, security of supply and low energy prices. The Europe 2020 strategy, for example, explicitly aims at promoting economic growth and competiveness. Third, targets "should only be set for areas where concrete policies to achieve them are conceivable" (European Commission 2014c, 59), otherwise progress cannot be linked to specific instruments. This might not be easily realisable for issues such as price differentials with other word regions, for example. Fourth, it is not only targets that take account of competitiveness and supply concerns but also the instruments. Almost all EU climate policy measures explicitly take into account the specific circumstances of the sectors they affect; the ETS, for example, includes various exemptions for energy intensive industries; energy efficiency instruments include various mechanisms to accommodate the financial situation of addressed stakeholders.

In its proposal for a 2030 climate framework, the EC proposed a number of indicators on some of the energy issues – rather than targets. This proposal would largely steer clear of the problems above. However, some of the proposed indicators duplicate those of the Europe 2020 or the EU sustainable development strategy, such as energy independence. Against this backdrop, it appears evident that the EC proposal is largely politically motivated; it responds to repeated allegation that EU climate policy has an environmental bias at the expense of other aspects of energy policies. However, a variety of mechanisms addressing competitiveness concerns – such as free allocation of allowances (ETS) or direct compensations for energy price increases (RED) - have already been integrated into EU climate policy already.

2.1.5 Conditional or unconditional targets?

A conditional target becomes effective or is adopted, if certain conditions are met, such as the adoption of an international agreement or specific economic circumstances. This approach had been used in 2007 to formulate the EU GHG target for 2020. The EC has phrased its proposal for 2030 targets without such conditions; only if the "outcome of the negotiations warrant a more ambitious target, this additional effort could be balanced by allowing access to international credits".

In light of disagreement within the EU on the 2030 targets, it might seem attractive to adopt a conditional target also for 2030, because this could allow getting more sceptical MS to agree to more ambitious measures (when and if certain conditions are met). While politics could call for a conditional target – a number of MS have expressed preference for a conditional target –, there are several arguments against using conditional targets:

- **Conditional targets impede progress within the EU:** Making the 30% EU GHG reduction target of 2007 conditional to factors outside of the EU's influence has been a fundamental obstacle to unilaterally scaling up the EU 2020 target from 20 to 30%– although many countries outside of the EU are taking climate action, and although the EU is already set to achieve more than the 20% it is now formally committed to. Opponents of a more ambitious target have insisted, however, that the original condition has not been fully met. Politically, this has been a strong enough argument and a key impediment to efforts to increase the target. Similar scenarios are possible if a reduction target would be tailored to specific economic circumstances – in this case the debate would centre on whether these economic circumstances are met or not, which is largely a political decision. Handing over the decision on the target level to developments elsewhere can be paralysing and not in the EU's economic interest in the long-term if circumstances change (as they did between 2007 and 2011, with the economic crisis and no new global deal from Copenhagen).
- **International agreement unlikely to address all competitiveness concerns:** Creating a level playing field has been the main argument for conditional targets – countries with less ambitious reduction commitment should not have a competitive advantage over those with more stringent obligations; an international agreement would create a level playing field and address competitive concerns. However, it is not clear, let alone agreed, which criteria an international agreement should fulfil to effectively address these concerns. It is quite possible that even if an international agreement is adopted competitiveness concerns will continue to play an important role. It is unlikely that there is – even in theory – an international agreement which could address all competiveness concerns. It has been very comfortable to argue that an international agreement is required to address competiveness concerns without specifying the content and scope of such an agreement.
- **Greater credibility:** In the international climate negotiations, unconditional targets are more credible. Conditional targets create ambiguities. Partner countries can perceive conditional targets as a pretext not to accept more ambitious commitments. The EU having dangled a higher target of 30% in front of its negotiating partners does not seem to have made a discernible difference in the 2008-9 negotiations. It is, therefore, questionable if such a conditional offer represents a bargaining chip.
- **Investment security:** Concerning investment decisions, conditional targets do not provide the required security, because the doubt remains whether or not conditions will be met and when. The current conditional target led to unproductive discussions, adding to investment uncertainty.

2.2 Instruments

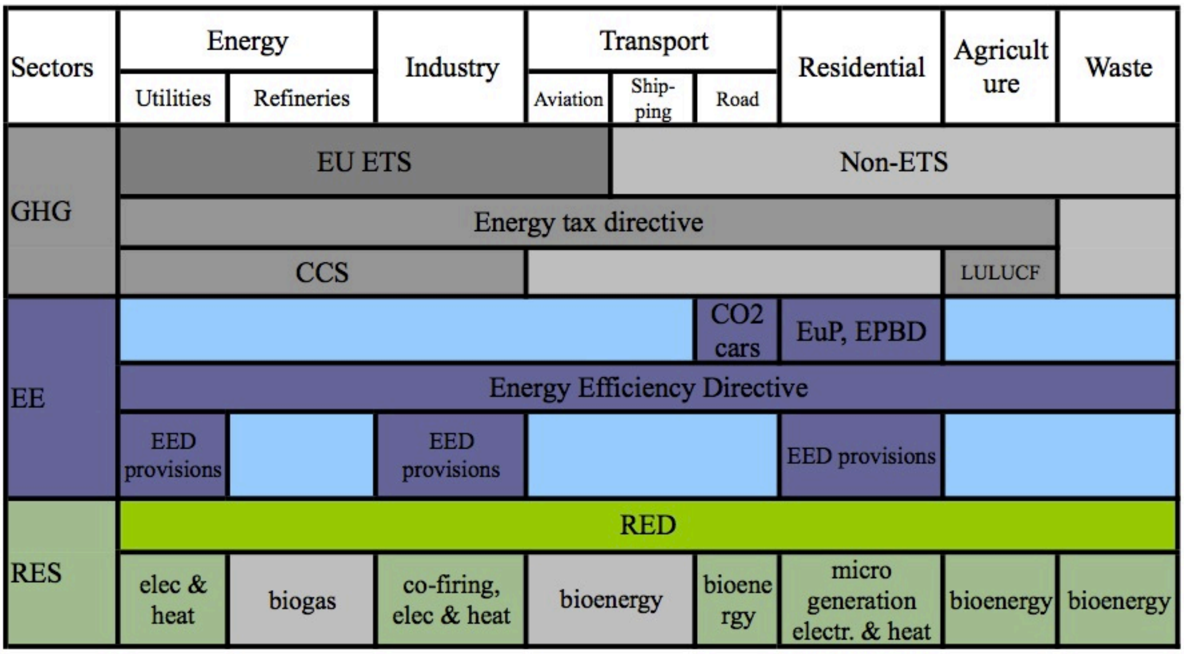
It goes without saying that policies and measures are fundamental to any successful climate and energy policy – **even the most ambitious targets have little or no effect if they are not complemented by effective instruments**. The right choice of instruments is at the heart of designing effective and efficient EU climate and energy policies after 2020.

This section seeks to make recommendations for specific improvements to the existing set of policies for post-2020, with a view to the target of decarbonisation by 2050. It does so by analysing the overall architecture of EU climate policy and then looking at the potential and necessary contributions by each main emitting sector. On that basis, it explores options for strengthening of the current architecture, looking at the EU ETS, the Non-ETS sectors, Renewable Energy support and Energy Efficiency.

2.2.1 Sectoral contributions to the 2050 objective

A key architectural characteristic of the current EU climate policy is the division into ETS and Non-ETS sectors. This design suggests a neat division of responsibilities, a clear split among the one instrument tackling the large point sources in the ETS sectors and one dealing with essentially all the others. However, many of the current instruments address emissions in both segments. An analysis of the need for better or additional policies must therefore also look at **individual sectoral contributions** and their respective coverage of emissions by instruments and current effectiveness – to then consider how this fits into the existing ETS/Non-ETS framework.

Figure 11: Approximate overview of EU climate and energy policy architecture by sector, target and main policy instruments – visualising overlaps and tailored policies



Source: © Ecologic Institute 2013

For the **long-term vision up to 2050**, the Commission has derived figures for the contributions of different sectors towards an 80% reductions trajectory for the EU as a whole. Table 6 provides an overview of the respective milestones per sector towards 2050.

According to this analysis, the highest absolute and relative reductions should come from the **power sector**. It decarbonises fast, reaching usually well above 60% emission reductions by 2030 and nearly 100% in 2050. Driven by EU and national energy efficiency legislation, above average contributions in the medium and long term are also possible in the **building sectors**. Because of further energy intensity decreases, nearly 75% in 2050 compared to 1990, and the CCS for the remaining energy intensive industrial CO_2 emissions from 2035 onwards **industry** also decarbonises significantly, but slightly less than the overall economy in the medium term (2030). The **transport** sector will not decarbonise fully (to be made up for by the power sector reductions) with improvements in energy efficiency being one of the major contributors. **Agriculture** will contribute significant reductions by 2030, but further decarbonisation steps are expected to be more difficult.

Table 6: EU greenhouse gas emission reductions overall and in different economic sectors in different decarbonisation scenarios

GHG reductions compared to 1990 in %	Years	2005	2030	2050
Sectors	Total	-7%	-40 to -44%	-79 to -82%
Power (CO2)		-7%	-54 to -68%	-93 to -99%
Industry (CO2)		-20%	-34 to -40%	-83 to -87%
Transport (incl. aviation, excl. maritime)[18] (CO2)		+30%	+20 to -9%	-54 to -67%
Transport (excl. aviation, excl. maritime)		+25%	+8 to -17%	-61 to -74%
Residential and services (CO2)		-12%	-37 to -53%	-88 to -91%
Agriculture (Non CO2)		-20%	-36 to -37%	-42 to -49%
Other Non CO2 emissions		-30%	-71.5 to -72.5%	-70 to -78%

Source: PRIMES, GAINS (European Commission 2011a, 52)

[18] Excludes international maritime bunker fuels, includes inland navigation in the EU.

Table 7: Emissions in ETS and Non-ETS sectors on a 2050 trajectory towards -80% total

Scope	Source: Year:	Latest data 2012	EU targets 2020	EEA 2013 2020	EC Ref 2013 2030	EC 2014 proposal 2030	EC 2011 Roadmap 2030	EC 2011 Roadmap 2050
Overall (compared to **1990**)		-18%	-20%	-21% / -24%*	-32%	-40%	-35 to -40%	-77 to -81%
ETS sectors (compared to **2005**)		-16%	-21%		-36%	-43%	-43 to -48%	-88 to -92%
Non-ETS sectors (compared to **2005**)		-9%	-10%	-11% / -15% *	-20%	-30%	-24 to -36%	-66 to -71%
Sources		*(EEA 2013d)*		*(EEA 2013d)*	*(European Commission 2013g)*	*(European Commission 2014d)*	(European Commission 2011b)	(European Commission 2011b)

**with additional measures*

These sectoral emission pathways can also be broken down into the current architectural dichotomy of ETS/Non-ETS. Largely because of reductions in the power sector, emission reductions in the sectors covered by the **ETS** might have to be close to 50% by 2030 and around 90% compared to 2005 would need to be achieved in 2050 (European Commission 2011b, 95). Importantly, however, the existing ETS cap trajectory does not lead to such levels of reductions.[19] **Non-ETS** sectors would (only) reduce their emissions by nearly 70% compared to 2005 in 2050. By 2030 the non-ETS sectors' contribution would have to be between 24% and 36%, which shows that there are a range of variations possible for these sectors in the next 15+ years. To meet reductions of 40% domestic in 2030, the EC proposed reductions of 43% in the ETS sector and 30% in the non-ETS sectors compared to 2005 (European Commission 2014a, 5).

In the following sections of this report, the state of the EU ETS and that of the instruments governing the Non-ETS sectors will be analysed.

2.2.2 The EU ETS: three recommendations for the future

There is broad agreement "that the ETS should remain the central instrument to bring about the transition to low carbon economy" (EC 2014, p.8). During the 2013 consultation on the Green Paper, stakeholders confirmed that the ETS must play a crucial role as a technology neutral, cost effective and EU wide driver for low carbon investment.

[19] The Linear Reduction Factor in use at present would result in around 38% reductions against 2005 in 2030 and around 70% in 2050.

Although the ETS is well established as a trading system – the ETS created the world's largest carbon market so far – it is in a difficult situation at present. The economic parameters on which the cap setting was based have changed substantially, contributing to an oversupply of allowances that threatens to render the system ineffective for decades.[20] This is also due to an obvious lack of trust in the political backing of the ETS and the underlying decarbonisation narrative, despite the long-term perspective enshrined in the directive. The **credibility of the ETS is not strong enough to project a visible carbon price signal into a mid- to long-term future**. The prolonged debate over how to manage the excess supply in the system and the lacklustre support for even temporarily changing the auctioning schedule for backloading provide evidence of the lack of political decisiveness on climate policy ambition in the EU.[21] The dismantling of the Australian ETS following the 2013 change in government represents an example of a policy reversal on climate change that show why certain non-governmental actors may be justified in not (yet) taking a long-term carbon mitigation aspiration into account as hard fact – even in the EU.

This leads to a set of three main recommendations:

- The EU ETS needs to be made **capable of actually reducing emissions** again. This means increasing scarcity in the near- and medium-term, earlier than foreseen under the current trajectory.
- The EU ETS should be **made "shock-proof"** to avoid a repeat of the current situation. The carbon price signal needs more stability.
- The ETS alone (even if improved) does not seem to have the power to put the sectors involved on a decarbonisation path. Energy and industry **sectors need ETS companions** to avoid expensive high-carbon lock-in on the one hand and to induce transformational technological innovation on the other hand.

The following segments will explore options for implementing these three points.

2.2.3 Structural reform of the EU ETS: making it reduce emissions

The EC has put forward a list of options to deal with the excess supply in its first "State of the Carbon Market" report (European Commission 2012d), which was published in November 2012 (following a requirement in the Directive's Articles 10(5) and 29).

There are essentially two ways of affecting scarcity in the ETS: **reducing supply or increasing demand**. The options listed in the EC report are

Figure 12: List of options for ETS reform as per EC

a: Increasing the EU reduction target to 30% in 2020

b: Retiring a number of allowances in phase 3

c: Early revision of the annual linear reduction factor

d: Extension of the scope of the EU ETS to other sectors

e: Use access to international credits

f: Discretionary price management mechanisms

Source: (European Commission 2012e)

[20] Analysts at PointCarbon expect that the ETS market will remain oversupplied until 2027, even with a slight change in the cap trajectory (Thomson Reuters Point Carbon 2013) – the Commission's Reference Scenario sees the surplus stay until 2050 without a change in the trajectory (see also Figure 3

[21] A compromise on the EC proposal (COM (2012) 697) on the so-called "backloading" (a temporary shifting of the volume of allowances available for auction) was adopted in December 2013 after controversial debate in the European Parliament in particular – formal publication took place on February 25, 2014.

primarily directed at the supply side (only option d) could affect demand directly). Naturally, there is a range of other factors that could affect in particular the demand for EU allowances (EUAs) (such as an unforeseen significant increase in industrial activity due to economic growth), but these cannot be triggered by changes to the legislation.

The EU ETS Directive does already include a review clause to assess and possibly change the cap trajectory in the long-term. Article 9 of the legislation foresees a review of the cap trajectory, but only invites a proposal from the Commission from 2020 onwards "with a view to the adoption of a decision by 2025".[22] While this does not by definition prevent such a revision from entering into effect in time for an impact on Phase IV, this provision is primarily aimed at a time-frame significantly later than 2020, which would not help address the current over-allocation. This built-in review of the system, therefore, is not likely to be sufficient to revive the ETS in the short-term.

In the January 2014 package of proposals, the EC has recognised this point and chosen to propose two of the options (c) and f)) as the key elements for a structural reform of the EU ETS: 1) a proposal for a 2030 ETS cap that requires a **change in the LRF to 2.2% from 2021** and 2) a **market stability reserve**, that would act as an automatic surplus regulation mechanism. With the backloading approved, there is no further action prior to 2020 included in the EC's proposal.

As the system is set up to work across trading periods, a distinction based on before and after 2020 could be largely irrelevant if a clear political decision is taken that takes on the scarcity issue for the ETS in a way that revives faith in the long-term "bite" of the ETS. As such, **a strong 2030 target could be a powerful driver for an ETS revival** and one that does not intervene in the allocation as scheduled for 2020, but that could already have an impact nevertheless.[23] However, as the only supply reduction option this would only work if the target was set tight enough so that the resulting ETS cap would be soaking up most of the excess supply in the system. The EC's proposed -40% target is too low in that respect, even the Impact Assessment for the 2030 communication acknowledges that. And few Member States (other than the UK) have so far indicated an interest for figures above 40% for the EU as a whole. This shows how closely interlinked target-setting for 2030 for the EU as a whole is with the pre-2020 historical ("emission baggage") performance of both ETS and Non-ETS. The **overall EU 2030 target could** in this way **represent a choice over the future of the ETS**.[24] In this context, it is worth looking at options to address the excess supply both before and after 2020.

[22] The ETS Directive currently foresees a linear reduction of the cap that uses 2010 as its starting point. While it is in practice the same absolute amount that is deducted every year, this is expressed in the directive as a "Linear Reduction Factor" (LRF) defined as relative share of 1.74% of average annual allowances allocated in Phase II (2008-12). The reason for the relative definition lies in the flexibility required to allow individual sectors or activities to be included (or taken out) over time, meaning that the respective base year value would have to be adjusted, changing the respective absolute cap reduction per annum, but not the relative value. Having said which, the current cap trajectory as set in the directive is not in line with a 2050 decarbonisation pathway and does require adjusting in that respect. The current emission reduction pathway would set the cap at zero in 2068 only. Even assuming full decarbonisation is not the specific quantitative objective, it is clear that the current trajectory would postpone the emission reductions obligation in the covered sectors by 10-15 years, potentially preventing the EU from achieving its 2050 goal.

[23] This is expected to be true even if a strict 2030 ETS cap where to only start changing the cap trajectory after 2020 if banking between the two periods is allowed – market actors would then see higher value even in allowances currently held as surplus, because an upcoming scarcity was being anticipated.

[24] In principle, a future EU target could also be divided up differently between the ETS and the Non-ETS sectors, placing a larger requirement on the ETS to deliver the additional reductions.

2.2.3.1 Pre-2020 supply

A *higher 2020 target for the EU as a whole* (option a) would imply an adjustment of the ETS cap (and in turn the LRF) before 2020 and could at the very least bring it back in line with the actual emissions development, stopping the further building up of oversupply. *Option c*, an *early revision of the LRF,* if applied before 2020, could bring about the same effect on its own without the target being adjusted, formalising the reductions that have already occurred and those projected but without an actual additional effort being required.[25] It could be beneficial for the EU diplomatically to be able to demonstrate its target overachievement to international partners, and so doing *option c)* (*LRF*) without *option a)* (*2020 target*) would miss out on a significant opportunity. Choosing the "permanent backloading" *option (b)* of *retiring a specific number of allowances* would have a similar effect to both the other options but may not take out a sufficiently large amount of allowances to eliminate the current surplus.[26] It would also, if done on its own, have the disadvantage of not receiving credit internationally for the additional reductions.

