Trends and projections in Europe 2020

Tracking progress towards Europe's climate and energy targets

Methodology Notes

These methodology notes accompany the report *Trends and Projections in Europe 2020*.
They explain the methodological approach and data sources used in the report in greater detail. They also provide some overview tables of the data used in the Trends and Projections analysis. The full analysis can be found at https://www.eea.europa.eu/publications/trends-and-projections-in-europe-2020.

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Annex 1 Progress towards greenhouse gas emission targets: data and methodology

A1.1 Reporting requirements for greenhouse gas emissions

The assessments of progress towards greenhouse gas (GHG) emission targets presented in the *Trends and Projections 2020* report are based, for the most part, on information submitted by Member States under Regulation (EU) No 525/2013, the Monitoring Mechanism Regulation (MMR) (EU, 2013d).

The purposes of the reporting requirements stipulated in the MMR are to enable the EU to complete its reporting commitments under the United Nations Framework Convention on Climate Change (UNFCCC) and to evaluate the projected progress of the EU and its Member States towards fulfilling their GHG emission mitigation commitments under the Kyoto Protocol in annual reports prepared by the European Commission and the EEA.

Implementing provisions (EU, 2014b) provide a structure and format for the reporting of GHG inventories and approximated GHG inventories, information on policies and measures, GHG projections and the use of auctioning revenue and project credits, and they are used for the purposes of the Land use, land use change and forestry (LULUCF) Decision (EU, 2013c). Furthermore, a delegated act (EU, 2014a) defines the substantive requirements for an EU inventory system to fulfil the obligations pursuant to Decision 19/CMP.1 (UNFCCC, 2013a).

A1.2 Data sources for greenhouse gas emissions

The analysis presented in this report is based on several sets of GHG emission data.

A1.2.1 Historical trends in greenhouse gas emissions

GHG emission data for the period 1990-2018 are official data reported by the EU and Member States under the UNFCCC in their corresponding GHG inventory reports (EEA, 2020f). The EEA is responsible for the compilation of the EU GHG inventory. Together with the European Topic Centre on Climate Change Mitigation and Energy (ETC/CME) ([24]), the EEA implements a quality assurance and quality control (QA/QC) procedure (EC, 2013a) to ensure the timeliness, completeness, consistency, comparability, accuracy and transparency of the inventories reported by Member States that are used in this report. In 2016, a comprehensive review of GHG emission data took place under Article 19 of the MMR, in the context of the annual compliance cycle under the Effort Sharing Decision (ESD). This concerned the years 2005, 2008-2010, 2013 and 2014. The years 2015, 2016, 2017 and 2018 were reviewed in 2017, 2018, 2019 and 2020 during the annual review cycles under the MMR.

From 2015 onwards, Member States' GHG inventories are based on the use of global warming potentials (GWPs) from the Intergovernmental Panel on Climate Change (IPCC)'s Fourth Assessment Report (AR4) (UNFCCC, 2013b). Thus, all the emission estimates used in this report were calculated using GWPs from the IPCC's AR4.

Early 'approximated' (proxy) estimates of 2019 GHG emissions were reported by Member States under the MMR by 31 July 2020. These estimates were aggregated to EU level by the EEA (forthcoming_b). Cyprus and Bulgaria did not submit proxy GHG inventories. For those countries, proxies were calculated by the EEA and the ETC/CME. The methodology and data sources are laid out in detail in the EEA report (EEA, forthcoming_b).

A1.2.2 Greenhouse gas emissions in the EU Emissions Trading System since 2005

Data in the EU Emissions Trading System (ETS) are used to analyse emission trends and to determine the level of emissions covered under the ESD. For the years 2005-2012, ETS emissions include estimates to reflect the scope of the EU ETS for the third trading

([24]) The ETC/CME is a consortium of European institutes contracted by the EEA to carry out specific tasks in the fields of climate change mitigation and energy.

Box A1.1 Targets for 2020 and 2030

2020

The Effort Sharing Decision (ESD) covers emissions from all sources outside the EU Emissions Trading System (ETS), except for emissions from aviation ([a]) and international maritime transport and net emissions from land use, land use change and forestry (LULUCF). The ESD therefore includes a range of diffuse sources in a wide range of sectors such as transport (e.g. cars, lorries), buildings (heating in particular), services, small industrial installations, agriculture and waste. Such sources currently account for 57 % of total greenhouse gas (GHG) emissions in the EU.

The ESD sets individual annual binding targets for GHG emissions not covered by the EU ETS — known as annual emission allocations (AEAs) — for all Member States for the period 2013-2020 (EU, 2009a). In 2013, the European Commission determined the AEAs of Member States for the period 2013-2020, using reviewed and verified emission data for the years 2005, 2008, 2009 and 2010 (EU, 2013a). The AEAs were adjusted in 2013 to reflect the change in the scope of the EU ETS from 2013 onwards (EU, 2013b) and in 2017 to reflect updates in methodologies for reporting of GHG inventories (EU, 2017) ([b]).

Each Member State will contribute to this effort, according to its relative wealth in terms of gross domestic product (GDP) per capita. The national emission targets range from a 20 % reduction for the richest Member States to a 20 % increase for the poorest ones by 2020, compared with 2005 levels (see Table A4.1). At EU level, this will deliver a reduction in emissions of approximately 9.3 % by 2020, compared with 2005 levels, from those sectors covered by the ESD. The least wealthy countries can increase emissions in these sectors because their relatively high economic growth is likely to be accompanied by higher emissions. Nevertheless, their targets still represent a limit on emissions, and an effort to reduce them will be required by all Member States; they will need to introduce policies and measures to limit or lower their emissions in the various Effort Sharing Decision sectors.

2030

The regulation on binding annual emission reductions by Member States from 2021 to 2030 (Regulation (EU) 1018/842, the Effort Sharing Regulation) (EU, 2018f) sets out binding annual GHG emission targets for Member States for the period 2021-2030. This regulation is the follow-up to the ESD, which established national emission targets for Member States in Effort Sharing sectors between 2013 and 2020. The regulation recognises the different capacities of Member States to act by differentiating targets according to GDP per capita across Member States. This ensures fairness, because Member States with the highest incomes take on more ambitious targets than Member States with lower incomes. EU leaders recognised that an approach for high-income Member States based solely on relative GDP per capita would mean that, for some, the costs associated with reaching their targets would be relatively high. To address this, these targets have been adjusted to reflect cost-effectiveness for Member States with an above average GDP per capita while maintaining the overall GDP per capita-based reduction in emissions required from this group of Member States. The resulting 2030 GHG emission targets range from 0 % to -40 %, compared with 2005 levels.

Notes: ([a]) Emissions from aviation have been included in the EU ETS since 1 January 2012. In principle, the EU ETS should cover all flights departing from and/or arriving at airports in all EU Member States, as well as Iceland, Liechtenstein and Norway and closely related territories. However, since 2012, only flights departing from and arriving at airports located in these countries (and Switzerland in 2012) have been included in the EU ETS. Non-CO_2 emissions from domestic aviation remain covered under the ESD.

([b]) According to Article 27(2) of Regulation (EU) 525/2013, the European Commission is to examine the impact of the use of the 2006 IPCC (Intergovernmental Panel on Climate Change) guidelines for national GHG inventories and significant changes brought about by the United Nations Framework Convention on Climate Change methodologies by December 2016, and it may revise Member States' AEAs, as provided in the ESD, accordingly.

period (2013-2020). These data are publicly available from the European Union Transaction Log (EUTL) ([25]) and the EEA ETS data viewer (EEA, 2020h). The data considered in the trend analysis were extracted from the EUTL on 1 July 2020. Data used to determine the ESD emissions for the period 2013-2017 were extracted from the EUTL on 8 March of each year of the ESD review of the respective year (as agreed by Working Group 1 under the Climate Change Committee in its session on 18 May 2015).

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

A1.2.3 Emissions covered under the Effort Sharing Decision

For analysing emission trends in the ESD, historical Effort Sharing emissions for the period 2005-2012 are calculated using the latest GHG inventory data, from which ETS emissions, CO_2 emissions from domestic aviation and nitrogen trifluoride (NF3) emissions are subtracted. ETS emissions include EEA estimates to reflect the scope of the EU ETS for the third trading period for the period 2005-2012 (ETC/CME, 2019).

