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PART 1/2

COMMISSION STAFF WORKING DOCUMENT
Accompanying the document

Report from the Commission

**Second Biennial Report of the European Union Under the UN Framework Convention
on Climate Change**

**(required under Article 18(1) of Regulation (EU) No 525/2013 of the European
Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and
reporting greenhouse gas emissions and for reporting other information at national and
Union level relevant to climate change and repealing Decision No 280/2004/EC and
Decision 2/CP.17 of the Conference of Parties of the UNFCCC)**

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Table of Contents

1.	GREENHOUSE GAS EMISSION INVENTORIES.....	1
1.1.	Summary information on GHG emission trends.....	1
1.2.	The EU inventory arrangements	4
2.	QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET.....	7
2.1.	The EU target under the Convention	7
2.2.	The EU target compliance architecture.....	9
2.3.	Other EU emission reduction targets	13
3.	POLICIES AND MEASURES	16
3.1.	Overarching policies and measures: the ETS and ESD	16
3.2.	Other Cross-cutting policies and measures	18
3.3.	Sectoral policies and measures: Energy	19
3.4.	Sectoral policies and measures: Transport.....	24
3.5.	Sectoral policies and measures: Industry / industrial processes	27
3.6.	Sectoral policies and measures: Agriculture	28
3.7.	Sectoral policies and measures: Forestry / LULUCF	31
3.8.	Sectoral policies and measures: Waste management / waste.....	32
3.9.	Assessment of the economic and social consequences of response measures	34
4.	PROJECTIONS	36
4.1.	Projections.....	36
4.2.	Quantified progress to 2020 targets	43
5.	PROVISION OF FINANCIAL, TECHNOLOGICAL AND CAPACITY BUILDING SUPPORT TO DEVELOPING COUNTRIES.....	45
5.1.	The EU's approach to provision of climate finance, including the provision of new and additional resources	45
5.2.	Financial Resources	52
5.3.	Technology development and transfer	54
5.4.	Capacity building	56
5.4.1.	The Low Emissions Capacity Building Programme.....	56
5.4.2.	The Global Climate Change Alliance	57

List of Tables

Table 1-1	EU GHG emissions in CO ₂ equivalents (without LULUCF)	1
Table 1-2	Overview of EU-28 GHG emissions and removals from 1990 to 2013 in CO ₂ equivalents (million tonnes).....	3
Table 1-3	Overview of EU-28 GHG emissions in the main source and sink categories 1990 to 2013 in CO ₂ -equivalents (million tonnes)	3
Table 1-4	Overview of EU-28 categories whose emissions increased or decreased by more than 20 million tonnes CO ₂ equivalents in the period 1990–2013	4
Table 2-1	Key facts of the Convention target of the EU-28.....	8
Table 2-2	Overview on EU targets.....	14
Table 3-1	Major energy efficiency policies and their underlying measures	22
Table 3-2	Overview of funding programmes and initiatives to promote low carbon technologies in the energy sector	23
Table 4-1	Historic greenhouse gas emissions and greenhouse gas emission projections in the ‘with existing measures’ scenario	37
Table 4-2	EU Reporting on progress (CTF Table 4).....	43
Table 5-1	GCCA programme contributions to existing national programmes or strategies	48
Table 5-2	- Provision of financial support in 2013-2014.....	53
Table 5-3	- Climate financing by the EIB.....	54

List of Figures

Figure 2-1	GHG targets under the 2020 climate and energy package.....	9
Figure 2-2	National 2020 GHG emission limits under the ESD, relative to 2005 emissions levels	11
Figure 3-1	Overview of the EU energy targets.....	20
Figure 3-2	The EU energy policy framework.....	20
Figure 3-3	Share of renewable energy sources (RES) in transport.....	25
Figure 3-4	The EU HFC phase-down	27
Figure 3-5	Common agricultural policy as part of the EU 2020 strategy.....	30

Figure 3-6	LULUCF policy framework including related policies	31
Figure 3-7	Main phases of a circular economy model.....	32
Figure 4-1	Total, aggregate, absolute historic and projected EU-28 GHG emissions.....	38
Figure 4-2	EU-28 GHG emissions per sector in the WEM scenario.....	39
Figure 4-3	EU-28 GHG emissions per gas in the WEM scenario	40

1. GREENHOUSE GAS EMISSION INVENTORIES

This section part summarises information on the EU's historic greenhouse gas (GHG) emissions since 1990.

1.1. Summary information on GHG emission trends

The emission data presented here is based on the European Union's national greenhouse gas inventory 1990-2013, submitted to the UNFCCC on 25 November 2015¹. The inventory is in line with the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention (Decision 24/CP.19) and with Regulation (EU) No 525/2013.

1.1.1. Overall greenhouse gas emission trends

EU GHG emissions are the sum of Member State (MS) emissions. Thus, trends in EU GHG emissions fully reflect emission trends at MS level. Most EU MS reduced GHG emissions between 1990 and 2013 (Table 1-1) and consequently total GHG emissions, without Land Use, Land Use Change and Forestry (LULUCF), in the EU-28 decreased by 21.2 % between 1990 and 2013 (-1 203 million tonnes CO₂ equivalents). However, when including international aviation for comparability with the EU 2020 target, the decrease is 1 139 million tonnes CO₂ equivalents or 19.8%.

Emissions per capita in the EU-28 dropped by 26 % for the same period, from 12.0 t/capita, to 8.9 t/capita. Emissions in the EU-28 have been decreasing while the economy has grown; the decoupling of economic growth from GHG emissions has been progressing steadily since 1990.

Table 1-1 EU GHG emissions in CO₂ equivalents (without LULUCF)

MEMBER STATE	1990 (million tonnes)	2013 (million tonnes)	2012–2013 (million tonnes)	Change 2012– 2013 (%)	Change 1990– 2013 (%)
Austria	78.7	79.6	-0.2	-0.2 %	1.2 %
Belgium	147.1	119.4	0.2	0.2 %	-18.8 %
Bulgaria	109.4	55.9	-5.3	-8.6 %	-48.9 %
Croatia	35.1	24.5	-1.0	-4.0 %	-30.3 %
Cyprus	5.6	8.3	-0.8	-8.9 %	49.7 %
Czech Republic	193.4	127.1	-3.5	-2.6 %	-34.2 %
Denmark	69.3	54.6	2.0	3.8 %	-21.2 %
Estonia	40.0	21.7	2.3	12.0 %	-45.7 %
Finland	71.1	63.0	0.6	1.0 %	-11.4 %
France	549.4	490.2	0.7	0.1 %	-10.8 %
Germany	1247.9	950.7	22.6	2.4 %	-23.8 %
Greece	105.0	105.1	-7.5	-6.6 %	0.1 %
Hungary	94.2	57.4	-2.6	-4.3 %	-39.1 %
Ireland	56.7	58.8	-0.8	-1.3 %	3.7 %

¹ http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8812.php

MEMBER STATE	1990 (million tonnes)	2013 (million tonnes)	2012–2013 (million tonnes)	Change 2012– 2013 (%)	Change 1990– 2013 (%)
Italy	521.1	437.3	-31.6	-6.7 %	-16.1 %
Latvia	26.2	10.9	-0.1	-0.5 %	-58.3 %
Lithuania	47.8	19.9	-1.3	-6.1 %	-58.3 %
Luxembourg	12.9	11.1	-0.6	-5.1 %	-13.5 %
Malta	2.0	2.8	-0.4	-12.1 %	39.4 %
Netherlands	219.5	195.8	-0.5	-0.2 %	-10.8 %
Poland	473.9	394.9	-3.9	-1.0 %	-16.7 %
Portugal	60.4	65.1	-1.9	-2.8 %	7.7 %
Romania	253.3	110.9	-10.0	-8.3 %	-56.2 %
Slovakia	75.5	43.7	0.0	-0.1 %	-42.2 %
Slovenia	18.6	18.2	-0.7	-3.9 %	-2.1 %
Spain	290.7	322.0	-26.7	-7.7 %	10.8 %
Sweden	71.8	55.8	-1.6	-2.7 %	-22.4 %
United Kingdom	803.7	572.1	-13.5	-2.3 %	-28.8 %
EU-28	5 680.2	4 476.8	-85.9	-1.9 %	-21.2 %
EU-28 International bunkers: Aviation	69.5	134.2	-0.1	-0.1 %	93.1 %
EU-28 International bunkers: Marine	108.8	139.6	-8.0	-5.4 %	28.8 %

The overall EU GHG emission trend is dominated by the two largest emitters, Germany and the United Kingdom, which together account for more than one third of total EU-28 GHG emissions in 2013. These two Member States have achieved total domestic GHG emission reductions in 2013 of 529 million tonnes of CO₂ equivalents compared to 1990 (not counting carbon sinks and the use of Kyoto mechanisms).

The main reasons for the favourable trend in Germany was increasing efficiency in power and heating plants and the economic restructuring of the five new Länder after German reunification. The reduction of GHG emissions in the United Kingdom was primarily the result of liberalising energy markets and the subsequent fuel switches from oil and coal to gas in electricity production, and N₂O emission reduction measures in the production of adipic acid.

France and Italy were the third and fourth largest emitters in 2013, with a share in the EU total of 11 % and 10 % respectively. Italy's GHG emissions were 16 % below 1990 levels in 2013. They increased in the years following 1990, primarily due to increases in road transport, electricity and heat production, and petroleum refining. However, Italian emissions decreased after 2004 with significant drops in 2009, 2012 and 2013, which were mainly due to the economic crisis and reductions in industrial output during these years. France's emissions were 11 % below 1990 levels in 2013. In France, large reductions were achieved in N₂O emissions from adipic acid production, but CO₂ emissions from road transport and HFC emissions from consumption of halocarbons increased considerably between 1990 and 2013.

Poland and Spain are the fifth and sixth largest emitters in the EU-28, accounting for 9 % and 7 %, respectively, of total EU-28 GHG emissions in 2013. Spain increased emissions by 11 % between 1990 and 2013. This was largely due to emission increases from road transport, electricity and heat production, and households and services. Poland decreased GHG emissions by 17 % between 1990 and 2013. The main factors for decreasing emissions in Poland – as with other new Member States

– was the decline of energy-inefficient heavy industry and the overall restructuring of the economy in the late 1980s and early 1990s. The notable exception was transport (especially road transport), where emissions increased.

1.1.2. Emission trends by gases

Table 1-2 gives an overview of the main trends in EU-28 GHG emissions and removals for 1990 – 2013. The most important GHG by far is CO₂, accounting for 82 % of total EU-28 emissions in 2013 excluding LULUCF. In 2013, EU-28 CO₂ emissions without LULUCF were 3 650 million tonnes, which was 18 % below 1990 levels.

Table 1-2 Overview of EU-28 GHG emissions and removals from 1990 to 2013 in CO₂ equivalents (million tonnes)

GREENHOUSE GAS EMISSIONS	1990	1995	2000	2005	2010	2011	2012	2013
Net CO ₂ emissions/removals	4 185	3 903	3 836	3 952	3 607	3 459	3 402	3 320
CO ₂ emissions (without LULUCF)	4 460	4 201	4 162	4 286	3 934	3 788	3 728	3 650
CH ₄	751	682	621	553	494	486	480	468
N ₂ O	413	373	333	311	265	260	257	258
HFCs	29	44	53	71	96	99	101	104
PFCs	25	17	12	7	4	4	4	4
Unspecified mix of HFCs and PFCs	6	6	2	1	0	0	0	0
SF ₆	11	15	10	8	6	6	6	6
NF ₃	0.02	0.04	0.12	0.16	0.12	0.13	0.09	0.07
Total (with net CO₂ emissions/removals)	5 421	5 040	4 866	4 903	4 472	4 315	4 250	4 159
Total (without CO₂ from LULUCF)	5 696	5 338	5 192	5 238	4 799	4 643	4 576	4 489
Total (without LULUCF)	5 680	5 332	5 177	5 224	4 786	4 630	4 563	4 447
International bunkers: Aviation	70	86	116	132	132	136	134	134
International bunkers: Marine	109	110	133	162	157	161	148	140

1.1.3. Emission trends by main source and sink categories

Table 1-3 gives an overview of EU-28 GHG emissions in the main source categories for 1990 – 2013. The most important sector by far is energy (i.e. combustion and fugitive emissions), accounting for 79 % of total EU-28 emissions in 2013. The second largest sector is agriculture (10 %), followed by industrial processes and product use (8 %).

Table 1-3 Overview of EU-28 GHG emissions in the main source and sink categories 1990 to 2013 in CO₂-equivalents (million tonnes)

GHG SOURCE AND SINK	1990	1995	2000	2005	2010	2011	2012	2013
1. Energy	4 356	4 088	4 018	4 115	3 798	3 650	3 604	3 524
2. Industrial Processes and Product Use	511	491	443	449	376	374	360	360
3. Agriculture	569	495	481	455	442	442	439	441
4. Land-Use, Land-Use Change and Forestry	-260	-282	-311	-321	-314	-316	-312	-318
5. Waste	244	248	235	205	170	164	159	152

GHG SOURCE AND SINK	1990	1995	2000	2005	2010	2011	2012	2013
6. Other	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Total (with net CO₂ emissions/removals)	5 421	5 040	4 866	4 903	4 472	4 315	4 250	4 159
Total (without LULUCF)	5 680	5 332	5 177	5 224	4 786	4 630	4 563	4 447
International bunkers: Aviation	70	86	116	132	132	136	134	134
International bunkers: Marine	109	110	133	162	157	161	148	140

Table 1-4 shows the sources with the largest contribution to the change in total GHG emissions in the EU-28 between 1990 and 2013 (and with greater disaggregation than Table 1-3).

Table 1-4 Overview of EU-28 categories whose emissions increased or decreased by more than 20 million tonnes CO₂ equivalents in the period 1990–2013

Source category	EU-28 Million tonnes (CO ₂ eq.)
Road Transportation (CO ₂ from 1.A.3.b)	119
Refrigeration and Air conditioning (HFCs from 2.F.1)	91
Commercial/Institutional (CO ₂ from 1.A.4.a)	-20
Fluorochemical Production (HFCs from 2.B.9)	-28
Direct N ₂ O Emissions From Managed Soils (N ₂ O from 3.D.1)	-31
Cement Production (CO ₂ from 2.A.1)	-31
Oil and Natural Gas and Other Emissions from Energy Production (CH ₄ from 1.B.2)	-34
Nitric Acid Production (N ₂ O from 2.B.2)	-45
Adipic Acid Production (N ₂ O from 2.B.3)	-57
Manufacture of Solid Fuels and Other Energy Industries (CO ₂ from 1.A.1.c)	-61
Enteric Fermentation (CH ₄ from 3.A)	-61
Managed Waste Disposal Sites (CH ₄ from 5.A.1)	-71
Coal Mining and Handling (CH ₄ from 1.B.1.a)	-74
Residential (CO ₂ from 1.A.4.b)	-75
Iron and steel production (CO ₂ from 1.A.2.a +2.C.1)	-107
Public Electricity and Heat Production (CO ₂ from 1.A.1.a)	-267
Manufacturing industries (excl. Iron and steel) (Energy-related CO ₂ from 1A2 excl. 1A2a)	-290
Total	-1 203

1.2. The EU inventory arrangements

The EU GHG inventory is the direct sum of the sectoral emissions data contained in the national inventories of the EU-28 Member States. The legal basis of the compilation of the EU inventory up to June 2013 was Decision No. 280/2004/EC concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol. From 8 July 2013, this Decision was replaced by Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change (hereafter referred to as the Monitoring Mechanism Regulation or

MMR). The Directorate-General for Climate Action of the European Commission is the overall body responsible for preparing the inventory of the European Union.

The main institutions involved in the compilation of the EU GHG inventory are the Member States, the European Commission Directorate-General for Climate Action, the European Environment Agency (EEA) and its European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM), Eurostat, and the Joint Research Centre (JRC).

Since the Sixth national communication and First biennial report from the European Union under the UNFCCC, the following changes have occurred in the inventory arrangements:

Accession of Croatia

The European Union has enlarged and Croatia officially joined on 1 July 2013. The accession of Croatia has not brought about a change to the structure and functioning of the EU national inventory system. Instead, Croatia was smoothly integrated into the EU annual inventory preparation cycle, being fully compliant with the internal deadlines and procedures. As a result, the main change is that the EU inventory submission under the UNFCCC now covers the EU-28 aggregate instead of the EU-27 aggregate used in inventory submissions until 2013.

Adoption of the Monitoring Mechanism Regulation, replacing the Monitoring Mechanism Decision

The legal basis for the national inventories on EU level, which also establishes the Union inventory system, has been updated. The previous Monitoring Mechanism Decision 280/2004/EC has been repealed and replaced by the Monitoring Mechanism Regulation (EU) No 525/2013 (MMR, cf. also section 2.2.2.1). Article 6 of the MMR establishes the Union national system, whose main objective is to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of national inventories with regard to the Union greenhouse gas inventory. The European Commission continues to be the single entity with overall responsibility, with the task to administer, maintain and continuously improve the Union inventory system.

Article 6(2) of the MMR empowers the European Commission to establish the substantive requirements for a Union inventory system in order to fulfil the obligations pursuant to Decision 19/CMP.1 of the Conference of the Parties to the UNFCCC serving as the meeting of the Parties to the Kyoto Protocol on national systems for inventories. These requirements have been set out in Commission Delegated Regulation (EU) No 666/2014, which establishes provisions for the Union quality assurance and quality control programme, the gap-filling procedures in cases of missing data from Member States and the timescales for cooperation and coordination during the annual reporting process and the UNFCCC reviews.