All three main pre-2020 options could in theory be implemented in a mutually supportive fashion and in various combinations, they do not present exclusive alternatives. They can also not be judged in their full potential without connection to post-2020 changes. To those concerned about changing the existing legislation prior to 2020, a strong 2030 cap may well be the preferred choice to dealing with the current surplus, but one that runs the risk of failing to deliver. **Taking further action to reduce supply pre-2020, during phase 3, is therefore recommended** as part of an effective post-2020 climate package. The specific quantity would to some extent depend on the post-202 cap trajectory and the assumptions being made about demand. On the basis of the information available at present, it seems advisable to be **taking out** an amount close to **the currently calculated oversupply of 1.75 billion EUAs** (end of 2012) (EEA 2013d, 39), to reset the ETS market to its starting point (for Phase II (2008)).[27] That would bring it back to the expectations that were prevalent then, which were of an explicit scarcity in the near-term. [28]

2.2.3.2 Post-2020 reform: implementing a target "fit for 2050"

The post-2020 options from the EC's list are more diverse and require a more in depth evaluation.

Early revision of the LRF

As indicated above, the current LRF does not correspond to a 2050 decarbonisation trajectory. It leads to a cap equal to around 71% reductions from 2005 levels by 2050 (see

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[25] Assuming that there is no corresponding lessening of reduction effort in the Non-ETS sectors – but these might also be overachieving (EEA 2013c).

[26] Backloading is meant to be done for 900 million EUAs, whereas the oversupply is estimated to be almost twice that amount (EEA 2013c, 39)

[27] See Hermann and Matthes 2012 for more detailed calculations of demand and supply balance and variations of options with cancellation of allowances and LRF changes – and expected impact on prices. The figures assumed there are slightly out of date due to an additional surplus build-up in 2012 that was close to 200 million EUAs higher than anticipated in the report (see EEA 2013b, 39). This in turn also has an impact on the amount recommended for deletion there.

[28] This recommendation also implies, that simply taking the 900 million EUAs that are slated to be set aside under the backloading proposal, would not represent a sufficient amount.

also detailed figures in Table 8 below) and would take until around 2068 to go to zero. A revision is thus justified to make the system "fit for 2050".

The timing of the revision has three main consequences:

1. an impact on the **trajectory** (a later revision would imply a steeper line than an earlier adaptation (to get to the same target level)) and
2. an impact on the cumulative number of allowances, and thus the **carbon budget** spent (a later change in the LRF towards the same 2050 target level will mean a higher number of allowances/emissions)
3. an impact on reducing the projected **excess supply** in the system

Table 8 below provides an overview of the respective figures for a variety of possible scenarios, demonstrating these impacts. To show how different design options compare with the reference case (I) of a mere continuation with the LRF of 1.74, there are two scenarios for different starting times of trying to get to 95% reductions in 2050 (II and III), one pre-2020 adjustment of the LRF (IV) and the EC 2014 proposal (V). The differences between the various options are striking, especially with a view to the impact on supply. An even slightly earlier adjustment towards the long-term goal (III vs II) could have double the supply impact pre-2030, despite a lower LRF. The EC's proposed adjustment to an LRF of 2.2% (V), enabling a reduction of 84% by 2050, would, however, have an supply impact of only just over half a billion EUAs, or around one **quarter** of the accumulated surplus projected by the EC reference scenario by 2030. Only a pre-2020 LRF adjustment (IV) starting as early as 2016 (half way through the third trading period) would be able to eat up close to the entire projected surplus - but would not necessarily already inject actual scarcity into the system.

Table 8: Overview of the implications of the timing of a LRF revision and its 2050 target

Option	2030 cap (in reduction from 2005)	LRF in 2030 (value relative to 2010)	Supply reduction by 2030 (in mio EUAs relative to reference)	Emission budget 2020-2050 (relative to reference)	2050 cap (in reduction from 2005)
I No change in the LRF (Reference)	-37.6%	1.74%	0	100%	70.9%
II LRF change from 2025 (to -95% (2005) in 2050)	-43.2%	2.91%	ca. 450	96.6%	95.0%
III LRF change from 2021 (to -95% (2005) in 2050)	-45.7%	2.75%	ca. 1,000	92.4%	95.0%
IV LRF change from 2016 (= change in 2020 cap)	-48.0%	2.46%	ca. 1,900	74.5%	100%
V EC 2014 proposal: -43% in 2030, LRF 2021	-43%	2.20%	ca. 550	87.8%	84.1%

Source: Ecologic Institute, calculations based on 2010 reference value of 2,199,094,594

The comparison of these scenarios shows that an LRF change on its own is unlikely to be able to deal with the projected oversupply by 2030. The **EC's proposal for an ETS cap** under a -40% target only makes a minor contribution and **is insufficient on its own**. This also makes an additional argument for further action to reduce oversupply prior to 2020. Permanent cancellation of EUAs before 2020 (such as the 900 million EUAs being "backloaded") could combine with a an LRF change of 2.75% or more as of 2021 to address an amount close to the current size of the oversupply (around 2 billion EUAs).

While the LRF can determine the 2030 ETS cap, it can also be an expression of choices made on the level of the overall EU target, the division of reduction effort between the ETS and Non-ETS sectors and also potentially the need to take a pre-2020 overachievement into account (insofar as it may result in a carry-over of allowances (both under ETS and/or the ESD that would be deemed to be distortive (see segment above on Pre-2020 supply)).

In the end, the most important thing is **an adjustment that puts** the carbon emission trajectory of **the sectors** covered **on a path towards 2050** decarbonisation – and that is in line with the need to make the ETS deliver actual emission cuts, taking pre-2020 supply issues into consideration. **The less action is taken to reduce supply pre-2020, the earlier a LRF revision should apply.** In order to get the ETS cap trajectory closer in line with a pathway towards the 2050 goal, any **LRF adjustment should definitely apply from the start of Phase IV, as of 2021 at the latest,** to avoid a steeper (and ultimately more costly) trajectory later**.**

Access to external credits

Reducing access to external credits is another post-2020 supply reduction option (e). The use of external credits for ETS compliance[29] has always been subject to quantitative and qualitative restrictions. The fact that a significant share of the build-up of an excess supply in the ETS is due to the inflow of external credits[30] suggests that the historic rules have been too generous.[31] This misjudgement on the possible impact of the rules has happened in part due to the lack of clarity and transparency on the actual use of credits that would be allowed (see also (Wyns 2013). While some additional quality restrictions are in place, prices for external credits are currently at record low levels[32]. The low prices mean that it is likely that the maximum allowable amount of such credits does enter the EU ETS in Phase III, acting as an additional price dampener.[33] While this effect is intended in principle, scarcity in the ETS would need to be reintroduced and a significant and actual reduction requirement be reintroduced, <u>before</u> this could be justified at present.

The current wording of the ETS Directive does not explicitly foresee future use of external credits in Phase IV, and the EC's 2014 proposal for a 2030 target says explicitly that it is

[29] The issue was originally debated and decided outside of and after the original Directive, under a proposal known as the "Linking directive" (2004/101/EC).

[30] More than half of the surplus (as of 2011) according to (H. Hermann and Matthes 2012, 41)and that may have increased still in 2012 (Morris 2013) and could increase further in the third trading period (H. Hermann and Matthes 2012).

[31] Additional restrictions do apply for phase III already (e.g. exclusion of CERs from HFC projects), but an analysis of the compliance behaviour of ETS operators in 2012 suggests that the looming threat of these limitations led to a rush in cancellations (Morris 2013). The effect of this (rational) behaviour is in essence a conversion of CERs into allowances, which have now been banked into phase III.

[32] This CER price slump is due to a significant oversupply or lack of demand (following also the apparent lack of scarcity in the EU ETS as a key driver for the global carbon market so far), which is expected to remain in place until a significant shift of circumstances takes place. CER prices are near zero, with prices of around 1€ reflecting the transaction cost involved in the credit sale, not the value of the credit as such. See for example International Emissions Trading Association 2012; GIZ 2012

[33] A rush to deliver CERs for ETS compliance apparently set in before the end of the second trading period, with further qualitative restrictions coming into force as of 2013 (Morris 2013; EEA 2013c).

meant to be "domestic". Under these circumstances, access to external credits would only increase supply, and not reduce it – which is the order of the day for the EU ETS at present and for the foreseeable future.

However, any revision of the legislation will likely open up this question again. The ETS was the driver for the development of the CDM, and the EU is an outspoken supporter of a new market-based mechanism to be worked out in the UN negotiations (Castro et al. 2012). Without a significant structural reform in the EU ETS pre-2020 and a tight post-2020 cap, **allowing any additional credits into the system simply does not make sense,** from the perspective of the functioning of the ETS**.** However, cutting the ties with external credits entirely could also result in diplomatic backlash – and may in fact hamper efforts to build up effective systems for multilateral cooperation on financing sustainable development.

To align these two dimensions, **future cap setting would have to take any allowed use of external credits into account upfront**, and be adjusted downward in a transparent fashion[34] to guarantee an actual need (and priority) for domestic emission reductions.[35] This could be done in many different ways in principle. One example would be through defining the allowable number per annum relative to scarcity in the system, such as a share of the gap between a baseline and the future cap trajectory (e.g. at the start of phase IV: 20% of the gap between the average emissions in 2018-2020 and the cap for 2021, then for 2022, and so on). Such a formulation would imply that offsets are only available after a trigger threshold is reached that justifies their use. That could prevent access to offsets when there is no actual scarcity.

Using instead a fixed historic year (such as has been the case so far) would, however, allow for the same absolute amount over time and so ever greater relative shares of external credits to be used, reducing continuously the share of domestic reductions. Alternatively, the allowable maximum offset use could be calculated against a rolling average of years (that would link it directly to an updated emission reduction "need", with less possibility that such a volume would facilitate an oversupply) or against the ever decreasing cap trajectory (e.g. 1% of the cap of that year), which would mean ever smaller absolute amounts but steady relative values.

Any rules that allow for access to external credits at some point would certainly have to be reflected in the formulation of the EU target as a whole, which would not be properly "domestic" but would need to then possibly have an additional quantitative external dimension (see also section 2.1.3 Level of ambition above).

Extending scope to other activities

The only conscious way other than a cap adjustment, in which changes to the EU ETS could result in additional demand is the possibility of extending coverage to additional activities

[34] Transparency in this case refers to clarity over absolute numbers of credits, and how that number relates to the reduction effort (supplementarity). So far this is expressed in vague relative terms, which do not easily show how much actually existed, and have arguably hidden (if not necessarily consciously so) the possible extent of external credits allowed under these provisions in the ETS Directive.

[35] Regulating the access to external credits in the future could also be done more explicitly in the context of a "shock proofing" mechanism, as discussed further below, where decisions on the possibility to surrender offsets (or not) would be taken explicitly in relation to a measure of overall scarcity.

(sectors and/or gases), ***option d*** in the EC's 2012 report. The scope of the ETS has in fact been changed several times already since the adoption of the original directive in 2003. In the review of the ETS for Phase III, a number of new activities were included, such as nitrous oxide from fertiliser production or the emission of fluorinated gases involved in aluminium smelting. In some cases, MS had already opted these activities into the system for phase II. The aviation sector has also been included in the ETS as of 2012 (Directive 2008/101/EC), but with unresolved questions over the eventual scope, following contestation by non-EU countries and their airlines.[36] According to the EC, adding sectors currently outside of the system could increase demand, as they have not recently reduced emissions as much as those inside the ETS (European Commission 2012e, 8).

In theory, all sectors could be included in an Emissions Trading System. However, there are a variety of considerations that need to be taken into account to judge if a sector is suitable. Such "compatibility criteria" should include the following two considerations:

- *Technical* feasibility*:* is reliable data available and is it possible to employ a thorough monitoring and verification system that is on par with that for the sectors covered so far (this consideration may exclude agriculture and forests, for example)?
- *Effectiveness of the instrument for the sector in question*. Is the resulting price signal actually visible at the point where reduction decisions would be made and will it thus provide an incentive to get the activity in question unto a 2050 pathway? For certain sectors, such as road transport, which could most simply be included as an upstream system (at refinery level), the price signal may not reach the most relevant levels (e.g. car manufacturers) or be too faint to be made out (for drivers, it would simply mean a few extra cents at the pump).

Taking such factors into account, the only sector presently under active consideration at the EU level is shipping, but an ETS solution is only one of five options considered currently to reduce emissions from the sector.[37] There are no obvious other candidates in sight and any such extension would require "more analytical work" (European Commission 2012d, 9).

An impact on demand from any expansion of the ETS scope would require that only few if no additional allowances would be added to the current ETS cap following the inclusion. New sectors would in all likelihood not be able to receive significant free allocation. Their demand would have to be met out of the share of allowances that are being auctioned. This might raise equal treatment concerns vis-à-vis other sectors (although in principle allocation rules could be changed for all, if need be) and would certainly make any political decision more difficult or at least contested.

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[36] Protest against the EU's decision to also include non-EU carriers in the system, and for flights beyond the EU territory, led to significant diplomatic backlash from several nations. In autumn 2012, the EU announced that it would "stop the clock" on enforcing the sensitive elements for one year and seek a solution on mitigating emissions from aviation through the International Civil Aviation Organisation (ICAO), which had so far not been able to agree on appropriate measures. After an ICAO meeting in October 2013, the EC presented a proposal for a limitation of the scope until 2016 (to EU internal flights, giving ICAO an additional three years. At the time of writing, this proposal is still to be formally adopted by the European Parliament, Without its consent, the "stop the clock" would be lifted at the end of April 2014. See European legislative observatory page at http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2013/0344(COD)

[37] In 2011, the EC held three meetings of an expert working group on shipping, complemented in 2012 by a public consultation (http://ec.europa.eu/clima/consultations/0014/index_en.htm). In June 2013 it published a strategy (COM(2013) 479), including a legislative proposal for an MRV system for shipping (COM(2013) 480) (http://ec.europa.eu/clima/policies/transport/shipping/index_en.htm). This is undergoing co-decision at the time of writing (see EU database on legislative processes (Prelex) at http://ec.europa.eu/prelex/detail_dossier_real.cfm?CL=en&DosID=1041028)

While it is thus possible that **additional sectors could be included in the EU ETS** in the long run (such as shipping), **doing so with a view to having an impact on demand** in the EU ETS **does not seem to be an effective option**. And the choice of sectors should be made only after careful consideration of the effectiveness and thus the suitability of the instrument for the activity in question. For a variety of sectors, other policies may be more suitable.

2.2.3.3 Making the ETS "shock-proof": allowing for targeted flexibility in emergencies

The ETS experience so far suggests that the future is difficult to predict and that course corrections can become a necessity. A review of the system should therefore include a look at options for making such a necessary readjustment transparent and predictable, rather than ad hoc. In its Carbon Market report, the EC calls this option (f), the introduction of a "discretionary price mechanism" (European Commission 2012d). It would in essence boil down to the possibility of influencing scarcity in the market through adding to or subtracting from credit supply.

Despite the recent experience, the introduction of the possibility to adjust is not universally agreed. Many understood the employment of a market mechanism to mean that the "invisible hand" of the market would be acting precisely without additional outside interventions and corrections from the regulator – and are, therefore, suspicious of allowing such changes even as an emergency option. However, the ETS is an artificial market, created by governments, and as such, changes to the rules can become necessary and are justified.

In fact, the ETS directive already contains a provision in Article 29, which demands that the EC monitor market operations and inform the institutions if it is not "functioning properly" through a report. The 2012 State of the Carbon Market report already made reference to this provision, suggesting that such a state has been reached (European Commission 2012d). The article does contain more specific and further reaching provisions, which foresee that action will be taken if "for more than six consecutive months, the allowance price is more than three times the average price of allowances during the two preceding years" ((Article 29a, paragraph 1, Directive 2009/29/EC). Measures are foreseen that could be taken to ease the tightening and increase supply, such as bringing more EUAs to the market (drawing on allowances foreseen for auctioning in the future anyway).

In essence, this means that a type of "shock-proofing" mechanism is already included, although at present only for potential price spikes.

In considering possible options for an expansion of this mechanism to include low prices, a set of key questions arise:

- Predictability: when is an action being considered?
- Transparency: how and on what basis is an action being defined?
- Institutional arrangements: who decides if and what action is taken?

<u>Predictability:</u> defining a "problematic state of the EU ETS" upfront is challenging. A lot of attention has been focused on the EUA price as the one single indicator for measuring performance – but even now judgements as to whether or not the ETS is in jeopardy or not do differ (see results of EC 2013 consultation on structural reform). The political choice with the introduction of the ETS was <u>not</u> to define a minimum price (a key way in which the ETS as a quantity-based instrument was different from a tax). As such, establishing a quantitative

trigger could be as simple as specific price level (possibly over a sustained period of time, such as in Article 29a), but it could also be a composite index, involving multiple variables being included (such as relative prices for coal and gas – historically observed or forecast over a certain point in time). However, any such quantification might not be able to be comprehensive enough to capture a wide range of possible developments in their many possible facets. The level chosen to trigger action should rather be based on an agreed upon analysis as to what signals a price or other indicator level below which the ETS is in trouble. The publication of such assessments should be regular enough so that both market actors and regulators have a level of information that sends early warnings in case an unexpected situation starts developing. For predictability purposes, it should be set in the definition of the assessment methodology what signals or levels of an indicator are considered to be worthy of concern.

Transparency: while it is more straight-forward what action could look like (more so than defining a useful trigger), the two would need to be connected in a logical way. Therefore, again, predefining specific quantifications may be politically difficult but also methodologically limited. For there to be any room to manoeuvre for supply-related actions there must be an amount of allowances from which some could be taken or where they could be returned to (such as the new entrant reserve foreseen as a possible source under Article 29a). Alternatively, rules for access to international credits could be used in the same way (as a store to remove and add credits), but it would be easier to simply have these as a valve to use in case of high prices (and taking away the ability to use such credits for compliance after the fact may carry legal ramifications). Options for taking action could be defined upfront (as in Article 29a) or be defined specifically to suit the occasion. Predefining multiple steps upfront with quantitative triggers and activities to take place in an automated fashion is possible in theory, but may again only be able to provide a solution to a very specific problem – and possibly not be the right reaction for the situation at hand.

Institutional arrangements: at present the EC already holds the function of a monitor for the operation of the ETS, and it can decide on some elements by itself (e.g. setting of the allowance level for phase III, based on the specific rules in the Directive) and refer others to the Climate Change Committee (e.g. action foreseen as possible under Article 29a) and the respective rules accompanying comitology processes, but significant changes need to go through full EU legislative processes, such as co-decision procedure. As Article 29a shows, it is possible to define a (limited) mandate for the Commission and assign the process to follow. However, it is also conceivable to have larger decision-taking power assigned to specific bodies – or to even create a separate entity for this purpose (see below).

Against this backdrop of considerations, one can evaluate possible options for a “shock proofing” mechanism, which include the following:

- Setting a **floor or ceiling** (or both = a corridor) for the operation of the ETS (price based or other), with trigger levels for supply related action
- Employing a system of **rolling caps**, which are adjusted at regular intervals, designed to provide flexibility at certain, predictable intervals.
- Establishing a **separate entity** with powers like a central carbon bank, an Independent Carbon Market Authority (ICMA)

In principle, elements of these options can be combined to create variants, but for the sake of simplicity these three are taken to represent the main types of possible different set-ups.

Floor and/or ceiling: The UK has established a price floor for use at the national level and to realign its domestic policy with the price slump in the EU ETS (Drummond 2013). The Australian ETS (which may now be dismantled) established a price corridor through a floor and ceiling and in fact started in a pilot phase with the floor price being a carbon tax on entities involved. The Regional Greenhouse Gas Initiative (RGGI) in Eastern States of the USA and the Californian ETS both employ price (ceiling) triggers to release extra access to international credits As elaborated above, a simple indicator such as price may have its problems, and should thus serve mainly as a trigger for a further process to be launched, through which action may then be better defined.