ESD emissions for 2005 that are calculated with the latest inventory data are different from ESD base-year emissions, which are used to compare Member States' progress towards achieving national targets and between Member States. The calculation of base-year emissions is explained in Section A1.2.6.

The Effort Sharing GHG emission data for the years 2013 to 2017 are consistent with the outcome of the 2016, 2017, 2018 and 2019 reviews of national GHG inventory data pursuant to Article 19 of the MMR. These data, which are used by the European Commission to determine Member States' compliance under the ESD for 2013, 2014, 2015, 2016 and 2017, are laid down in implementing decisions; the data for 2018 are expected to be published in late 2020.

A1.2.4 Long-term trends in Emissions Trading System and Effort Sharing Decision emissions

In Figure 2.3 and Figure 2.4, GHG emissions for the years 1990-2018 are split into those covered by the EU ETS and those covered by the ESD. These splits are based on the application of a percentage of each of the main source categories defined by the IPCC for the reporting of national GHG inventories, based on Member States' projections submitted in 2020. Projections for ETS and ESD are reported by source categories in Member States' submissions.

The 'energy industries' sector in Figure 2.3 aggregates ETS emissions of energy industries, fugitive emissions from fuels and CO_2 from transport and storage, i.e. inventory source categories 1.A.1, 1B and 1C. 'Other stationary installations' covers all other ETS emissions, mainly from manufacturing and construction and from industrial processes, i.e. inventory source categories 1.A.2 and 2.

The 'industry and other' sector in Figure 2.4 aggregates Effort Sharing emissions from energy supply, manufacturing and industrial processes and product use, i.e. inventory source categories 1.A.1, 1.A.2, 1.B and 2.

EEA estimates to reflect the scope of the EU ETS for the third trading period for the years 2005-2012 (ETC/CME, 2019) are included here, too.

A1.2.5 Annual emission targets (annual emission allocations) under the Effort Sharing legislation

The annual emission allocation (AEA) values for the period from 2013 to 2020 were defined in Commission Decision No 2013/162/EU (EU, 2013a) and adjusted in accordance with Commission Implementing Decision No 2013/634/EU (EU, 2013b) to reflect the change in scope of the EU ETS in 2013.

Following the 2016 comprehensive review of Member States' historical GHG inventory estimates, the AEAs for the years 2017-2020 were recalculated to reflect updates in the methodologies for reporting GHG inventories (EU, 2017). This recalculation ensures that the level of effort originally intended (as a percentage) is maintained for each Member State in the ESD. The recalculation also ensures consistency between the targets and the emissions reported by the Member States for compliance with the ESD, as the current reported emissions already take account of the methodological updates.

Effort Sharing base-year emissions for 2005 and AEA values for 2017-2020 used throughout this report follow Commission Decision (EU) 2017/1471 (EU, 2017) and Decision No 2013/634/EU (EU, 2013b).

The Effort Sharing Regulation (ESR) defines Member States' minimum contributions required to achieve the EU's 2030 target of a 30 % reduction in emissions compared with 2005 in ESR sectors (see Table A4.1). Absolute AEA values for the period from 2021 to 2030 will be determined in the year 2020. These will be based on the final Effort Sharing emissions for 2005 and the period 2016 to 2018, following the comprehensive review conducted in 2020. Average Effort Sharing emissions for these years are necessary to define the starting point for the calculation of AEAs for the period from 2021 to 2030.

Box A1.2 Flexibility mechanisms

The Effort Sharing Decision (ESD) allows Member States to use flexibility provisions to meet their annual targets, with certain limitations:

- Within a Member State, any overachievement in a year during the period 2013-2019 can be carried over to subsequent years, up to 2020. Up to 5 % of a Member State's annual emission allocation (AEA) may be carried forward to the following year during the period 2013-2019. Member States may transfer up to 5 % of their AEAs to other Member States, which may use this emission allocation until 2020 (*ex ante*). Any overachievement in a year during the period 2013-2019 may also be transferred to other Member States, which may use this emission allocation until 2020 (*ex post*). The latter can take place only after emission data for the relevant year have been confirmed.

The Effort Sharing Regulation (ESR) for 2030 targets maintains existing flexibilities under the current ESD with some adjustments:

- Banking of unused AEAs is capped at a total of 30 % of the cumulative AEA of the year in question from 2022 to 2029.
- Borrowing is limited to 10 % of the AEA of the following year from 2021 to 2025 and to 5 % from 2026 to 2029.
- The limit for transfers of AEAs to other Member States is increased to 10 % of the AEA of respective years in the period 2026-2030. The recipient Member State can use these AEAs for the respective years or for later years.
- International project credits are excluded as the EU target is to be met domestically.
- The ESR allows nine Member States the choice of using a limited amount of ETS allowances for offsetting emissions in the Effort Sharing sectors in the period 2021-2030. It concerns Member States that have national reduction targets significantly above both the EU average and their cost-effective reduction potential or that did not allocate any EU ETS allowances for free to industrial installations in 2013. The Member States having this option are Austria, Belgium, Denmark, Finland, Ireland, Luxembourg, the Netherlands, Malta and Sweden.
- Eligible Member States needed to notify the Commission by 31 December 2019 how much of the maximum amount of this flexibility they intend to use during the Effort Sharing compliance period 2021-2030. Iceland and Norway are also eligible as they have agreed with the EU to implement the ESR.
- The maximum limit that can be used annually in the period 2021-2030 is set at 2 % of each country's Effort Sharing emissions in 2005, except for Ireland, Luxembourg and Iceland, which are allowed a limit of up to 4 %. The total maximum amount for all 11 eligible countries is limited to 107 million tonnes. Six Member States, as well as Iceland and Norway, have given notice that they intend to use their full amount of this flexibility, whereas Belgium intends to use 1.89 %. The Netherlands and Sweden have decided not to use the flexibility. Member States may request downward revisions of their percentages for later years during the compliance period in 2024 and 2027, respectively.
- There is a new flexibility to use credits from the land use sector. Land mitigation units (LMUs) from afforested land, managed cropland and managed grassland allow Member States to use up to 280 million credits over the entire period 2021-2030 in the whole of the EU to comply with their national targets. All Member States are eligible to make use of this flexibility, but Member States with a larger proportion of emissions from agriculture have greater access to it. In line with EU leaders' guidance, this recognises that there is a relatively low mitigation potential for emissions from the agriculture sector. Iceland and Norway also have access to this flexibility since both are part of the ESR and Land use, land use change and forestry Regulation for the period 2021-2030.

The best currently available Effort Sharing emission data have been used for a preliminary estimation of future AEAs:

- 2005: ESD base year emissions calculated on the basis of the 2016 comprehensive ESD review and following the methodology presented in Section A1.2.7 (EU, 2017);
- 2016: final ESD emissions (EU, 2018a);
- 2017: final ESD emissions (EC, 2019);
- 2018: final ESD emissions (EEA, 2020i)

The adjustments pursuant to Article 10(2) listed under Annex IV of the ESR are already considered in the AEA amounts for 2021 for the eligible Member States.

A1.2.6 The 2005 Effort Sharing Decision base year emissions

The 2005 **ESD base-year emissions** are calculated by the EEA, to be consistent with both:

- the relative 2020 Effort Sharing target (as a percentage of 2005 emissions) defined in the ESD (EU, 2009a);
- the absolute 2020 Effort Sharing target determined by the European Commission (EU, 2017).

The EEA calculates 2005 ESD base-year emissions as follows:

ESD base year emissions = 2020 absolute target/ (1 + % of 2020 Effort Sharing target).

These calculated ESD base-year emissions can also be used, for example, to compare relative changes in Effort Sharing emissions with 2020 Effort Sharing targets expressed as percentages.

In this report, calculated 2005 ESD base-year emissions are used to express the distance between Effort Sharing emissions and Effort Sharing targets in a normalised way (see, for example, Figure 2.6). The distance, calculated as the absolute difference between emissions and targets divided by 2005 ESD base-year emissions, is expressed in percentage points (a share of 2005 base-year emissions). It is then directly comparable with targets and reductions as percentages of 2005 levels and allows relevant comparisons between Member States.

These calculated 2005 ESD base-year emissions reflect the current scope of the EU ETS (EU, 2013b) and the outcome of the comprehensive ESD review in 2016 and may therefore differ, sometimes significantly, from emissions in the Effort Sharing sectors for the year 2005 that are estimated based on the latest GHG inventories and ETS data.