New framework partnership agreement between the EEA and its ETC/ACM

Regulation (EC) No 401/2009 on the European Environment Agency (EEA) and the European Environment Information and Observation Network describes, in its Article 4(4)-(6), European Topic Centres as part of the Agency's network. European Topic Centres (ETCs) are centres of thematic expertise contracted by the EEA to carry out specific tasks identified in the EEA strategy.

The European Topic Centre for Air Pollution and Climate Change Mitigation (ETC/ACM) is a major partner under the Union inventory system, supporting the technical work of the European Environment Agency. It was established by a contract between the lead organisation Rijksinstituut voor Volksgezondheid en Milieu (RIVM) in the Netherlands and the EEA. The current framework

partnership agreement runs from 1 January 2014 until 31 December 2018. The ETC/ACM is a consortium of 14 European organisations with RIVM as its lead organisation.

2. QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET

This section explains the EU 2020 emission reduction target under the UNFCCC and the target compliance architecture set up within the EU in order to meet that target, and gives an overview of other EU emission reduction targets.

2.1. The EU target under the Convention

In 2010, the EU submitted a pledge to reduce its GHG emissions by 2020 by 20 % compared to 1990 levels, in order to contribute to achieving the ultimate objective of the UNFCCC: 'to stabilise GHG concentrations at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system'², or, in other words, to limit the global temperature increase to less than 2°C compared to temperature levels before industrialization (FCCC/CP/2010/7/Add.1). The EU is also committed to raising this target to a 30 % emission reduction by 2020 compared with 1990 levels, provided that other developed countries also commit to achieving comparable emission reductions, and that developing countries contribute adequately, according to their responsibilities and respective capabilities. This offer was reiterated in the submission to the UNFCCC by the EU-28 and Iceland on 30 April 2014³.

The definition of the Convention target for 2020 is documented in the revised note provided by the UNFCCC Secretariat on the 'Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention' (FCCC/SB/2011/INF.1/Rev.1 of 7 June 2011). In addition, the EU provided additional information relating to its quantified economy-wide emission reduction target in a submission as part of the process of clarifying the developed country Parties' targets in 2012 (FCCC/AWGLCA/2012/MISC.1).

The EU clarified that the accounting rules for the target under the UNFCCC are more ambitious than the current rules under the Kyoto Protocol, for example, including international aviation, adding an annual compliance cycle for emissions under the Effort Sharing Decision (ESD, see section 2.2.1) or higher Clean Development Mechanism (CDM) quality standards under the EU Emissions Trading System (EU ETS) (FCCC/TP/2013/7). Accordingly, the following assumptions and conditions apply to the EU's 20 % target under the UNFCCC:

- The EU Convention pledge does not include emissions/removals from Land Use, Land-Use Change and Forestry, but it is estimated to be a net sink over the relevant period. EU inventories also include information on emissions and removals from LULUCF in accordance with relevant reporting commitments under the UNFCCC. Accounting for LULUCF activities only takes place under the Kyoto Protocol.
- The target covers the gases CO₂, CH₄, N₂O, HFCs, PFCs and SF₆.
- The target refers to 1990 as a single base year for all covered gases and all Member States.

² First steps to a safer future: Introducing the United Nations Framework Convention on Climate Change <http://unfccc.int/essential/background/convention/items/6036.php>

³ European Union, its Member States and Iceland submission pursuant to par 9 of decision 1/CMP.8' http://ec.europa.eu/clima/policies/international/negotiations/docs/eu_submission_20140430_en.pdf

- Emissions from international aviation to the extent it is included in the EU ETS are included in the target⁴.
- A limited number of CERs, ERUs and units from new market-based mechanisms may be used to achieve the target (see section 2.2.2.3): in the ETS, the use of international credits is capped (up to 50 % of the reduction required from EU ETS sectors by 2020). Quality standards also apply to the use of international credits in the EU ETS, including a ban on credits from LULUCF projects and certain industrial gas projects. In the ESD sectors, the annual use of international credits is limited to up to 3 % of each Member State's ESD emissions in 2005, with a limited number of Member States being permitted to use an additional 1 % from projects in Least Developed Countries (LDCs) or Small Island Developing States (SIDS), subject to conditions.
- The Global Warming Potentials (GWPs) used to aggregate GHG emissions up to 2020 under EU legislation were those based on the Second Assessment Report of the IPCC when the target was submitted. In its submission to clarify the 2020 target from 20 March 2012, the EU announced that the implications of the CMP Decision to revise the GWPs to those from the IPCC Fourth Assessment Report (AR4) are under review. This review has been completed and revised GWPs from AR4 were adopted for the EU ETS. For the revision of ESD targets the revised GWPs were taken into account. For the implementation until 2020, GWPs from AR4 will be used consistently with the UNFCCC reporting guidelines for GHG inventories.

Table 2-1 Key facts of the Convention target of the EU-28

Parameters	Target
Base Year	1990
Target Year	2020
Emission Reduction target	-20% in 2020 compared to 1990
Gases covered	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆
Global Warming Potential	AR4
Sectors Covered	All IPCC sources and sectors, as measured by the full annual inventory and international aviation to the extent it is included in the EU ETS.
Land Use, Land-Use Change, and Forests (LULUCF)	Accounted under KP, reported in EU inventories under the Convention. Assumed to produce net removals
Use of international credits (JI and CDM)	Possible subject to quantitative and qualitative limits.
Other	Conditional offer to move to a 30% reduction by 2020 compared to 1990 levels as part of a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities.

⁴ In the EU, the sum of emissions covered by category 1.A.3.a 'domestic aviation' and memo item 'international bunkers - aviation' go beyond the scope of the EU target, as emissions from international aviation are included in the EU Climate and Energy Package and the EU target under the UNFCCC to the extent to which aviation is part of the EU ETS.

2.2. The EU target compliance architecture

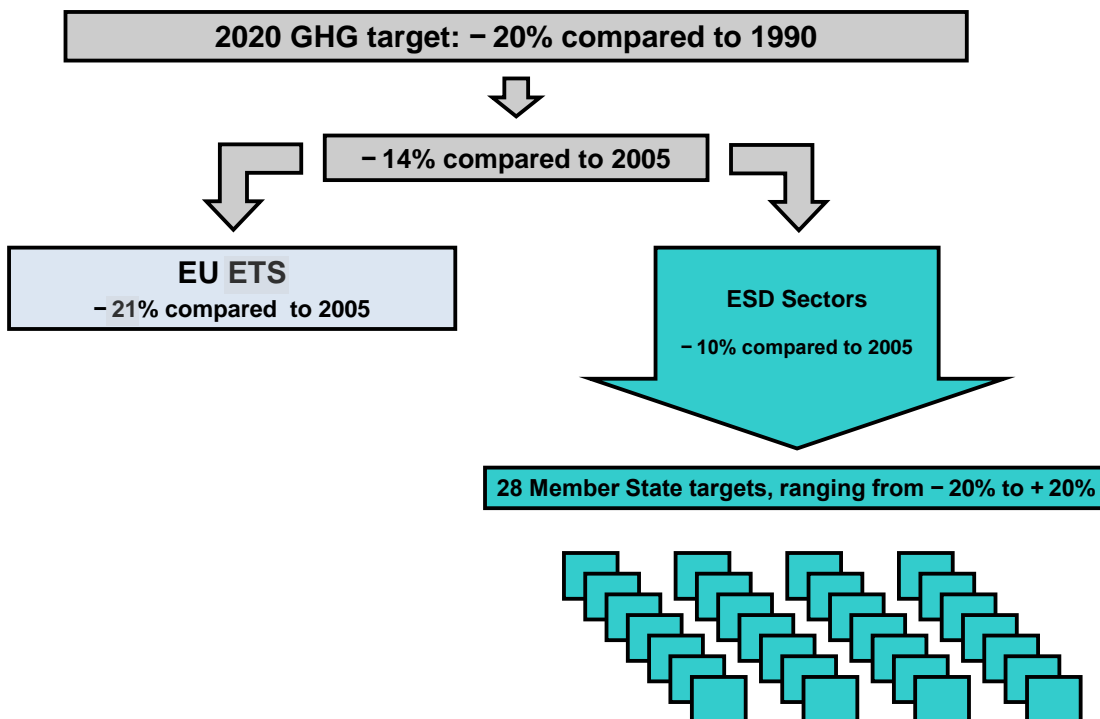
2.2.1. The 2020 climate and energy package

In 2009 the EU established internal rules under its “2020 climate and energy package”⁵ - these underpin the EU implementation of the target under the Convention. The package introduced a clear approach to achieving the 20 % reduction of total GHG emissions from 1990 levels, which is equivalent to a 14 % reduction compared to 2005 levels. This 14 % reduction objective is divided between the ETS and ESD sectors. These two sub-targets are:

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

The distribution of the total target across the ETS and ESD is shown in Figure 2-1.

Figure 2-1 GHG targets under the 2020 climate and energy package



Source: European Commission

Under the revised EU ETS Directive (Directive 2009/29/EC), a single ETS cap covers the EU Member States and three participating non-EU countries (Norway, Iceland and Liechtenstein), i.e. there are no further individual caps by country. Allowances allocated in the EU ETS from 2013 to 2020 decrease by 1.74 % annually, starting from the average level of allowances issued by Member States for the second trading period (2008–2012).

⁵ http://ec.europa.eu/clima/policies/package/index_en.htm

The three non-EU countries participating in EU ETS (Norway, Iceland and Liechtenstein) are also subject to a similarly defined cap and the same annual decrease in allowance allocation.

For further additional information on recent changes in the EU ETS see section 3.1.

The vast majority of emissions within the EU which fall outside the scope of the EU ETS are addressed under the Effort Sharing Decision (ESD) (Decision No 406/2009/EC). The ESD covers emissions from all sources outside the EU ETS, except for emissions from domestic and international aviation (which were included in the EU ETS from 1 January 2012), international maritime, and emissions and removals from land use, land-use change and forestry (LULUCF). It thus includes a diverse range of small-scale emitters in a wide range of sectors: transport (cars, trucks), buildings (in particular heating), services, small industrial installations, fugitive emissions from the energy sector, emissions of fluorinated gases from appliances and other sources, agriculture and waste. Such sources currently account for about 60 % of total GHG emissions in the EU.

While the EU ETS target is to be achieved by the EU as a whole, the ESD target was divided into national targets to be achieved individually by each Member State (see Figure 2-1). Under the Effort Sharing Decision, national emission targets for 2020 are set, expressed as percentage changes from 2005 levels. These changes have been transferred into binding quantified annual reduction targets for the period from 2013 to 2020 (Commission Decisions 2013/162/EU and 2013/634/EU), denominated in Annual Emission Allocations (AEAs). At country level, 2020 targets under the ESD range from -20 % to +20 %, compared to 2005 levels. ESD targets for 2020 for each EU Member State are shown in Figure 2-2.

Figure 2-2 National 2020 GHG emission limits under the ESD, relative to 2005 emissions levels



Source: EU Decision No 406/2009/EC, Annex 2

The target levels have been set on the basis of Member States' relative Gross Domestic Product per capita. In addition, different levels of development in the EU-28 are taken into account by the provision of several flexibility options. Up to certain limitations, the ESD allows Member States to make use of flexibility provisions for meeting their annual targets: carry-over of over-achievements to subsequent years within each Member State, transfers of AEAs between Member States and the use of international credits (credits from Joint Implementation and the Clean Development Mechanism). Nevertheless ESD targets are designed in a strict manner: Every year, once MS emissions are reviewed according to strict criteria (described in Chapter III of the Commission Implementing Regulation 749/2014), the European Commission issues an implementing decision on MS ESD emissions in the given year. MS exceeding their annual AEA, even after taking into account the flexibility provisions and the use of JI/CDM credits, will face *inter alia* a penalty – a deduction from their emission allocation of the following year (excess emissions, multiplied by 1.08).

For additional information on recent changes related to the ESD see section 3.1.

2.2.2. Monitoring on progress to 2020 targets

For the monitoring of GHG emissions at the EU and the Member State level, the Monitoring Mechanism Regulation has been adopted, see section 2.2.2.1 below. Also for the effective operation of the EU ETS, robust, transparent, consistent and accurate monitoring and reporting of greenhouse gas emissions are essential, therefore an annual procedure of monitoring, reporting and verification (MRV) is implemented. Installations and aircraft operators have to monitor, report and verify their annual emissions in accordance with two EU Regulations, the Monitoring and Reporting Regulation

(MRR) and the Accreditation and Verification Regulation (AVR) which are explained in section 2.2.2.2.

2.2.2.1. Monitoring Mechanism Regulation

The Monitoring Mechanism Regulation No 525/2013 (MMR) was adopted in May 2013 and entered into force on 8 July 2013. The main aims of the MMR are to improve the quality of the data reported and assist the EU and Member States with the tracking of their progress towards emission targets for 2013-2020. The mechanism refers to the following reporting elements:

- Reporting on historical GHG emissions and removals, including national and Union inventory systems and approximated inventories;
- Reporting on low-carbon development strategies;
- Reporting on policies and measures and on projections of GHG emissions and removals
- Member States reporting on financial and technology support provided to developing countries;
- Member States' use of revenues from the auctioning of allowances in the EU Emissions Trading System (EU ETS);
- Member States' reporting on adaptation to climate change.

In 2014 the Implementing Regulation (EU No 749/2014) and Delegated Regulation (EU No 666/2014) were adopted to enable the implementation of the Monitoring Mechanism Regulation in several of its provisions, specifying in more detail the structure of the information, reporting formats, and submission procedures.

2.2.2.2. Monitoring and reporting under the EU Emission Trading System

The reform of the EU Emission Trading System in Phase III (2013-2020) has resulted in important changes with regard to domestic institutional arrangements for the monitoring and reporting of GHG emissions under the EU ETS. EU ETS MRV now requires complying with two Commission Regulations, one specific to monitoring and reporting (EU No 601/2012) and the other to verification and accreditation (EU No 600/2012). The latter introduces a framework of rules for the accreditation of verifiers to ensure that the verification of an installation's or an aircraft operator's emission report is carried out by a verifier that possesses the technical competence to perform the entrusted task in an independent and impartial manner and in conformity with the requirements and principles set out. These regulations have direct legal effect in the Member States and their provisions apply directly to operators or aircraft operators, verifiers, and accreditation parties. The regulations provide clarity on the roles and responsibilities of all parties (i.e. industrial installations and aircraft operators are required to have an approved monitoring plan) which will strengthen the compliance chain.⁶

⁶ http://ec.europa.eu/clima/policies/ets/monitoring/documentation_en.htm

2.2.2.3. Accounting for Flexible Mechanisms under the 2020 target

In general, in the EU the use of flexible mechanisms can take place on the one hand by operators in the EU ETS, on the other hand by governments for the achievement of ESD targets.

As part of phase II of the EU ETS (the period 2008-2012), Member States were required to inform the European Commission in their National Allocation Plans of the limit on JI and CDM credits that could be used by operators. This limit was then assessed according to the principle of supplementarity, and where appropriate approved or revised by the European Commission. In total, this adds up to approximately 1.4 billion CERs or ERUs that could have been used by operators for compliance in phase II of the EU ETS.

The amended EU ETS Directive 2009/29/EC (Article 11a(8)) sets the upper limit for credit use for the period from 2008 to 2020 at a maximum of 50 % of the reduction effort below 2005 levels. This is further specified into installation-level limits in the Commission Regulation on international credit entitlements (RICE) (EU No 1123/2013). The sum of the installation-level limits is expected to be lower than the upper limit, but higher than the 1.4 billion CERs and ERUs already allowed in the second period. Since some entitlements are expressed as a percentage of verified emissions over the entire period, the overall maximum amount will only be known at the end of the third trading period.

Since 2013 it is no longer possible to track the use of flexible mechanisms in the EU ETS directly via information on EUTL public website because CERs and ERUs are no longer surrendered directly but are exchanged into EUAs. These exchanges will become public on installation level after three years, with the first information reflecting the use in 2013 available in 2016.

The ESD allows Member States to make use of flexibility provisions for meeting their annual targets, with certain limitations. In the ESD sectors, the annual use of carbon credits is limited to up to 3 % of each Member State's ESD emissions in 2005. Member States that do not use their 3 % limit for the use of international credits in any specific year can transfer the unused part of their limit to another Member State or bank it for their own use until 2020. Member States fulfilling additional criteria (Austria, Belgium, Cyprus, Denmark, Finland, Ireland, Italy, Luxembourg, Portugal, Slovenia, Spain and Sweden) may use credits from projects in Least Developed Countries (LDCs) and Small Island Developing States (SIDS) up to an additional 1 % of their verified emissions in 2005. These credits are not bankable and transferable. Approximately 750 Mt of international credits can be used during the period from 2013 to 2020 in the ESD.

Moreover, higher CDM quality standards apply to the use of CERs for compliance with the EU's target under the Convention.

2.3. Other EU emission reduction targets

In addition to the EU target under the Convention, the EU also committed to a legally binding quantified emission limitation reduction commitment for the second commitment period of the Kyoto Protocol (2013 - 2020). In Table 2-2 all relevant GHG reduction targets for the EU and their key facts are displayed in an overview. On the left, the table includes the international commitments under the Kyoto Protocol and the UNFCCC. On the right, the EU commitments under the Climate and Energy Package are included.