Rolling caps: the Australian ETS was set up to assess a set of indicators and decide changes to the cap on an annual basis – but was meant to do this for every five years into the future, to generate enough predictability (Magali Patay and Oliver Sartor 2012). This mechanism is more transparent and predictable, but also complex in its operation. Introducing such a system to the EU ETS would represent a departure from the current system and is as such less likely to find much sympathy, although it may represent a good compromise on key considerations for any shock proofing.

Separate entity: the Australian ETS had established an independent Climate Change Authority (CCA) to perform monitoring and expert analysis for the rolling caps, but it did not have decision-taking power. Setting up a carbon bank-like institution has an expression in EU financial market management, the European Central Bank, and the key difference to other instruments would be that it would hold the power to take decisions directly without further consultation. Depending on the set-up decided, such an Independent Carbon Market Authority could be restricted in the types of measures it could take and the amount of supply adjustment power it could hold. It could have the advantage of giving a supervisory function to a body outside of the current set-up (such as not being directly located inside the EC), and it could take many pieces of information into account. However, it could also lessen predictability and transparency, although this would depend on the design (DG Climate Action 2013).

Under ideal circumstances, the ETS should not be (again) in need of a correction in the supply to guarantee actual reductions and stabilise the price. In any case, the simplest way to avoid price slumps in the future is a strong and ambitious cap for 2030 and beyond, in line with 2050. Any mechanism introduced should only be used under very specific circumstances that represent a threat to the functioning of the ETS (compared to its intended function).

In summary, all options have their respective merits. Independent evaluation and monitoring, is advisable, compared to basing actions on individual, simplistic indicators. Clear triggers for action would provide predictability, connected with a specific and transparent process. A one phrase formula for such a system could be that it should be “rules-based” (Matthes 2013), with specific decisions taken on a case-by-case basis, within a predefined framework.

Table 9: Overview of possible "shock-proofing" mechanisms and their respective qualities

Type of mechanism	Level of predictability (more is better)	Level of transparency (inclusiveness is better)	Level of politicisation (less is better)	Institutional arrangement
floor and ceiling = corridor	+ depends on rules, but clear triggers	+/o strong level of automaticity not advisable, clear process needed	+/o triggers decided upfront, but action could still be controversial	Depends on design
Rolling caps	+ system would be known upfront, regular intervals	++ cap adjustments would be triggered, know in advance	+ with upfront rules and a certain independence	Probably a role for the EC. Decisions via EU processes. Departure from current system
Separate entity (Independent Carbon Market Authority)	o depends on design, but likely less than others	o unless a specific set of options is given, ICMA would hold much flexible power to decide	++ Mandate to would have been transferred, decisions would be independent	New body being set up, may require even treaty change

Source: Ecologic Institute – own assumptions

This means, that **it should be as specific as possible in its course of action, as automatic as possible in terms of when and what action is triggered** (e.g. define a menu of specific actions to choose from). A revision of the directive should also clarify the exact mandate that a monitoring entity, in all likelihood the EC, should have for the preparation of analysis and possible proposals for action – and what process would be followed. Based on the experience with the ETS in its current state, provisions for such possible interventions must be broadened to include price slumps and a monitoring of the climate effectiveness of the system.

In its January 2014 package, the EC has put forward a proposal to amend the ETS Directive to introduce a so-called market stability reserve (MSR), which represents a floor and ceiling mechanism. This would essentially provide a corridor of a maximum (and to a lesser extent minimum) supply surplus, measuring the number of allowances issued into the system (including external credits) against actual emissions (=allowances cancelled for compliance). In years in which these so-called "allowances in circulation" would exceed a maximum of 830 million, an automatic set-aside mechanism would be triggered, placing 12% of those allowances in circulation into the new market stability reserve. If the surplus were below 400 million, allowances would be reintroduced from the reserve in tranches of 100 million, until the reserve is emptied.

This proposal does take up a number of the considerations for an effective shock-proofing mechanism, in that it sets forth a transparent quantitative trigger (based on historic data available to all) with a specific and predictable action to follow – and leaves no space for politicisation of the process. However, there are also several drawbacks.

a) The corridor of 400 to 830 million surplus allowances in circulation still allows for a significant amount of surplus to remain in the system, supposedly to allow for hedging strategies, which would take such amounts "out of circulation" in a broader sense. However, this mechanism does by itself not re-establish actual direct scarcity in the sense that the cap plus any amount of EUAs in circulation represent an amount lower than the actual emissions level. Lowering the floor trigger (to a lower if not negative amount) could change that.

b) The strict automaticity of the action triggered establishes a type of "built-in backloading", which does not allow for any kind of input by relevant authorities, such as the European Parliament for example.

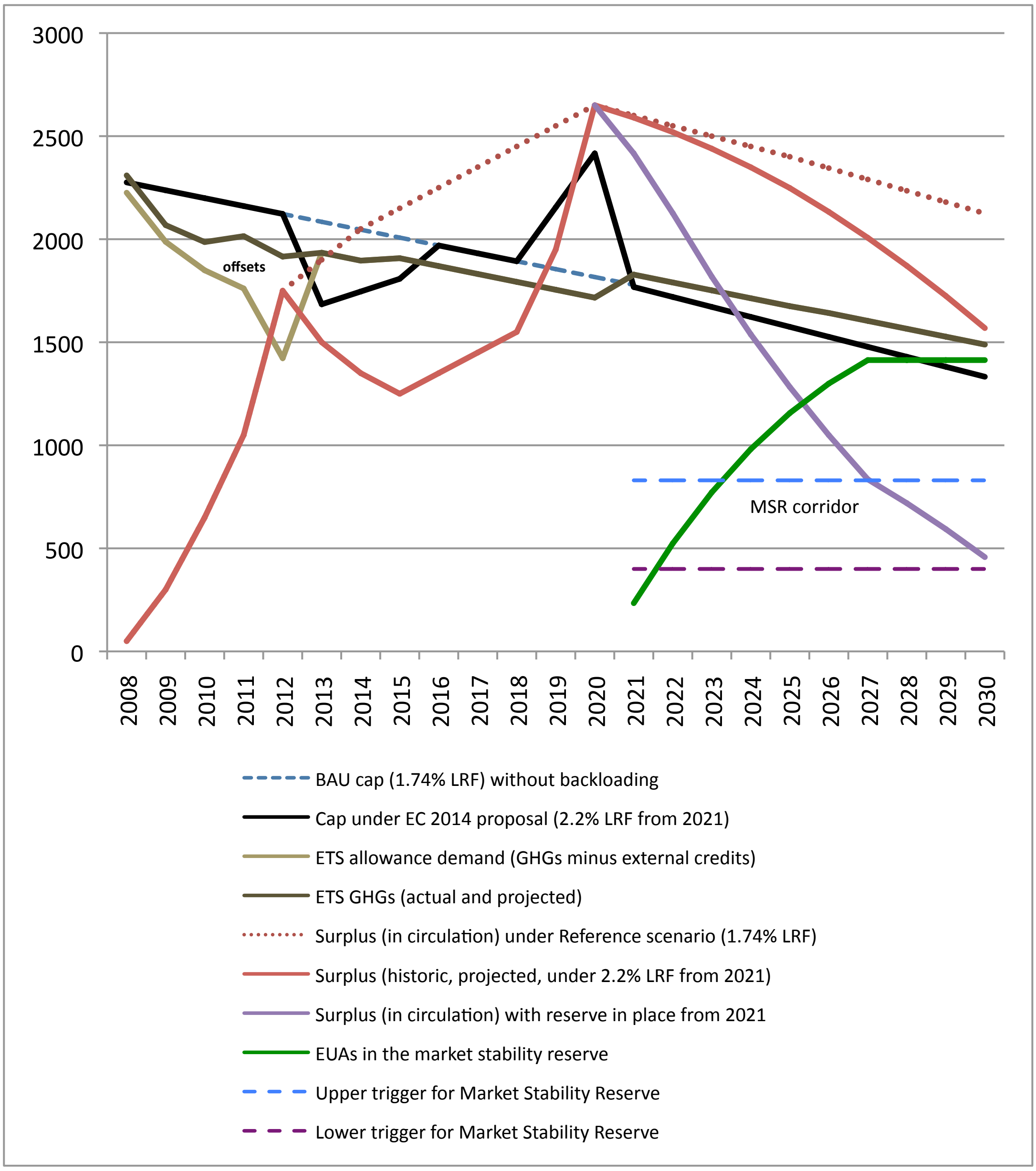
c) On its own, the mechanism does not have environmental benefits other than a potential temporary propping up of the EUA price, since all EUAs moved to the reserve are expected to be returned to the system – there is no possibility given to decide on permanent cancellation of parts of it, or a dedicated use of eventual auctioning revenues for a specific purpose (such as in the case of the NER300).

2.2.3.4 Merit of the EC 2014 proposal for a post-2020 ETS

With its January 2014 proposals, the European Commission has put forward a specific option for a changed EU ETS from 2021 onward. Prior to that, it does not attempt to take on the current excess supply other than through the backloading that had just been adopted politically.

The real merits of the EC's 2014 proposal for post-2020 ETS with a changed LRF and a new reserve mechanism (the MSR) must be measured in terms of its impact on the current and projected surplus for the EU ETS and the overall environmental integrity. Analysis based on the projected surplus under the EC 2013 Reference Scenario (see Figure 13) shows the following: On the plus side, the **surplus actually available in the market is reduced rapidly** from 2021 onwards (albeit from new record levels of over 2.5 billion EUAs). However, **even the combined effect of the two proposed changes to the ETS may not suffice** to take the pre-2020 oversupply out of the system by 2030.

Figure 13 Anticipation of the possible impact of the EC 2014 proposals on scarcity in the EU ETS after 2020 (including backloading)



Source: Ecologic Institute, calculations based on 2010 reference value of 2,199,094,594

The Commission's two-pronged approach is thus effective in principle, but leaves an element of downward price pressure in the system that did not exist at the proper start of the ETS in 2008 and that was not meant to be there (as in: having been anticipated). Not to do away with the undesired effects of historically specific circumstances and design mistakes for yet another full decade cannot be judged a sufficiently rigid approach towards improving the effectiveness of the EU ETS. The fact that only a fraction (around 20%) of the Reference scenario's surplus are actually taken away through the lower reduction factor shows that on its own this measure is not an adequate response to getting rid of excess allowances permanently. **A larger cancellation (or non-issuance) of allowances, already pre-2020, should still be considered.** Furthermore, the provisions of the proposed reserve mechanism could be strengthened, and possible cancellation should be included as a feature.

2.2.4 The ETS companions: push and pull measures to avoid lock-in and support innovation

Over the next 30 years, most of the fossil-fuel based power generation in Europe will have to be shut down or converted to CCS for decarbonisation to succeed. New high-carbon plants (based on hard coal or lignite) without CCS integration have no place in an economically efficient, climate-friendly energy strategy and should not be built. A high enough carbon price from a strengthened EU ETS could be guiding power plant usage away from coal power, but this signal may not come or it may come too late.[38] At the same time, debates over capacity based support mechanisms for investments in non-renewable power generation in many EU MS (such as contracts for difference in the UK) indicate that the current power market set-up may not provide sufficient incentives for the building of new plants in the first place. And a recent report on prospects for new coal-fired plants in Germany, the Netherlands and Spain found that new plants in either country were currently very unlikely (Pöyry 2013).[39] These are indications that even a slightly stronger ETS signal after 2020 may not prove significant for long-term investment decisions in the power sector (see also Section 2.2.7.2 Wider energy market reforms needed, mainly in the electricity sector below). Using the ETS as the sole policy instrument to guide the building of new (low carbon) power capacity may thus be insufficient.

In the energy intensive industrial sectors, technology options for reducing emissions from current processes and products are limited. Alternative process set-ups and alternative inputs or products are not yet available off the shelf, but are being investigated and hold significant potential. Examples from the cement sector: co-firing of biomass in a traditional cement production process could yield up to 35% reductions in cement production. An oxy-fuel firing process combined with CCS could reduce 90% of emissions. However, a magnesium based clinker technology has been developed that is virtually emission free (without CCS).[40] Especially the further reaching new technologies do require dedicated support to be developed further and brought to market.

A strategy for power sector and industrial decarbonisation needs, therefore, policies in addition to the ETS, beyond the support for renewable energy and efficiency improvements. It needs to do three things a) reduce usage of existing non-CCS fossil fuel combustion over

[38] The differential between coal and gas is such that the carbon signal is expected to have to be over 40€ and up to 60€ (to reach the so-called switch price and) to induce a move to lower carbon electricity generation. These are so far unprecedented levels.

[39] The situation may be different in other countries, such as Poland, where state support for domestic coal use in power generation could make new plants economic. BNEF also finds that the economics of coal and gas differ between MS, with CEE countries such as Poland showing more favourable economics for coal over gas (Bloomberg New Energy Finance 2011)

[40] The British company Novacem that developed this technology, has however, gone bankrupt and had to sell their intellectual property. The company's own announcement of the sale came in October 2012 (http://novacem.com/wp-content/uploads/2012/10/Novacem.16-October-2012.pdf). For additional news reporting, see for example Tickell and Macalister 2012

time; b) prevent the building of non-CCS combustion plants and c) support transformative decarbonisation technologies. Such a strategy requires a combination of push & pull policies: a **push** away from (non-CCS) fossil fuel and **pull** for low carbon technology development and deployment, which is particularly important for industry sectors.

2.2.4.1 Push policies to phase out existing high carbon plants: emissions performance standards

There are essentially two main options for push policies in this context.

1) *Market-based instruments* that introduce an extra cost.
2) *Regulation* via standard setting and associated permitting.

Market based instruments: these could be in the form of a carbon tax, for example applicable to GHG emissions from combustion plants. However, with the EU ETS there is already such an instrument in place, introduced specifically *instead* of a tax, making an additional instrument potentially duplicative[41] and certainly politically more difficult to introduce.

Regulation for power plants could be in the form of an Emissions Performance Standard (EPS), a regulatory limitation of the pollution output created and emitted to the environment. EPS for power generation are already in place in Canada, in California, and under consideration for the UK and for the US as a whole[42]. An EPS could include emission limit values, for specific pollutants or GHGs, in the form of, for example, a **maximum limit value of CO_2/kWh**; it could also consist of **energy intensity standards or combustion efficiency factors**. An EPS[43] can bring more certainty over the specific technological path available to the power sector by excluding certain types of plants over time.

In principle, the **Industrial Emissions Directive (IED) (2010/75/EU)** could be a possible basis for adopting emission performance standards at EU level, either as **CO_2/kWh** limit values or as **energy intensity standards**.

- **CO_2/kWh limit values:** While the scope of the directive suggests that it could set EPS for GHG, Article 9 explicitly excludes emission limit values for **"direct" GHG emissions** – unless necessary to ensure that no significant local pollution is caused. In consequence, the IED is not a legal basis for setting a national EPS, such as certain CO_2 emissions per KWh. Recital 9 of the directive states clearly that no emission limit value for direct emissions of the greenhouse gases specified in Annex I should be adopted under directive, in order to avoid duplication of the ETS. In turn, EPS for direct GHG emissions would require amending the IED, which necessitates qualified majority in the Council. Despite the clear wording of article 9 IED, it has been argued that pursuant to Article 193 TFEU CO_2 emission values are in line with the IED (Ziehm 2013; Verheyen 2013). Article 193 allows MS to take more stringent protective measures if they are compatible with the Treaties but it is questionable whether this provision allows measures that are explicitly prohibited by a directive. According to

[41] Such an additional tax could, however, also act as an indirect carbon floor price for the activities subject to the tax.

[42] The Environmental Protection Agency (EPA) published a first proposal in April of 2012 and an updated version in September 2013 (US EPA 2013). The EPS is part of President Obama's climate change strategy and represents the possibility to take action without the need to introduce new legislation, since the Clean Air Act would provide the legal basis for the EPS.

[43] The term is used here synonymously for all types of standards with a similar effect.

one leading commentary, protective measures are admissible if they point to the "same direction of the EU law" (Calliess and Ruffert 2011).

- **Energy efficiency standards**: In contrast to direct emissions, the directive allows energy efficiency **standards** – in principle. Article 11 determines that MS can take measures to provide that installations are operated in accordance with the principle of energy efficiency, i.e. that "energy is used efficiently". Concerning CO_2, the directive states that MS "may choose not to impose requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site" (article 9.2.). In consequence, MS could set an (indirect) EPS via energy efficiency standards, such as requirements on energy input per KWh or combustion efficiency factors. However, the IED contains no specific requirements on energy efficiency. The IED's requirements address issues such as emission limit values for polluting substances, or monitoring and management only but sets no energy efficiency standards. In contrast to emission limit values, which are quantified in the respective annexes, the IED only requires MS to comply with the "principle of energy efficiency".[44]

Irrespective of the legal issues under the IED, it is worth considering a **number of additional and essential aspects of EPS for regulating CO_2 emissions**:

- **Phasing in EPS:** There are many ways in which an EPS could be designed, and an in-depth analysis of each option is well beyond the scope of this paper.[45] A key point of any option is whether the EPS standard is limited to new plants (such as in the UK) or addresses also old ones. EPS covering only new installations would have little effect (Ecofys 2009). Concerns over the economic impacts of a rapid introduction of stringent standards for existing plants can be addressed, for example, by a stepwise application with a dynamic reduction over time. Analysis by Ecofys shows that it is more effective to start early with lower requirements than later with stringent ones (Ecofys 2009) . Table 10 below provides an illustration of how that could be done.

Table 10: Example of possible step-wise approach – differentiated between plants (figures for illustration purposes only)

	2020	2025	2030	2035	2040
Example 1:					
• Dynamic reduction (all plants)	500g	450g	400g	350g	300g
Example 2: differentiation between					
• Existing plants and		500g	500g	400g	400g
• New plants	350g	350g	350g	300g	300g

Source: © Ecologic Institute 2013

[44] It is obliged to set at least the minimum requirements of the Directive the energy efficiency requirements which form part of IPPC are significant in respect of climate change mitigation policies (DEFRA 2012).

[45] See Ecofys 2009 for a variety of scenarios

- **Size of installations covered**: Another critical consideration regarding the scope of an EPS would be the size of installations covered, for example through defining a minimum threshold, such as e.g. 50 or 100MW capacity. This could be used as a means to guide investments. Interestingly, the definition of the scope of the EPS could also be used as a flexibility mechanism. If the threshold was based on actual annual generation, e.g. 1GWh per annum, this could leave peak demand plants out, which could be a way of allowing older coal plants to remain in place as back-up, without compromising the overall effectiveness of the EPS as a tool towards a long-term change towards low-carbon capacity.

2.2.4.2 Pull policies: supporting low carbon technology development

Push policies can induce innovation in that they make existing products more expensive or take them out of the market entirely. However, they are not necessarily designed to facilitate transformational innovation for new technology or products. Market actors need to have a lot of confidence that pioneering investments will pay back before they will engage in such fundamental research. In the energy sector, pull policies have been very successful in this regard in the form of support mechanisms for renewable energy, such as feed-in tariffs. The EC judges, that an Emission Performance Standards (EPS) alone would not suffice for alternative power technology development, such as CCS specifically, as it would “give no guarantee that plants would be built with CCS, and could rather shift investments simply to energy sources with a lower carbon content“ (European Commission 2013e, 21). The same is true for the innovation push that a strong carbon price signal could have on innovation for other alternative industrial processes or products.