It is important to note that ESR base-year emissions 2005 will be part of the above-mentioned determination of Annual Emission Allocations under the ESR, and based on the results of the 2020 comprehensive review. These will take into account the latest GHG inventory data for 2005 and will be relevant for discussing the trends in Effort Sharing emissions for the period 2021-2030. The ESR base-year emissions 2005 were not available at the time of writing and were thus not used in any assessment in this report.

A1.2.7 Projections of greenhouse gas emissions

This report uses GHG projection data that were reported by Member States under the MMR in 2019 and updated in 2020 (EEA, 2020j). Mandatory reporting of projections takes place every 2 years (2015, 2017, 2019). Member States must also report substantial changes to projections every other year (2014, 2016, 2018, 2020). In 2020, 13 Member States (Austria, Belgium, Cyprus, Denmark, Estonia, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Poland, and Slovenia) submitted updated projections under the MMR.

Under the MMR, Member States report projections in two scenarios:

- A WEM scenario, which considers the implementation of existing (already implemented) measures.
- If available, a WAM scenario is reported too. It considers the implementation of additional measures (at the planning stage).

In 2020, 11 Member States reported projections based on such WAM scenarios: Austria, Belgium, Estonia, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Poland and Slovenia). Cyprus and Denmark provided only a WEM scenario update. Bulgaria, Germany, Malta, the Netherlands and Sweden did not report a WAM scenario in 2019 either. To aggregate a WAM scenario at EU level, data for the seven Member States that did not report a WAM scenario were gap-filled using the WEM scenario.

Member States' reported projections include total and sectoral GHG emissions by source category as well as a split of these projections between those covered by the EU ETS and those covered by the Effort Sharing sectors. Total GHG projections are used to assess progress towards achieving the EU's 40 % reduction target by 2030, and 'Effort Sharing projections' are used to assess Member States' progress towards achieving their national 2030 targets, set under the ESR.

The EEA, together with its ETC/CME, implements a QA/QC procedure to ensure the timeliness, completeness, consistency, comparability, accuracy and transparency of the projections reported by Member States and used in this report. This procedure is described in *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* (EC, 2015a). If significant discrepancies

are observed between the inventory value for the reference year and that for the projected year, the level of projections is aligned. Such calibration is performed to match national MMR projections with the GHG inventory, which is the year 2018. In 2020, no such calibration took place.

During the past year, Member States submitted their national energy and climate plans (NECPs) to the European Commission, including GHG projections that differ slightly from the projections Member States reported under the MMR in March 2019 or 2020, in some cases due to calibration to the most recent GHG inventory data. In addition, differences in total emissions for the year 2030 can be explained by differences in the 'with additional measures' scenario provisions under the MMR in contrast to 'with planned measures' scenarios in NECPs and in the gap-filling methodologies used by the Commission and the EEA.

Table A.1.1 presents the results for Effort Sharing emission projections with additional measures under the MMR and with planned NECP measures. Missing scenarios with additional or planned measures for Effort Sharing emissions were gap-filled by the EEA with the WEM scenario and by the Commission with domestic ESR targets (Denmark, the Netherlands, Romania and Slovakia) or WAM scenarios provided

Table A1.1 Projections for Effort Sharing emissions ($MtCO_2e$) from national energy and climate plans and from the Monitoring Mechanism Regulation, 2030

Country	Latest WAM provided under MMR 2019/2020	ESR 2030		
		MMR — WAM	NECP — WPM	Difference WPM/WAM
Austria	2020	41.5	41.5	0.0
Belgium	2020	52.7	52.7	0.0
Bulgaria	-	23.9	25.2	1.3
Croatia	2019	14.2	14.2	0.0
Cyprus	-	4.0	3.4	-0.6
Czechia	2019	53.3	53.3	0.0
Denmark	-	30.6	24.2	-6.3
Estonia	2020	5.1	5.1	0.0
Finland	2019	21.3	21.2	-0.1
France	2019	232.6	232.6	0.0
Germany	-	373.6	310.0	-63.6
Greece	2020	41.5	41.5	0.0
Hungary	2020	37.1	37.1	0.0
Ireland	2020	33.6	33.6	0.0
Italy	2019	215.5	216.0	0.5
Latvia	2020	7.8	7.4	-0.3
Lithuania	2020	10.0	10.0	0.0
Luxembourg	2020	4.7	4.7	0.0
Malta	-	1.6	1.6	0.0
Netherlands	-	86.3	81.8	-4.5
Poland	2020	166.6	166.6	0.0
Portugal	2019	25.9	25.9	0.0
Romania	2019	79.9	74.0	-5.9
Slovakia	2019	18.2	18.4	0.2
Slovenia	2020	8.7	8.7	0.0
Spain	2019	144.7	142.9	-1.8
Sweden	-	26.0	26.0	0.0
United Kingdom	2019	284.1	284.1	0.0

Note: WAM scenarios are scenarios 'with additional measures' reported under the MMR. WPM stands for 'with planned measures' and reflects the WAM scenario where available; where WAM scenarios are not available, the European Commission has gap-filled these data using other indications on the expected effects of planned measures in the Effort Sharing sectors as reported in the NECPs.

Sources: EC (2020f); EEA (2020j).

under the MMR in 2019 (Portugal). While the projections are identical or very similar for most Member States, Germany, Denmark and Romania show the largest differences.

A1.3 Historical and projected total greenhouse gases, Emissions Trading System and Effort Sharing emissions by sector for 2005-2030 and legislated and estimated Effort Sharing annual emission allocations 2013-2030

Member States report historical Effort Sharing emissions at an aggregated level. To better understand the overall developments in trends in emissions, it is helpful to split Effort Sharing emissions into source sectors. This has been accomplished by the EEA and its ETC/CME.

Total Effort Sharing and ETS emissions, and projected shares of ETS emissions by source category, as reported in GHG projections, have been considered in order to disaggregate ETS and Effort Sharing emissions by source category according to the IPCC's common reporting format (CRF). The shares of ETS emissions are mostly zero or negligible for the agriculture, waste, transport and buildings sectors, which leads to robust assumptions on Effort Sharing emissions for these sectors. For the sectors energy industries, manufacturing (CRF 1.A.1, 1.A.2, 1B), and process emissions and product use (CRF 2), the shares are considerably higher, particularly in some Member States. Therefore, these sectors were aggregated into a sector called 'industry and other'. The sum of Effort Sharing emissions from energy industries, manufacturing and process emissions and product use provides a more robust figure. CRF sectors 1.A.4 and 1.A.5 are summed under the category 'buildings'. Table A1.2 provides an overview for the EU-27 and each country on trends in emissions.

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
EU-27	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**3 817**	**3 709**	**3 565**	**3 415**	**3 287**	**3 817**	**3 628**	**3 305**	**2 999**	**2 785**
Energy supply	1 191	1 076	1 018	958	889	1 191	1 052	918	828	758
Manufacturing and construction industries	426	429	421	413	407	426	415	394	368	354
Transport	792	828	825	802	784	792	806	760	678	612
Residential and commercial	551	542	498	464	436	551	529	452	385	339
Industrial processes and process use	344	336	316	299	295	344	333	311	290	284
Agriculture	388	388	387	388	390	388	385	375	366	364
Waste	124	110	100	92	86	124	108	95	83	75
Emissions Trading System (stationary installations)	1 600	1 506	1 445	1 382	1 314	1 600	1 471	1 331	1 225	1 150
Effort Sharing Decision	2 204	2 189	2 105	2 019	1 958	2 204	2 143	1 961	1 761	1 623
Land use, land use change and forestry	-295	-216	-214	-188	-183	-298	-223	-227	-200	-206
International aviation	107	120	129	136	140	107	120	127	132	129