Table 2-2 Overview on EU targets

	International commitments		EU domestic legislation	
	Kyoto Protocol	UNFCCC	EU ETS	Climate and Energy Package ESD
Target year of period	First commitment period (2008-2012)	2020	2013-2020	2013-2020
Emission reduction target	-8%	-20%	-21% compared to 2005 for ETS emissions	Annual targets by MS. In 2020 - 10% compared to 2005 for non-ETS emissions
Further targets		Conditional target of -30% if other Parties take on adequate commitments	Renewable Energy Directive: 20% share of renewable energy of gross final energy consumption; Energy Efficiency Directive : Increase energy efficiency by 20 %	
Base year	1990 KP Flexibility rules (Art 3(5)) regarding F-gases and Economies in Transition	1990	1990 for overall emission reduction target; 2005 for renewable energy and energy efficiency target; as well as for targets broken down into ETS and non-ETS emissions	
LULUCF	Included ARD and other activities if elected	Excluded	Excluded	
Aviation	Domestic aviation included. International aviation excluded.	Aviation in the scope of the EU ETS included. In practice total aviation emissions considered.	Domestic and international aviation, as in the scope of EU ETS	Aviation generally excluded, some domestic aviation included (operators below ETS de minimis thresholds)

	International commitments		EU domestic legislation	
	Kyoto Protocol		UNFCCC	Climate and Energy Package
				ESD
Use of international credits	Use of KP flexible mechanisms subject to KP rules	Use of KP flexible mechanisms subject to KP rules	Subject to quantitative and qualitative limits	Subject to quantitative and qualitative limits, see section 2.2.2.3
Carry-over of units from preceding periods	Not applicable	Subject to KP rules including those agreed in the Doha Amendment	Not applicable	No carry-over from previous period
Gases covered	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ ,	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ , NF ₃	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆
Sectors included	Annex A of KP (Energy, IPPU, agriculture, waste), LULUCF according to KP accounting rules for CPI	Annex A of KP (Energy, IPPU, agriculture, waste), LULUCF according to accounting rules for CP2	Energy, IPPU, agriculture, waste, aviation in the scope of the EU ETS	Power & heat generation, energy-intensive industry sectors, aviation (Annex I of ETS directive) Transport (except aviation), buildings, non-ETS industry, agriculture (except forestry) and waste
GWPs used	IPCC SAR	IPCC AR4	IPCC AR4	IPCC AR4

3. POLICIES AND MEASURES

This chapter provides an overview on the EU policies and measures (PaMs) which contribute to meeting the EU emission reduction target as explained in section 2. A description of the EU system of assessing economic and social consequences of climate change response measures is included in section 3.9.

In the EU, there are two distinct levels of PaMs that have an impact on greenhouse gas emissions:

- European Union policies, which are proposed by the Commission and subsequently approved, amended or rejected by the Council of the European Union and the European Parliament. These common and coordinated policies and measures are applicable to all Member States, though Member States may implement Directives at different points in time. This report concentrates on these EU policies.
- National policies developed and implemented by Member States themselves. As such, these policies and measures are outside the scope of this Biennial Report.

Quantifications of the PaMs impacts on GHG emission reduction are attached in Table 3 of the Common Tabular Format (CTF). These (mostly) ex-ante estimates are produced by the European Commission in individual policy Impact Assessments and assume full implementation of the EU policies. However, estimates are not available for all EU policies and all years covered in CTF Table 3. Some older estimates refer to the EU-15 while more recent estimates are for the EU-27 or the EU-28.

3.1. Overarching policies and measures: the ETS and ESD

The two main overarching policies are the EU Emission Trading System (ETS) and the Effort Sharing Decision (ESD), both establishing EU internal rules under the “2020 climate and energy package” which underpin the implementation of the target under the Convention. The main elements of the ETS, the ESD and the EU monitoring system are presented in section 2. Details on ETS and ESD were reported in sections 4.2.2 and 4.2.3 of the first biennial report from the European Union under the UNFCCC (BR1). Changes and updates compared to the information provided in the BR1 are explained in the following two sections.

3.1.1. EU Emissions Trading System

The following structural changes to the ETS have taken place or have been decided since the publication of the BR1.

Firstly, the scope of the ETS with regard to aviation has been changed. Since 2012 emissions from all flights from, to and within the European Economic Area (EEA) - the 28 EU Member States, plus Iceland, Liechtenstein and Norway - are included in the EU Emissions Trading System (ETS). The legislation, adopted in 2008, applies to both EU and non-EU airlines alike. To allow time for negotiations on a global market-based measure applying to international aviation emissions, the ETS requirements were

suspended for flights in 2012 to and from non-European countries (Decision No 377/2013/EU). For the period 2013 to 2016 the legislation has also been amended so that only emissions from flights within the EEA fall under the ETS (Regulation EU No 421/2014). The EU made this change following agreement by the International Civil Aviation Organization (ICAO) Assembly in October 2013 to develop a global market-based mechanism addressing international aviation emissions by 2016 and apply it by 2020. The amended law provides for the Commission to report to the European Parliament and Council on the outcome of the 2016 ICAO Assembly and propose measures as appropriate to take international developments into account with effect from 2017. With Regulation EU No 421/2014 exemptions for operators with low emissions have also been introduced.

Since 2013, the EU ETS operates under the improved and harmonised rules of Phase 3. In October 2014 EU Heads of State and Government have decided- within the 2030 Climate and Energy Framework- that a well-functioning, reformed EU ETS together with an instrument to stabilise the market (Market Stability Reserve – MSR) will constitute the main mechanism to achieve the reduction of emissions in the EU ETS by 43% compared to 2005.

The MSR has adopted in October 2015 (Decision (EU) 2015/1814). The reserve will start operating in January 2019. It will neutralise the negative impacts of the existing surplus of allowances and improve the system's resilience to future shocks by adjusting the supply of allowances to be auctioned.

On 15 July 2015, the Commission presented a legislative proposal on the revision of the EU ETS for Phase 4 in line with the 2030 Climate and Energy policy Framework.

The key changes are:

- The overall number of emission allowances will decline at an annual rate of 2.2% from 2021 onwards, compared to 1.74% currently. This leads to a significant additional emissions reduction of some 556 million tonnes between 2021 and 2030.
- The proposal further develops predictable, robust and fair rules to address the risk of carbon leakage. The system of free allocation is revised in order to distribute the available allowances in the most effective and efficient way to those sectors at highest risk of relocating their production outside the EU (around 50 sectors in total).
- An Innovation Fund will be set up to extend existing support for the demonstration of innovative technologies to breakthrough innovation in industry. Free allowances will continue to be available to modernise the power sector in lower-income Member States. In addition, a dedicated Modernisation Fund will be established to facilitate investments in modernising the power sector and wider energy systems and boost energy efficiency in these Member States.

3.1.2. *Effort Sharing Decision*

Since the publication of the BR1 the national ESD targets have been adjusted to reflect the change in scope of the EU ETS with Decision 2013/634/EU. The progress of Member States in meeting the emission reduction targets set in the ESD is assessed under the Monitoring Mechanism Regulation (Regulation No 525/2013), and also as part of the European Semester⁷.

3.1.3. *Changes in domestic institutional arrangements*

In 2014 the Implementing Regulation (EU No 749/2014) and Delegated Regulation (EU No 666/2014) were adopted to enable the implementation of the Monitoring Mechanism Regulation (Regulation No 525/2013, see section 2.2.2.1) in several of its provisions, specifying in more detail the structure of the information, reporting formats, and submission procedures. However, no new institutions were set up in that context.

3.2. **Other Cross-cutting policies and measures**

Climate action is a key priority for the EU. To respond to challenges and investment needs related to climate change, the EU has agreed that at least 20% of its budget for 2014-2020 – as much as €180 billion – should be spent on climate change-related action. To achieve this increase, mitigation and adaptation actions are integrated into all major EU spending programmes, in particular cohesion policy, regional development, energy, transport, research and innovation and the Common Agricultural Policy.

The key developments in cross cutting funding policies include:

- **Horizon 2020:** Horizon 2020⁸ is the largest ever EU Research and Innovation programme, with nearly €80 billion of funding available over seven years (2014 to 2020). One of Horizon 2020's principle objectives is to provide solutions through the means of science and innovation to European and global societal challenges. The EU aims to spend 35% of the overall Horizon 2020 budget on climate-related research and innovation actions. Particular global and/or regional societal challenges that will be addressed include:
 - Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bio-economy;
 - Secure, clean and efficient energy
 - Smart, green and integrated transport
 - Climate action, environment, resource efficiency and raw materials, as well as earth observation
- **European Structural and Investment Funds (ESIF):** The budget and investment priorities of the ESIF⁹ for the 2014-2020 programming period are

⁷ The European Semester is the EU's annual cycle of economic policy guidance and surveillance: http://ec.europa.eu/economy_finance/economic_governance/the_european_semester/index_en.htm

⁸ <http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>

⁹ http://ec.europa.eu/regional_policy/en/information/legislation/regulations

designed to ensure the implementation of the Europe 2020 strategy for smart, sustainable and inclusive growth. Regional policy targets all regions and cities in the European Union in order to support job creation, business competitiveness, economic growth, sustainable development, and improve citizens' quality of life. In order to reach these goals and address the diverse development needs in all EU regions, almost one third of the total EU budget has been set aside for Cohesion Policy for 2014-2020.

The key developments in cross cutting regulatory policies include:

- **The Energy Taxation Directive:** The Commission proposal for the revision of Directive 2003/96/EC of 2011¹⁰ described in the BR1 was withdrawn by the Commission due to lack of agreement in the Council. The Commission is currently reflecting on appropriate initiatives in this area. Directive 2003/96/EC of course remains applicable to taxation of energy products and electricity.
- **National Emissions Ceiling (NEC) Directive:** A revised NEC Directive – presented as a Commission proposal in 2013 as part of the Clean Air Policy Package¹¹ – will (when agreed by the co-legislators) replace the existing directive from 2001 (Directive 2001/81/EC). Its overarching aim is to reduce adverse health impacts of air pollution, including reducing the cases of premature deaths per year due to air pollution by more than half. To this end the proposal includes national emission reduction commitments for each Member State for 2030 (with interim targets also set for 2025) for six specific pollutants: NO_x, SO₂, NMVOC, NH₃, PM_{2.5} and CH₄.

3.3. Sectoral policies and measures: Energy

The EU energy policies are organised in a comprehensive framework consisting of different strategy papers, roadmaps and targets which affect the energy policy framework of the European Union whose overall objectives are the provision of “secure, competitive, and sustainable energy.” The Energy Union Strategy (COM(2015) 80 final) extends the focus of the 2020 Energy Strategy (COM(2010) 639 final) and also includes two GHG relevant dimensions: (1) energy efficiency contributing to moderation of demand and (2) decarbonisation of the economy. Besides this overall Energy Union Strategy, the EU has set three milestones encompassing all EU energy targets which are relevant for GHG emissions for the time period 2020-2050 (see Figure 3-1).

¹⁰ http://europa.eu/rapid/press-release_MEMO-11-238_en.htm?locale=en

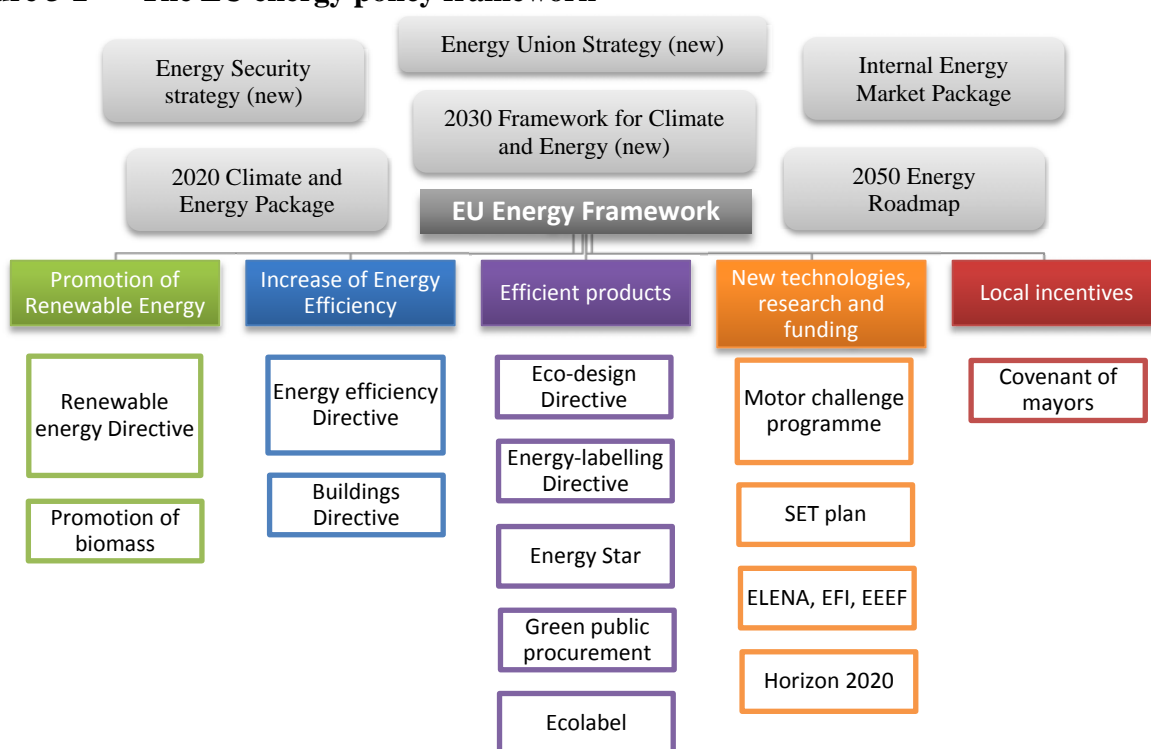
¹¹ http://ec.europa.eu/environment/air/clean_air_policy.htm

Figure 3-1 Overview of the EU energy targets

2020	<ul style="list-style-type: none"> • 20 % Share of renewable energy • 20 % Increase in energy efficiency 	2020 Climate and Energy Package: COM(2008) 30 final
2030	<ul style="list-style-type: none"> • > 27 % Share of renewable energy • > 27 % increase in energy efficiency, indicative target (will be reviewed in 2020, having in mind 30 %) 	2030 Framework for Climate and Energy: COM(2014) 15 final
2050	<ul style="list-style-type: none"> • Roadmap for a 80-95 % GHG emission reduction • several qualitative energy targets: e.g. decarbonisation of energy system 	The Energy Roadmap 2050: COM(2011) 112 final

Figure 3-2 provides an overview of the main strategies and frameworks that influence the EU energy policies as well as the key Policies and Measures, organised by topic.

Figure 3-2 The EU energy policy framework



3.3.1. Promotion of renewable energy

The promotion of renewable energy in the EU has been part of the energy policy priorities during the last two decades. The EU has established a broad policy framework for renewable energies via the **Renewable Energy Directive 2009/28/EC** directly and indirectly affecting other sectors, such as transport or LULUCF. The Directive aims at a 20 % share of renewable energy by 2020. The EU is on track to meet this target and reached a share of 15 % of renewable energy in 2013, with 2014 share estimated at 15.3 %. The increase in renewable energy use since 2005 resulted in approx. 388 Mt of gross avoided CO₂ emissions at EU level in 2013 (COM(2015) 293 final). With 88 Mtoe or about 46 % of all primary renewable energy production in 2013, solid biomass still

made the largest contribution in RES primary production, followed by hydro energy (32 Mtoe), while wind and solar energy production levels have doubled since 2009¹².

The majority of the Member States are well on track to meeting the renewable energy targets laid down in the Renewable Energy Directive. For the EU as a whole, there are good prospects that the 2020 target will be reached. However, for a number of Member States, reaching the targets may appear difficult not least due to the steeper slope of the trajectory and persistent market barriers. Making best use of the opportunities offered by the cooperation mechanisms foreseen in the renewable Energy Directive is necessary.

The new **2030 Framework for Climate and Energy** framework (COM(2014) 15 final) stipulates a share of at least 27 % by 2030. The Energy Union Strategy (COM(2015) 80 final) includes the EU commitment to become the world leader in renewable energy, the global hub for developing the next generation of technically advanced and competitive renewable energies. Further deployment of renewable energy sources will be a key factor in the EU and in all other countries as the global efforts to mitigate climate change.

3.3.2. *Increase of energy efficiency*

The EU has an agreed target of improving energy efficiency by at least 27 % by 2030 within the context of the 2030 framework for Climate and Energy. This target will be reviewed in 2020 having in mind extending it to 30 %. According to the most recent Communication on Energy Efficiency (COM(2014) 520 final), the EU is expected to achieve energy savings of around 18-19% in 2020¹³. If all Member States work equally hard to implement fully the agreed legislation, the **Energy Efficiency Directive 2012/27/EU**¹⁴, the 20 % target can be achieved without the need for additional measures.

As laid down in the new Energy Union Strategy, the EU will pay special attention to sectors with large energy efficiency potential, such as transport (cf. section 3.4.1) and buildings (**Energy Performance of Buildings Directive 2010/31/EU**). The Commission plans to promote new financing schemes to fully exploit the energy efficiency potential of buildings. At present energy efficiency policies in the EU include the following fields of action which are listed in Table 3-1:

¹² http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_from_renewable_sources

¹³ This means falling short of the 20% savings target by 20-40 Mtoe.

¹⁴ The Directive explicitly sets goals of 1 483 Mtoe (mega tonnes of oil equivalent) of primary energy consumption and 1 086 Mtoe of final energy consumption by 2020

Table 3-1 Major energy efficiency policies and their underlying measures

Energy Efficiency Directive 2012/27/EU	Energy Performance of Buildings Directive 2010/31/EU
Removal of market barriers in the energy market	Introduction of energy performance certificates
Introduction of energy audits and energy management systems	Establishment of inspections schemes for heating and air cooling systems
Energy efficiency in the public and private sector	All new buildings must be nearly zero energy buildings by 31/12/2020 (public buildings by 31/12/2018)
Promotion of CHP (combined heat and power) and district heating/cooling	Minimum energy performance requirements for new buildings and building renovations
Smart metering and billing	Financial measures to improve energy efficiency

3.3.3. *Efficient products*

In terms of products and appliances, the EU aims to reduce their environmental impact and increase energy efficiency. This objective, which also helps customers save money, can be seen in the Energy Union Strategy. It is estimated that consumers could save around €100 billion annually by 2020 through more efficient appliances (COM(2014) 520 final).