Recent work on technological innovation by economist Mariana Mazzucato points out the critical role of the state in investing in fundamental research and thereby delivering those breakthrough innovations that allow the private sector to move forward on that basis, taking the outcome of state-financed research and applying it in the market economy (Mazzucato 2013).

EU financial support for low carbon technology exists, but is limited, and at present levels insufficient. This is evident in the specific example of CCS technology. There are existing financial support mechanisms for CCS pilot projects established through the special reserve created under the ETS (NER300) and the European Energy Programme for Recovery (EEPR) – and the European Industrial Initiative (EII) was created under the Strategic Energy Technology (SET) Plan to support additional research (European Commission 2013e). However, as the EC points out in its 2013 communication on the future of CCS in Europe (COM(2013)180), “despite these efforts, CCS has not yet taken off in Europe” (ibid, p. 4). Of the CCS projects currently in operation world-wide, none are in the EU-28 (while two are located in Norway). Plans for such projects, for example in the UK, “are being postponed or abandoned” (Koelemeijer et al. 2013, 10). Under the first call for CCS proposals to be supported by the NER300 funding, no projects were chosen, due in large part to a lack of co-financing from both public and private investors (European Commission 2013e, 16–17)..

This example of the difficulty to get even pilot and demonstration projects going is evidence of the lack of an economic case for low-carbon innovative technology in the face of a weaker ETS price signal and a current lack of commitment by MS to put money into technology for long-term decarbonisation – and on top of that a lack of trust by investors in the strength of governmental climate ambitions overall. While the absence of CCS may not impede decarbonisation efforts in the power sector, industrial sectors in particular require support to develop alternative materials and processes to go beyond incremental emission reductions. **A dedicated strategy is needed to help overcome the economic "valley of death" for new technologies that could hold promise for decarbonisation in key industrial sectors**.[46]

A stronger EU ETS could provide a much-needed boost for investments in low carbon alternatives and would also provide more funding for the NER300 (which is fed by auctioning revenues), which could be broadened to finance also low carbon industrial technology projects, not just CCS and Renewables. It may also be possible to increase the reserve, or to lower requirements for co-funding. A further reaching option for the medium and long term could also be to provide a premium for low carbon products, such as a feed-in tariff for CCS based steel or a tax break on every ton of low carbon cement. The former is currently being explored in the UK, under its Energy Market reform, in the format of so-called Contracts for Difference (CfD).[47]

Conclusion: a strengthened EU ETS would go a long way towards avoiding further carbon lock-in and helping to phase out non-CCS thermal plants in Europe, and provide a welcome price signal in favour of low carbon innovation. However, market economics in energy may develop in such a way, that other regulation and price mechanisms (such as capacity markets) may come into play. EPS could provide the necessary long-term certainty for the power sector in particular. An EPS could also serve as an important backstop to the EU ETS, should the carbon price signal not be sufficient, especially for the operation of existing plants. An EPS in itself would not, however, necessarily help advance technological innovation sufficiently, and these will require additional pull policies to help overcome the early stages of development and testing. Financial support is required to boost Europe's capacity to develop low carbon industrial processes and products.

2.2.5 Effort sharing: strengthening a yet untested mechanism

The Effort Sharing Decision (ESD) establishes binding annual targets for GHG emissions not covered by the EU ETS for all MS for the period 2013–2020. The ESD requires overall reductions of Non-ETS emissions by approximately 10%, compared with 2005 levels.[48] MS must contribute to these overall reductions according to their relative wealth in terms of GDP per capita. In relative figures, richer MS are required to reduce their emissions by up to 20%; poorer MS are allowed to increase their emissions, up to 20%. Unlike the ETS, the ESD is not set to continue after 2020, **emission reductions targets are only valid for the years 2013-2020** and will not continue after 2020.

[46] See also Wyns 2013 for specific analysis and further recommendations on financial instruments

[47] The UK government published draft terms for the CfDs in August of 2013 (UK Department of Energy and Climate Change 2013)

[48] In contrast to the ETS, the ESD only sets a frame. Within this frame, Member States adopt implementing measures. Although Member States have considerable discretion within the ESD, there are a number of measures taken at EU level that Member States have to apply when reducing Non-ETS emissions. Examples include CO2 emission standards for new cars and vans; measures to improve the energy performance of buildings, eco-design requirements for energy–related products, and energy labelling systems or restrictions on fluorinated industrial gases (F-gases).

As demonstrated in chapter 1, **emissions falling under the ESD were already 10% below 2005 levels in 2012, meaning that the EU has achieved the 2020 Non-ETS reduction target eight years early**. In 2020, they are expected to be 1% below the ESD target even with existing measures. With additional measures the EU is projected to overachieve the ESD target by 8% (EEA 2012b, 63). Chapter 1 also shows that there are considerable differences among MS: as of 2012, Non-ETS emissions could be lower than the respective 2020 targets in 13 MS – with current measures and without the use of flexible mechanisms; eight Member would meet their targets for 2020 with the implementation of planned measures; the remaining six countries would meet their target only through the purchase of international credits (EEA 2012b).

The use of external credits would, however, expand the projected overachievement of the target. This would imply that **the EU as a whole could increase emissions from now until 2020, despite the fact that it is not on track to meet the long term 2050 target**. This pro emission incentive is also problematic because the non-ETS sectors hold large potentials for low-cost reductions. According to analysis by AEA, the ESD target can be met, at an EU level, at no net cost to the European economy. Pursuant to the same study, a further 56 Mt $CO_{2\text{-eqv}}$ of annual emissions reductions in 2020 is available at a cost less than €25/t$CO_{2\text{-eqv}}$. The take up of this cost-effective potential would represent an additional 8.5% reduction in the 2020 emission level, and a total reduction of 14% on the emission level in 2005 (AEA et al. 2012). Going far beyond these estimates, ClientEarth has argued that additional technical and behavioral change mitigation options from recent Commission studies would reduce approximately 39% in ESD sectors by 2020 (or 2030) compared to 2005 emission levels (Holyoak and Poplawski-Stephens 2013).

The **insufficient level of ambition is potentially aggravated by the various flexibility mechanisms of the ESD**. According to Article 3, MS "may carry forward from the following year a quantity of up to 5% of its annual emission allocation". They may also transfer up to 5% of its annual emission allocation for a given year to other Member States. Pursuant to Article 5 of the ESD, MS may also use JI/CDM credits to meet their respective targets. When using credits, project‑based emission credits are capped on a yearly basis up to 3% of 2005 non‑ETS emissions in MS. MS 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 MS or bank it for own use until 2020 (article 5.6.). In addition, MS may use credits from projects under Article 24a of Directive 2003/87/EC, "without any quantitative limit whatsoever" (Article 5.7.).

Although these numbers sound low, it means that up to 750 Mt JI/CDM credits could be used during the period from 2013 to 2020, tantamount to two thirds of the overall emission reductions necessary for reaching the ESD target (Carbon Market Watch 2013). Considering the fact that targets are largely being achieved domestically, these provisions mean that most MS could meet their ESD targets many times over by recourse to offsets, possibly creating a similar build-up of an additional surplus as took place in the EU ETS at the end of the second trading period (if a carry over of AEAs is allowed into the post-2020 period).

In light of framework's current weaknesses, around 40% of MS are not actively engaged in implementing the ESD, according to a recent study (AEA et al. 2012). **The ESD has failed to create strong incentives for substantial additional domestic reduction efforts.**

Despite these significant shortcomings, the **ESD could become a more adequate framework** in the future that meets fully its objectives, i.e. to make "significant greenhouse gas emission reductions within the Union" (recital 11). In its proposal for a 2030 framework, the EC calls for significant strengthening of the ESD.

Essential steps to turn the ESD into such a framework include:

Adequate level of ambition: Most essentially, the ESD needs to set targets that bring the EU's Non-ETS emissions to a level that is consistent with the long-term targets. Quantifying the required level of ambition for milestones towards 2050 depends on the overall reduction target and on what happens in the ETS. In any case, significantly higher targets are required for 2030, to keep the EU on a credible long-term reduction path. The EC proposal of a 30% reduction target (compared to 2005) for 2030 is a step in that direction. It would likely require proportionally higher reductions under the ESD than in the ETS sectors in the decade of 2021 to 2030 (see also

- Table 7: Emissions in ETS and Non-ETS sectors on a 2050 trajectory towards -80% total).
- **Implementation strategy:** Rather than only setting targets and flexibility mechanisms and leaving all else to the MS, a reformed ESD should describe an implementation strategy, with assessments of EU wide policies and measures and their impacts. An overall strategy for the Non-ETS sectors (analogous possibly to the comprehensive approach to EU GHG reductions under the European Climate Change Programme (ECCP)) should include sector specific assessments and could be complemented by explicit sectoral strategies for the main non-ETS emission contributors (transport, agriculture, waste, etc.). At the MS level, the "national plans for competitive, secure and sustainable energy" proposed by the EC as part of a new 2030 governance framework, could serve similarly as the vehicle for Non-ETS implementation strategies, taking into account and reporting also separately on action on renewables and efficiency (see also section 2.4 below).
- **Effort sharing criteria:** Today, the effort sharing formula under the ESD is based largely on GDP per capita. This system is clear, fair and puts the burden – in relative terms – on richer MS. This system, however, has the disadvantage of neglecting cheaper mitigation options, notably in poorer MS. The latter was meant to be realised by the ability to trade across countries, an element that has not materialised also far due to the better than anticipated reductions. Other possible criteria and their implications for 2030 MS targets have been explored in a recent report by the Oeko Institute, looking at cost efficiency, equal reduction effort, per capita emissions and economic capacity as possible bases for distribution (Hauke Hermann et al. 2014). They show, that the choice of allocation method can have significant differences in targets for MS with very specific circumstances. The NGO ClientEarth has published a specific proposal for a new sharing criteria, based less on GDP per capita and more on the geography of most cost effective reductions (ClientEarth 2013). While this proposal has the potential advantage of reducing costs, it has the inherent disadvantage that poorer MS would have to reduce relatively more emissions than under the current system. This makes financial support indispensable and thus the system likely more complicated (certainly the political negotiations around it). Apparently in line with this logic, the EC proposed in early 2014 that "each Member State's GHG reduction target should continue to take into account these distributional factors while ensuring the integrity of the internal market, for example, in relation to energy efficiency and energy using products. Given the importance of future investments, solutions that contribute to improved finance will also be required".

- **Flexibility mechanisms:** Although there is little experience with the ESD flexibility mechanisms, current standards on the use of external credits threaten domestic action and thus the effectiveness of the ESD. Removing the use of such credits from the ESD entirely or at least tightening the limits on the quantity substantially would strengthen domestic action, which is in line with the recital 11: 'the use of credits should be limited so that it is supplemental to domestic action.' In addition or alternatively, community level projects under Article 24a could be prioritised over international off-sets by requiring a minimum proportions of Article 24A (ClientEarth 2013) if any offset credits are to be used at all. In general, harmonisation of rules between the EU ETS and the Non-ETS sectors is advisable. For example, international credits from industrial gas projects that destroy HFC-23 and those reducing N2O are prohibited in the EU ETS from May 2013 onwards – the same should apply to the ESD. Beyond offsets, the option to carry over and carry forward emission allowances could be limited.

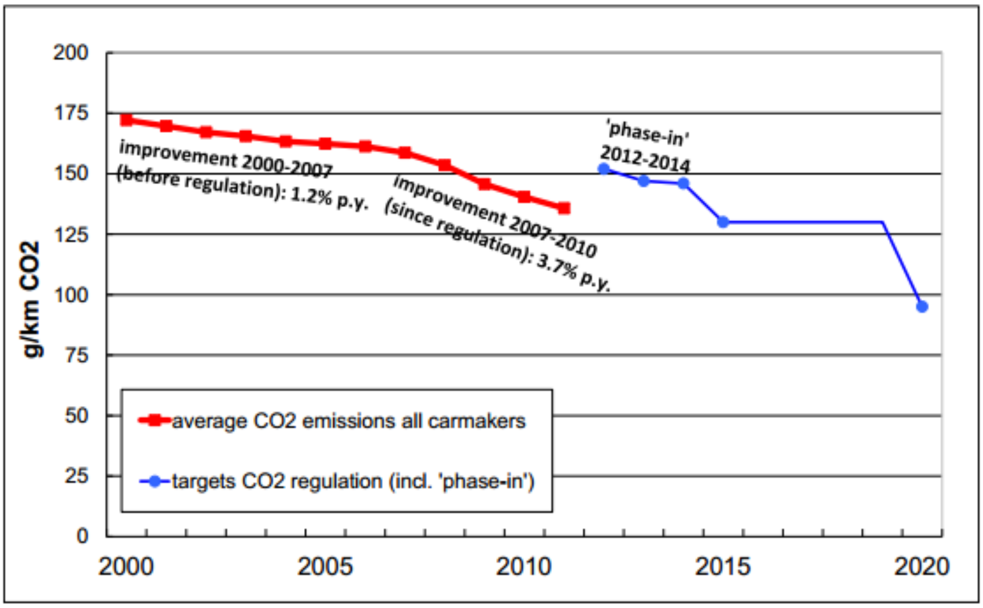
Such reformed ESD would form a solid frame to reduce Non-ETS emissions. However, the **debate on how to break down and divide up Non-ETS reduction efforts among the EU's 28 Member States is likely to be controversial**.

2.2.6 Emission Standards for Cars

According to **current legislation**, car manufacturers are required to reach a fleet average of 130 g CO_2/km by 2015.. For the time after 2015, the Commission's proposal from June 2013 would have set the requirement at 95 g CO_2/km by 2020. This proposal was not accepted at the October meeting of EU environmental ministers (Council of the European Union 2013b). Germany gained support from other countries for its requested change to the proposal, countering with a proposal to extend the deadline for the achievement of the 95 g limit to 2024 (Banks 2013). In the following negotiations between Council representatives and negotiators of the European Parliament the phase-in period was limited to one year. The final regulation requires that in 2020 95 % of new car sales have to comply with the EU target. By the end of 2020 this share is raised to 100%. The regulation also contains flexibility mechanisms such as the option to pool fleets from multiple manufacturers to meet the fleet average standard and the limited use of "super credits" from 2020 to 2022 for very low emission vehicles (50 g/km or less). For the three year time period, a limit of 7.5g of CO_2/km was introduced for the use of these "super credits". In order to prepare for the years beyond 2020, the regulation will be reviewed by the European Commission in the end of 2015 (European Parliament 2014b; Council of the European Union 2014)

The automobile industry is already on the path to meet the 130 g/km target before 2015, and if it continues on its current trend, the rate of progress is more than enough to meet the 95 g/km goal by 2020, as indicated in the figure below.

Figure 14: Fleet-average CO2 emissions of new cars in the EU versus regulatory CO2 targets



Source: Dings 2012; EEA 2013a

Additionally, studies have found that a stricter emissions standard is technically possible for 2020. Achieving between 80 and 85 g/km would be technically feasible by 2020, though the costs would be higher than for the 95 g/km standard. This would require an overall shift towards smaller cars. Fleets would have to include more electric and hybrid vehicles, and other technologies such as light-weight bodies would have to be applied on a wide scale (Wells et al. 2010; Sharpe and Smokers 2009).

Despite these efficiency improvements, **overall progress towards the 2030 goal of minus 20% compared to 2008 and the long-term transport climate goals – overall GHG reductions of 60% by 2050 – remains insufficient** (EEA 2012a). Increases in absolute demand for transport have cancelled out progress in emissions reductions made by increased efficiency. A study for the Commission found that rebound effects of higher fuel efficiency can offset the gains in efficiency, especially in the long term. The study predicts that the 27% emissions reduction resulting from efficiency improvements , i.e.130 g/km to 95 g/km, will lead to actual emission reductions of only 22.1% (short term) and 15.2% (long term), (Smokers et al. 2011, 21). In addition, recent studies found a growing gap between manufacturer type-approval test values and real world fuel efficiency, suggesting that fuel efficiency standards may not provide a reliable indicator of emissions from cars.[49]

[49] Comparisons of real world fuel efficiency data and manufacturer type-approval values indicate that the discrepancy between manufacturer test values and real world values are significant. According to data from Germany, the gap has grown from 8% to 21% between 2001 and 2011, and an Austrian study found an average gap of 17% in 2009 (Mock et al. 2012). Testing procedures do not accurately reflect real-world driving behaviour, and in this way deliver inaccurate estimations of fuel efficiency.

In consequence, while efficiency improvements remain an important instrument, they alone will not reduce emissions by 20% in 2030 or 60% in 2050. Additional instruments are essential, as presented in the Staff Working Paper accompanying the Commission's 2011 white paper on transport. To meet the transport emission target, a **comprehensive mix of policies is** required, which addresses behavioural, technological, and structural issues (European Commission 2011c). Next to improved fuel efficiency in cars, other options such as reducing travel demand, electrification, and modal shift are indispensable to meet climate goals (White and Anderson 2012). The EC confirmed these views in its proposal of a 2030 framework, calling for "a gradual transformation of the entire transport system towards a better integration between modes, greater exploitation of the non-road alternatives, improved management of traffic flows through intelligent transport systems, and extensive innovation in and deployment of new propulsion and navigation technologies and alternative fuels" (European Commission 2014a, 14)(EC, 2014, p. 14).

2.2.7 Renewable energies

Most decarbonisation scenarios suggest significantly increased shares of renewable energy, some up to 45% of gross final energy consumption by 2030 and between 55% and 75% by 2050. Renewable energy sources dominate the energy mix in all low carbon scenarios for 2050 (Charles et al. 2013, 13). Their share is projected to be highest in the electricity sector where close to full decarbonisation appears feasible and lower in the heating and cooling and the transport sectors. The EEA expects that – beyond the EU ETS itself and the implementation of the EED – the largest emissions reductions are expected via measures supporting renewable energy (EEA 2013c, 93).

In its communication for a 2030 framework, the Commission has proposed a renewables target of at least 27% (European Commission 2014a) which is significantly below requests from environmental and green industry stakeholders. Given the strong plea from several MS, including the UK, for not renewing the renewables target at all, the relatively low target can be interpreted as a compromise. The EC has proposed that the target should be binding at the EU level, but MS would be free to determine their own national level targets, preferably in coordination with neighbouring countries. Similarly to the current EED process, the Commission is aiming to ensure that the EU target will be met in an iterative process. Also, the proposal does not foresee a sectoral break-down of the target. The Commission expects the electricity sector to deliver the biggest contribution – at least 45% in 2030 – and sees a shrinking role for renewables in transport. Detailed planning will be left to the MS.

It remains to be seen how the current instrument set for promotion of renewable energies will be transformed in the 2030 framework. In contrast to the ETS Directive, the Renewable Energy Directive does not automatically extend beyond 2020. Its aim is to support the demonstration and commercialisation of renewable energy technologies. It is thus built on the assumption that these technologies will at some point reach maturity and become competitive with conventional energy generation technologies. The directive with its mandatory targets and the national support schemes implementing them has achieved significant progress towards this aim. The scaling up of global production volumes and technological advances have allowed producers to substantially cut costs per unit. Photovoltaic modules experienced the biggest plunge, with prices down by 76% between 2008 and 2012, while onshore wind turbines became 25% cheaper during the same time period (McCrone 2012). As a reaction to this progress, the Commission now differentiates between 'mature energy technologies' (such as to onshore-wind and large-scale PV plants), and new and immature technologies with high potential (such as off-shore wind and concentrated solar power) on the other hand. For mature technologies subsidies should be phased out between 2020 and 2030.