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Austria	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**78.9**	**79.7**	**76.6**	**74.0**	**72.3**	**78.9**	**78.7**	**72.9**	**67.2**	**63.9**
Energy supply	11.2	10.3	8.5	7.6	7.0	11.2	10.2	8.8	7.8	7.3
Manufacturing and construction industries	10.5	11.6	11.9	12.1	12.5	10.5	11.3	11.0	10.4	10.7
Transport	22.7	24.5	24.5	23.7	22.9	22.7	24.3	22.8	20.8	19.4
Residential and commercial	9.1	8.6	8.0	7.4	6.8	9.1	8.3	7.3	6.0	4.7
Industrial processes and process use	16.6	16.0	15.1	14.7	14.5	16.6	15.9	14.9	14.3	14.1
Agriculture	7.2	7.5	7.5	7.6	7.7	7.2	7.4	7.2	6.9	6.9
Waste	1.6	1.3	1.1	0.9	0.8	1.6	1.3	1.1	0.9	0.8
Emissions Trading System (stationary installations)	29.5	28.7	26.8	26.1	25.7	29.5	28.5	26.7	25.6	25.2
Effort Sharing Decision	49.3	50.9	49.8	47.9	46.5	49.3	50.1	46.2	41.5	38.6
Land use, land use change and forestry	-4.6	-4.2	-3.5	-2.7	-3.1	-4.6	-4.2	-3.5	-2.7	-3.1

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Belgium	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**117.1**	**113.3**	**119.6**	**127.5**	**135.5**	**117.1**	**109.9**	**112.6**	**111.4**	**110.2**
Energy supply	21.9	17.1	22.6	30.5	38.4	21.9	16.9	24.9	31.4	37.9
Manufacturing and construction industries	13.6	14.4	16.5	17.0	17.4	13.6	13.8	15.5	15.4	15.2
Transport	26.7	26.9	27.5	28.3	29.2	26.7	25.4	22.8	19.5	16.3
Residential and commercial	23.5	23.5	23.0	22.5	22.0	23.5	23.1	20.4	17.7	15.0
Industrial processes and process use	19.8	20.3	19.6	19.2	18.7	19.8	20.0	19.1	18.3	17.5
Agriculture	10.1	9.8	9.4	9.2	9.1	10.1	9.5	8.9	8.2	7.6
Waste	1.6	1.3	1.0	0.8	0.7	1.6	1.3	1.0	0.8	0.7
Emissions Trading System (stationary installations)	44.6	42.3	49.8	58.1	66.4	44.6	41.6	51.7	58.7	65.6
Effort Sharing Decision	72.5	71.0	69.8	69.4	69.0	72.5	68.3	60.8	52.7	44.5
Land use, land use change and forestry	-0.5	-0.7	-0.9	-1.2	-1.5	-0.5	-0.7	-0.9	-1.2	-1.5

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Bulgaria	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**60.5**	**71.3**	**61.5**	**58.4**	**51.5**	**60.5**	**71.3**	**61.5**	**58.4**	**51.5**
Energy supply	31.5	39.6	32.7	29.6	22.8	31.5	39.6	32.7	29.6	22.8
Manufacturing and construction industries	2.9	4.4	3.8	3.3	3.3	2.9	4.4	3.8	3.3	3.3
Transport	9.2	10.4	9.6	10.0	9.4	9.2	10.4	9.6	10.0	9.4
Residential and commercial	1.9	1.9	1.5	1.1	1.1	1.9	1.9	1.5	1.1	1.1
Industrial processes and process use	5.8	5.3	5.0	5.1	5.3	5.8	5.3	5.0	5.1	5.3
Agriculture	5.1	6.0	5.3	5.8	6.3	5.1	6.0	5.3	5.8	6.3
Waste	4.2	3.7	3.5	3.4	3.3	4.2	3.7	3.5	3.4	3.3
Emissions Trading System (stationary installations)	36.9	45.8	38.0	34.4	27.7	36.9	45.8	38.0	34.4	27.7
Effort Sharing Decision	23.6	25.4	23.5	23.9	23.8	23.6	25.4	23.5	23.9	23.8
Land use, land use change and forestry	-9.2	-8.4	-7.7	-7.2	-6.8	-9.2	-8.4	-7.7	-7.2	-6.8

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Croatia	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**24.7**	**23.4**	**23.4**	**23.5**	**23.2**	**24.7**	**22.5**	**21.6**	**20.9**	**19.5**
Energy supply	5.3	3.9	3.9	3.8	3.5	5.3	3.9	3.8	3.6	3.1
Manufacturing and construction industries	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.1
Transport	6.0	6.3	6.0	5.6	5.3	6.0	6.3	5.9	5.6	5.1
Residential and commercial	3.2	2.8	2.9	2.9	2.8	3.2	2.8	2.7	2.7	2.5
Industrial processes and process use	2.8	2.9	3.0	3.1	3.2	2.8	2.5	2.6	2.6	2.7
Agriculture	2.9	2.7	2.8	2.9	3.0	2.9	2.4	2.5	2.6	2.7
Waste	2.2	2.4	2.7	2.9	3.1	2.2	2.3	1.9	1.6	1.4
Emissions Trading System (stationary installations)	8.4	7.4	7.2	7.1	6.8	8.4	7.2	6.9	6.7	6.2
Effort Sharing Decision	16.2	16.0	16.2	16.4	16.4	16.2	15.3	14.7	14.2	13.3
Land use, land use change and forestry	-5.4	-4.2	-3.1	-2.5	-2.1	-5.4	-4.2	-3.1	-2.5	-2.1

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Cyprus	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**8.3**	**9.2**	**7.8**	**7.9**	**6.9**	**8.3**	**9.2**	**7.8**	**7.9**	**6.9**
Energy supply	3.0	3.3	1.9	2.1	1.4	3.0	3.3	1.9	2.1	1.4
Manufacturing and construction industries	0.6	0.9	0.9	0.9	0.9	0.6	0.9	0.9	0.9	0.9
Transport	1.9	2.1	2.1	2.0	1.9	1.9	2.1	2.1	2.0	1.9
Residential and commercial	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5
Industrial processes and process use	1.2	1.4	1.4	1.4	1.4	1.2	1.4	1.4	1.4	1.4
Agriculture	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Waste	0.5	0.5	0.4	0.4	0.3	0.5	0.5	0.4	0.4	0.3
Emissions Trading System (stationary installations)	4.4	5.1	3.7	3.9	3.2	4.4	5.1	3.7	3.9	3.2
Effort Sharing Decision	3.9	4.1	4.1	4.0	3.7	3.9	4.1	4.1	4.0	3.7
Land use, land use change and forestry	-0.6	-0.5	-0.6	-0.6	-0.7	-0.6	-0.5	-0.6	-0.6	-0.7

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Czechia	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**127.6**	**126.3**	**114.6**	**109.8**	**99.6**	**127.6**	**125.9**	**114.2**	**109.2**	**98.4**
Energy supply	58.1	55.5	46.4	45.5	39.5	58.1	55.5	46.4	45.5	39.5
Manufacturing and construction industries	9.7	9.9	9.8	9.7	9.6	9.7	9.9	9.8	9.7	9.6
Transport	17.7	17.9	17.4	16.1	14.3	17.7	17.6	17.0	15.7	13.9
Residential and commercial	13.4	13.2	12.0	10.8	9.7	13.4	13.2	12.0	10.8	9.7
Industrial processes and process use	15.0	16.0	15.3	14.4	13.8	15.0	16.0	15.3	14.4	13.8
Agriculture	8.2	8.4	8.8	9.1	9.1	8.2	8.4	8.8	9.1	9.1
Waste	5.5	5.4	4.8	4.2	3.6	5.5	5.4	4.8	3.9	2.8
Emissions Trading System (stationary installations)	66.6	63.1	56.2	55.9	49.9	66.6	63.1	56.2	55.9	49.9
Effort Sharing Decision	61.0	63.2	58.3	54.0	49.7	61.0	62.9	58.0	53.3	48.5
Land use, land use change and forestry	-6.5	0.6	-1.7	-1.6	-1.7	-6.5	1.2	-1.1	-0.5	-0.6

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Denmark	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**48.6**	**46.0**	**40.5**	**37.8**	**37.8**	**48.6**	**46.0**	**40.5**	**37.8**	**37.8**
Energy supply	13.6	10.4	6.0	4.3	4.3	13.6	10.4	6.0	4.3	4.3
Manufacturing and construction industries	3.8	3.8	3.4	3.4	3.4	3.8	3.8	3.4	3.4	3.4
Transport	12.7	13.6	13.9	13.4	13.4	12.7	13.6	13.9	13.4	13.4
Residential and commercial	4.7	4.3	3.7	3.3	3.3	4.7	4.3	3.7	3.3	3.3
Industrial processes and process use	1.8	2.0	1.8	1.8	1.8	1.8	2.0	1.8	1.8	1.8
Agriculture	10.9	11.0	10.7	10.8	10.8	10.9	11.0	10.7	10.8	10.8
Waste	1.1	1.1	0.9	0.8	0.8	1.1	1.1	0.9	0.8	0.8
Emissions Trading System (stationary installations)	15.8	13.1	8.7	7.1	7.1	15.8	13.1	8.7	7.1	7.1
Effort Sharing Decision	32.7	32.8	31.8	30.6	30.6	32.7	32.8	31.8	30.6	30.6
Land use, land use change and forestry	5.2	6.2	5.1	5.3	5.3	5.2	6.2	5.1	5.3	5.3