The EU has implemented two Directives which provide the overall frameworks for **ecodesign standards** (2009/125/EC) and **energy labelling** (2010/30/EU). These are followed by a set of regulations that define the technical details for each product category. The list of such products and appliances is continuously extended and kept up to date. A third, voluntary labelling scheme known as **Energy Star**¹⁵ is also widely used for office equipment. With regard to the use of efficient products, the public sector acts as an example. Thus, the EU developed the **Green Public Procurement**¹⁶ instrument which aims to promote the purchase of environmentally friendly goods, services and works. In July 2015 the Commission proposed a revision (COM(2015) 341 final) of the energy label, namely to simplify the energy label scale and to adapt the scale to current market efficiency standards.

The overall impact of these measures will depend on how many implementing regulations are adopted. The emission reductions achieved could be very substantial over time, reaching 320 Mt CO₂ per year by 2020, including the impact of energy labelling, Energy Star and tyre labelling¹⁷.

¹⁵ <http://www.eu-energystar.org/>

¹⁶ http://ec.europa.eu/environment/gpp/index_en.htm

¹⁷ Kemna R. (2014): Ecodesign Impact Accounting – Part 1 – Status Nov. 2013, https://ec.europa.eu/energy/sites/ener/files/documents/2014_06_ecodesign_impact_accounting_part1.pdf

3.3.4. *New technologies, research and funding initiatives*

Delivery on the ambitious GHG and energy targets depends to a great extent on the innovative capacity of the European industrial and research sector, with special regard to low-carbon technologies. The EU has therefore put in place European-level innovation strategies and R&D financing mechanisms, including public funds as well as public-private partnerships and technology initiatives. The common objective lying behind these efforts is to streamline scarce resources and accelerate the market-rollout of new technologies indispensable for decarbonising the economy.

Table 3-2 Overview of funding programmes and initiatives to promote low carbon technologies in the energy sector

Fund/programme/initiative	Description
European Strategic Energy Technology Plan (SET-Plan)	Provides the overall framework for promoting strengthened cooperation in R&I between the EU, Member States and stakeholders (research and industry), with the aim to step up the efforts to bring new, efficient and cost-competitive low-carbon technologies faster to the market and deliver the energy transition in a cost-competitive way.
The Horizon 2020 programme	From the €80 billion strong Horizon 2020 budget nearly €6 billion were allocated for research and innovation in the field of secure, clean and efficient energy technologies for the period of 2014 and 2020.
EU Project Development Assistance (PDA) Facilities	Provides the grant support for project promoters to develop and launch their energy efficiency investment projects and programmes.
InnovFin – EU Finance for Innovators programme under Horizon 2020	A joint initiative by the European Investment Bank (EIB) Group and the European Commission under Horizon 2020. It builds on the success of the Risk-Sharing Finance Facility developed under FP7. A new pilot scheme under InnovFin – Energy Demo Projects facility – enables the EIB for the first time to finance innovative first-of-a-kind demonstration projects in the field of renewable energy and hydrogen/fuel cells, i.e. projects which are often considered initially non-bankable. The EIB provides loans and loan guarantees between €7.5 million and €75 million.
The European Energy Efficiency Fund (EEEF)	Stocked with €265 million for supporting private public partnerships investing in energy efficiency, renewable energy and GHG emission reductions.
European Regional Development Fund (ERDF)	Part of the European Structural and Innovation (ESI) Funds. €38 billion are determined for investing in the fields of e.g. buildings, renewable energy, smart grids and transport during 2014 and 2020.
Motor Challenge Programme	A European Commission initiative to aid industrial companies to improve the energy efficiency of their electric motor driven systems.

3.3.5. *Local incentives*

The European Commission launched the **Covenant of Mayors** to endorse and support the efforts deployed by local authorities in the implementation of sustainable energy policies. This initiative is strongly supported by the European Commission in context of the new Energy Union Strategy. With regard to the 2030 framework, the “new integrated

Covenant of Mayors for climate and energy” was launched in October 2015, setting a 40 % emission reduction objective for 2030 and including adaptation and the international dimension.. By the beginning of 2015, more than 6 200 mayors, representing more than one fourth of the EU’s inhabitants, have joined the Covenant. According to the most recent estimations of 2015 it is expected to achieve a 28 % CO₂ emission reduction¹⁸ (on average) by 2020 compared to the base year (1990 is the recommended base year, although it may differ in some cases). This corresponds to a reduction of approximately 190 Mt of CO₂.

3.4. Sectoral policies and measures: Transport

EU transport sector policies are also organized in a comprehensive framework of strategy papers, roadmaps, Communications, Regulations and Directives. The most important overarching document is the White Paper of 2011 “Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system” (COM(2011) 144 final). This paper defines a long-term strategy to achieve the 60 % GHG emission reduction target for transport by 2050. Based on the White Paper the Commission prepares appropriate legislative proposals.

3.4.1. Efficiency and technical standards

The **CO₂ and Cars Regulation** (EC) No 443/2009 limits CO₂ emissions from new cars to a fleet average of 130 grams of CO₂ per kilometre (g/km) by 2015 and 95 g/km by 2021. The 2015 and 2021 targets represent reductions of 18 % and 40 % respectively, compared with the 2007 fleet average. In 2014, Regulation (EU) No 333/2014 on modalities for reaching the 2021 target for cars was adopted. Implementing the 2021 emission targets for cars is expected to result in annual savings of 24.9 Mt CO₂ in 2021, and 43.6 Mt CO₂ in 2030.

The **CO₂ and Vans Regulation** (EU) No 510/2011 limits CO₂ emissions from new vans to a fleet average of 175 g/km by 2017 and 147 g/km by 2020. These cuts represent reductions of 14 % and 28% respectively, compared with the 2007 average. The annual CO₂ equivalent savings are expected to be 1.9 Mt in 2020 and 5.3 Mt in 2030.

The most recent (provisional) data published by the EEA¹⁹ indicates that the EU car and van fleets will have met their targets well ahead of the deadlines. The average specific emissions of the European fleet in 2014 were 123.4 g/km for new cars (compared to the 130 g/km target for 2015) and 169.2 g/km for new vans (compared to the 175 g/km target for 2017).

The Directive 1999/94/EC on **Car Labelling** is a demand-side policy and an important complementary measure to help car manufacturers to meet their specific CO₂ emission targets and to raise consumer awareness on fuel use and CO₂ emissions of new passenger cars. It requires that information relating to the fuel economy and CO₂ emissions of new

¹⁸ http://www.covenantofmayors.eu/IMG/pdf/Covenant_in_Figures_dec_2014.pdf

¹⁹ EEA (2014): Monitoring CO₂ emissions from passenger cars and vans in 2013. EEA Technical report No 19/2014.

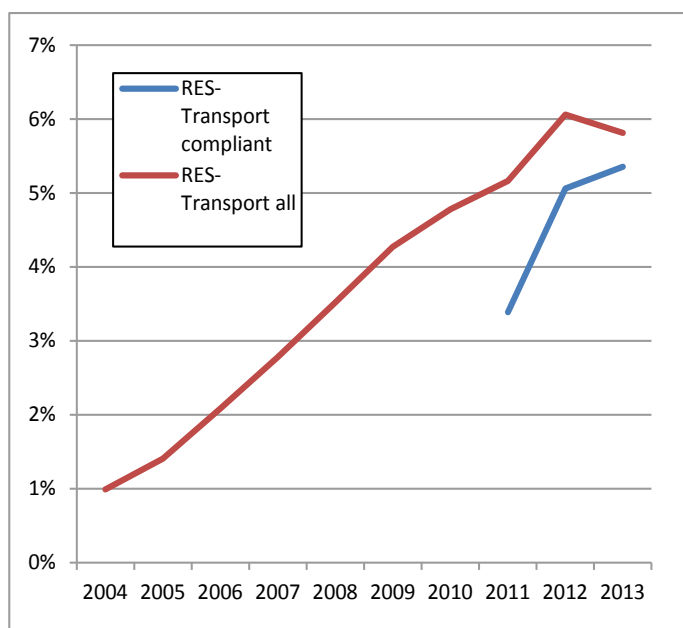
passenger cars offered for sale or lease in the Union is consistently made available to consumers in order to enable more informed purchase decisions.

A number of Regulations are in place related to **environmental and safety requirements of tyres and gear shift indicators (GSI)**. Regulation (EC) No 661/2009 aims at increasing the fuel efficiency of motor vehicles by introducing tyre pressure monitoring systems and GSI. In addition, Regulation (EC) No 1222/2009 on the labelling of tyres aims at influencing energy demand by promoting the market transformation towards fuel-efficient tyres. The Regulations' total CO₂ emission savings from all vehicle types are expected to range from 1.5 to 4 Mt annually by 2020.

3.4.2. Fuels from renewable energy sources

The **Renewable Energy Directive 2009/28/EC** sets, *inter alia*, mandatory targets for renewable energy used in the transport sector. By 2020, the share of renewable energy shall amount to 10 % of fuels consumed in the transport sector, which can include biofuels (including biogas), renewable electricity or hydrogen originating from renewable sources. In addition, the Renewable Energy Directive sets a number of

Figure 3-1 Share of renewable energy sources (RES) in transport



Note: overall and compliant according to the sustainability criteria included in Article 17 of the Renewable Energy Directive

Source: Eurostat SHARES 2013

sustainability criteria that must be met for biofuels to count towards the target, including a minimum threshold of GHG savings for biofuels: the life cycle GHG emissions of biofuels used must be at least 35 % lower than from the fossil fuel replaced. This threshold will be raised to 50 % in 2017. The Directive also lays down that biofuels must not derive from land with high carbon stocks or high biodiversity. Figure 3-3 shows that in 2013 5.4 % of transport related energy consumption came from renewable sources which were compliant with the sustainability criteria included in Article 17 of the Renewable Energy Directive. 2014 projection indicates a share of 5.7%. Achieving 10% renewable energy target for

transport by 2020 is challenging, but remains feasible, and progress achieved in some Member States testify to this. A breakthrough in advanced biofuels, and a comprehensive approach towards decarbonisation of the transport sector, including decisive steps towards increasing the share of renewable electricity in transport, remains key (COM (2015) 293).

Directive 2009/30/EC on **Fuel Quality** tightens the requirements for a number of fuel parameters. The Directive introduces a binding target for fuel suppliers to reduce life-cycle GHG emissions per unit of energy from fuel and energy supplied by 6 % by 2020 compared to 2010. The reduction is to be obtained through the use of biofuels, alternative

fuels, electricity in road transport or reductions in upstream emissions such as from flaring and venting at production sites. The expected savings of 6 % of total well-to-wheel road transport CO₂ emissions in 2020 amount to roughly 55 Mt CO₂ in 2020, excluding indirect land use change (ILUC) emissions. Council Directive (EU) 2015/652 specifies calculation methods and reporting requirements under the Fuel Quality Directive.

The EU agreed in April 2015 to amend both Directives mentioned above in order to limit negative effects of **indirect land use changes** (ILUC) which may be associated with the production of biofuels. ILUC can reduce the GHG savings associated with the use of biofuels if their production diverts food and feed production to new land. For this purpose, the amendment foresees that biofuels from food crops and some energy crops should be limited to a share of 7 % of the total fuel consumption. Other contributors to the 10 % target would be advanced biofuels made from waste, residues, non-food cellulosic material or ligno-cellulosic biomass and renewable electricity in road and rail. Note that these advanced options are all accounted for several times (factors 2 to 5) so that their contribution in real energy terms will be lower than the nominal 3 % needed to fill the theoretical gap to 10 %. In addition, the GHG performance of the biofuel production processes will be improved and a minimum threshold of 60 % for the GHG emission savings is set for new biofuel production installations.

3.4.3. *Infrastructure*

The **Directives on road user charges** (Directives 1999/62/EC, 2006/38/EC, 2011/76/EC) set common rules on distance-related (tolls) and time-based (vignettes) road user charges for heavy goods vehicles. These rules stipulate how and to what extent the cost of construction, operation, maintenance and development of the infrastructure as well as the costs of traffic-related noise and air pollution can be borne (through tolls and vignettes) by road users. Following the most recent amendment to the Directive, tolls may also include an "external cost charge" which reflects the cost of air pollution and/or noise pollution. Statistics on freight transport in two Member States show that the introduction of the tolls coincided with a decrease in the average distance travelled by trucks, notably resulting from the optimisation of road transport itself (reduction of empty running, increase in load factors).

The Directive 2014/94/EU on **Deployment of Alternative Fuels Infrastructure** requires Member States to adopt national policy frameworks for the market development of alternative fuels and their infrastructure, including targets for the build-up of alternative fuel infrastructure. The Directive also sets common technical specifications for the infrastructure interface and requests development of an alternative fuel labelling system to ensure clarity in the consumer information on vehicle/fuel compatibility, as well as an alternative fuel price comparison methodology.

3.4.4. *Other policies and measures*

The **Clean Vehicles Directive** 2009/33/EC aims at a broad market introduction of environmentally-friendly vehicles. The Directive requires that energy and environmental impacts linked to the operation of vehicles over their whole lifetime, including CO₂ emissions, are taken into account in public procurement, including public transport operators. Public procurement of clean efficient vehicles was expected to result in savings of up to 1.9 Mt CO₂ emissions per year in 2017 compared to the baseline

scenario. A recent external evaluation found that the impact has actually been much lower. A revision of this legislation has been announced for 2017 in the Energy Union Package.

The strategy for progressively including greenhouse gas emissions from **maritime transport** consists of the following consecutive steps (COM(2013) 479 final): (1) Establishing a system for monitoring, reporting and verifying (MRV) of CO₂ emissions; (2) Setting reduction targets for the maritime transport sector; (3) Applying further measures, including market-based instruments, in the medium to long term. Relating to the first of these three steps, on 29 April 2015 the Council and European Parliament adopted Regulation (EU) 2015/757 establishing an EU-wide MRV system for large ships. As from 2018, this system will cover all ships over 5 000 gross tonnes that use EU ports, irrespective of where the ships are registered. Under a MRV system, CO₂ emissions from the maritime transport sector are expected to be 2 % lower than the baseline in 2030.

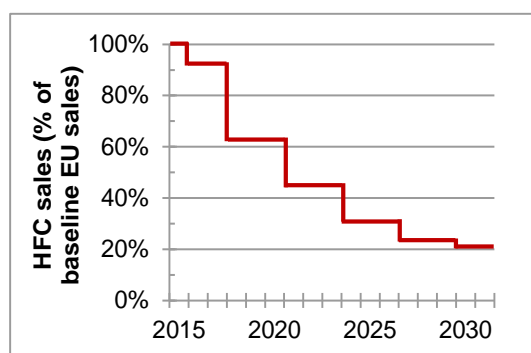
3.5. Sectoral policies and measures: Industry / industrial processes

Industrial processes in the mineral, chemical and metal industry are important sources of GHG emissions. With the **EU Emissions Trading System**, the European Union has a comprehensive and effective measure in place to control and reduce these emissions across all EU Member States (cf. section 3.1.1). This framework is complemented by additional policies and measures, *inter alia* addressing fluorinated gases.

3.5.1. Preventing emissions and substituting the use of fluorinated gases

Fluorinated gases (F-gases), in particular hydrofluorocarbons (HFCs), were introduced mostly as replacements for ozone depleting substances. The EU has been controlling the

Figure 3-2 The EU HFC phase-down



Note: Maximum allowed placing of HFCs on the EU market, compared to baseline EU sales (average of sales 2009-2012)

Source: F-Gas Regulation (EU) No 517/2014 (Annex V)

use of these gases since 2006 and has recently adopted a revised **F-Gas Regulation** (EU) No 517/2014 that will lead to significant emission reductions in the coming years. The revised Regulation retains many important and successful features of the previous F-Gas Regulation related to leak prevention, F-gas recovery and technical training. As its main measure to reduce the use of HFCs, the new Regulation prescribes a cap and subsequent reduction of HFCs that can be placed on the EU market (“phase-down”), thus eliminating 79 % of the current consumption levels of HFCs by

2030, leading to a two-thirds reduction of emissions.

The new F-Gas Regulation also includes a number of bans. F-gases with high GWPs are restricted from use in new equipment in refrigeration, small air conditioners, fire protection, foams and technical aerosols. In addition, a “service ban” requires operators of existing equipment to start using more climate-friendly alternatives from 2020 onwards.

In addition, the EU proposed in April 2015 an amendment to the Montreal Protocol to include a phase-down of HFCs at global level.

3.5.2. *Climate-friendly refrigerants in mobile air conditioning*

Mobile air conditioning (MAC) systems so far mostly used the hydrofluorocarbon R134a, which is a potent greenhouse gas. In order to phase out its use, Directive 2006/40/EC was put in place which covers MACs fitted to passenger cars and light commercial vehicles. It is being enforced over three phases, starting in 2008. Currently, air conditioning systems in new *vehicle types* have to be filled with gases with a GWP lower than 150. From 2017 onwards this applies to all new air conditioned *vehicles* put on the EU market.

The fluorinated gas policies presented in chapters 3.5.1 and 3.5.22 are estimated to lead to cumulative emission savings of 1.5 Gt CO₂eq. by 2030 and 5 Gt CO₂eq. by 2050.