This logic assumes that mature renewable can become competitive in the electricity markets. But it becomes increasingly clear that this is not the case. In the electricity sector, the regulatory challenge for the time after 2020 is thus not so much about renewing, adapting or harmonising support schemes but about transforming the electricity system so that renewable energies can become its central pillar. By contrast, most renewable energy technologies used in the transport and heating sectors still have substantially higher costs than fossil fuels and will also require targeted support between 2020 and 2030 (see above).

2.2.7.1 Remaining need for support schemes, mainly in the heating and transport sector

In the heating and cooling sector, cost reductions of renewables compared to their fossil fuel alternatives are slower than in the electricity market. Between 2005 and 2011, the renewables share grew at 4.4% per year compared to 6.4% in the electricity sector (EEA 2013c, 119). Projections by the EC suggest that their share might even decline in the future (European Commission 2013b, 4). In addition to further efforts to remove administrative barriers, financial support will thus be required beyond 2020 to tap the large remaining potential for renewable deployment (Sanner et al. 2011). Administrative barriers include cumbersome planning and permitting procedures, building codes and facilitation of infrastructure investment, e.g. in heating networks.

In the transport sector, economic viability of biofuels without subsidies is also not in sight. However, in contrast to the heating sector, the further expansion of first generation biofuels beyond the current level is also not advisable given its doubtful environmental performance, negative social impacts and high costs (Charles et al. 2013). On the contrary, the Commission's proposal to end public financial support for food-based biofuels after 2020 appears to be the appropriate course of action. Investments in first generation biofuels should be replaced by intensive efforts to reducing energy demand in transport. Future measures will need to include stricter efficiency standards, but also non-technical measures to increase bike riding, train use and walking while reducing distances travelled. Alternatives, such as second generation biofuels based on wastes and residues or renewable electricity, are under development, but still face economic and technological challenges which will limit the potential for up-scaling between 2020 and 2030. Because of these challenges second generation biofuels are a risky bet.

This analysis points to two conclusions: First, more than in any other sector, reducing energy demand is the key lever for GHG mitigation in the transport sector (see above). Second, the limitations of renewable deployment in the transport sector and the potential role of electric mobility underline once more the importance of a significant and swift built-up of renewable capacity in the electricity sector which is the subject of the following section.

2.2.7.2 Wider energy market reforms needed, mainly in the electricity sector

National support schemes to incentivise the deployment of renewable electricity technologies include diverse instruments, but the most widely-used are 1) Feed-in-tariffs (FITs), 2) Quota

Systems, 3) Premiums and 4) Tenders. All instruments have their respective strengths and weaknesses. One challenge with FITs, the most commonly used instrument, is the limited control on the total quantity of RES installed. Since they are not linked to market prices, basic FITs also do not give an incentive to plant investors to locate and operate their plant depending on the needs of grid operators who continuously have to match electricity demand and supply. To address this problem, FITs have been combined with forms of direct marketing of RES electricity by operators, backed up by the FIT. Quota systems, in turn, have performed less well than price-based mechanisms in terms of RES built-up and costs per unit (Butler and Neuhoff 2008). Under quota systems, the investor risks tend to be higher because the future cash flow depends on fluctuating certificate prices, leading to higher financing costs and limiting investments by private and community-based investors. MS have tried to address these challenges by mixing elements of price- and quantity-based systems (e.g. by introducing minimum and maximum prices in certificate trading or quantity-based tariff reductions in FITs). However, the deficiencies outlined above do not only reflect limits of the support instrument. Rather they are symptoms of the power sector's transformation from a centralised, fossil fuel and nuclear-based system to a decentralised generation based on intermittent sources (Diekmann et al. 2012).

Most MS currently have so-called energy-only markets. In this system, electricity prices are determined depending on the variable costs of the last additional plant needed to satisfy electricity demand in any given hour. Since solar and wind have close to zero variable costs, they push electricity spot market prices down (Jensen and Skytte 2002; Weigt 2008). With rising shares of solar and wind in the mix the prices will approach zero and will not allow investors to refinance capital costs. Increasingly, fossil fuel and biomass plants will also face difficulties to even refinance fuel costs. Intermittent renewable energy sources can thus not become competitive within the existing market design. A pathway towards a fully decarbonised power generation will require a wider energy sector reform. Intense discussions about the future energy market design, e.g. about the need for capacity markets or mechanism, future connection between the heat and electricity systems and the need for electricity storage are ongoing at MS and EU level.[50]

The conclusion for the instrument discussion is that a revision of the Renewable Energy Directive is desirable. **The strong commitment signal, that only a mandatory target can provide, should be maintained to encourage further investment** in renewable energy capacity. This, in turn, is the main lever to bring down unit costs.

The 27% target for 2030 that the Commission proposed in January 2014 is better than no target, but it clearly lacks ambition. The fact that MS will not take on binding national targets is likely to increase fragmentation in renewables promotion across the EU. Some MS will continue to heavily invest in renewables, while others are likely to turn away fearing high costs. First signs of roll-back are visible e.g.:

- in Spain which scrapped its FITs in January 2012 due to a discrepancy between rising costs and limited revenues from electricity sales where prices are regulated;

[50] This discussion is outside the scope of this study. The 2050 Energy Roadmap (European Commission 2011e) or a recent paper by the SWP (Geden and Fischer 2014) provide good overviews of the challenges.

- in Italy which stopped support for PV provided by the Fifth Energy Account (Conto Energia) when the programme reached a preset cap of €6.7 billion in June 2013.
- In the Czech Republic which has limited FITs to plants with capacity of up to 100kW and excluded PV.

Also, an adapted Renewable Energy Directive alone will not be enough. The challenges for a post-2020 energy policy is not to adjust support schemes or to harmonise them but to transform the entire energy system – regulation, infrastructure, and market design – so that renewable energies can become its central element. Markets need to allow RES to refinance the capital cost of investments, particularly wind and solar which have very low marginal costs (International Energy Agency 2013, 12). The Commission has a done a first step on infrastructure by reaffirming the 2002 goal of increasing interconnection capacity to 10% of installed generation capacity, but has not expressed a vision for a revised energy market design.

The perfect regulatory solution does not exist yet. In this learning process, a method of trial-and-error is vital to collect experiences and diffuse the best-performing instruments. The evolution of the support schemes over the last decade clearly shows that this type of diffusion is taking place between MS. In a fully harmonised system, the risks of picking a low-performing instrument are much higher. In addition, the EU's role could be to work swiftly towards a physically integrated grid by extending interconnections between national electricity grids and by extending market coupling.

2.2.8 Energy saving and efficiency

Energy saving is the **backbone of decarbonisation**. Without drastically improved energy efficiency and high rates of energy saving, decarbonisation is a mission impossible. Accordingly, the overall energy consumption decreases significantly across all decarbonisation scenarios (European Commission 2011b). According to the Low Carbon Roadmap, for example, consumption would fall from 1,740 Mtoe in 2020 to around 1,650 Mtoe by 2030, and would accelerate even further after 2030, with projected gross inland energy consumption falling to 1300 - 1350 Mtoe by 2050. Compared to the peak demand in 2005, primary energy demand will have decreased by some 32% to 41% by 2050.

The EU is, however, not on this decarbonisation path. It is unlikely that the EU will meet its efficiency target in 2020 (EEA 2013c, 11). In its 2013 reference scenario, the EC estimates that energy savings would continue to marginally increase up to 2035; but after 2035 energy consumption would marginally grow (European Commission 2014c, 26). The potential consequences of insufficient gains in energy saving are significant, because every extra unit of energy demand caused by a failure on efficiency would have to be generated from zero carbon sources (White and Anderson 2012).

Although deficient, the EU frame on energy efficiency has helped save energy, in particular in MS with low levels of ambition. A recent study showed that without EU directives no or almost no activities would have been carried out in their countries. Many experts especially consider the (first) EBPD (Directive 2002/91/EC on the energy performance of buildings) a milestone, catalysing a new legal framework (Schüle et al. 2013).

Reforming EU climate and energy policies after 2020 **must address this shortcoming. At EU level, there are a number of options, in particular** the following

2.2.8.1 Energy Efficiency Directive

The new **EED** – adopted in late 2012 – is the key EU policy instrument for saving energy. The EED reforms EU energy efficiency policies fundamentally. The EED repeals the Cogeneration Directive (2004/8/EC) and the Energy End Use Efficiency and Energy Services Directive (2006/32/EC). The EED, adopted in 2012, was not part of the 2008 climate and energy package. The EED "establishes a common framework of measures for the promotion of energy efficiency within the Union in order to ensure the achievement of the Union's 2020 20% headline target on energy efficiency and to pave the way for further energy efficiency improvements beyond that date" (article 1.1. of the Directive). The 20% target is defined in Article 3.1 as a maximum of 1,474 Mtoe primary energy or 1,078 Mtoe final energy consumption in 2020.

Article 3.1 requires MS to set **indicative national energy efficiency targets** ("based on either primary or final energy consumption, primary or final energy savings, or energy intensity). The EED obliges MS to notify these targets to the Commission by 30 April 2013 (article 3.1). As of June 2013, all but two MS have notified 2020 targets (European Commission 2013f). Because of incomplete submissions and comparability problems[51], it is not clear whether the implementation of notified targets would result in savings of 20%. The Commission stated cautiously that "based on these targets, a preliminary conclusion is that these MS are collectively working towards a level of ambition that is close to, if not compatible with, the overall EU target for 2020. [...], a final conclusion on the overall level of ambition can be drawn only once all targets and levels are reported."(European Commission 2013a, 4) It should be noted, however, that "the notified 18 primary energy values sum up to 1,247.8 Mtoe, or 84.7% of the EU target of 1,474 Mtoe in 2020, while these MS accounted for 82.6% of EU primary energy consumption in 2010. The 18 final energy values sum to 764.4Mtoe or 70.9% of the EU target in 2020, while these MS accounted for 67.7% share of EU final energy consumption in 2010" (European Commission 2013a, 4).

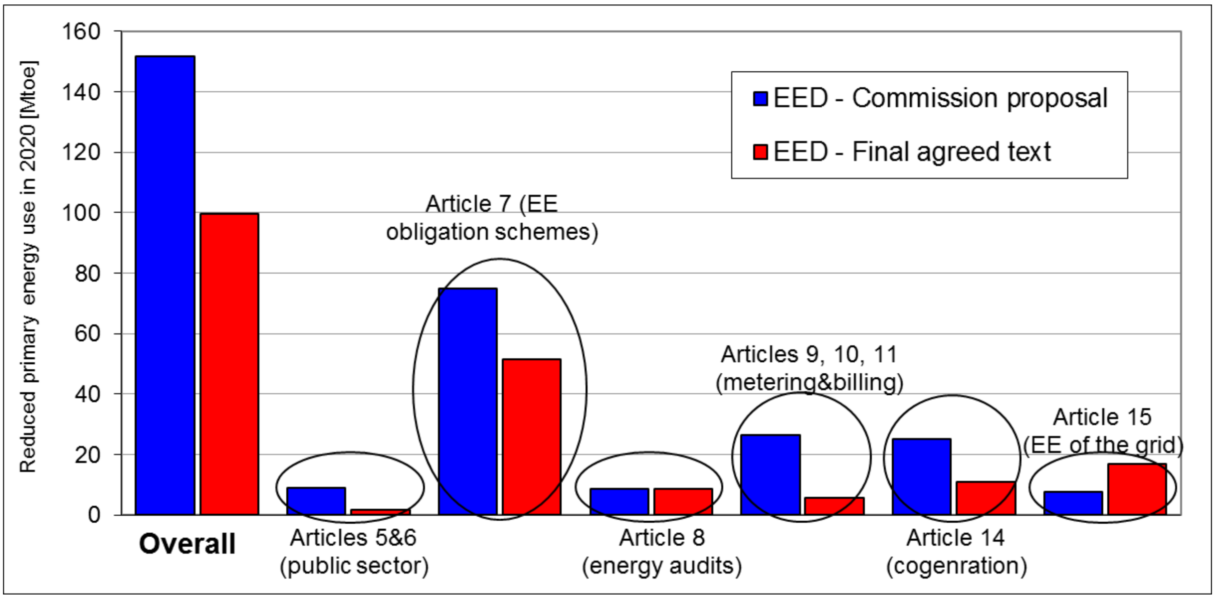
Accordingly, there is still a gap (Coalition for Energy Savings 2013b): **even the notified targets would not enable the EU to meet its 20% target**. According to calculations by the Coalition for Energy Savings, eighteen targets available do not reduce the gap to the EU's 20% energy savings target; if the remaining nine country targets are of similar ambition the EU would only realise 17% energy savings, falling short of the target by 62 Mtoe - nearly the annual energy consumption of Belgium (Coalition for Energy Savings 2013b).

Like MS targets, instruments envisaged by the EED are unlikely to improve energy efficiency by 20%. Contributions of the **EED's specific instruments** do not add up to 20%. The EED introduces a number of obligations for MS on efficiency in energy use, such as renovation of buildings, public procurement, energy efficiency schemes, energy audits and management systems or metering and billing, and efficiency in energy supply, such as promotion of cogeneration. These measures could result in 15% energy savings by 2020 (Groenenberg 2012). The gap with the 20% target will be filled partly by additional fuel-efficiency regulations under the Ecodesign Directive, resulting in another 2% savings. The Coalition for Energy Savings "Gap-o-meter" shows that the EED minimum requirements for measures adopted in the EED will not be enough to achieve the EU energy savings target and will, in fact, leave a

[51] Some MS targets, for example, focus on primary energy consumption, other on gross final energy consumption or primary energy intensity. MS use different base years or use different modeling frameworks (EEA 2013c, 126–128)

gap of around 94 Mtoe (Coalition for Energy Savings 2013a). The following figure by the EC also gives an indication of the saving potential of the draft EED and the agreed EED (Donnelly 2013) and identifies a considerable gap between the saving potential of draft directive and the adopted directive:

Figure 15: Savings potential of the draft and final version of the Energy Efficiency Directive



Source: European Commission

Against this background, it appears very likely that the EU will not meet the efficiency target, even with the EED. Consequently, it is probable that the **EC will propose further measures in mid-2014**, when the EED review is due.[52] The review cycle as set out in the EED makes an earlier proposal politically unfeasible; the lack of lessons learned from the implementation of the very new EED is another strong argument against proposals before mid-2014. Although there are no experiences with the implementation of the EED, a stronger EED should include the following key measures – in broad terms[53]:

- **Legally binding target:** Some have argued against a legally binding target because such target would have only limited added value if binding EU legislation would be implemented at the same time (Koelemeijer et al. 2013). However, experience has shown that legally binding targets have a considerable normative force, as demonstrated above. The earlier that legal certainty can be given through a binding target, the easier and the cheaper it will be for businesses to start investing in the right energy efficient measures (Vitali Roscini 2011). Given the fundamental importance of energy savings for decarbonisation, a binding saving target would be a

[52] The EED introduces a monitoring system. According to article 24, Member States report on the progress achieved towards national energy efficiency targets annually. The Commission reviews progress by the end of June 2014 and assesses "whether the Union is likely to achieve energy consumption of no more than 1 474 Mtoe of primary energy and/or no more than 1 078 Mtoe of final energy in 2020" (article 3.2). The Based on this assessment, the Commission may issue recommendations to Member States and may propose, if considered necessary, further measures.

[53] A detailed analysis of the complex issues is beyond the scope of this study.

major step forward. The EC proposals of early 2014 did not exclude such a target. Instead the EC stated that the review would, among other things, "consider whether energy intensity improvements of the economy and economic sectors, or absolute energy savings or a hybrid of the two represents a better benchmark upon which to frame a 2030 objective" (European Commission 2014a, 8).

- **Effort Sharing:** Some stakeholders have suggested that the EED should already have allocated national responsibilities to share reduction effort among MS. Effort sharing schemes have been successful in setting specific targets for MS; they have accommodated national circumstances and overall EU requirements. However, there no significant experience with the flexibility mechanisms under the GHG effort sharing decision. They helped to reach agreement and to conclude negotiations, but have not proven to facilitate implementation.
- **Renovation of buildings:** Article 4 of the EED simply requires MS to establish a strategy for mobilising investment in renovation of buildings, public and private. This requirement is unlikely to improve energy efficient as required by climate change policies. Energy efficiency through renovation of buildings would improve significantly if the EED would overhaul today's system where minimum energy performance requirements are set nationally. This system leads to widely differing standards, sometimes to very low standards.
- **Include private buildings:** The EED only sets a 3% renovation obligation for buildings owned by public bodies; these represent less than 12% of the EU building stock
- **Monitoring:** The EED should also require MS to put in place an independent system of monitoring and verification to ensure that the obligated parties do not over-estimate their savings but deliver real savings.

2.2.8.2 Ecodesign: Performance Standards and Labelling

The Ecodesign Directive, adopted in 2005 and revised in 2009, currently covers twelve **product groups**, and five more groups are covered by energy regulations. 37 further preparatory studies are in the process of being conducted.[54] Under the current Working Plan (2012-2014), seven more product groups are being prioritised for investigation by 2014, and 5 additional groups are being conditionally considered (i.e. launching a preparatory study is contingent on the outcome of other ongoing regulatory processes and/or reviews, so that double regulation can be avoided) (European Commission 2012e, 5). A separate study investigating the power savings potential of electricity generating equipment will also be conducted.

During the period 2012-2014, the focus will be on implementing regulations adopted since 2005, including for the product groups identified as priorities in the 2009-2011 Working Plan, and on preparatory work for implementation of the 7-12 groups identified in the 2012-2014

[54] Multiple preparatory studies are conducted *within* each product group – it therefore cannot be assumed that 37 new product groups will be implemented in the future. Information on how many product groups are being investigated, when the preparatory studies will be completed, or when the measures will be put into effect is not available.

Plan. By 2014, regulations should be in force for 13 product groups (ten ecodesign regulations, three energy labelling measures) as well as two voluntary agreements.

According to an **assessment study**, Ecodesign has been particularly effective in improving efficiency in lighting, and has also had impacts in stand-by power use, circulation in buildings, and electric motors. The study found that efficiency increases in most other product groups cannot be attributed directly to Ecodesign, but may be the result of natural market development (Center for Strategy and Evaluation Services 2012, 3). It was also determined that the Directive had a positive impact on promoting innovation and the uptake of innovative technologies, although this was not an explicit objective of the Directive (Center for Strategy and Evaluation Services 2012, 4).

However, the **full potential of the Ecodesign directive has not been maximized**. The 12 products currently subject to active Ecodesign regulation are estimated to have an energy savings potential of about 12% of final electricity consumption by 2020 (compared to 2009, when the directive was revised) (European Commission 2012b, 4). However, there are many more products that fall under the current scope of the Ecodesign Directive and *could* therefore be regulated. If regulations are implemented to cover all product groups eligible under the current Directive, they would comprise 80% of the EU's total electricity consumption (with Energy Using Products comprising 50%) and 60% of heat consumption (Molenbroek, Cuijpers, and Blok 2012, 2). Due to limited capacity, only a small number of product groups are targeted as priorities in each Working Period.