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Estonia	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**18.1**	**15.6**	**16.6**	**12.5**	**12.6**	**18.1**	**15.4**	**15.3**	**10.7**	**10.9**
Energy supply	12.3	9.7	10.5	6.3	6.2	12.3	9.6	9.6	5.3	5.4
Manufacturing and construction industries	0.5	0.6	0.6	0.7	0.7	0.5	0.6	0.6	0.7	0.7
Transport	2.3	2.2	2.3	2.4	2.5	2.3	2.1	1.9	1.7	1.8
Residential and commercial	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.6	0.6	0.6
Industrial processes and process use	0.5	0.7	0.7	0.7	0.6	0.5	0.7	0.7	0.7	0.6
Agriculture	1.4	1.4	1.5	1.6	1.6	1.4	1.4	1.5	1.6	1.6
Waste	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2
Emissions Trading System (stationary installations)	11.9	9.9	10.8	6.6	6.6	11.9	9.7	9.9	5.7	5.8
Effort Sharing Decision	6.2	5.8	5.9	5.9	6.0	6.2	5.7	5.4	5.1	5.1
Land use, land use change and forestry	-2.3	-1.4	-0.1	-0.2	0.2	-2.3	-1.4	-0.1	-0.2	0.2

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Finland	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**55.1**	**52.4**	**48.3**	**44.4**	**42.8**	**55.1**	**52.1**	**45.6**	**39.1**	**37.5**
Energy supply	17.9	16.4	13.9	11.4	10.3	17.9	16.4	13.9	10.7	9.9
Manufacturing and construction industries	6.9	5.8	5.3	4.9	4.6	6.9	5.8	5.2	4.6	4.3
Transport	10.9	11.4	10.7	10.3	10.0	10.9	11.1	8.8	7.1	6.4
Residential and commercial	4.9	4.3	4.0	3.8	3.7	4.9	4.3	3.7	3.4	3.2
Industrial processes and process use	5.9	6.3	6.6	6.6	6.9	5.9	6.3	6.4	6.4	6.8
Agriculture	6.5	6.6	6.4	6.3	6.4	6.5	6.6	6.4	5.8	6.0
Waste	2.1	1.6	1.3	1.1	0.9	2.1	1.6	1.3	1.1	0.9
Emissions Trading System (stationary installations)	25.5	23.2	20.8	18.2	17.4	25.5	23.2	20.7	17.6	17.0
Effort Sharing Decision	29.4	29.0	27.3	26.0	25.2	29.4	28.7	24.7	21.3	20.3
Land use, land use change and forestry	-20.1	-30.5	-31.4	-29.9	-34.4	-20.1	-30.5	-31.4	-30.9	-35.4

GHG emission projections ($Mt\ CO_2e$)	WEM scenario					WAM scenario				
France	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**458.1**	**461.3**	**434.4**	**416.5**	**406.2**	**458.1**	**434.4**	**365.3**	**306.5**	**247.3**
Energy supply	46.0	59.5	58.7	57.2	56.6	46.0	51.4	35.5	30.0	19.2
Manufacturing and construction industries	52.4	47.7	47.0	47.0	46.9	52.4	43.6	38.8	31.5	24.1
Transport	132.3	134.2	127.6	125.5	125.1	132.3	126.5	111.0	94.3	71.5
Residential and commercial	88.6	86.4	75.4	65.4	59.7	88.6	83.6	65.7	47.2	36.1
Industrial processes and process use	43.7	42.7	36.3	33.0	31.6	43.7	41.4	33.0	27.4	24.4
Agriculture	77.8	75.3	74.4	73.3	72.6	77.8	73.6	69.0	65.2	62.1
Waste	17.2	15.5	15.0	15.0	13.7	17.2	14.3	12.3	11.0	9.8
Emissions Trading System (stationary installations)	99.6	111.2	109.3	107.9	106.7	99.6	100.8	82.2	69.4	54.9
Effort Sharing Decision	353.9	345.4	320.4	303.9	294.7	353.9	328.9	278.5	232.6	188.4
Land use, land use change and forestry	-40.8	-38.5	-31.6	-29.0	-25.2	-40.8	-39.0	-37.7	-40.2	-45.2

GHG emission projections ($Mt\ CO_2e$)	WEM scenario					WAM scenario				
Germany [a]	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**906.8**	**835.6**	**800.4**	**730.0**	**697.6**	**906.8**	**835.6**	**800.4**	**730.0**	**697.6**
Energy supply	347.5	293.4	297.4	261.8	254.2	347.5	293.4	297.4	261.8	254.2
Manufacturing and construction industries	126.8	118.0	112.0	107.1	103.4	126.8	118.0	112.0	107.1	103.4
Transport	162.8	171.2	166.5	160.3	152.1	162.8	171.2	166.5	160.3	152.1
Residential and commercial	131.0	122.9	103.3	88.4	76.4	131.0	122.9	103.3	88.4	76.4
Industrial processes and process use	60.9	58.2	52.4	45.4	44.5	60.9	58.2	52.4	45.4	44.5
Agriculture	66.7	63.2	62.0	61.5	61.5	66.7	63.2	62.0	61.5	61.5
Waste	11.1	8.6	6.8	5.5	5.4	11.1	8.6	6.8	5.5	5.4
Emissions Trading System (stationary installations)	455.8	396.6	394.0	354.1	343.4	455.8	396.6	394.0	354.1	343.4
Effort Sharing Decision	448.6	436.6	404.1	373.6	351.9	448.6	436.6	404.1	373.6	351.9
Land use, land use change and forestry	-14.5	29.5	11.3	19.0	18.8	-14.5	29.5	11.3	19.0	18.8

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Greece	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**95.3**	**87.9**	**81.1**	**78.1**	**73.1**	**95.3**	**80.3**	**69.1**	**60.9**	**58.2**
Energy supply	42.0	32.9	26.4	23.3	17.6	42.0	27.0	17.8	11.1	9.2
Manufacturing and construction industries	5.2	5.6	5.6	5.7	5.9	5.2	5.2	4.8	4.4	4.3
Transport	17.1	17.7	17.9	17.4	17.0	17.1	17.8	17.9	16.9	15.8
Residential and commercial	6.7	8.2	8.1	8.1	8.4	6.7	6.8	5.6	4.9	4.7
Industrial processes and process use	12.0	10.7	9.9	10.0	10.1	12.0	10.7	9.9	10.0	10.1
Agriculture	7.8	8.1	8.6	9.1	9.7	7.8	8.1	8.6	9.1	9.7
Waste	4.5	4.8	4.6	4.4	4.3	4.5	4.8	4.6	4.4	4.3
Emissions Trading System (stationary installations)	49.8	40.4	33.8	30.7	25.3	49.8	34.6	25.4	18.8	17.0
Effort Sharing Decision	45.1	46.9	46.7	46.8	47.1	45.1	45.1	43.1	41.5	40.6
Land use, land use change and forestry	-3.7	-1.6	-1.1	-0.6	-0.2	-3.7	-1.6	-1.1	-0.6	-0.2