3.5.3. *Best available techniques in industry*

Energy and manufacturing industries account for more than half of the EU's total GHG emissions and are important energy consumers and emitters of atmospheric pollutants. The **Industrial Emissions Directive** 2010/75/EU (IED) sets out the main principles for the permitting and control of installations based on an integrated approach and the application of best available techniques (BAT). BAT means the most effective techniques to achieve a high level of environmental protection as a whole, which can be implemented under technically and economically viable conditions and taking into consideration the costs and benefits.

The IED affects climate change by regulating greenhouse gases (CO₂, CH₄, N₂O, fluorinated gases) to the extent they are not covered by the ETS or where this would be necessary to prevent significant local pollution, and by regulating indirect greenhouse gases such as NO_x and SO_x and short-lived climate forcers such as black carbon. Furthermore, the IED promotes energy efficiency and makes fuel switching more attractive. The Directive governs various types of industrial installations, and thus affects the energy sector (cf. section 3.3), the agriculture sector (3.6) and the waste sector (3.8). It is complemented by other EU-wide policies, such as the National Emission Ceilings (NEC) Directive (cf. section 3.2). The **European Pollutant Release and Transfer Register** (E-PRTR) provides easily accessible key environmental data, including GHG emissions, from industrial facilities in EU Member States. This register contributes to transparency and public participation in environmental decision-making.

Best available techniques are not fixed over time but are subject to an updating process. Currently, the BAT reference document for large combustion plants is under review. The new BAT conclusions, defining updated ranges of BAT-associated emission levels for air and water pollutants, are expected to be adopted in 2016.

3.6. **Sectoral policies and measures: Agriculture**

Agricultural activities can result in methane emissions from livestock digestion processes and storage of animal manure; the use of organic and mineral nitrogen fertilisers can lead to nitrous oxide emissions. On the other hand, products of agricultural activities can be a

renewable energy source and can contribute to CO₂ savings. These are allocated to the energy sector (cf. section 3.3).

3.6.1. *Common Agricultural Policy*

The agriculture sector has the specialty that it is mainly driven by one policy, the Common Agricultural Policy (CAP), which determines a common way for all Member States of the European Union. For the period 2014 – 2020, three strategic objectives for rural development in the EU have been set in line with the Europe 2020 Strategy (COM(2010) 2020 final): Improving the competitiveness of agriculture, the sustainable management of natural resources and climate action, and a balanced territorial development of rural areas. These objectives are to be met by various pieces of legislation, as described below and as shown in Figure 3-5).

Regulation (EU) No 1305/2013 on support for rural development by the **European Agricultural Fund for Rural Development** (EAFRD) foresees that Member States draw up and co-finance multiannual rural development programmes (RDPs), at national or regional level. These programmes have to meet the three strategic objectives for 2014 – 2020, including sustainability and climate action.

The “**Horizontal Regulation**” (EU) No 1306/2013 provides the financial management rules for the two CAP funds, the European Agricultural Guarantee Fund (EAGF) which finances market measures and direct payments, and the EAFRD which finances support to rural development. It brings together the rules on cross compliance, farm advisory systems and monitoring and evaluation of the CAP. The **Regulation on Transitional Provisions** (EU) No 1310/2013 is designed to bridge the gap between the two rural development programming periods – before and after the 2013 reform. Under certain circumstances already existing national programmes are also eligible for support in the new programming period.

In 2013, the EU has agreed that at least 20 % of the Union’s budget for 2014 – 2020 should be spent on climate related action. This also affects the CAP and its specific funding programs, which consequently take climate mitigation and adaptation as an additional criterion for support.

Figure 3-5 Common agricultural policy as part of the EU 2020 strategy



Note: “Other ESI funds” are structural and investment funds in areas other than agriculture.

Source: European Commission²⁰

3.6.2. *Organic production, soil protection and minimising fertiliser use*

Organic farming is growing in Europe at a fast pace, about 500 000 hectares of agricultural land convert to organic production each year (COM(2014)179 final). In 2014, the European Commission published the **Action Plan for the future of Organic Production** in the European Union (COM(2914) 179 final), together with a **Proposal for a Regulation on Organic Production** and labelling of organic products (COM(2014) 180 final). The Action Plan defines the strategy for organic production, controls and trade for the forthcoming period, by laying down 18 concrete actions, considering EU instruments, consumer awareness, research, monitoring, certification and trade with third countries. The proposal for a Regulation lays down principles for organic production and rules for production, labelling, certification and trading.

Soils are very relevant for GHG emissions policies. Soil is a carbon pool that can act as a significant sink or source of carbon emissions. The protection of soils is considered in the Common Agricultural Policy, especially the provisions of cross-compliance are important for agricultural soil protection. In 2006, the European Commission adopted a **Soil Thematic Strategy** (COM(2006) 231 final), which tackles the full range of threats associated with soil degradation and creates a common framework for the protection of soil. The **7th Environment Action Programme** (Decision No 1386/2013/EU) commits the EU and its Member States to increasing efforts to reduce soil erosion, increase soil organic matter and to remediate contaminated sites.

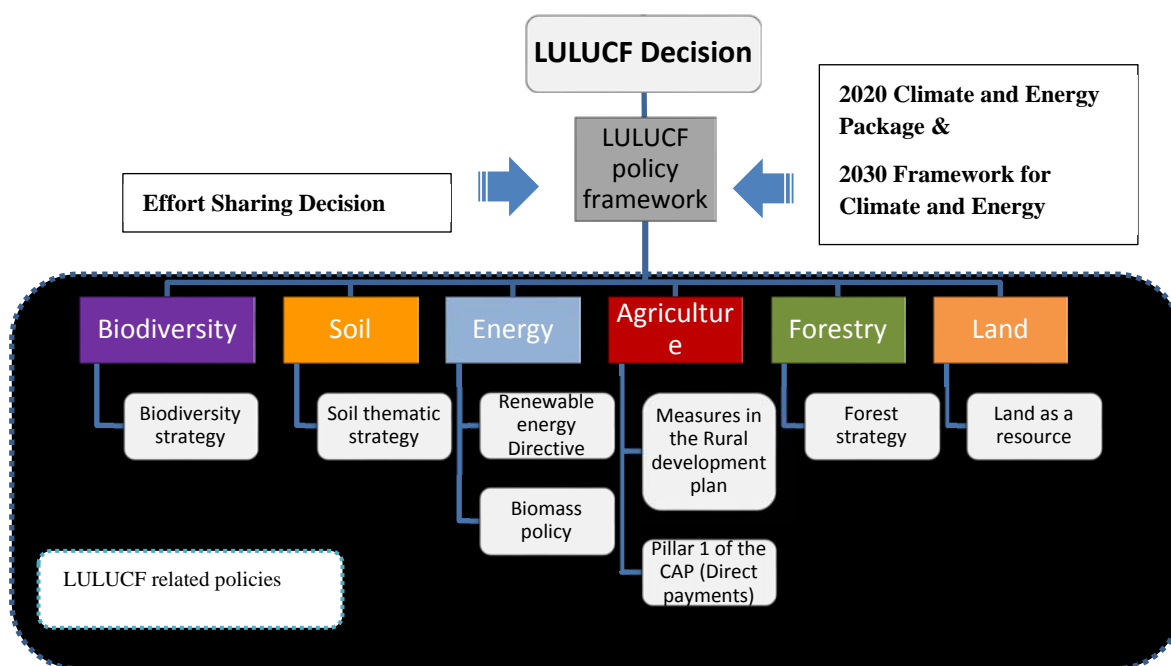
Between 2000 and 2012, N₂O emissions from agricultural soils in the EU-28 saw a 10 % decrease. The implementation of the **Nitrates Directive** 91/676/EEC, which sets limits for nitrogen content in livestock manure applied per surface area, contributed to this decrease. In addition, the National Emission Ceilings Directive 2001/81/EC (cf. section 3.2), indirectly affects N₂O emissions as it sets emission limits for ammonia (NH₃) and therefore triggers measures to reduce nitrogen input to soils.

²⁰ <https://enrd.ec.europa.eu/en/policy-in-action/cap-towards-2020/rdp-programming-2014-2020/policy-overview>

3.7. Sectoral policies and measures: Forestry / LULUCF

There are a number of other policies in place which have an impact on LULUCF emissions/removals, although they may not be known explicitly as LULUCF measures. This is presented in Figure 3-6 which also shows the wide range of different topics that can be associated with LULUCF emissions/removals: biodiversity, soil, energy, agriculture, forestry and land management. At present the EU’s main LULUCF policy instrument is the **LULUCF Decision** (529/2013/EU). This sets out reporting obligations and processes for the development and improvement of national reporting systems. With regard to the future, especially in context to the 2030 Framework for Climate and Energy, the EU is examining how the LULUCF sector shall be integrated in the EU’s climate policy, alongside the other non-ETS sectors.

Figure 3-6 LULUCF policy framework including related policies



3.7.1. LULUCF reporting and accounting in the EU (LULUCF Decision)

At present LULUCF emissions are not accounted towards the “internal” EU targets under the 2020 Climate and Energy Package. They are, however, covered under the EU’s 2nd commitment period target in the Kyoto Protocol. If a Member State incurs a net emission debit between 2013 and 2020, the debit would have to be covered by additional emission reductions produced in other sectors of the economy in the EU, or in third countries. In the second commitment period of the Kyoto Protocol it has become mandatory to report Forest Management (FM) in addition to Afforestation, Reforestation and Deforestation (ARD). In addition, the EU Decision requires EU Member States to establish systems for estimating emissions and removals for Cropland Management and Grazing Land Management, even if the activity has not been elected under the Kyoto Protocol.

3.7.2. LULUCF in the 2030 Framework for Climate and Energy

The role of LULUCF in the EU climate change policy framework is becoming increasingly relevant and it is currently being assessed how LULUCF will be accounted for and integrated in the post-2020 framework.

At present in the 2030 Framework three policy options are under discussion in the EU, which were also laid out in the 2030 Impact Assessment (SWD(2014) 15 final. A stakeholder consultation was conducted from March to June 2015²¹.

3.8. Sectoral policies and measures: Waste management / waste

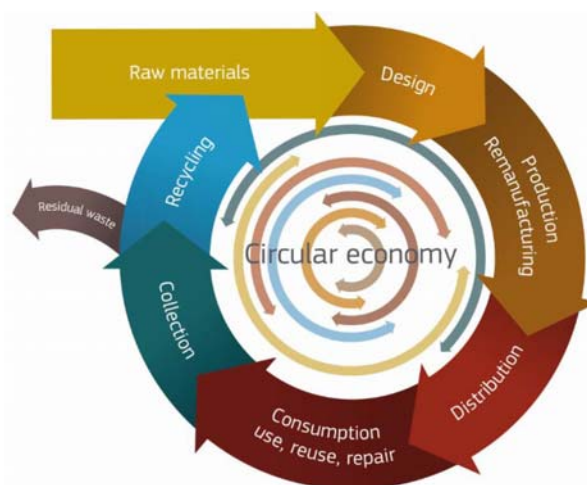
Policies and measures relating to solid waste disposal, biological treatment of waste, waste incineration and open burning of waste, as well as wastewater treatment and discharge, are climate relevant. Important GHGs in this sector are CH₄, which mainly arises from the treatment and disposal of solid waste, and N₂O originating from waste water. In addition, a substitution of primary raw materials by secondary raw materials coming from recycling allow for significant GHG savings due to lower demand for energy needed to extract raw materials and turn them into products.

3.8.1. From waste management to a circular economy

Waste management in Europe has a long history; the first piece of legislation providing a framework for waste management was published in 1975, which laid down the principles of waste management: (1) prevention of waste, (2) recovery of waste, and (3) its use as a source of energy.

In late 2015, a circular economy package was presented by the Commission, including a new proposal on waste targets. The circular economy package will go beyond waste management alone, by addressing the whole life cycle of resources and products, in order to close the loop. This means dealing with production processes, material and product design, consumer and buyer information, distribution and retail to stimulate waste prevention by increased re-using, repairing, refurbishing and also by recycling existing materials and products to minimise the residual waste, ideally leading to a zero waste society.

Figure 3-3 Main phases of a circular economy model



Source: European Commission.

3.8.2. Limitation to landfilling

The objective of the **Landfill Directive** 1999/31/EC is to prevent or reduce as far as possible negative effects on the environment resulting from the landfilling of waste –

²¹ http://ec.europa.eu/clima/consultations/articles/0026_en.htm

including emissions of GHG – by introducing stringent technical requirements for waste and landfills. By 2016, biodegradable waste going to landfills must be reduced to 35 % of the total amount (by weight) produced in 1995. In addition, the Directive requires collection of landfill gas from all landfills receiving biodegradable municipal waste. As an alternative to landfilling, waste is incinerated with energy recovery, which is governed by the Industrial Emissions Directive (cf. section 3.5.3). It is estimated that a full implementation of the Landfill Directive will lead to a net reduction of 62 million tonnes CO₂ eq in 2020 compared to 2008²².

3.8.3. *Management of biodegradable waste*

Biodegradable waste is of interest in terms of GHG emissions, as this is the waste fraction delivering most CH₄ emissions during anaerobic decomposition. Several EU legal instruments address the treatment of biodegradable waste: (1) The Landfill Directive requires Member States to reduce bio-waste deposited on landfills; (2) the **Waste Framework Directive** 2008/98/EC contains specific elements related to bio-waste and (3) the Industrial Emissions Directive lays down principles for controlling bio-waste treatment and incineration plants.

3.8.4. *EU policies targeting waste streams*

In this section policies are grouped together which target different waste streams; the GHG reduction potential may become apparent only in the overall life-cycle where emissions are avoided during production or due to smaller amounts of waste. Management of the biodegradable waste stream is described in section 3.8.3.

The **Packaging and Packaging Waste Directive** (PPWD) 94/62/EC provides for measures aimed at limiting the production of packaging waste and promoting recycling, re-use and other forms of waste recovery, hence, at reducing the final disposal of such waste. Member States are required to introduce systems for the return and/or collection of used packaging to meet the targets set out in the Directive. The particular problem of plastic waste is addressed by a Green Paper (COM(2013) 123 final) and a Proposal for an amendment to the PPWD to **reduce the consumption of lightweight plastic carrier bags** (COM(2013) 761 final). On 28 April 2015, the European Parliament approved of such an amendment that will require EU Member States to either reduce annual average consumption of lightweight plastic bags per citizen, or to ban the handing-over of free bags (Directive (EU) 2015/720).

The **Directive on Waste of Electrical and Electronic Equipment** (WEEE) 2012/19/EC requires Member States to take measures to encourage producers to design and produce electrical and electronic equipment which take into account and facilitate dismantling and recovery. Moreover, it sets ambitious collection targets in order to minimise the disposal of WEEE in the form of unsorted municipal waste. It also sets targets for re-use and recycling as well as targets for recovery of WEEE to ensure the correct treatment of all collected WEEE. The **End-of-Life Vehicles Directive** (ELVD) 2000/53/EC aims to reduce the amount of waste produced from vehicles when they are scrapped and to increase re-use, recycling and other forms of recovery of end-of-life

²² European Environment Agency (EEA) (2011). Waste opportunities: past and future climate benefits from better municipal waste management in Europe. Report no. 3/2011.

vehicles and their components. The **Motor Vehicles Directive** 2005/64/EC sets very high targets for re-use, recycling and other forms of recovery of end-of-life vehicles and their components so as to reduce the disposal of waste as well as to improve the environmental performance of all economic operators involved in the life cycle of vehicles. Further, it sets provisions on the type-approval of motor-vehicles with regards to their reusability, recyclability and recoverability. The **Battery Directive** 2006/66/EC provides, *inter alia*, targets for collection and recycling and establishes rules for treatment and disposal of batteries and accumulators.

3.8.5. *Reduction of GHG Emissions from Urban Waste Water Treatment*

The **Urban Waste Water Treatment Directive** 91/271/EEC concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors. The Directive requires, *inter alia*, total nitrogen reduction for discharges from treatment plants to sensitive areas. As increased nitrogen removal has been found to lead to a decrease in N₂O emissions in wastewater treatment plants²³, this requirement can contribute to a reduction of N₂O emissions.

3.9. **Assessment of the economic and social consequences of response measures**

To ensure that all relevant possible impacts are taken into account, the EU has established processes that assess the economic and social consequences of climate policy measures.

For the development of new policy initiatives through legislative proposals by the European Commission, an impact assessment system has been established in which all proposals are examined before any legislation is passed. It is based on an integrated approach which analyses both benefits and costs, and addresses all significant economic, social and environmental impacts of possible new initiatives (for details please refer to section 4.10 of the EU BR1 as well as chapter 15 of the EU National Inventory Report 2014).

Beyond this internal impact assessment system, procedures for assessing the impacts of EU (climate change) policies on external countries have also been established. Even though there is no explicit dialogue on response measures, the impacts of policy measures implemented by the EU are naturally being discussed within the framework of bilateral and regional cooperation. Such processes are included in various EU cooperation policies and agreements with third countries on a sectoral level, such as for trade agreements, as well as on an overarching political level in regional cooperation with Africa, Asia and Latin America as well as in bilateral relations. This way, it is ensured that the effects of such policies on non-EU countries are taken into account.