Ecodesign could be made more effective by taken the following steps, among others:

- Expanding the Ecodesign Directive to **other product groups**, namely cars and new fossil fuel power plants, or to non-energy related products such as clothing or toys. The idea behind this is to create a real top runner model with the most efficient products setting the benchmark for further products. However, the Directive could not be extended with an equivalent extension of financing – in order for measures to be effective, resources available for the program must increase more than the increase of scope, otherwise the instrument will become overwhelmed by backlog and effectively become useless (Center for Strategy and Evaluation Services 2012, 6).
- Increasing the **pace of regulation implementation**. This addresses the problem created by outdated data reducing the effectiveness of regulation and eliminates the unused potential of the Directive. In order to achieve this, more resources would need to be dedicated to Ecodesign at EU and MS levels.
- Introducing **mandatory online product registration** systems for manufacturers. This has proven effective in Australia and the US and would streamline monitoring and assessment (Molenbroek, Cuijpers, and Blok 2012, 20).

2.2.8.3 Energy Performance of Buildings Directive (EPBD)

The **buildings sector** accounts for 40% of the EU's total energy use and 36% of the EU's GHG emissions. The buildings sector also makes up 9% of EU GDP and 8% of employment (European Commission 2008, 2). Indirect emissions associated with electricity used within buildings are assumed to be captured by the ETS, as it applies to electricity generation, so buildings fall outside the scope of the ESD (AEA et al. 2012, 1).

The EPBD requires MS to establish **minimum energy performance requirements**, though the EPBD does not specify the level of these requirements. It also includes requirements on MS to establish energy performance certificate systems, an overview of financial and other incentives, and for all new buildings to be nearly-zero-energy buildings by 2020.

The historical **trend in emissions** in the buildings sector has been a gradual decline but with large yearly fluctuations (AEA et al. 2012), though total energy consumption of buildings has increased slightly (Lapillonne et al. 2012). Changes in emissions from the buildings sector tend to be slow because buildings are characterized by multi-decade renovation cycles and long lock-in periods, and much of the European building stock dates back far before the existence of energy efficiency standards. Regulation of the energy consumption of buildings or the increase of the refurbishment rates is therefore a challenge, also because efficiency improvements in buildings are often extremely cost effective. About 70% of the abatement potential in buildings, which is estimated at up to 118 Mt CO_2 more than in a business-as-usual scenario, would lead to overall savings greater than overall costs (AEA et al. 2012, 3).

Energy efficiency measures in buildings are subject to many **significant barriers**, including information barriers and poor communication of incentives and regulation schemes, high up-front costs and hidden benefits, market failures such as misplaced incentives in rental buildings, behavioural barriers among individuals and companies, missing political leadership, and structural barriers. These factors contribute to a disconnection between policy goals, funding, and action. Concerning measure at EU level, the EEA concluded that "an effective implementation of the measures introduced by EU Directives will require a higher degree of harmonisation and integration" (EEA, 2013). The EEA also argued that measures in different sectors are not well aligned and that 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.).

Opportunities for improvement of the EPBD and energy efficiency in buildings include, among others:

- Establishing standards for the existing building stock.
- Improving coordination and information exchange between investors, target groups, and sectors, especially in non-domestic and public sectors (Maldonado 2013, 76). This is possible by identifying which types of investment schemes work best with which sector and institutional framework. Better awareness and leveraging of EU and national funding opportunities is also necessary. A critical mass of good examples to inform MS of successful applications of EU funding would facilitate this.
- Equating energy efficiency in buildings with high quality. It needs to be clear to investors that only with high energy efficiency can a building constitute a good investment (Maldonado 2013, 76).

2.3 Coherence of Climate Policies

"Coherence" is a term of growing importance in climate policy discussions, although its meaning can vary and is generally rather vague. In the political and academic discussion, the question of coherence is closely related to the question of how many (targets) and which instruments should be part of the climate policy instrument mix. In classical economic theory, the optimal solution would be a unified carbon price for all emitters: this approach would be coherent by definition and, pending certain assumptions, every reduction goal would be reached with minimal costs. Therefore, is it argued that climate policy should ideally rely on a single instrument: an ETS which covers all sectors (e.g. buildings, transport, industry, and energy). This argumentation is simplifying the complexity and multiplicity of climate policy for the following reasons:

- **The reality of emissions trading:** the reality of emissions trading is, like all instruments, the product of political negotiation and must accommodate diverse legal, institutional, and political frameworks. Consequences of this are i.a. unambitious emission limits, various exceptions and compensation schemes, a continuation of free allocation – all provisions which undermine the efficacy of the instrument but could not be dealt with differently due to a host of reasons. The efficacy of the instrument therefore remains less than the theoretical ideal.
- **Long-term reduction goals will be missed:** the long-term decarbonisation goal requires i.a. a quick and comprehensive restructuring of existing energy infrastructures with a planning horizon of multiple decades. It is debated whether ETS can in practice drive the required investments, or if it might not be necessary to have other flanking instruments (such as public funding for technology development and market penetration). The ETS may be better suited to incentivize short- and mid-term reduction potential on the basis of existing technologies as well as their further development. Intelligently guiding investment, not to mention research funding, could support such ETS functionality and need not be in contradiction.
- **Not practical for diffuse emissions sources:** ETS is difficult to implement for sectors in which monitoring emissions costs a great deal of effort (e.g. Agriculture and forestry, but also small emitters). In these cases, transaction costs for the measuring and reporting may outweigh the benefits from efficiency gains. The problem of monitoring in these sectors exists with other instruments as well. However the precision of information about emissions is often lower than with ETS. The high transaction costs for diffuse sources could be avoided by an "upstream" trading system, in which preparation of fossil fuels would fall under the ETS, such as emission allowances for fuel sold at refineries or petrol stations. For the actual emitters – the end users of fossil fuels – this would be experienced as a fuel cost increase, so that the producer escapes paying for the cost of emissions. Since the affected groups (transport, private households) are already covered by mineral oil taxes (at markedly higher prices than the carbon price in emissions trading), the question arises of what benefit such an upstream emissions trading would have. Therefore certain sources would need individually specific instruments to effectively achieve reductions.
- **Not implementable for reduction potentials with negative or excessive avoidance costs:** for options which would be profitable even without a carbon price (energy efficiency in buildings), emissions trading is not a cost efficient instrument. The barriers to realizing this reduction potential must be removed (e.g. Information deficit, lack of access to financing, etc). There are also reduction potentials whose current avoidance costs (e.g. CCS) are too high for a carbon price to be able to

incentivize them. The costs of these potentials can however be reduced over time through targeted research and innovation funding. As long as these technologies have reached maturity for the market, the carbon price can contribute to their spread through the market.

- **Risk of political failure:** Depending on one single instrument is a risky strategy, since there is no Plan B if one instrument does not deliver the expected results. The restructuring to a low carbon economy is a complex process of trial and transformation; the pathway cannot be reliably predicted in detail.
- **Instruments complementing each other:** different instruments can support each other in reaching their goals. In this way, the expansion of renewable energy through public support mechanisms leads to decarbonisation of the economy, even in times of weak market signals from ETS. It must be insured that the contribution of renewables and the efficiency of decarbonisation is taken into account in the ETS budget and does not weaken emission trading.
- **Flexibility for MS:** the various instruments can be differentiated by the degree to which they are coordinated and agreed upon EU-wide. In this way, the post-2012 ETS only allows minimal national differences, however in the implementation of the Renewables Directive, MS have a great deal of leeway for decisions. In energy efficiency the EU-wide momentum is even less. The plurality of instruments gives individual MS more freedom in adapting them to national circumstances and existing legal frameworks – including the possibility of doing the EU-level minimum. A unified ETS for (almost) all sectors would remove this freedom.

From these different hindrances and insecurities, it is clear that a coherent EU climate policy for 2030, i.e. a system free from contradiction and inefficiency, is a theoretical ideal at best. Coherence means avoiding contradictions and inefficiencies to the extent possible (for example between cultivating biomass in monoculture and conservation) and that the system is capable of being improved and being adapted in reaction to changes. Coherence in this form is an ideal towards which climate policy should be oriented, but not one which can be expected to be fully achieved, as the real world complexities do not allow for a simple optimisation It is especially unrealistic to replace the climate policy instrument mix with one single, market-based instrument such as a broad ETS in the name of coherence.

The plea for an instrument mix for the EU climate and energy policy 2030 and the warning against an oversimplified concept of coherence does not mean, however, that coherence does not offer a sensible orientation. The existing instrument mix could surely be improved in places to avoid individual policy conflicts or remove unintended effect – and avoiding inefficiencies may become more important with the increasing importance of climate and energy policy for the economy.However, such improvements should be guided not by the goal of oversimplification and a “one instrument fits all” mentality in the name of coherence is . With the growing economic importance of climate policy and the tight relationship with energy policy, the interdependence with other fields of policy increases, and the need for more tailor-made policy solutions for dedicated policy objectives (such as support for specific types of mitigation technologies) is increased rather than reduced.

2.4 Institutional Issues

The institutional architecture of current EU climate policies has been an important factor in bringing about progress. The community method, i.e. adopting legally binding legislation under article 191 (environment) or 194 (energy) of the Treaty of Lisbon (European Union 2007), was instrumental in setting a credible frame for EU climate policies, in that it allowed for consolidated and jointly agreed policies at the EU level, bringing a strong common and coordinated element to the efforts of Member States. One of these instruments is the EU ETS, whose establishment created the division between the ETS sectors and non-ETS sectors, which is now a key feature of the current climate policy architecture.

Although the institutional design is adequate, at least two institutional issues have emerged since 2007: first, the EU's institutional climate architecture has struggled to adapt to changing circumstances; second it has grappled with fragmentation of (climate and) energy policies. These two issues are discussed below, with a view to improving them for a 2030 framework.

2.4.1 EU climate policies: ability to learn and adjust

In principle, the EU and its legislative processes have built-in possibilities for policy learning, and are able to adjust based on experience or changing circumstances. Many legal acts foresee periodic reviews, with the option that changes be made (in the form of the EC presenting respective proposals) if these should be warranted. The time-frames for these policy cycles vary, but are counted in years. From the adoption of one policy to its implementation (1-2 years) and review (1-3 years later), plus eventually a revised proposal being decided upon (1-2 years) and entering into force, actual change to decisions once adopted can take at least 5 years and longer. Often, one could argue, earlier reviews and adjustments do not make sense, because there has not been sufficient time to gain experience and provide actual information for a review.

However, when circumstances changes significantly, or when design flaws of a policy become apparent rather quickly, faster adjustments can be necessary. Most current energy and climate policies do not have mechanisms that allow for such fast changes and are thus unable to adjust quickly. Even supposedly minor changes, such as for example the backloading of ETS allowances (a mere change in the auctioning schedules) can become extremely complex and burdensome, because a fully fledged legislative decision-making process is required to amend the legislation in question. More ambitious reform proposals, such as the scaling up of the 2020 reduction target, appear to be a "mission impossible" due to the unanimity requirement. This is a major problem. Given their complexity, the relative lack of experience in the area and the long-term perspective they take on, climate policies have – almost by definition – a constant need for adjustment and reform.

There are various reasons for the limited adjustment capacities of the current system. Many of them are political. MS, for example, have very different opinions about climate and energy policies. Sometimes positions of MS are deeply entrenched in society. Other reasons are institutional, such as the need to reach consensus. Very often, the European Council is ultimately responsible for energy and climate policy. Thus, even technical details can become a matter for heads of states and government. The European Council decides by consensus, every single MS has a veto. This makes compromises indispensable, often implying that only the lowest common denominator. The same is true for conclusions issued by other policy Council formations.

In contrast to this practice, the Council may adopt conclusions by qualified majority if they call for a legislative proposal by the Commission. Conclusions issued in connection with legislative proposal could also be treated this way in principle. One could thus interprete the existing legal basis such that decisions on conclusions by consensus, which is the current practice, could and should rather be the exception; decision by qualified majority should be and could be the rule. It is up to MS, however, to take the decision to change their practice. Arguably, this could enhance the speed of decision-making by ending de facto veto power of any single country. Regardless of procedural improvements, however, building broad agreement on the main directions in EU policy among most if not all MS is essential for long-term policy success.

2.4.2 Fragmentation

Circumstances in the EU's 28 Member States vary greatly. While some MS already have high shares of renewable energies, others rely more on coal, nuclear power or gas. Energy intensity also differs greatly, for example; Bulgaria, the MS with the highest energy intensity, is over seven times as energy intense as Ireland, with the lowest energy intensity (Eurostat 2013d). Some MS have liberalised their energy markets more than others. There are – obviously – many more differences. This diversity of energy policies make coherent and coordinated action difficult; they have worked against agreement among MS on targets, for example. The current framework accommodates these differences to some extent: the RE directive sets targets according to MS circumstances and capacities; the ESD takes a similar approach, also differentiating targets between MS. For EE, the diversity is even greater, in that the respective national targets are not decided jointly at EU level but left to MS to specify.

This diversity might well increase, if no mandatory national RES targets should be adopted for 2030. In the absence of common rules for a growing number of targets, there will be a rising need to generate an element of harmonisation through other means. The disconnect between EU policy ambitions and MS' unwillingness to commit threatens the overall effectiveness of the system. And the diverging needs of more self-determination by MS and greater European interconnection of its energy systems must be aligned with each other. The **2030 climate and energy framework is in need of** elements that can help forge a **reintegration** to avoid further fragmentation. One way to enhance coordination could be through a more rigorous intra-EU governance system. Such processes can also enhance transparency at a time when legal bindingness for target achievement is reduced.

There is considerable experience with intra-EU coordination tools, especially soft governance mechanisms around processes such as the Lisbon Strategy. There are also various examples in the current climate and energy framework, e.g. under the Renewable Energy and Energy Efficiency Directives. These requested MS to submit national implementation plans, following an EU process that set the overall frame, provided guidance and even templates.

Effectiveness of these processes has been mixed. Lisbon has delivered little and inconsistent tangible progress towards its goals (European Commission 2010). Although there was moderate progress towards some of the Lisbon Strategy goals before the crisis, the European institutional landscape was not able to effectively cope with the crisis and was not able to deliver a framework that prevents such crises in the first place. It is also unclear how much of the progress can be attributed to the Lisbon Strategy and how much was part of natural business cycles. The National Reform Programmes (NRPs) required of each MS as part of the Lisbon strategy delivered mixed results. Due to differing political will within MS and unclear communication of the purpose of the NRPs, some MS used them as instruments to coordinate and drive forward policy reforms, while other used them simply as reporting tools.

Experience with the specific energy related plans has been mixed, also. The national renewable energy action plans (NREAPs) for example provided a good level of detailed information and required MS to present a lot of information in a common format. For Energy Efficiency, the level of standardization was relatively lower, providing less transparency in the form of an easy comparison, but also less specificity on the respective national strategies. Importantly, a key difference lies in the fact that the RES targets are legally binding and those for EE only indicative.

In its 2014 proposal for a new 2030 framework, the European Commission also included a new governance framework. The EC stated its belief that “there is a need to simplify and streamline the current separate processes for reporting on renewable energy, energy efficiency and greenhouse gas reduction for the period after 2020, and to have a consolidated governance process with Member States” (European Commission 2014a, 12). The EC proposed that EU targets would be met by a mix of EU measures and national measures, which MS would describe in national plans for “competitive, secure and sustainable energy”. These plans should set out a clear approach to greenhouse gas emissions in the non-ETS sector, renewable energy, energy savings, energy security, research and innovation and other important choices such as nuclear energy, shale gas, carbon capture and storage. The plans should enhance coherence, EU coordination and surveillance, “including assessment of such plans against Union level climate and energy objectives, and progress towards the objectives of the internal energy market and state aid guidelines”.

To set up these new comprehensive national climate and energy plans, the EC proposes an iterative, three stage process: 1) the EC would produce detailed guidance on the national plans; 2) MS would compile plans in consultation with neighbouring MS; 3) the EC would assess if draft plans are sufficient to meet the EU climate and energy objectives. If the EC considers the plan insufficient, “a deeper iterative process would take place with the Member States concerned with the aim of reinforcing its content”. These plans should be operational well before 2020. The EC explicitly states that the process will be set in legislation if progress is not insufficient (European Commission 2014c).

The EC apparently believes that this proposal steers a course between the diversity of national realities and the need for coordinated action at EU level. It also appears that the plans are meant to help achieve what might not be achievable through EU legislation – partly because required majorities in the Council do not seem available.

This approach, especially the motivation of the latter argument, is **clearly a second best option to binding national targets** and greater integration of coordinated target achievement policies at the EU level. At present, the process as such is not decided and its implementation could take place in many different ways. It will need to fulfil a list of criteria to be effective, including the need for clear guidance, common reporting formats, etc.. However, its potential to connect common EU level needs and diverse MS specifics, and to combine different aspects of the overall climate and energy framework needs to be further explored.

3 EU Climate and Energy after 2020: Summary and Recommendations

3.1 Lessons learned: reform, not revolution.

The good news first: the current architecture of EU climate and energy policies is adequate – **in principle**. It has helped deliver substantial reductions in GHG emissions and it has promoted a significant increase in renewable energies. And according to the 2014 Report on Energy Prices and Costs, "there is no empirical evidence that the current framework has caused carbon leakage or has impacted negatively on the competitiveness of the EU economy. The EU has retained the lead in exports of energy intensive goods" (European Commission 2014d, 13). These are remarkable achievements.

Despite these achievements, important elements of current policy framework **require reform**, some of them urgently. First, the targets. The **level of ambition** – as reflected in the 2020 targets or the energy roadmap – is insufficient to meet the 2050 GHG reduction targets. Even with the implementation of measures currently in the planning, 2030 emissions are believed to decrease to only 28% below 1990 levels (compared to – 24% in 2020) (European Commission 2014c). Such reductions fall short of cost effective decarbonisation pathway towards 2050.

Second, the instruments. Marred by large surpluses of allowances, the **ETS has failed to set prices that incentivise the required investments** and – more problematically – is not expected to do so in the future. **Attempts to improve energy efficiency have suffered from a fragmented and insufficiently rigid EU policy framework.** They have not and are unlikely to deliver energy savings at the level required.

In times of economic crisis, EU climate and energy policies have been criticized as expensive, inefficient and incoherent. **Political pressure to weaken the framework** has been high, almost questioning the decarbonisation objectives of the EU as such. This has led to significant uncertainties for investors, who no longer see credible political signals that the EU is truly committed to decarbonising its economy. This **has undermined one of the key objectives of the 2020 framework: providing business with investment security**. In response to the consultation of the 2030 framework, many stakeholders expressed their expectation that the 2030 framework would reduce uncertainty among investors, governments and citizens.

In 2007, when the European Council adopted the climate and energy package, climate policies were able to set the political agenda – at all levels, including the top level of head of states and government. This was the case in Europe but also internationally where climate change featured high on the agenda of the UN and G8. This has changed. Today, attention of politicians has shifted, primarily to issues competiveness and growth, pushing climate policy down on the agenda. Remaining proponents of ambitious climate policy are unable to push through required reform and merely react to what can be considered a constant assault on the climate *acquis*. This offers an essential lesson for future climate change policies: to be **successful and capable of adopting necessary reforms, climate policy proponents must set the agenda** and should not simply respond to what the general political discourse appears to dictate. After all, there remains a significant ambition gap between planned mitigation reductions and what is necessary to limit global temperature rise to below 2°C. Obviously, regaining political leadership in times of economic crisis is a difficult undertaking, but success ultimately depends on a high degree of political leadership. Simply defensive politics are unlikely to achieve more than maintaining the status quo, at best. Meaningful climate policies require clearly more than conserving the status quo, they require political leadership.