GHG emission projections (Mt CO_2e)	WEM scenario					WAM scenario				
Hungary	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**60.8**	**69.7**	**66.6**	**62.8**	**62.6**	**60.8**	**65.1**	**61.2**	**56.2**	**51.8**
Energy supply	14.6	18.6	14.1	10.2	8.3	14.6	14.8	12.3	10.5	7.3
Manufacturing and construction industries	4.2	7.9	8.6	9.3	10.1	4.2	8.0	8.5	9.1	10.0
Transport	12.2	12.8	13.9	13.2	13.0	12.2	12.5	13.4	12.8	10.7
Residential and commercial	12.3	12.9	13.0	13.3	14.2	12.3	12.3	10.2	8.0	7.8
Industrial processes and process use	7.3	7.1	6.5	6.5	6.5	7.3	7.1	6.5	6.5	6.5
Agriculture	6.7	7.2	7.5	7.8	8.0	6.7	7.2	7.5	7.2	7.5
Waste	3.5	3.2	2.9	2.6	2.6	3.5	3.2	2.9	2.1	2.1
Emissions Trading System (stationary installations)	19.6	25.7	21.9	18.7	17.3	19.6	22.4	20.3	19.1	16.5
Effort Sharing Decision	41.1	44.0	44.7	44.1	45.4	41.1	42.7	41.0	37.1	35.3
Land use, land use change and forestry	-5.4	-2.3	-1.4	-0.5	-0.5	-5.4	-2.8	-2.4	-2.0	-2.0

GHG emission projections (Mt CO_2e)	WEM scenario					WAM scenario				
Iceland	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**4.7**	**5.0**	**4.8**	**4.5**	**4.2**	**4.7**	**5.0**	**4.8**	**4.5**	**4.2**
Energy supply	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Manufacturing and construction industries	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Transport	0.9	1.0	0.9	0.6	0.4	0.9	1.0	0.9	0.6	0.4
Residential and commercial	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.7	0.7	0.6
Industrial processes and process use	2.0	2.2	2.2	2.1	2.0	2.0	2.2	2.2	2.1	2.0
Agriculture	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.5	0.5	0.5
Waste	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Emissions Trading System (stationary installations)	1.8	2.0	2.0	2.0	1.9	1.8	2.0	2.0	2.0	1.9
Effort Sharing Decision	2.9	3.0	2.8	2.5	2.2	2.9	3.0	2.8	2.5	2.2
Land use, land-use change and forestry	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Ireland	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**59.4**	**63.1**	**62.3**	**59.7**	**62.5**	**59.4**	**62.6**	**54.5**	**46.7**	**48.1**
Energy supply	12.0	11.4	10.2	8.7	11.3	12.0	11.7	8.2	7.0	9.2
Manufacturing and construction industries	4.5	5.6	5.7	6.1	6.8	4.5	5.5	5.1	5.1	5.6
Transport	11.8	12.8	12.8	11.3	9.6	11.8	12.4	10.9	7.6	5.8
Residential and commercial	8.4	9.3	8.8	8.5	9.1	8.4	9.1	7.2	5.0	5.0
Industrial processes and process use	3.2	3.6	3.9	4.2	4.8	3.2	3.5	3.8	4.1	4.6
Agriculture	18.6	19.6	20.1	20.2	20.3	18.6	19.6	18.6	17.3	17.4
Waste	0.9	0.8	0.7	0.6	0.5	0.9	0.8	0.7	0.6	0.5
Emissions Trading System (stationary installations)	16.8	17.0	16.3	15.5	19.0	16.8	17.2	13.8	13.0	16.1
Effort Sharing Decision	42.6	46.1	46.0	44.2	43.5	42.6	45.4	40.7	33.6	32.0
Land use, land use change and forestry	4.5	3.5	5.4	6.6	7.9	4.5	3.5	5.4	6.6	7.9

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Italy	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**434.0**	**419.0**	**398.3**	**383.2**	**371.4**	**434.0**	**406.2**	**358.1**	**327.0**	**322.1**
Energy supply	113.4	99.8	89.1	88.7	85.3	113.4	97.2	69.0	64.2	65.9
Manufacturing and construction industries	51.0	56.4	55.7	53.4	52.1	51.0	53.1	51.6	48.4	52.9
Transport	106.0	102.9	103.3	96.0	95.3	106.0	98.0	95.1	82.2	78.3
Residential and commercial	82.5	81.4	75.4	73.6	70.3	82.5	79.3	67.5	60.9	56.5
Industrial processes and process use	32.6	32.2	30.4	28.5	27.7	32.6	32.2	30.4	28.5	27.7
Agriculture	30.1	30.6	30.3	30.0	29.6	30.1	30.6	30.3	30.0	29.6
Waste	18.6	15.7	14.1	12.8	11.2	18.6	15.7	14.1	12.8	11.2
Emissions Trading System (stationary installations)	156.2	148.5	138.0	136.5	133.8	156.2	143.7	115.4	109.3	114.0
Effort Sharing Decision	275.6	268.1	258.0	244.4	235.3	275.6	260.2	240.3	215.5	205.7
Land use, land use change and forestry	-39.9	-26.0	-22.8	-23.4	-26.2	-39.9	-26.0	-22.8	-23.4	-26.2

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Latvia	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**11.3**	**11.8**	**10.8**	**10.4**	**9.3**	**11.3**	**11.8**	**10.6**	**10.2**	**9.1**
Energy supply	1.9	2.3	1.5	1.4	1.1	1.9	2.3	1.5	1.4	1.1
Manufacturing and construction industries	0.7	0.8	0.9	0.9	1.0	0.7	0.8	0.8	0.9	1.0
Transport	3.2	2.9	2.6	2.5	1.9	3.2	2.9	2.6	2.5	1.9
Residential and commercial	1.4	1.7	1.5	1.4	1.1	1.4	1.7	1.5	1.4	1.1
Industrial processes and process use	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Agriculture	2.8	2.9	3.1	3.1	3.1	2.8	2.9	3.0	3.0	3.0
Waste	0.6	0.5	0.4	0.3	0.3	0.6	0.5	0.4	0.3	0.2
Emissions Trading System (stationary installations)	2.3	2.8	2.5	2.5	2.2	2.3	2.8	2.5	2.5	2.2
Effort Sharing Decision	8.9	9.0	8.3	7.9	7.1	8.9	9.0	8.2	7.8	6.9
Land use, land use change and forestry	1.7	2.1	3.6	4.6	4.4	1.7	2.1	3.4	4.3	4.1

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Lithuania	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**20.5**	**21.0**	**20.3**	**19.6**	**19.3**	**20.5**	**21.0**	**18.5**	**15.9**	**15.2**
Energy supply	3.7	2.9	2.5	2.4	2.4	3.7	2.9	2.4	2.3	2.3
Manufacturing and construction industries	1.2	1.2	1.2	1.1	1.1	1.2	1.2	1.2	1.1	1.1
Transport	5.1	6.2	6.3	6.2	6.0	5.1	6.2	5.2	3.7	3.2
Residential and commercial	1.3	1.6	1.5	1.5	1.5	1.3	1.5	1.3	1.2	1.2
Industrial processes and process use	3.5	3.9	3.7	3.6	3.5	3.5	3.9	3.6	3.4	3.3
Agriculture	4.6	4.4	4.4	4.3	4.3	4.6	4.4	4.1	3.8	3.7
Waste	1.1	0.9	0.7	0.6	0.5	1.1	0.9	0.7	0.5	0.4
Emissions Trading System (stationary installations)	6.9	6.7	6.3	6.2	6.1	6.9	6.7	6.1	5.9	5.8
Effort Sharing Decision	13.6	14.3	14.0	13.5	13.2	13.6	14.3	12.4	10.0	9.3
Land use, land use change and forestry	-3.9	-4.7	-3.9	-3.3	-3.0	-3.9	-4.7	-4.1	-3.9	-4.0