The free Trade Agreements that have been concluded between the EU and third countries provide pertinent examples. For instance, the Deep and Comprehensive Free Trade Area (DCFTA) signed between the EU and Ukraine on 27 June 2014 sets out various processes which enable concerned stakeholders to get in contact with the EU on potential impacts of policies and regulations under the Trade Agreement.²⁴ These include

²³ <http://www.bmlfuw.gv.at/publikationen/wasser/abwasser/Lachgasemissionen---K1-ranlagen.html>

²⁴ For more information see <http://ec.europa.eu/trade/policy/countries-and-regions/countries/ukraine/>.

provisions that allow interested parties to comment on proposed regulations under the agreement. Furthermore, enquiry or contact points are established to respond to questions arising from the application of regulations included in the agreement. Negotiations of similar agreements are taking place between the EU and Morocco, Tunisia, Jordan and Georgia, among others.

Furthermore, dialogues on impacts of EU policies on third countries take place in the context of the European Neighbourhood Policy (ENP). As the basis for cooperation between the EU and a neighbouring country an Association Agreement is negotiated bilaterally between the two partners. In such an agreement, specific political priorities are set for the country concerned. Following the agreement, actions plans are negotiated between the EU and the respective neighbouring country which include priority areas for cooperation and a specific focus of action for each of these areas for three to five years. In the negotiations of an action plan, the country is able to raise specific issues of concern with the EU. Additionally, in technical discussions within sub-committees established through the Association Agreement (particularly on energy, transport and the environment), targeted exchanges on policy issues and directions for future cooperation at bilateral level take place. Partner countries can ask questions about planned EU initiatives and legislations at such meetings to technical experts.²⁵

An example of an initiative to address the impacts of EU climate change policies on third countries is currently being prepared under the regional Union for the Mediterranean. Under this NAMA initiative, technical assistance will be provided to project development in key sectors, including tourism. This assistance will help stakeholders from individual countries to develop mitigation actions with easier access to climate finance. The initiative, suggested by Egypt, will focus on renewable energy and energy efficiency, and target key vulnerabilities of Mediterranean countries regarding strong fossil fuel reliance and fossil fuel subsidies.²⁶

²⁵ For further information on the ENP see <http://eeas.europa.eu/enp/>.

²⁶ See <http://ufmsecretariat.org/informal-ufm-high-level-conference-on-climate-change/>.

4. PROJECTIONS

This part summarises information on the EU's projected emissions up to 2030 (section 4.1). Furthermore, as is necessary for the second Biennial Report from the European Union under the UNFCCC, an assessment of progress to the 2020 EU emission reduction target under the UNFCCC is provided in section 4.2 (cf. explanation in section 2.1).

4.1. Projections

4.1.1. *Introduction*

This section presents projections of greenhouse gas emissions (GHG emissions) for the “with existing measures scenario” (WEM), differentiated by sector and by gas and aggregated to EU-28 level. Projections are presented for 2015, 2020, 2025 and 2030. All emissions and projections are displayed in CO₂ equivalents and excluding emissions or removals from LULUCF. Projections of emissions related to fuel sold to ships and aircrafts engaged in international transport are not included in the totals reported in this section, unless noted otherwise.

The WEM projection of the European Union represents a business-as-usual scenario aggregated from 28 national WEM projections where only policies and measures that have been adopted or already implemented in the Member State are considered, as far as covered by national projections. With regard to EU policy coverage the WEM projection is thus a conservative scenario. For Member States that did not submit new projections in 2015, the EUCLIMIT Reference scenario 2013²⁷ was used for gap-filling purposes.

Information on sensitivity analysis (section 4.1.3) and methodology (section 4.1.4) is included below the following section on greenhouse gas projections.

4.1.2. *Projections of EU GHG emissions*

4.1.2.1. Summary

Table 4-1 summarises historic and projected greenhouse gas emissions as totals, per sector and per gas. This information is visualised and further insights are provided in Sections 4.1.2.2 - 4.1.2.4.

²⁷ <http://ec.europa.eu/transport/media/publications/doc/trends-to-2050-update-2013.pdf>

Table 4-1 Historic greenhouse gas emissions and greenhouse gas emission projections in the ‘with existing measures’ scenario

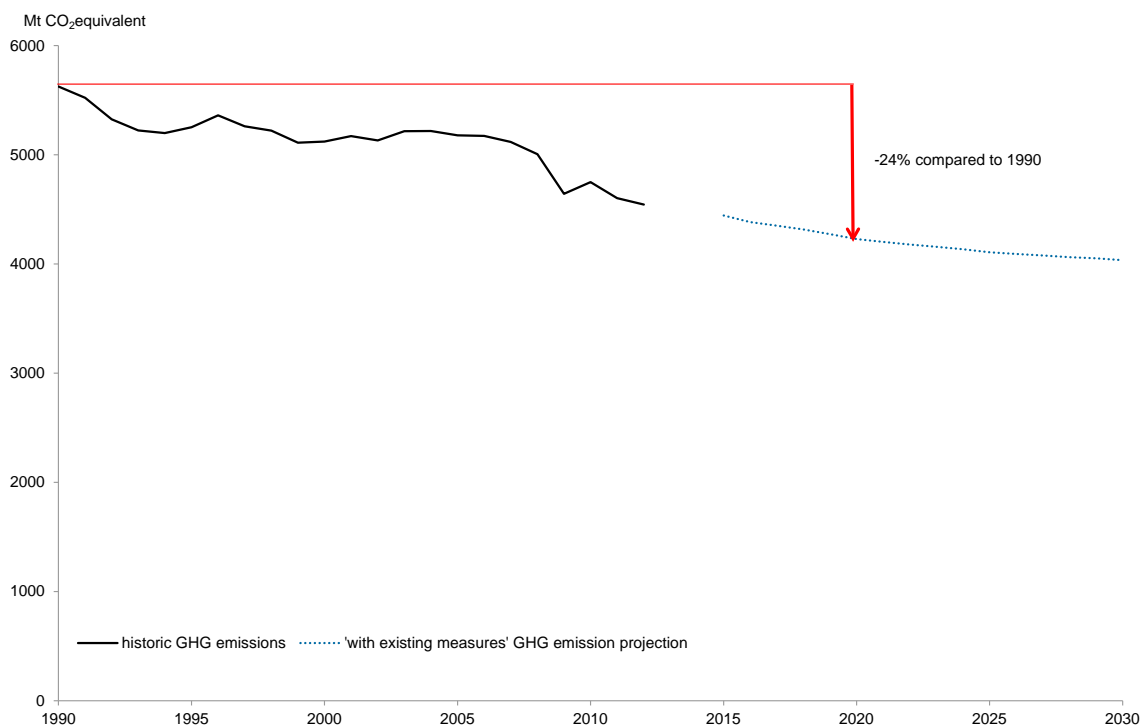
	1990	1995	2000	2005	2010	2013	2015	2020	2025	2030
History										
Mt CO₂equivalent										
Total GHG emissions (excl. LULUCF; excl. International aviation)	5680	5322	5177	5224	4786	4477				
By sector										
Energy	3570	3248	3097	3141	2859	2637				
Transport	786	840	921	974	939	887				
Industry/industrial processes	511	491	443	449	376	360				
Agriculture	569	495	481	455	442	441				
Waste management/waste	244	248	235	205	170	152				
By gas										
CH ₄ emissions excluding CH ₄ from LULUCF	744	673	613	547	489	463				
CO ₂ emissions excluding net CO ₂ from LULUCF	4460	4201	4162	4286	3934	3650				
N ₂ O emissions excluding N ₂ O from LULUCF	405	366	325	304	257	251				
Total F-Gases (excl. NF ₃)	71	82	77	87	106	114				
Memo items										
<i>Memo item: international aviation</i>	70	86	116	132	132	134				
<i>Memo item: international navigation</i>	109	110	133	162	157	140				
With existing measures' scenario										
Mt CO₂equivalent										
Total GHG emissions (excl. LULUCF; excl. International aviation)							4445	4228	4108	4034
By sector										
Energy							2594	2400	2299	2224
Transport							895	885	878	889
Industry/industrial processes							364	363	356	348
Agriculture							445	449	453	458
Waste management/waste							146	132	121	115
By gas										
CH ₄ emissions excluding CH ₄ from LULUCF							457	440	427	418
CO ₂ emissions excluding net CO ₂ from LULUCF							3607	3414	3316	3259
N ₂ O emissions excluding N ₂ O from LULUCF							268	270	272	275
Total F-Gases (excl. NF ₃)							109	103	90	80
Memo items										
<i>Memo item: international aviation</i>							139	153	165	176
<i>Memo item: international navigation</i>							151	153	154	155

Note: The EU's greenhouse gas projection is the result of an aggregation of Member States individual GHG projections. Member States had to submit these projections under the MMR in March 2015. The preparation of the projections takes considerable time. It is therefore likely that the F-Gas Regulation which was adopted in 2014 could not be considered within individual greenhouse gas projections. Therefore its anticipated effects are not completely reflected in the EU's greenhouse gas projection.

4.1.2.2. Total aggregate GHG emission projections

Figure 4-1 presents total aggregate GHG emission trends and the WEM projection for EU-28. The figure includes historic values (solid lines) and projected values (dotted line). In the WEM scenario, total EU-28 GHG in 2020 are projected to be 24% below 1990 GHG emissions (including international aviation). Up to 2030 GHG emissions are projected to decrease further compared to 1990.

Figure 4-1 Total, aggregate, absolute historic and projected EU-28 GHG emissions



Note: Values up to 2013 are from the latest available greenhouse gas inventory. Projected values, starting in 2015, stem from Member States submissions under Article 14, MMR. The 24 % emission reduction in 2020 (compared to 1990) is calculated taking into account international aviation.

4.1.2.3. Total aggregate GHG emission projections per sector

From a sectoral perspective (Figure 4 2) it can be seen that the largest share of GHG emission reductions are from the energy sector which also contributes the most to aggregate GHG emissions – shown here excluding transport. Energy sector emissions are projected to decrease by 33 % (vs. 1990) in 2020 and by 38 % up to 2030. In general, EU-28 GHG emissions from the energy sector show a gradual downward trend from 1990 to the present day, with a short and steep decrease during the economic crisis, after which they increased again somewhat and then continue with the downward trend also in projections. These decreases can be explained by a variety of factors but are mainly due to increased use of renewables, fuel switching to gas (also reducing CH₄ emissions from coal mining), increased energy and technical efficiency and decreases in fuel combustion in manufacturing industries.

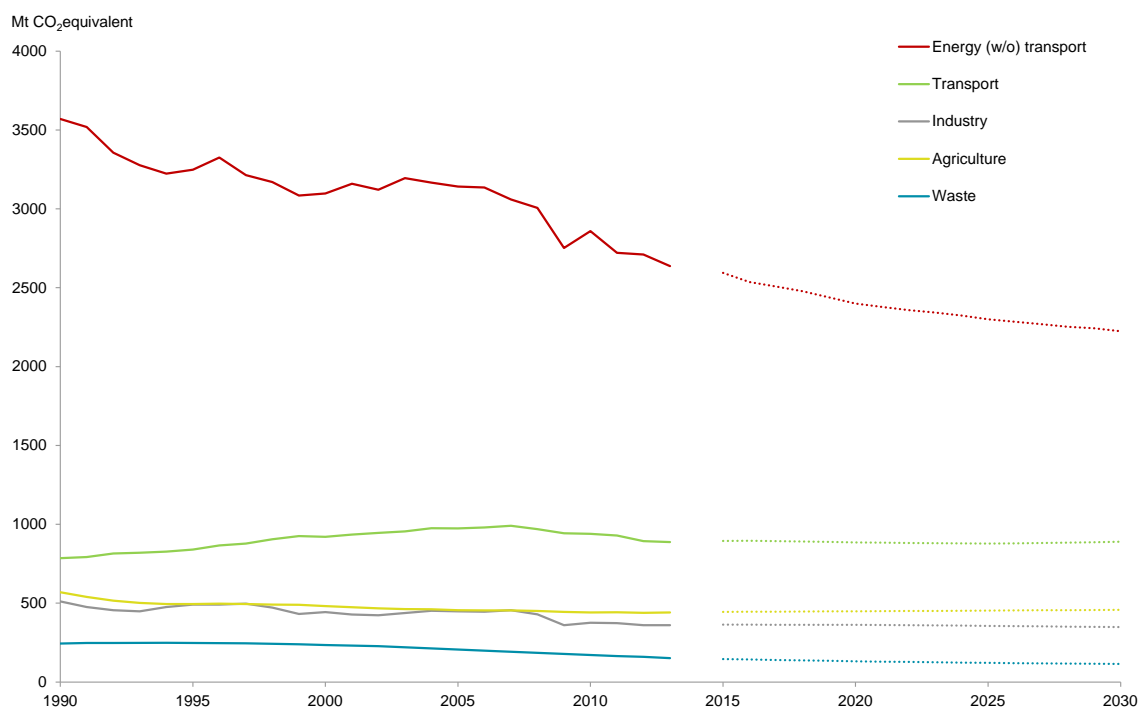
In the Eastern Member States, construction and restructuring of industry have also played a role in reducing emissions. However such reductions have been counteracted by increased housing stock and growth in the services sector, resulting in increased demand for energy services in buildings and homes, and in particular strong growth in demand for electricity to provide these. Recent economic growth in the Eastern Member States is reflected in increased demand for energy services. Projections for the sector anticipate that emissions from energy will further decrease due to the effects of existing policies and measures.

The only sector which is projected to exhibit 2020 GHG emissions larger than 1990 is the transport sector. After 2007 a slow but steady decline in transport emissions is visible, due to a combination of higher fuel prices and more stringent policies, such as

CO₂ standards for cars and vans. In 2020 it is projected to have 13 % higher GHG emissions than 1990, staying at about that level until 2030.

The industry sector is projected to decrease its process and product related GHG emissions by approximately 29 % in 2020 (vs. 1990) and by about 32 % up to 2030. The observed GHG emission trends and projections in the agriculture and waste sector were similar in the past – both exhibit a steady decline. The waste sector is projected to exhibit steadily declining GHG emissions (approximately -46 % vs. 1990 in 2020 and -53 % vs. 1990 in 2030).

Figure 4-2 EU-28 GHG emissions per sector in the WEM scenario



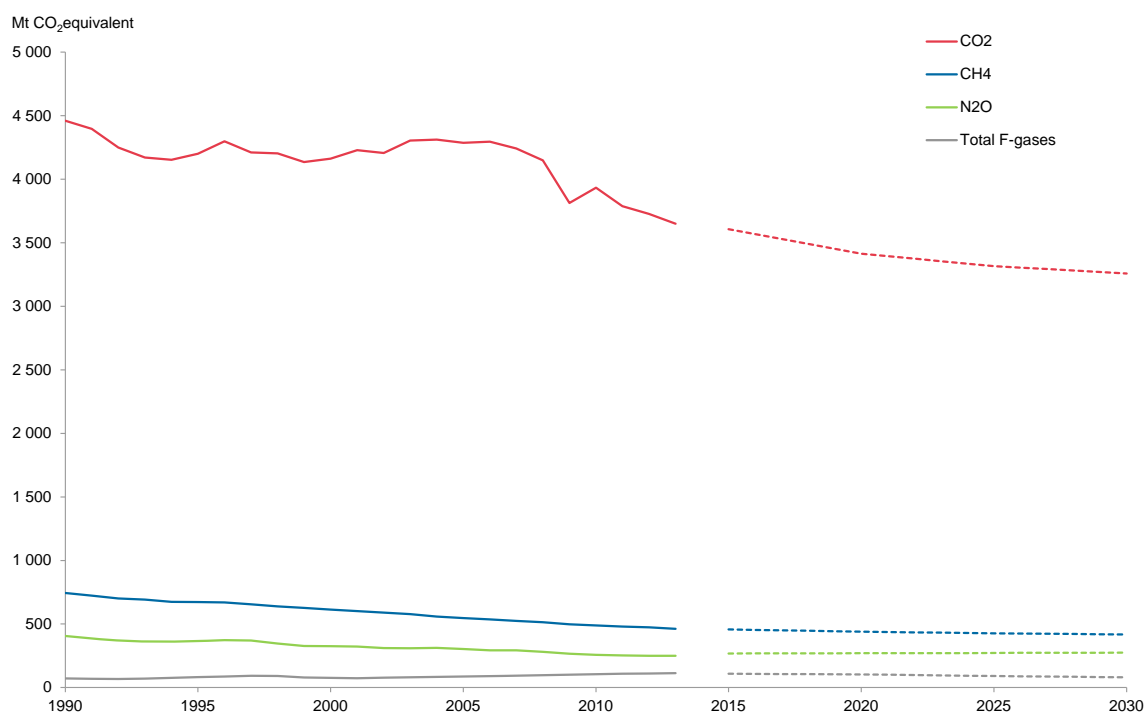
Note: The trajectories displayed here are not stacked, i.e. each trajectory refers to the values shown on the y-axis. Values up to 2013 are from the latest available greenhouse gas inventory. Projected values, starting in 2015, stem from Member States submissions under Article 14, MMR.

4.1.2.4. Total aggregate GHG emission projections gas

Figure 4-3 below illustrates the expected change in emissions from individual greenhouse gases between 1990 and 2030 under the WEM scenario. The major contributor to GHG emissions - CO₂ - is projected to decline by approximately 23 % (vs. 1990) by 2020 and by about 27 % up to 2030. CH₄ emissions steadily declined in the past and are projected to do so in the future.

N₂O emissions are projected to stagnate after 2015. F-gas emissions have been steadily rising for more than 10 years, however in the projections the emissions are expected to steadily decrease up to 2030 due to the implementation of EU F-Gases legislation.