Scenarios have played a critical role in EU climate and energy policies. MS have routinely asked for detailed impact assessments of what specific targets and instruments would deliver and – most importantly – of expected cost. While a solid understanding of the impact of specific measures is critical, the **significance of projections has been overplayed**. Scenarios have been taken as reality, while they – by definition – have to deal with a great number of uncertainties and assumptions. Depending on assumptions, scenarios deliver very different results, making them prone to political manipulation. As a consequence, EU climate and energy policies have to incorporate the lesson that decarbonisation is long-term undertaking that has to live with large uncertainties and inevitably requires constant adjustment and reform. Climate and energy policies must set the long-term direction, while maintaining the ability to reform and adapt.

3.2 Targets

Targets have a positive impact on climate and energy policies. They provide a clear reference point and create accountability. They have been a critical communication tool – the “20-20-20” target trio has become a central reference point for EU climate discussions and are a catch phrase in the political discourse. Targets have contributed to investment security and have been the backbone of the ETS.

To serve these functions well, targets should be **legally binding**. The binding renewable target has considerable political weight and has shaped energy policies: Between 1995 – 2000, when there was no regulatory framework in place, the share of renewable energy in the EU grew by only 1.9% per year, but it grew by 4.5% between 2001 and 2010 when the indicative and voluntary targets was adopted. With legally binding national targets (from 2009 onwards), the growth accelerated further. This demonstrates that, to be taken seriously, targets should be legally binding. In light of this experience and its essential importance for decarbonisation of the economy, targets on energy efficiency should be equally legally binding.

There is a **strong case for maintaining the current system of three targets** for GHG emission reductions, energy efficiency and renewable energy. The three targets serve different purposes, all of which are worthwhile political objectives in their own. Moreover, they are mutually supportive of each other. And having multiple targets represents a hedging strategy against political failure in one target area. Given different views on nuclear energy and CCS, for example, it is clear that the EU’s decarbonisation strategy must rest on the expansion of renewable energies and energy savings as common elements. Decarbonisation is bound to fail without drastic improvements in energy efficiency and expansion of renewable energies. For investors to “believe” in the political sincerity, they will require underpinning through credible targets.

Concerning the **level of ambition of targets**, there is considerable disagreement. Stakeholders have called for GHG reduction targets between 30% and 55% for 2030. Ranges between 30% and 45% and 30% and 50% have been proposed for renewable energy and energy savings respectively. These proposals have been supported by comprehensive scenarios, which suggest even broader ranges. Concerning energy savings, scenarios range between 2% above the 2007 baseline and 40% below the same baseline; renewable energy scenarios run between 19% and 48%. Despite the large uncertainties in these scenarios, they give a rough indication of the levels at which to quantify targets.

For the GHG target, the following set of criteria is recommend:

- For a credible and realistic long-term reduction pathway, **the 2030 GHG target should be at least 45% below 1990 levels for domestic emissions** alone. Starting with a direct path to 2050 only later, and being more lenient towards 2030 for example, will require steeper reductions than what the EU has been able to achieve so far.
- Any **use of offsets should increase this target further, towards 50% and beyond**.
- The reduction target must also take into account the carry-over surplus allowances from the EU ETS (and possibly the ESD).
- Making the **target conditional** upon progress in the international talks, as had been done for 2020, **would make the EU hostage to forces outside its own control**, and can only be discouraged.

An adequate climate change mitigation strategy must also call for renewable and efficiency targets on the upper end of the range, because CCS remains a risky bet, nuclear energy is not an option in many MS and other technological breakthroughs remain uncertain.

The **EC proposal for targets falls short in a number of ways**, and needs to be strengthened considerably. The 40% GHG reductions is a starting base for negotiating a higher target among MS – it does not fully represent the Commission's own figures for a cost-effective pathway and is not in line with a 2050 decarbonisation trajectory beyond 80%. The proposal does, however, specify that the reduction target would be counted for domestic emissions, which suggests that any external credits would have to be additional (beyond 40%). The RES target appears to be too low and close to business as usual. The absence of national binding RES targets in the proposal represents a significant weakening of the current architecture, that threatens investor confidence and thus further progress in RE deployment in many MS – leading to lower emission reductions and fewer energy security benefits. The absence of guidance on a future energy efficiency target for 2030 represents a significant gap in the EC proposal, that weakens its comprehensiveness.

3.3 Instruments

Key elements of the current instrument mix are in need of reform to be fit for 2050.

3.3.1 ETS Reform

At present, trust in the political backing of the ETS and the underlying decarbonisation narrative is not strong enough to project a visible carbon price signal into a mid- to long-term future. Moreover, the existing structural over-allocation in the system could keep the price signal insignificant for the near- and mid-term until 2025 or even 2030. This leads to a set of three main recommendations going forward:

- The EU ETS needs to be given back the **capacity to actually reduce emissions**. This means reintroducing and increasing scarcity in the system in the near- and medium-term (pre- and post-2020). There are a number of options for doing this. An ambitious cap for 2030 is the most straight-forward solution, which should be combined with an early revision of the Linear Reduction Factor towards that target and specific action to reduce the current surplus before 2020. The other options to influence post-2020 supply (access to offsets and extension of the scope) are of uncertain merit and should not be considered at this point.
- The EU ETS should be **made "shock-proof"** to prevent the current constellation from happening again – when time may be running out towards the 2050 objective to engage in prolonged controversy over if and how to make adjustments. The ETS needs a dedicated mechanism to help guarantee stability under extreme circumstances. Procedural and institutional arrangements such as those planned originally for the Australian ETS have advantages, but would require a larger deviation from the current system. A future shock-proofing mechanism should be based on more than just price as trigger and have a menu of specific options for action, with a clear and transparent process for decision taking.
- The ETS alone (even if improved) does not seem to have the power to put the sectors involved on a decarbonisation path. Energy and industry **sectors need ETS companions to avoid expensive high-carbon lock-in** on the one hand **and to induce technological innovation** on the other hand. An effective decarbonisation strategy requires a combination of push & pull policies for these sectors. As a push policy, using some form of standard setting, such as an Emissions Performance Standard (EPS) is a suitable vehicle, and these have been put in place or are under discussion in a number of countries (including the UK and the USA). This type of regulation needs to be combined with government support for the development of radical low carbon innovation. A stronger EU ETS could provide a much-needed boost for investments in low carbon alternatives and would also provide more funding for R&D promotion (such as via an expanded NER300). Furthermore, financial support schemes for low carbon products could be introduced.

Against this backdrop of necessary improvements, the **January 2014 proposal by the European Commission** represents a step in the right direction, but **falls short of the ETS' reform requirements in several ways**. It does not tackle the current and projected build-up of surplus allowances sufficiently (reaching only around 20%). Additional pre-or post-2020 action is required. The proposed shock-proofing mechanism, the so-called Market Stability Reserve, does reduce the surplus in circulation rapidly, but does so only temporarily (returning the allowances at a later stage) and may not even have an impact fast enough to take all the pre-2020 surplus out by 2030. Boundaries for the trigger should be revised and an allowance cancellation option should be built into the system.

The Commission's two-pronged approach is thus effective in principle, but leaves an element of downward price pressure in the system that did not exist at the proper start of the ETS in 2008 and that was not meant to be there (as in: having been anticipated). Not to do away with the undesired effects of historically specific circumstances and design mistakes for yet another full decade cannot be judged a sufficiently rigid approach towards improving the effectiveness of the EU ETS with a view to decarbonisation of the sectors in question. Additional measures to address low carbon innovation are not part of the EC proposal at this point in time.

3.3.2 Effort Sharing Decision

Marred by insufficient levels of ambition and under threat from large quantities of surplus credits, the ESD looks likely to fail in driving non-ETS emission reductions in its current form. The extensive flexibilities under the ESD give MS little incentives to deliver emissions reductions in their territory. To serve as an important tool to reduce emissions – which remains possible in principle – the ESD should be reformed along the following lines.

- Most essentially, the **ESD needs to set targets** that bring the EU's Non-ETS emissions to a level that is **consistent with the long-term decarbonisation**. Quantifying the required level of ambition for milestones towards 2050 depends on the overall reduction target and on what happens in the ETS. In any case, significantly higher targets are required for 2030, to keep the EU on a credible long-term reduction path. The EC proposal of an EU wide 30% reduction target compared to 2005 for 2030 is a step in that direction.
- Rather than only setting targets and flexibility mechanisms and leaving all else to the MS, **a reformed ESD should describe an implementation strategy**, with assessments of EU wide policies and measures and their impacts. This should **include sector specific assessments** and could be complemented by explicit sectoral strategies for the main non-ETS emission contributors (transport, agriculture, waste, etc.). At the MS level, the "national plans for competitive, secure and sustainable energy" proposed by the EC as part of a new 2030 governance framework, could serve similarly as the vehicle for Non-ETS implementation strategies.
- Current standards on the use of external credits threaten domestic action and thus the effectiveness of the ESD. Rules should be brought in line with those for the EU ETS, excluding certain types of credits and further **limiting offset use** – including to stopping access to credits post-2020 to avoid diverting from investments in the domestic decarbonisation. Beyond offsets, the option to carry over and carry forward emission allowances could be limited.

3.3.3 Renewable Energy

All in all, the 2009 Renewable Energy Directive has been a **success** up to now. Currently, the EU is on track to meet its target of increasing the share of renewable energy to 20% of final energy consumption by 2020. The costs of key technologies like wind and solar plants have gone down significantly with rising installation volumes. The former niche technologies have conquered a sizeable market share in the power sector. Mandatory MS targets and the support schemes for renewable energies underlying their implementation have enabled this success. Progress in the heating and cooling sector is slower than in the electricity sector, but still positive.

The success story is tainted by the questionable environmental performance of first generation biofuels, which supply almost all of the renewable energy used in the transport sector. Despite the sustainability criteria included in the Renewable Energy Directive, findings on the net impact of crop-based biofuels on GHG emissions, biodiversity and global food markets point towards the need to restrict and potentially decrease their deployment in the future.

For the post-2020 renewable energy policy framework this leads to the following recommendations:

- The **mandatory renewable energy target** should be maintained since it provides a strong investment signal. However, in the transport sector, crop-based biofuels should not cover more than 5% of the sector's final energy demand, potentially decreasing up to 2030. The minimum 27% target proposed by the Commission is a good start, but should be increased to at least 30% to deliver the necessary investment security.
- In the **transport sector**, mature and cost-effective technologies to fully substitute fossil fuels by renewables do not yet exist. More than in any other sectors, this points to the need to increase energy efficiency and to develop innovative, low carbon options to move people and goods around in the EU.
- Renewable energies in the **heating and cooling sector need further financial support** through the established support schemes. In addition, efforts to remove administrative, informational and institutional barriers need to be continued with more focus on the heating and cooling sector in particular and in coherence with energy efficiency measures in buildings.
- The **power sector** has the highest potential for full decarbonisation. The two key technologies wind and solar energy are approaching competitiveness with fossil fuels when measured in levelised costs per kWh. However, the current energy market design in most MS does not allow intermittent energy technologies with a high capital-to-running-cost ratio to be financially viable without state support. Although the debate about the future energy market design could not be covered in detail in this study, it is clearly central to find an integrated EU approach to reforming energy electricity markets.
- Therefore, an adapted Renewable Energy Directive alone will not be enough. For the power sector, the challenges for a post-2020 energy policy are not to adjust support schemes or to harmonise them but to transform the entire energy system – regulation, infrastructure, and market design – so that renewable energies can become its central element. The perfect regulatory solution does not exist yet. In this learning process, a method of trial-and-error therefore is vital to collect experiences and diffuse the best-performing instruments. The evolution of the support schemes over the last decade clearly shows that this type of diffusion is taking place between MS. In a fully harmonised system, the risks associated with picking a low-performing instrument are much higher. In addition, the EU's role could be to work swiftly towards a physically integrated grid by extending interconnections between national electricity grids and by extending market coupling. Reaffirming the target of increasing interconnection capacity to at least 10% of installed capacity is a good first step, but

will need to be supported by concrete implementation steps, including targeted EU funding.

3.3.4 Energy Efficiency

Energy savings is a **backbone of any decarbonisation scenario**. Without significant energy saving, decarbonisation and long-term climate goals cannot realistically be met. Even with the newly adopted EED, the EU does not appear to be on track achieve lasting energy savings, with significant consequences. Reforming EU climate and energy policies after 2020 must address this shortcoming:

- The 2014 review of the EED offers an obvious opportunity to reform and strengthen the EED. A reformed EED should include a binding target for MS, including an effort sharing mechanism. Energy efficiency through renovation of buildings would improve significantly if the EED would overhaul today's system, in which minimum energy performance requirements are set nationally.
- The Ecodesign Directive would benefit from better coordinating with related regulations, such as Green Public Procurement and Eco-Labelling standards. Expanding the Ecodesign Directive to other product groups, namely cars and new fossil fuel power plants, or to non-energy related products such as clothing or toys, could further strengthen the directive.
- The EPBD and energy efficiency in buildings would particularly benefit from efficiency standards for the existing building stock and improved information exchange between investors, target groups and sectors, especially in non-domestic and public sectors.

3.3.5 Institutional arrangements

Two key institutional issues are central to the success of future EU climate policy. One is the ability of the political system to **make adjustments to policies under special circumstances**, the second is the **danger of further fragmentation** of EU climate policy and what **governance options exist to act as a reintegrating force of balance** between diverging needs.

Ability to adapt

In principle, the EU and its legislative processes have built-in possibilities for policy learning, and are able to adjust based on experience or changing circumstances. However, when circumstances changes significantly, or when design flaws of a policy become apparent rather quickly, faster adjustments can be necessary. Most **current energy and climate policies do not have mechanisms that allow for such fast changes** and are thus unable to adjust quickly. Even supposedly minor changes, such as for example the backloading of ETS allowances (a mere change in the auctioning schedules) can become extremely complex and burdensome. More ambitious reform proposals, such as the scaling up of the 2020 reduction target, appear to be a mission impossible. There are various reasons for limited adjustment capacities of the current system, most of them are political, others stem from the voting practice in the Council of Ministers. As long as the Council of Ministers insists on decisions by consensus, the slowest MS determined progress. The inability of the

Environment Council to adopt conclusions on the low carbon roadmap are an important example of the resulting veto power that individual MS can hold.

However, decisions by consensus should be the exception; **decision by qualified majority should be the rule**, including for Council conclusions (that are part of a legislative process). This makes coalition building essential, as it is present, but would take away the de facto veto power of any single Member State.

Working against fragmentation

Energy policies across the EU are widely diverse, which makes coherent and coordinated action difficult; they have worked against agreement among MS on targets, for example. The current framework accommodates these differences to some extent but building country specific factors into the legislation. This diversity might well increase, if no mandatory national RES targets should be adopted for 2030. In the absence of common rules for a growing number of targets, there will be **a rising need to generate an element of harmonisation through other means**. There is considerable experience with intra-EU coordination tools, especially soft governance mechanisms around processes such as the Lisbon Strategy. There are also various examples in the current climate and energy framework. Effectiveness of these processes has been mixed.

In its 2014 proposal for a new 2030 framework, the European Commission also included a new governance framework. The EC apparently believes that this proposal steers a course between the diversity of national realities and the need for coordinated action at EU level. This approach is clearly a second best option to binding national targets and greater integration of coordinated target achievement policies at the EU level. At present, the process as such is not decided and its implementation could take place in many different ways. It will need to fulfil a list of criteria to be effective, including the need for clear guidance, common reporting formats, etc.. However, its **potential to connect common EU level needs and diverse MS specifics**, and to combine different aspects of the overall climate and energy framework **should be further explored**.

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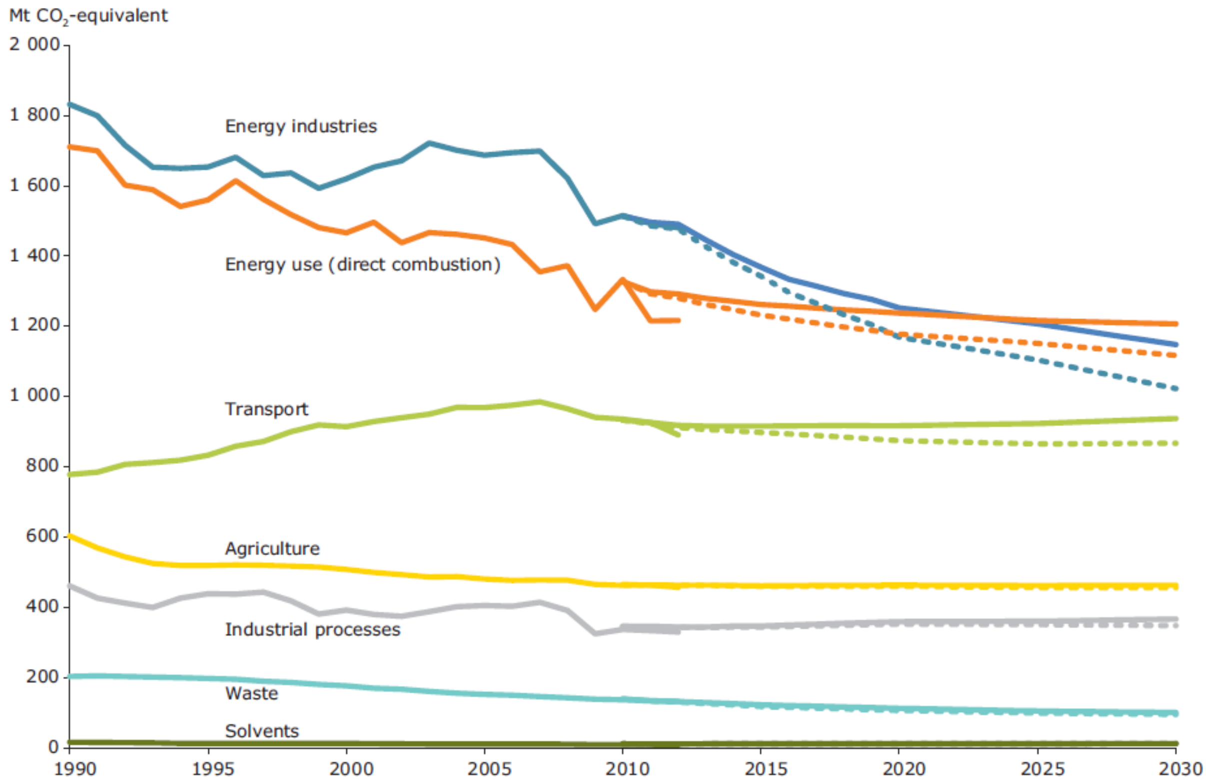
ANNEX