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Luxembourg	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**10.3**	**9.8**	**9.7**	**9.8**	**10.0**	**10.3**	**9.1**	**7.3**	**5.8**	**4.7**
Energy supply	0.5	0.2	0.2	0.2	0.2	0.5	0.2	0.1	0.1	0.1
Manufacturing and construction industries	1.1	1.0	1.0	1.0	1.0	1.1	1.0	0.9	0.8	0.7
Transport	5.7	5.5	5.5	5.8	6.2	5.7	5.1	4.0	3.3	2.5
Residential and commercial	1.6	1.7	1.6	1.5	1.4	1.6	1.4	1.0	0.6	0.4
Industrial processes and process use	0.6	0.6	0.6	0.5	0.4	0.6	0.6	0.6	0.5	0.4
Agriculture	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.5
Waste	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Emissions Trading System (stationary installations)	1.7	1.4	1.3	1.2	1.1	1.7	1.4	1.2	1.1	1.0
Effort Sharing Decision	8.6	8.4	8.4	8.6	8.8	8.6	7.7	6.0	4.7	3.7
Land use, land use change and forestry	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Malta	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**2.2**	**2.4**	**2.6**	**2.7**	**2.7**	**2.2**	**2.4**	**2.6**	**2.7**	**2.7**
Energy supply	0.9	1.0	1.0	1.1	1.1	0.9	1.0	1.0	1.1	1.1
Manufacturing and construction industries	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1
Transport	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.6	0.6
Residential and commercial	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Industrial processes and process use	0.2	0.2	0.3	0.3	0.4	0.2	0.2	0.3	0.3	0.4
Agriculture	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Waste	0.1	0.3	0.3	0.3	0.2	0.1	0.3	0.3	0.3	0.2
Emissions Trading System (stationary installations)	0.9	1.0	1.0	1.1	1.1	0.9	1.0	1.0	1.1	1.1
Effort Sharing Decision	1.3	1.5	1.5	1.6	1.6	1.3	1.5	1.5	1.6	1.6
Land use, land use change and forestry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Netherlands	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**195.1**	**169.7**	**168.0**	**157.9**	**151.0**	**195.1**	**169.7**	**168.0**	**157.9**	**151.0**
Energy supply	71.1	53.0	53.8	48.0	44.3	71.1	53.0	53.8	48.0	44.3
Manufacturing and construction industries	24.1	23.9	24.2	23.4	21.6	24.1	23.9	24.2	23.4	21.6
Transport	31.2	29.5	29.7	29.1	29.7	31.2	29.5	29.7	29.1	29.7
Residential and commercial	34.4	30.9	28.6	26.0	24.0	34.4	30.9	28.6	26.0	24.0
Industrial processes and process use	11.7	11.0	11.0	11.0	11.5	11.7	11.0	11.0	11.0	11.5
Agriculture	19.2	18.8	18.7	18.7	18.7	19.2	18.8	18.7	18.7	18.7
Waste	3.4	2.5	2.0	1.6	1.3	3.4	2.5	2.0	1.6	1.3
Emissions Trading System (stationary installations)	94.1	75.5	77.2	71.5	66.7	94.1	75.5	77.2	71.5	66.7
Effort Sharing Decision	100.9	94.1	90.7	86.3	84.2	100.9	94.1	90.7	86.3	84.2
Land use, land use change and forestry	6.7	6.3	6.4	6.8	6.7	6.7	6.3	6.4	6.8	6.7

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Norway	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**54.5**	**50.8**	**48.0**	**45.3**	**42.5**	**54.5**	**50.8**	**48.0**	**45.3**	**42.5**
Energy supply	19.1	18.6	17.7	16.8	15.9	19.1	18.6	17.7	16.8	15.9
Manufacturing and construction industries	4.0	4.1	3.9	3.7	3.5	4.0	4.1	3.9	3.7	3.5
Transport	14.3	11.4	10.3	9.1	7.9	14.3	11.4	10.3	9.1	7.9
Residential and commercial	2.8	2.7	2.6	2.4	2.3	2.8	2.7	2.6	2.4	2.3
Industrial processes and process use	8.5	8.3	8.1	7.8	7.5	8.5	8.3	8.1	7.8	7.5
Agriculture	4.4	4.6	4.6	4.6	4.7	4.4	4.6	4.6	4.6	4.7
Waste	1.3	1.1	0.9	0.8	0.6	1.3	1.1	0.9	0.8	0.6
Emissions Trading System (stationary installations)	25.6	25.7	24.8	23.9	23.0	25.6	25.7	24.8	23.9	23.0
Effort Sharing Decision	27.7	23.8	22.0	20.1	18.2	27.7	23.8	22.0	20.1	18.2
Land use, land use change and forestry	-23.7	-23.5	-22.4	-21.3	-20.2	-23.7	-23.5	-22.4	-21.3	-20.2

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Poland	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**390.4**	**397.8**	**403.6**	**404.7**	**370.5**	**390.4**	**384.2**	**363.5**	**336.3**	**295.0**
Energy supply	187.5	179.3	183.7	185.0	153.7	187.5	171.3	165.6	153.6	120.7
Manufacturing and construction industries	28.0	29.1	28.3	27.4	26.5	28.0	25.7	22.5	19.7	17.7
Transport	48.0	64.2	67.7	69.7	69.1	48.0	63.6	61.1	57.0	55.3
Residential and commercial	54.9	55.9	55.0	53.9	52.5	54.9	54.3	45.3	37.6	33.5
Industrial processes and process use	28.5	24.4	24.0	23.9	24.0	28.5	24.4	24.0	23.6	23.1
Agriculture	29.6	31.8	32.5	32.9	33.2	29.6	31.8	32.5	32.9	33.2
Waste	13.9	13.1	12.4	11.9	11.6	13.9	13.1	12.4	11.9	11.6
Emissions Trading System (stationary installations)	198.7	199.7	203.9	205.0	176.2	198.7	188.9	181.8	169.5	137.8
Effort Sharing Decision	191.6	198.0	199.6	199.7	194.1	191.6	195.2	181.6	166.6	157.1
Land use, land use change and forestry	-30.6	-31.8	-27.3	-21.7	-17.7	-30.6	-31.8	-27.3	-21.7	-17.7

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Portugal	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**69.4**	**63.2**	**56.6**	**42.4**	**37.3**	**69.4**	**63.1**	**48.9**	**37.8**	**29.0**
Energy supply	19.6	16.2	13.5	6.5	4.1	19.6	16.2	5.8	4.5	2.2
Manufacturing and construction industries	7.9	7.6	6.0	6.4	6.1	7.9	7.6	5.8	5.9	4.3
Transport	16.4	16.3	16.7	11.2	10.3	16.4	16.3	17.1	9.3	7.2
Residential and commercial	4.4	4.8	4.4	4.3	3.7	4.4	4.7	4.3	4.2	2.3
Industrial processes and process use	7.8	7.0	5.9	5.2	4.7	7.8	7.0	5.9	5.2	4.7
Agriculture	6.7	6.8	6.2	5.6	5.7	6.7	6.8	6.1	5.5	5.5
Waste	6.6	4.4	3.8	3.3	2.8	6.6	4.4	3.8	3.3	2.8
Emissions Trading System (stationary installations)	27.9	25.8	21.5	14.7	11.6	27.9	25.1	12.9	11.7	8.3
Effort Sharing Decision	41.1	37.1	34.9	27.6	25.5	41.1	37.7	35.8	25.9	20.6
Land use, land use change and forestry	-8.5	-4.6	-5.8	-6.9	-7.4	-8.5	-4.6	-9.0	-6.9	-9.9

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Romania [b]	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**116.5**	**118.2**	**119.0**	**126.3**	**130.9**	**116.5**	**116.3**	**116.2**	**122.9**	**126.0**
Energy supply	41.1	38.8	34.7	37.8	38.2	41.1	38.5	34.4	37.6	38.0
Manufacturing and construction industries	12.5	13.0	13.5	14.0	14.8	12.5	12.7	13.3	14.0	14.1
Transport	15.7	17.8	19.3	20.3	20.9	15.7	17.4	18.9	19.9	20.5
Residential and commercial	10.8	11.5	12.3	13.2	13.9	10.8	11.3	12.0	12.5	13.3
Industrial processes and process use	11.9	12.7	13.9	14.8	15.6	11.9	12.7	13.9	14.8	15.6
Agriculture	18.7	19.2	20.6	21.9	23.4	18.7	18.4	19.1	19.9	20.6
Waste	5.8	5.2	4.6	4.3	4.1	5.8	5.2	4.6	4.3	4.0
Emissions Trading System (stationary installations)	42.3	41.7	39.1	42.9	44.3	42.3	41.5	39.0	42.9	43.9
Effort Sharing Decision	74.2	76.5	79.9	83.4	86.6	74.2	74.7	77.2	79.9	82.1
Land use, land use change and forestry	-18.3	-17.0	-18.1	-16.5	-16.8	-18.3	-16.0	-12.8	-9.9	-10.6