Figure 4-3 EU-28 GHG emissions per gas in the WEM scenario



Note: The trajectories displayed here are not stacked, i.e. each trajectory refers to the values shown on the y-axis. Values up to 2012 are from the latest available greenhouse gas inventory. Projected values, starting in 2015, stem from Member States submissions under Article 14, MMR. For gap-filled countries, the share of gases has been calculated applying the average share of EU-28 of specific gases to total GHG emissions

The EU's greenhouse gas projection is the result of an aggregation of Member States individual GHG projections. Member States had to submit these projections under the MMR in March 2015. The preparation of the projections takes considerable time. It is therefore likely that the F-Gas Regulation which was adopted in 2014 could not be considered within individual greenhouse gas projections. Therefore its anticipated effects may not be completely reflected in the EU's greenhouse gas projection.

4.1.3. Sensitivity Analysis

Under Article 14 of Regulation 525/2013/EU Member States are required to report on results of a sensitivity analysis of their greenhouse gas projections. While this is mandatory reporting, no pre-defined set of parameters or variables is given.

As a consequence, Member States' sensitivity analyses are based on different assumptions and methodologies, take into account different national circumstances and structures. Across Member States key parameters and assumptions are varied in a heterogeneous manner. It is thus not possible to aggregate the results of individual Member State sensitivities into an EU-28 sensitivity projection scenario.

It is also not possible to repeat the sensitivity approach undertaken in the BR1 (cf. pp 426). At the time of the preparation of this report no updated, comparable EU-wide projection scenario was available from a homogenous modelling exercise which could serve as a sensitivity scenario.

The previous sensitivity projection is not suitable for a sensitivity analysis any longer because in the meantime further EU wide measures have been adopted. Moreover, it used

the SAR GWPs which are not directly comparable with the AR4 GWPs used for reporting projections under Article 14 of Regulation 525/2013/EU. However, at the time of drafting this biennial report, another EU-wide projection of GHG trends has been conducted which includes EU wide targets on renewable energy and the Energy Efficiency Directive of 2012 as an important new EU wide measure,. Both have induced a number of national measures during 2012-14 which are covered by the 2015 WEM projections. This scenario shows GHG emission reductions (excluding LULUCF) of 19% between 2005 and 2020 and 28% between 2005 and 2030, which are of a comparable order of magnitude as the aggregate EU projection 2015, which shows GHG emission reductions of 22% between 2005 and 2020 and 25% between 2005 and 2030²⁸.

4.1.4. Methodology

4.1.4.1. Compilation of the EU projections

The projections of GHG emissions for EU-28 are based on individual national projections of Member States' submissions to the European Commission under Regulation 525/2013/EU in 2015.

EEA's European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM) has compiled the national projections and applied QA/QC procedures to ensure consistency of the data reported by MS (see Section 4.1.4.4).

- The reported scenario is documented in Section 4.1.1.
- Projections unless otherwise noted, are reported excluding governmental use of Kyoto mechanisms and carbon sinks
- The sector breakdown reported follows the structure of the CTF Tables and includes: Energy (without transport), transport, industry/industrial processes, agriculture, and waste.
- The gases which are covered are: CH₄ emissions excluding LULUCF, CO₂ emissions excluding LULUCF, N₂O emissions excluding LULUCF and total F-Gases.
- Figures represent historic GHG emissions up to 2013 Projections are represented starting 2015.

4.1.4.2. Projection methodology

Information presented in Section 4.1.2 for the EU-28 is derived through an aggregation of individual Member State projections. Detailed descriptions of the methodologies used to generate individual Member State projections, further information on their sensitivity analyses and their key parameters and assumptions are presented in individual Member State Biennial Reports. The EU-28 GHG projection has been aggregated using Member

²⁸ <http://ec.europa.eu/transport/media/publications/doc/trends-to-2050-update-2013.pdf>, recalculated with updated global warming potentials.

States' submissions to the European Commission under Regulation 525/2013/EU in 2015.

4.1.4.3. Key parameters and assumptions

The key parameter assumptions of individual Member States are documented in their national projections and, in addition, were aggregated to obtain information relating to the EU-28. The Commission provided Member States with recommended parameter values for the evolution of the EU ETS CO₂ price and for international fuel import prices. It also provided default values for GDP and population to improve consistency of Member State projections.

In national projections these were used to a varying extent. In the case of different national assumptions, Member States were invited to use the recommended values for sensitivity analysis. For documentation of the EU-28 projection, key parameters have been derived as weighted averages or sums of the values of key parameters as reported by Member States. These are shown for EU-28 in CTF Table 5.

4.1.4.4. QA/QC procedure

The QA/QC procedures applied to the projections data follow the EU QA/QC procedure as laid out in the document *Elements of the Union System for Policies and Measures and Projections and the Quality Assurance and Control (QA/QC) Programme as Required under Regulation (EU) No 525/2013*²⁹ and in the 2015 ETC technical report “*Quality assurance and quality control procedure for national and Union GHG projections*” are briefly explained here.

EEA’s European Topic Centre for Air Pollution and Climate Change Mitigation (ETC/ACM) has compiled the national projections as submitted by the EU Member States under the MMR and applied quality assurance and quality control (QA/QC) procedures that consist of a number of checks against quality criteria such as completeness, consistency, comparability, accuracy and transparency of reported data.

If the quality checks showed that the submission did not follow the quality criteria, the ETC/ACM reviewer sought explanation in the accompanying documents submitted by MS. If no explanations could be found, the reviewers asked Member States projection experts to provide clarification or correct the dataset as necessary. If Member States did not provide the requested information, the ETC/ACM proceeded with corrective actions which consist of filling identified data gaps and performing error corrections and the reference year calibration. Such corrective actions are essential to ensure the quality of projections data used in the annual reports of the Commission and the EEA. The EU-28 emission projections presented here conform to the EEA’s and European Commission’s 2015 reports on progress towards the 2020 GHG target³⁰.

²⁹ http://ec.europa.eu/clima/policies/strategies/progress/monitoring/docs/union_pams_projections_en.pdf

³⁰ The reports are available for download under :
http://ec.europa.eu/clima/policies/strategies/progress/documentation_en.htm
and <http://www.eea.europa.eu/publications/trends-and-projections-in-europe-2015>

4.1.4.5. Changes in methodologies

The methodologies to report on greenhouse gas projections remained unchanged to the first Biennial Report from the European Union under the UNFCCC (cf. EU BR1, Section 5.6).

Improvements to the QA/QC procedure were made. The procedure is documented completely in the 2015 ETC technical report “*Quality assurance and quality control procedure for national and Union GHG projections*”.

4.2. Quantified progress to 2020 targets

For the quantification of the progress to the EU 2020 target under the UNFCCC (cf. explanation in section 2.1), the development of GHG emissions is the key indicator. The Convention target of a reduction of emissions by 20% from 1990 to 2020 only refers to the emissions of the EU-28 as a whole. GHG emissions of EU-28 are calculated as the sum of MS emissions. The development of GHG emissions of EU-28 is shown in section 1.1 above. Considering the scope of the EU 2020 target (i.e. non LULUCF, including international aviation) the 2013 emissions are at 20% below the 1990 emission level, which means that EU-28 is well on track to reach its Convention target.

In the context of the EU’s 2nd Biennial report to the UNFCCC, reporting on progress on targets is standardized in the Common Tabular Format (CTF) Tables 4, 4a and 4b.

Table 4-2 EU Reporting on progress (CTF Table 4)

	Unit	Base Year	2011	2012	2013	Comment
Total (without LULUCF)	Mt CO ₂ eq	5 750	4 766	4 697	4 611	Total GHG including domestic and international aviation, excluding LULUCF and NF3
Contribution from LULUCF	Mt CO ₂ eq	NA	NA	NA	NA	Not applicable: Numbers for LULUCF are not reported because this sector is not included under the Convention target
Market-based mechanisms under the Convention	number of units / Mt CO ₂ eq		NA	NA	NA	Not applicable: Use of CER and ERU cannot be quantified at the time of reporting.
Other market-based mechanisms	number of units / Mt CO ₂ eq		NA	NA	NA	Not applicable: No “other” market-based mechanisms are in use.

Emissions and sinks in the sector of LULUCF are not included under the Convention target; therefore they are not included in CTF tables related to progress to the Convention target. Emissions in this sector are only accounted under Kyoto targets. In the first Kyoto

commitment period the LULUCF sector has been a net sink for EU-28 due to a total emission removal of 381 Mt CO₂-equivalent (76 Mt CO₂-equivalent per year)³¹.

The use of flexible mechanisms takes place on the one hand by operators in the EU ETS, on the other hand by governments for the achievement of ESD targets (see section 2.2.2.3). Under the EU ETS, since 2013 it is no longer possible to track the use of flexible mechanisms directly via information on EUTL public website because CERs and ERUs are no longer surrendered directly rather they are exchanged into EUAs. These exchanges will become public on installation level after three years, with the first information reflecting the use in 2013 available in 2016. The use of flexible mechanisms can neither be quantified under the ESD at present. As the compliance assessment for the first year 2013 under the ESD will only take place in 2016, any potential use of CER and ERU units for the first year will only take place in 2016.

Thus, for the 2nd Biennial Report, the EU and its MS can only report that no units have been used under the ESD so far and no quantitative information can be given for the use of flexible mechanisms in CTF Tables 4 and 4b.

³¹ EEA 2014 Progress towards 2008-2012 Kyoto targets in Europe.
<http://www.eea.europa.eu/publications/progress-towards-2008-2012-kyoto>

5. PROVISION OF FINANCIAL, TECHNOLOGICAL AND CAPACITY BUILDING SUPPORT TO DEVELOPING COUNTRIES

This section includes information on the provision of financial, technological and capacity-building support to developing countries by the EU (activities carried out by the EU institutions, such as the European Commission and the European Investment Bank).

Information on the provision of financial, technological and capacity-building support to developing countries by individual EU Member States can be found in their respective Biennial Reports.

Detailed data on the support provided in 2013 and 2014 are included in the annexed Common Tabular Format (CTF) Tables 7, 8 & 9.

5.1. The EU's approach to provision of climate finance, including the provision of new and additional resources

The European Commission published a Communication in February 2005 entitled “Winning the Battle Against Climate Change”. This Communication outlined key elements for the EU's post-2012 strategy. Specifically, it called for stronger cooperation with third countries in order to tackle the climate change problem³².

EU climate and development actions are largely intertwined, contributing to inclusive growth for sustainable human development which cannot be thought of without limiting climate change. The EU promotes a common and comprehensive approach to financing for development, including climate change actions as part of the “Agenda for Change,” emphasising mutually reinforcing climate and development co-benefits. The EU emphasises the catalytic role that official development aid (ODA) has in facilitating increased financing from other sources. Thus, the EU has strengthened efforts to create instruments and platforms that support leveraging of financing from multiple sources, in particular from the private sector.

The implementation of climate action at national and regional levels is supported by geographical programmes³³ that focus on development priorities defined for a specific country or region.

The Commission draws up strategy papers in cooperation with the beneficiary countries. They are based on the specific needs and situation of regions and partner countries and also take their performance into account. The strategy papers set out priority areas and financial allocations and serve as the basis for the programming of aid. Based on these strategies, yearly action programmes are adopted defining more specific objectives and fields of intervention, as well as expected results and the exact amount of available funding.

³² For further information on the CC cooperation with non-EU countries, please visit the following website: http://ec.europa.eu/clima/policies/international/cooperation/index_en.htm.

³³ For more information on these programmes – the Development Cooperation Instrument (DCI), European Neighbourhood and Partnership Instrument (ENPI) and the European Development Fund (EDF), please see BR1.

Further, the EU has established a number of innovative initiatives and facilities such as the Global Climate Change Alliance (GCCA), the Forest Law Enforcement, Governance and Trade (FLEGT), the Global Energy Efficiency and Renewable Energy Fund (GEEREF) and the EU water and energy facilities and the Regional Investment Facilities (the so called blending mechanisms).

The financial resources reported in this Biennial Report are considered to be “new and additional resources” meaning that they were committed after and not included in the previous national communication or biennial report. As per recommendation of the ERT³⁴, it is further stated that the EU budgets are determined on an annual basis so that each annual commitment cycle represents new and additional resources.

Scaling up climate finance by 2020 will be an iterative process. It will need to go hand in hand with national governments developing enabling environments, such as domestic climate strategies, policies, instruments and mechanisms, and conducive regulatory frameworks. These will facilitate actions and create viable projects which are ready for support. Such approaches will provide incentives to (re)direct private investment towards low carbon development.

The EU and its Member States see private finance as key to scaling up levels of climate finance, although not as a substitute for public finance where public finance is needed. Private finance and investment will be pivotal to achieving long-term transformation of developing countries into low-carbon, sustainable, and climate-resilient economies.

5.1.1. Addressing the needs of developing countries

It is the responsibility of governments to take the lead in designing and implementing climate policies as a basis for enhanced action and enhanced support. The EU strives to work closely with its partners to strengthen national planning capacities, institutions, planning processes, public financial management and procedures and monitoring systems to create a solid basis for countries to take charge of climate mainstreaming and to enable them to benefit from climate change finance and support from all sources.

The EU has placed climate change high on the agenda of our external relations; and in particular in our relations with developing countries. Climate change is now regularly discussed in the framework of our Policy Dialogue with Partner countries. National ownership is a key principle for all EU support. Programming of bilateral support normally starts with the national government / actors taking ownership of an inclusive development process. To the extent possible, the EU bases its programming on the partner countries'/regions' own development plans or equivalent, including regional and sector plans, such as National Adaptation Programmes of Action (NAPAs/NAPs) or Nationally Appropriate Mitigation Actions (NAMAs) or – as appropriate – a combination of such documents, depending on the national context.

The GCCA (see section 5.4.2) , for example, provides a platform for dialogue and exchange between the EU and developing countries most vulnerable to climate change, in particular Least Developed Countries (LDCs) and Small Island Developing States (SIDS). The aim is to promote climate change as a core issue in the partnership between these countries and the EU,

³⁴ ERT: Expert Review Team under the UNFCCC, having reviewed the First biennial report from the European Union.

building confidence and supporting a convergence of visions on how best to address climate change.

In 2014, a global evaluation recognised that the GCCA had made a significant contribution to the formulation and implementation of national policies and dialogue on climate change.

Building on recommendations from the GCCA evaluation, a new phase started: The Global Climate Change Alliance Plus EU Flagship Initiative (GCCA+).

The new GCCA+ is sharper in focus and wider in outreach. It will concentrate on three priority areas where the greatest impact is anticipated: (1) Mainstreaming climate change into poverty reduction and development efforts; (2) Increasing resilience to climate-related stresses and shocks; (3) Supporting formulation and implementation of concrete sectoral-based adaptation strategies.

The GCCA programmes are designed to align with national priorities and support on-going national or regional activities. For instance, the GCCA supports the Mekong River Commission's Climate Change and Adaptation Initiative and the implementation of some priorities of the Pacific Islands Framework for Action on Climate Change.

The table below shows how GCCA-supported interventions promote or build on national adaptation strategies.

Table 5-1 GCCA programme contributions to existing national programmes or strategies

GCCA programme	Contributes to the implementation of
Bangladesh	The Bangladesh Climate Change Strategy and Action Plan
Belize	The National Adaptation Strategy to Address Climate Change in the Water Sector
Bhutan	The Renewable Natural Resources sector programme/five-year plan
Burkina Faso	The National Rural Sector Plan
Chad	A number of NAPA priorities and the National Development Plan 2015–2020
Central African Republic	The national REDD+ strategy in the south-western region
Comoros, the	The national poverty reduction and growth strategy
Ethiopia	The Climate Resilient Green Economy strategy, the national Climate Change Adaptation programme, and the Sustainable Land Management programme
Guyana	The National Mangrove Action plan
Lesotho	The environment and climate change priorities of the National Strategic Development Plan
Malawi	A number of NAPA priorities
Mauritania	A number of NAPA priorities
Mauritius	The Maurice Île Durable sustainable development strategy
Nepal	Mainstreaming of NAPA-prioritised activities through the national framework of Local Adaptation Plans for Action
Papua New Guinea	The national REDD readiness plan
Rwanda	The Strategic Road Map for Land Reform and the Strategic Plan for Environment and Natural Resources
Samoa	The Water for Life sector plan
São Tomé and Príncipe	The National Programme for Food and Nutritional Security
Seychelles	The Seychelles National Climate Change Strategy and the Seychelles Sustainable Development Strategy
Solomon Islands	A number of NAPA priorities and the National Disaster Risk Management Plan
Uganda	The NAPA, operationalisation of two climate-related objectives of the 2010 National Development Plan
Vanuatu	Measures identified in the NAPA

Source: From Integrated Climate Strategies to Climate Finance Effectiveness: Experiences from the Global Climate Change Alliance (2013)

5.1.1.1. Addressing both adaptation and mitigation needs

The EU has taken steps to ensure a balanced provision of support between adaptation and mitigation, in a situation in which mitigation gathered more resources than adaptation in the

past. As in the previous biennial report, when considering grants only, the EU has provided balanced support between adaptation and mitigation in 2013 and 2014 (USD 1 465 million / € 1 104 million and USD 1 450 / € 1 093 million respectively). This has been achieved by integrating adaptation considerations into existing and new development assistance programmes and through engagement in new areas of work such as combined adaptation and disaster risk reduction efforts.

In providing climate support, the EU has made intense efforts to take into account and integrate our partners concerns and priorities on topics such as, in addition to mitigation and adaptation *tout court*: green economy, migration, disaster risk reduction, clean energy, biodiversity, forests, agriculture and research and innovation.

5.1.2. *Innovating in delivering support: engaging the private sector in adaptation and mitigation in developing countries*

There is an increasing range of ways to collect and pool revenues, use traditional development finance and deliver aid. Engaging the private sector in development financing is another innovative way of mobilizing new funds.

The EU and Member States, together with European and international public financing institutions are actively collaborating through regional blending mechanisms, which are expected to be further scaled up in future, in order to use grant funding to leverage financing from other sources.