3.4 Annex A: Sectoral trends

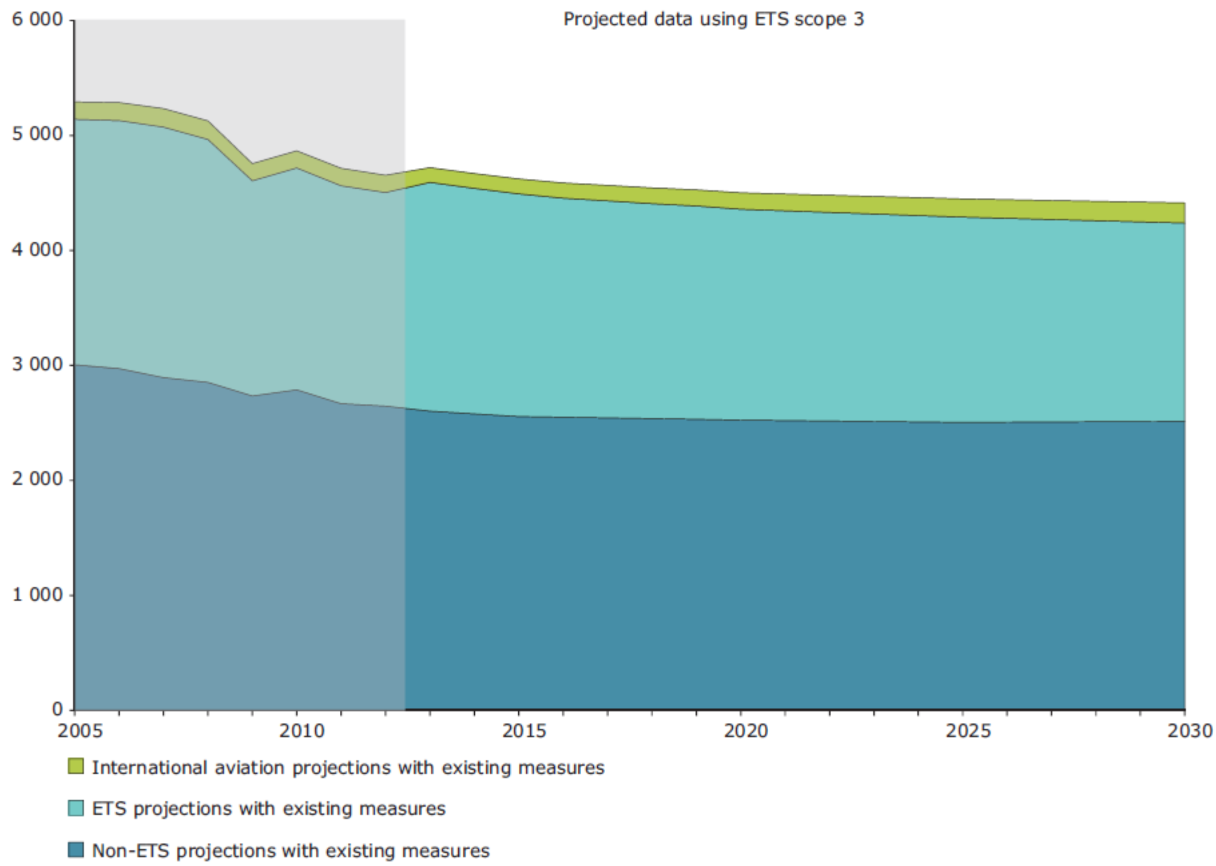
Figure 16: Sectoral trends and emissions of EU GHG emissions



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.

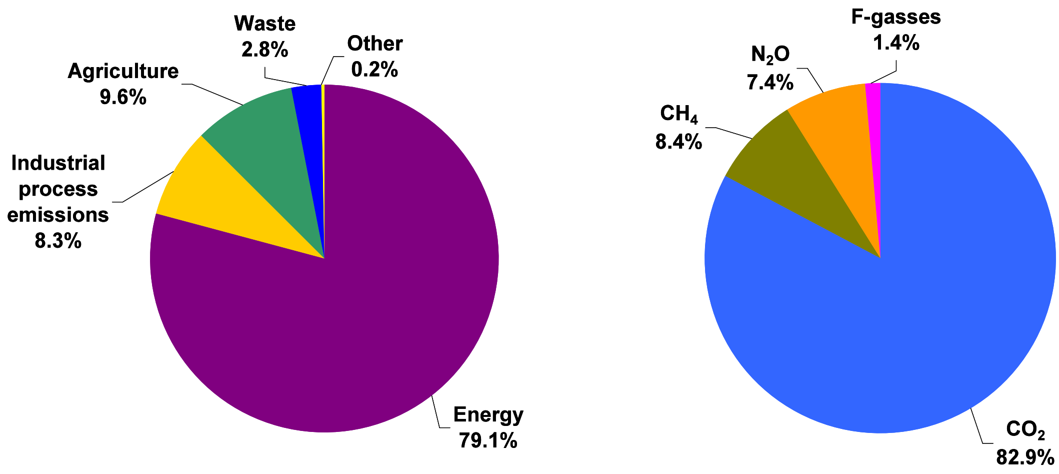
Source: EEA 2013b, 98

Figure 17: GHG trends and projections for ETS and non-ETS emissions, 2005–2030



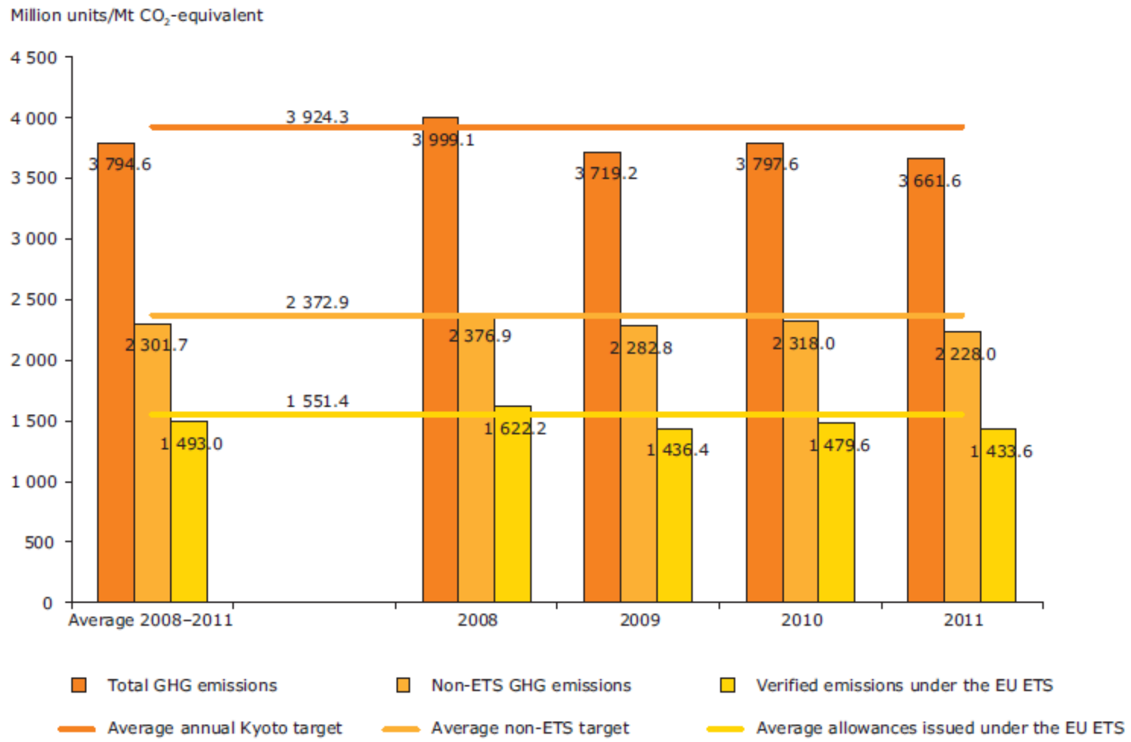
Source: EEA 2013b, 97

Figure 18: GHG emission profile EU-27, per sector



Source: European Commission 2011a, 21.

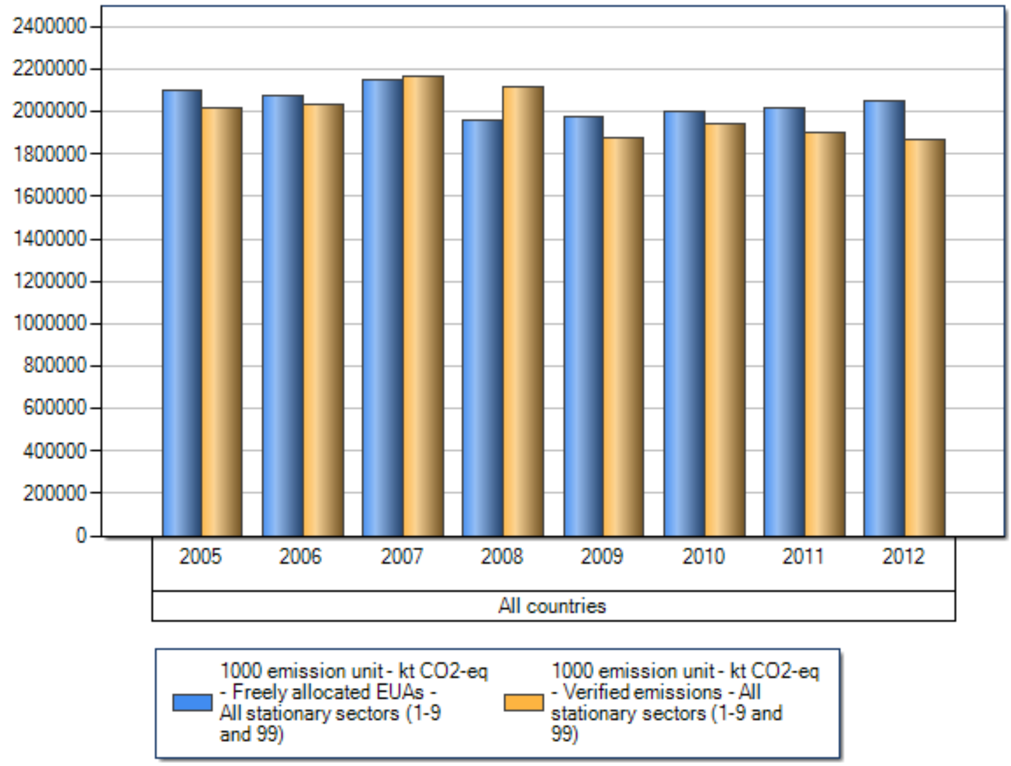
Figure 19: Total ETS and non-ETS emission trends in the EU-15 compared to their respective targets, 2008-2011



Source: EEA 2012b, 40

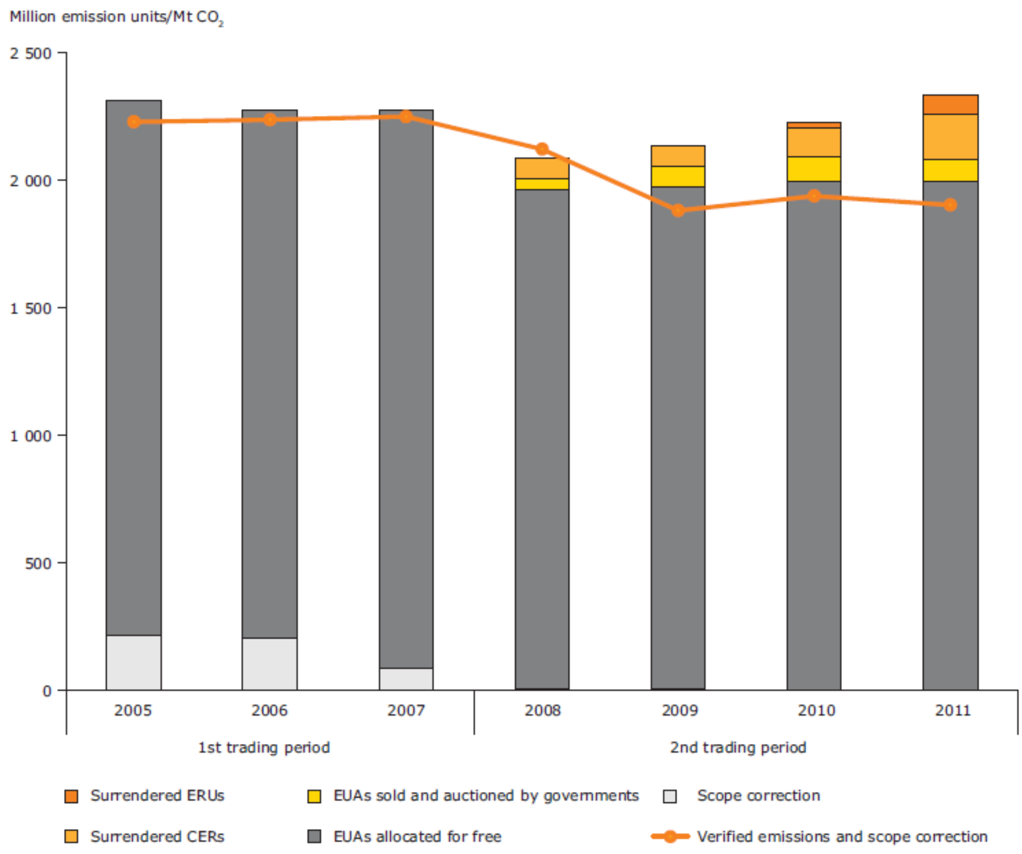
3.5 Annex B: Emission Trading

Figure 20: Freely allocated EUAs and emissions, EU-27



Source: EEA 2013a

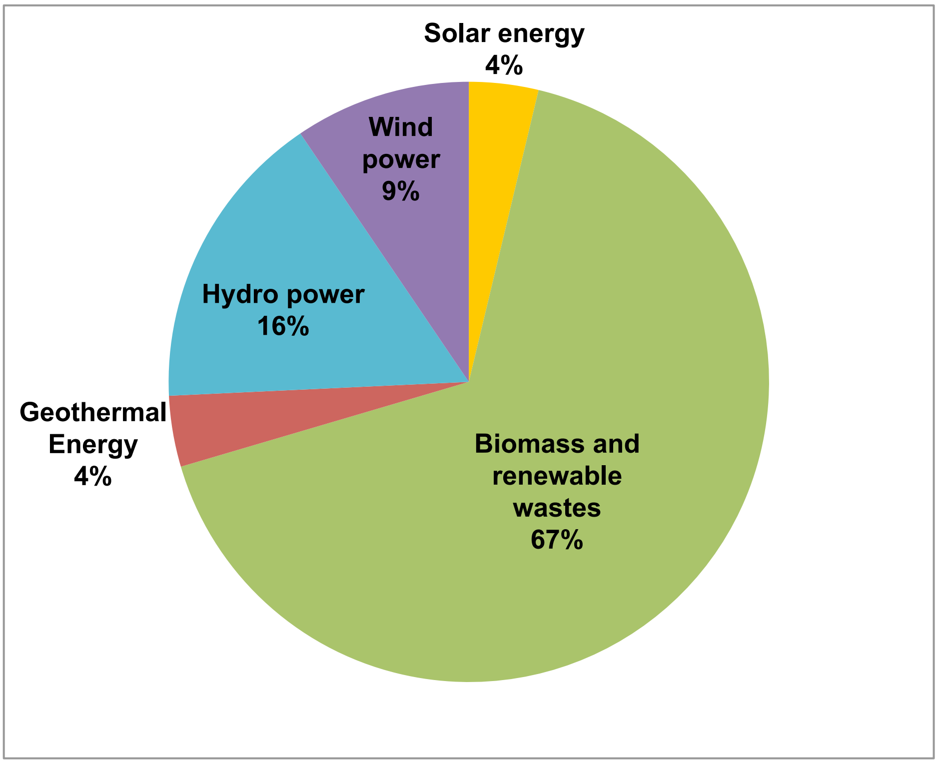
Figure 21: Comparison of available emission units and verified emissions in all 30 EU ETS countries, 2005–2011



Source: EEA 2012b

3.6 Annex C: Renewable Energy trends by sector and Member States

Figure 22: Renewable energy production by source in the EU-27 in 2011



Source: (Eurostat 2013b)

Table 11: Share of energy from renewable sources in gross final energy consumption in 2011 and national targets for 2020

Country	Renewables share	Target
Estonia	25.9%	25%
Portugal	24.9%	31%
Romania	21.4%	24%
Denmark	23.1%	30%
Lithuania	20.3%	23%
Slovenia	18.8%	25%
Spain	15.1%	20%
Bulgaria	13.8%	16%
Germany	12.3%	18%
Greece	11.6%	18%
France	11.5%	23%
Italy	11.5%	17%
Poland	10.4%	15%
Slovakia	9.7%	14%
Czech Republic	9.4%	13%
Hungary	9.1%	13%
Ireland	6.7%	16%
Cyprus	5.4%	13%
Netherlands	4.3%	14%
Belgium	4.1%	13%
UK	3.8%	15%
Luxembourg	2.9%	11%
Malta	0.4%	10%
EU-27	**13.0%**	**20%**

Source: EEA 2013c, 11

3.7 Annex D: Energy Efficiency of the Member States

Table 12: Energy intensity, efficiency gains and consumption changes of MS

MS	Change (%) of final energy intensity (2000-2010)	Energy efficiency gains (2000-2010)			Change (%) of energy consump. (2010-2011)	Weight (%) of energy in HICP basket (2011)
		Industry (%)	Transport (%)	Households (%)		
AT	-0.4	-2.7	13.7	18.2	-3.8	8.9
BE	-2.0	13.7	2.9	17.0	5.3	11.0
BG	-3.7	54.4	3.2	10.1	4.7	11.9
CY	-1.3	29.3	3.3	11.5	-1.1	8.7
CZ	-3.5	14.5	0.0	13.9	-3.7	14.0
DE	-1.6	-1.6	11.5	14.3	-4.7	12.3
DK	-1.0	15.7	9.7	10.1	-5.1	11.5
EE	-2.3	35.3	0.0	8.7	-2.3	13.9
ES	-0.8	-18.8	0.0	12.6	-2.9	10.8
FI	-1.8	9.8	1.9	10.7	-5.2	7.5
FR	-1.2	8.3	9.0	15.8	-6.7	9.3
GR	-4.1	12.1	8.1	4.3	-1.0	9.2
HR	-1.2	12.9	14.1	3.7	-2.4	13.2
HU	-2.2	27.5	15.3	3.1	-2.3	15.5
IE	-2.2	7.9	6.4	23.3	-8.6	10.5
IT	0.1	10.7	2.1	15.1	-2.0	8.4
LT	-2.7	40.6	7.2	5.8	-1.3	15.4
LU	-1.3	-8.5	0.0	18.2	-0.6	11.5
LV	-1.7	9.1	16.4	31.9	-6.8	15.5
MT	-1.6	-8.9	18.0	8.9	-1.8	6.7
NL	-1.4	20.9	7.3	19.9	-6.1	11.3
PL	-2.5	40.9	15.6	22.5	-2.7	13.9
PT	-0.4	0.6	5.1	18.2	-4.4	12.7
RO	-4.2	24.1	0.0	30.8	0.3	17.8
SE	-2.5	5.8	1.7	16.9	-6.9	12.0
SK	-4.2	-1.1	14.1	2.4	-6.7	14.3
SL	-2.2	20.7	11.5	24.6	0.0	15.4
UK	-2.7	16.6	11.2	18.5	-7.4	8.7
EU-27	-1.5	12.0	8.7	15.3	-4.3	10.6

Sources: Energy intensity and energy efficiency gains: Odyssee (2013); Energy consumption and weight of energy in HICP basket: Eurostat (2013).