Blending is a powerful tool for leveraging additional resources and increasing the impact of EU aid on the transition towards low emission and climate resilient economies and societies.

Blending combines EU grants with loans or equity from public and private financiers. The EU grant attracts additional financing for important investments in partner countries by creating a favourable investment environment and reducing risk for private investors. On a case-by-case basis, the EU grant contribution can take different forms to support investment projects:

- investment grant or interest rate subsidy - reducing the initial investment and overall project cost for the partner country;
- technical assistance - ensuring the quality, efficiency and sustainability of the project;
- risk capital (i.e. equity or quasi-equity) - attracting additional financing;
- guarantees - unlocking financing for development by reducing risk.

Nowadays EU regional blending facilities have been established in all regions of EU external cooperation: Neighbourhood Investment Facility (NIF), Latin America Investment Facility (LAIF), Asian Investment Facility (AIF), Investment facility for Central Asia (IFCA), Caribbean Investment Facility (CIF), Investment Facility for the Pacific (IFP), the EU-Africa Infrastructure Trust Fund (ITF) and the *Western Balkans* Investment Framework (WBIF).

Between 2007 and 2014, the EU issued grants worth more than €2 billion to finance about 200 blended projects, leveraging at least €19 billion from other public financial institutions to

produce an overall investment volume of more €44 billion. The Commission estimates that about 62% of the projects financed by EU Blending Facilities since 2007 had a climate change objective as a main or significant objective.

The EU has also made innovative efforts, as recommended in its policy papers³⁵, to involve the private sector in development and climate investments, for example, by using risk mitigation instruments for renewables or providing focused credit lines to financial intermediaries on energy efficiency.

5.1.3. *Methodology for tracking the provision of finance, technology and capacity building support*

The approach used by the EU to track its provision of climate finance, technology and capacity building support is based on the OECD Development Assistance Committee (DAC) system of Rio markers that has been integrated into the EU's own project monitoring and reporting system.

The following definitions are used to track climate finance and support.

- Definition of climate finance: Climate finance aims at reducing emissions, and enhancing sinks of greenhouse gases and aims at reducing vulnerability of, and maintaining and increasing the resilience of, human and ecological systems to negative climate change impacts (adapted from the definition of climate finance by the Standing Committee on Finance).
- Definition of mitigation activities: An activity should be considered as climate-change mitigation related if it contributes to the objective of stabilisation of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system by promoting efforts to reduce or limit GHG emissions or to enhance GHG sequestration (adapted from the operational definitions and criteria for eligibility of the OECD-DAC Policy Markers in tracking and reporting climate support to mitigation activities).
- Definition of adaptation activities: An activity should be considered as adaptation related if it intends to reduce the vulnerability of human or natural systems to the impacts of climate change and climate-related risks, by maintaining or increasing adaptive capacity and resilience. This encompasses a range of activities from information and knowledge generation, to capacity development, planning and the implementation of climate change adaptation actions (adapted from the operational definitions and criteria for eligibility of the OECD-DAC Policy Markers in tracking and reporting climate support to adaptation activities).
- Definition of climate relevant technology development and transfer: a broad set of processes covering the flows of know-how, experience and equipment for mitigating

³⁵ Brussels, 13.5.2014 COM(2014) 263 final "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions a Stronger Role of the Private Sector in Achieving Inclusive and Sustainable Growth in Developing Countries".

and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions. The broad and inclusive term “transfer” comprises the process of learning to understand, utilize and replicate the technology, including the capacity to choose and adapt to local conditions and integrate it with indigenous technologies (adapted from the IPCC definition of climate relevant technology transfer).

- Definition of climate relevant capacity building: capacity-building is a process which seeks to build, develop, strengthen, enhance and improve existing scientific and technical skills, capabilities and institutions particularly in developing countries, to enable them to assess, adapt, manage and develop technologies. Capacity building must be country-driven, addressing specific needs and conditions of developing countries and reflecting their national sustainable development strategies, priorities and initiatives (adapted from the UNFCCC definition of capacity building activities).

The Rio markers are policy markers, and were originally not intended for accurate quantification of flows to support policy goals. Therefore, an activity can have more than one principal or significant policy objective (i.e. it can be marked for several Rio markers; mitigation, adaptation and other Rio conventions such as Biodiversity and Desertification).

The EU has adopted the following approach to “translate” the Rio marked data into estimated climate finance flows:

- If an activity is marked as principal for mitigation or adaptation, 100% of the support is considered and reported as climate finance;
- If an aid activity is marked as significant for mitigation or adaptation, then only 40% of the support is considered and reported as climate finance.
- To avoid double counting, any activity can only count as 100%, 40% or 0%. If an activity is marked for both mitigation and adaptation, only the highest marking will count when calculating the total climate relevant financial contributing of the activity.

This biennial report covers support that has been committed in 2013 and 2014. A commitment entails that a final decision has been taken on allocation of the funds to a specific project and programme. In general, disbursement follows commitment unless exceptional circumstances arise. The EU is working towards tracking climate relevant disbursements in the near future.

The EIB’s climate relevant financial flows have been tracked using the joint approach developed by the Multilateral Development Banks (MDBs)³⁶.

³⁶ Can be found at http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2015/06/16/090224b082f3a601/2_0/Rendered/PDF/20140joint0rep0nks00climate0finance.pdf

5.2. Financial Resources

5.2.1. *Provision of financial support through multilateral channels*

The EU has not provided core contributions to multilateral organizations, including to the operating entities of the financial mechanism of UNFCCC (the Global Environmental Facility and the Green Climate Fund)³⁷.

The EU has, however, supported a number of global programmes and Trust Funds managed by multilateral organisations, such as UNDP, UNEP, FAO and the World Bank.³⁸ In the context of this Biennial Report these initiatives are reported as bilateral support and included in CTF table 7(b).

5.2.2. *Provision of financial support through bilateral channels*

The total support provided by the EU to developing country Parties to the UNFCCC³⁹ in 2013 and 2014 was USD 2 178 million (€1 641 million). Of this support, USD 1 465 million (€1104 million) was directed to adaptation and USD 1 450 (€1 093 million) to mitigation.⁴⁰

³⁷ The EU's contributions to the UNFCCC and the Kyoto Protocol's budgets are included in the National Communication.

³⁸ For the description of two such initiatives (the EU-UNDP Low Emissions Capacity Building Programme and the UN-REDD Programme), please also see the EU's BR1.

³⁹ The list of recipients includes all developing country Parties to the UNFCCC who are on the DAC list of ODA recipients (link: <http://www.oecd.org/dac/stats/documentupload/DAC%20List%20of%20ODA%20Recipients%202014%20final.pdf>).

⁴⁰ Please note that the mitigation and adaptation figures cannot be added up to provide the total. This is due to the fact that a number of projects are both mitigation and adaptation relevant. For details, please see the Rio markers methodology in 5.1.3.

Table 5-2 - Provision of financial support in 2013-2014⁴¹

	Adaptation	Mitigation	Total
2013			
<i>EURO</i>	661,394,000.00	606,266,904.58	964,262,104.58
<i>USD</i>	878,331,232.00	805,122,449.28	1,280,540,074.88
2014			
<i>EURO</i>	442,366,448.63	486,583,205.71	677,011,701.71
<i>USD</i>	586,577,910.89	645,209,330.77	897,717,516.48
TOTAL			
<i>Euro</i>	1,103,760,448.63	1,092,850,110.29	1,641,273,806.29
<i>USD</i>	1,464,909,142.89	1,450,331,780.05	2,178,257,591.36

Of total finance provided by the EU in 2013 and 2014, 18% or USD 382 million (€ 288 million) were provided to LDCs. USD 259 million (€ 195 million) were provided for adaptation-relevant activities in LDCs and USD 185 million (€ 139 million) for activities related to mitigation.⁴²

In addition, climate finance is channelled to developing country Parties to the UNFCCC by the European Investment Bank (EIB). All EIB funds which are reported here are provided in the form of loans. In line with the MDBs' joint approach to tracking climate finance⁴³, it is specified for each project, which share is relevant for mitigation or adaptation. The Rio markers are not applied to funding provided by the EIB.

In 2013, total climate finance provided to developing country Parties to the UNFCCC by the EIB was USD 2 718 million (EUR 2 047 million). In 2014, total climate finance provided to developing country Parties to UNFCCC by the EIB was USD 2 783 million (€2 098 million).

⁴¹ Totals in this table correspond to the total figures shown in CTF table 7. However, totals for mitigation and adaptation are not shown in CTF table 7b, but were calculated for this overview table in line with the methodology for applying the Rio markers explained in chapter 5.1.3 for EU funds. The Rio markers are not applied to projects funded by the EIB which are also included in CTF table 7b.

⁴² Please note that the mitigation and adaptation figures cannot be added up to provide the total. This is due to the fact that a number of projects are both mitigation and adaptation relevant. For details, please see the Rio markers methodology in 5.1.3.

⁴³ See http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2015/06/16/090224b082f3a601/2_0/Rendered/PDF/20140joint0repOnks00climateofinance.pdf.

Table 5-3 - Climate financing by the EIB

	Adaptation	Mitigation	Total
2013			
<i>EURO</i>	97 500 000.00	1 949 027 799.00	2 046 527 799.00
<i>USD</i>	129 480 000.00	2 588 308 917.07	2 717 788 917.07
2014			
<i>EURO</i>	51 600 000.00	2 046 850 000.00	2 098 450 000.00
<i>USD</i>	68 421 600.00	2 714 123 100.00	2 782 544 700.00
TOTAL			
<i>EURO</i>	149 100 000.00	3 995 877 799.00	4 144 977 799.00
<i>USD</i>	197 901 600.00	5 302 432 017.07	5 500 333 617.07

Of total climate finance provided by the EIB in 2014, USD 431 million were channelled to developing countries as ODA and USD 242 million were delivered as OOF (for USD 2 110 million, this information is not available).

For detailed information on the bilateral provision of support by the EU and the EIB, please see CTF Table 7(b) in the CTF Appendix.

5.3. Technology development and transfer

Europe is a leading player in the area of low carbon technologies and is maintaining its position with a range of policy initiatives.

While emissions are falling in Europe, it is predicted that by 2020, nearly two-thirds of the world's emissions will come from developing countries. It is therefore vital that climate technologies are accessible in all parts of the world in order to keep the average global temperature rise to below 2°C compared to pre-industrial levels – the threshold beyond which we risk dangerous and irreversible climate change.

But accessible knowledge and technologies are not enough; the right set of specific local conditions needs to be in place to attract project developers and investors. This so-called 'enabling environment' involves a set of interrelated conditions - legal, organisational, fiscal, informational, political, and cultural. Key elements include the reduction of risks related to the project investment and its operation and to the policies in place. A skilled workforce is also crucial to maintain know-how in the community.

The transfer of technologies to developing countries offers great business opportunities for the private sector, which has the potential to leverage much higher investments than can be obtained through the public sector. Private sector involvement is also a key driver of technological innovation. In the EU, more than two-thirds of spending on innovation comes from the private sector and the vast majority of technologies are owned and operated by private actors.

The EU supports the development and deployment of technologies in developing countries through substantial investments in innovation. It also supports the transfer of climate technologies to developing countries, although such cooperation also requires governments,

private sector entities, financial institutions, NGOs, and research and education institutions in developing countries to play their part. This includes support to increase administrative capacities and explore opportunities for public-private partnerships. It also helps harness finance to leverage private funding for infrastructure projects.

The EU also supports new forms of partnerships and multi-stakeholder alliances between national or local authorities, enterprises and NGOs for skills development and the provision of basic services.

These partnerships facilitate access to sustainable and affordable energy, water and agriculture. They develop synergies between public and private interests in technology transfer, and engage stakeholders in the development and diffusion of technology, particularly to and between developing countries.

Capacity building and innovation are important and the EU works closely with governments in developing countries to help them develop and implement policies in support of private sector involvement. The aim is to reinforce administrative capacities and support the development of legal and regulatory frameworks and guidelines for public-private partnerships.

5.3.1. EU Funded Technology Transfer Initiatives and Programme

All development aid cooperation projects in the field of climate change, and described in the previous section, involve technology transfer activities as defined by the technology transfer framework (both hard and soft technologies considered). It is, however, in most cases impossible, within a given programme, to get a breakdown of the technology transfer activities and related financial resources.

CTF Table 8 includes details of a non-exhaustive list of selected initiatives implemented in cooperation with developing country partners, with an important technology development and transfer component, which the EU believes are fairly representative of the overall technology development and transfer support provided by the EU.

5.3.1.1. EU research and innovation framework programmes

The EU research and innovation framework programmes are open for participation from third countries, with ‘automatic EU funding’ being limited to developing countries. There are also dedicated programme instruments in place to support specific cooperation priorities with third countries. In the 7th Framework Programme (FP7) that covered the period between 2007 and 2013, 4.73% of all participation came from third countries (incl. developed and developing countries), which received 1.93% of all EU funding. Many of these international cooperation actions contributed to technology development in and/or knowledge transfer to developing countries.

Horizon 2020 is the EU’s “new” research and innovation framework programme for 2014-2020, with a nearly €80 billion budget. In order to facilitate joint knowledge creation and transfer, Horizon 2020 is also open for third country participation, and work programmes will

include targeted calls to address specific research and innovation cooperation priorities jointly identified with partner countries.

The Horizon 2020 Regulation establishes climate action and sustainable development as cross-cutting priorities. It sets expenditure objectives of 35% and 60% respectively and requires monitoring and reporting of these.

5.4. Capacity building

Capacity development is at the heart of the EU development assistance, in line with the provisions of the Paris Declaration on Aid Effectiveness and the Accra Agenda for Action. The EU's development activities in the field of climate change are based on, and emphasize the importance of, the principles of national ownership, stakeholder participation, country-driven demand, cooperation between donors and across programmes, and impact assessment and monitoring (when appropriate). Due to the fact that almost all development activities undertaken by the EU and its Member States include a capacity-building component(s) or activities and given the high number and volume of development programmes supported, it is impossible to estimate and single out the full extent of financial support provided by the EU explicitly for the purposes of capacity-building. Since EU support is partner country-driven, only information from partner countries, for example through their National Communications, is the best way to get a picture of capacity building support and activities and their effectiveness.

CTF Table 9 includes details of a non-exhaustive list of selected support initiatives with an important capacity building component, which the EU believes are fairly representative of the overall capacity building support provided by the EU.

In addition to those included in CTF table 9, we would highlight two flagship initiatives:

- The Low Emissions Capacity Building Programme, focused on mitigation action and its MRV, mostly in middle income countries, and
- The Global Climate Change Alliance, focused on adaptation in least developed countries and small island development states.

5.4.1. The Low Emissions Capacity Building Programme

A global initiative to support national climate change mitigation efforts, low emission development strategies and enhanced measuring, reporting and verification systems.

The UNDP Low Emission Capacity Building (LECB) Programme⁴⁴ promotes essential cooperation between relevant institutions, engaging the public sector and industry in a concerted effort to address climate change consistent with national development priorities around the world. Programme-supported projects aim to strengthen technical and institutional capacity at the national level. This work includes the identification and formulation of NAMAs, Low emission development strategies (LEDS), mitigation actions in selected industries with the participation of the private sector, the strengthening of GHG inventory

⁴⁴ More information can be found at www.lowemissiondevelopment.org

management systems and the design of Measurement, Reporting and Verification (MRV) systems.

The LECB Programme runs through 2016 and is active in twenty five countries around the globe, including: Argentina, Bhutan, Chile, China, Colombia, Costa Rica, DRC, Ecuador, Egypt, Ghana, Indonesia, Kenya, Lebanon, Malaysia, Mexico, Moldova, Morocco, Peru, Philippines, Tanzania, Thailand, Trinidad and Tobago, Uganda, Vietnam and Zambia.

The global programme is supported through contributions by the European Commission, the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), and the Australian Government, while implemented by UNDP.

5.4.2. The Global Climate Change Alliance

The GCCA⁴⁵ was established by the European Union (EU) in 2007 to strengthen dialogue and cooperation with developing countries, in particular least developed countries (LDCs) and small island developing States (SIDS).

It started its work in just four pilot countries. Today it has a budget of more than €300 million and is one of the most significant climate initiatives in the world. It supports 51 programmes around the world and is active in 38 countries, 8 regions and subregions and at the global level.

By fostering effective dialogue and cooperation on climate change, the Alliance helps to ensure that poor developing countries most vulnerable to climate change increase their capacities to adapt to the effects of climate change, in support of the achievement of the Millennium Development Goals (MDGs).

Where this benefits their poverty reduction objectives, the Alliance also helps such countries to participate in the global climate change mitigation effort.

In 2014, a new phase of the GCCA, the GCCA+ flagship initiative, began in line with the European Commission's new Multiannual Financial Framework (2014-2020).

The GCCA+ aim is to boost the efficiency of its response to the needs of vulnerable countries and groups. Using ambitious and innovative approaches, it will achieve its goals by building on its two mutually reinforcing pillars:

- Under the first pillar, the GCCA+ serves as a platform for dialogue and exchange of experience between the EU and developing countries, focusing on climate policy and bringing renewed attention to the issue of international climate finance. The results feed into negotiations for a new climate deal under the United Nations Framework Convention on Climate Change (UNFCCC).
- Under the second pillar, the GCCA+ acts as a source of technical and financial support for the world's most climate-vulnerable countries, whose populations need climate finance the most. Extra efforts will be made to strengthen the strategically important issues of ecosystems-based adaptation, migration and gender equality.

⁴⁵ More information can be found at: <http://www.gcca.eu/>