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Slovakia	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**41.6**	**42.4**	**42.0**	**41.4**	**39.5**	**41.6**	**41.2**	**38.8**	**34.0**	**31.7**
Energy supply	9.2	9.0	8.7	8.9	7.9	9.2	8.7	7.0	5.7	5.0
Manufacturing and construction industries	6.8	6.8	6.6	6.8	6.5	6.8	6.8	6.3	5.4	4.7
Transport	7.3	7.8	8.5	8.8	8.8	7.3	6.9	7.1	7.1	6.9
Residential and commercial	5.0	5.5	5.4	5.4	5.3	5.0	5.5	5.4	4.9	4.7
Industrial processes and process use	9.2	9.4	9.1	8.1	7.7	9.2	9.4	9.2	7.5	7.0
Agriculture	2.5	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.4	2.5
Waste	1.7	1.6	1.3	1.0	0.9	1.7	1.6	1.3	1.0	0.9
Emissions Trading System (stationary installations)	20.9	20.9	20.1	20.0	18.7	20.9	20.9	18.9	15.8	14.4
Effort Sharing Decision	20.8	21.4	21.9	21.4	20.8	20.8	20.3	19.9	18.2	17.3
Land use, land use change and forestry	-6.6	-6.1	-5.0	-4.4	-4.2	-6.6	-6.2	-5.1	-4.5	-4.2

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Slovenia	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**17.0**	**17.1**	**17.0**	**16.9**	**16.8**	**17.0**	**16.7**	**15.8**	**13.1**	**9.7**
Energy supply	5.0	5.0	4.9	5.0	5.1	5.0	4.8	4.6	3.2	1.6
Manufacturing and construction industries	1.6	1.7	1.7	1.6	1.7	1.6	1.6	1.5	1.3	1.1
Transport	5.4	5.8	6.1	6.4	6.3	5.4	5.7	5.6	5.0	3.7
Residential and commercial	1.5	1.3	1.0	0.8	0.6	1.5	1.2	0.9	0.6	0.4
Industrial processes and process use	1.2	1.2	1.1	1.1	1.0	1.2	1.2	1.1	1.1	1.0
Agriculture	1.7	1.7	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.6
Waste	0.6	0.5	0.4	0.3	0.2	0.6	0.5	0.4	0.3	0.2
Emissions Trading System (stationary installations)	6.2	6.2	6.2	6.3	6.5	6.2	6.0	5.8	4.4	2.8
Effort Sharing Decision	10.8	10.9	10.8	10.6	10.3	10.8	10.7	10.0	8.7	7.0
Land use, land use change and forestry	-3.6	-4.7	-4.3	-5.7	-3.5	-5.0	-5.6	-5.6	-6.4	-5.0

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Spain	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**335.8**	**331.7**	**315.7**	**310.6**	**299.0**	**335.8**	**327.4**	**266.3**	**226.7**	**204.1**
Energy supply	90.8	76.9	60.8	60.2	53.8	90.8	81.2	43.8	35.4	34.5
Manufacturing and construction industries	40.5	42.0	42.2	41.2	40.9	40.5	40.5	37.2	33.5	30.7
Transport	83.2	89.9	91.9	92.1	90.5	83.2	85.7	74.6	57.7	45.8
Residential and commercial	40.1	43.5	43.7	42.6	40.7	40.1	40.7	37.0	32.7	28.6
Industrial processes and process use	32.3	31.0	29.5	27.8	27.4	32.3	31.0	29.5	27.8	27.3
Agriculture	34.5	34.6	34.6	34.5	34.0	34.5	34.6	32.3	30.0	29.2
Waste	14.4	13.8	13.1	12.2	11.7	14.4	13.7	11.9	9.6	7.9
Emissions Trading System (stationary installations)	137.3	126.3	111.2	110.0	103.9	137.3	129.1	90.7	79.5	76.5
Effort Sharing Decision	196.1	202.6	201.5	197.5	191.8	196.1	195.7	173.1	144.7	125.2
Land use, land use change and forestry	-42.0	-35.3	-32.5	-31.6	-31.4	-44.1	-41.4	-39.8	-36.0	-33.8

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
Sweden	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**53.5**	**49.7**	**47.7**	**46.1**	**45.6**	**53.5**	**49.7**	**47.7**	**46.1**	**45.6**
Energy supply	9.7	10.0	10.0	9.9	9.9	9.7	10.0	10.0	9.9	9.9
Manufacturing and construction industries	7.0	6.7	6.4	6.1	6.0	7.0	6.7	6.4	6.1	6.0
Transport	17.8	14.8	13.9	13.4	13.2	17.8	14.8	13.9	13.4	13.2
Residential and commercial	3.3	2.8	2.5	2.5	2.5	3.3	2.8	2.5	2.5	2.5
Industrial processes and process use	7.3	7.7	7.5	7.3	7.2	7.3	7.7	7.5	7.3	7.2
Agriculture	6.9	6.7	6.4	6.2	6.1	6.9	6.7	6.4	6.2	6.1
Waste	1.4	1.1	0.9	0.7	0.6	1.4	1.1	0.9	0.7	0.6
Emissions Trading System (stationary installations)	19.3	19.7	19.6	19.5	19.4	19.3	19.7	19.6	19.5	19.4
Effort Sharing Decision	33.7	29.4	27.4	26.0	25.5	33.7	29.4	27.4	26.0	25.5
Land use, land use change and forestry	-45.5	-41.4	-42.5	-40.6	-39.0	-45.5	-41.4	-42.5	-40.6	-39.0

Table A1.2 Historical and projected total greenhouse gas, Emissions Trading System and Effort Sharing emissions by sector, 2005-2030 (cont.)

GHG emission projections ($MtCO_2e$)	WEM scenario					WAM scenario				
United Kingdom	**2015**	**2020**	**2025**	**2030**	**2035**	**2015**	**2020**	**2025**	**2030**	**2035**
Total GHG emissions	**507.8**	**414.4**	**384.6**	**375.6**	**364.9**	**507.8**	**414.0**	**385.3**	**371.8**	**358.2**
Energy supply	144.4	69.6	59.1	56.4	45.2	144.4	69.2	60.0	52.9	39.0
Manufacturing and construction industries	56.4	54.3	48.9	47.3	48.0	56.4	54.2	48.8	47.2	47.7
Transport	121.0	113.2	106.4	102.3	99.9	121.0	113.2	106.4	102.3	99.9
Residential and commercial	91.3	94.8	95.6	99.5	104.3	91.3	94.8	95.4	99.3	104.0
Industrial processes and process use	33.7	26.5	21.9	18.6	16.7	33.7	26.5	21.9	18.5	16.7
Agriculture	42.1	39.5	38.2	37.8	37.7	42.1	39.5	38.2	37.8	37.7
Waste	19.0	16.5	14.6	13.7	13.2	19.0	16.5	14.6	13.7	13.2
Emissions Trading System (stationary installations)	177.8	106.4	92.3	89.7	79.3	177.8	105.3	92.5	85.5	72.3
Effort Sharing Decision	328.5	306.0	290.3	283.7	283.5	328.5	306.7	290.8	284.1	283.7
Land use, land use change and forestry	-15.1	-15.7	-14.1	-10.7	-8.3	-15.1	-15.7	-14.1	-10.7	-8.3

Notes: In 2020, 11 of the 13 Member States that submitted updated projections reported WAM scenarios: Austria, Belgium, Estonia, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Poland and Slovenia. Cyprus and Denmark provided an updated WEM scenario only. Data for the Member States that did not report a WAM scenario have been gap-filled using the WEM scenario.

'Energy supply' corresponds to CRF categories 1.A + 1.B + 1.C. 'Manufacturing and construction industries' corresponds to CRF category 1.A.2. 'Transport' corresponds to CRF category 1.A.3. 'Residential and commercial' corresponds to CRF categories 1.A.4 + 1.A.5, including 1.A.4.c (Agriculture, forestry and fishing). 'Agriculture' corresponds to CRF category 3. 'Waste' corresponds to CRF category 5.

([a]) The projection for Germany reflects the situation in 2019 before the climate action programme 2030 was adopted by the German government. Two studies published in March 2020 (Öko-Institut, 2020; Prognos, 2020) estimate that Germany's annual emissions would be reduced to 598-614 Mt CO_2e in 2030 when the climate action programme 2030 is taken into account. These studies will form the basis for the next German projection report (due in 2021) and have already been taken into account in the NECP.

([b]) Romania did not report a projection in 2019 and in 2020; figures are related to its GHG projection submitted in 2017.

Sources: EEA (2019d) (2019e).

A1.3.1 Tracking progress towards targets under the Effort Sharing legislation

The progress of Member States towards achieving their targets under the Effort Sharing legislation is assessed by comparing Effort Sharing GHG emission levels with the relevant annual targets under the legislation. The assessment does not consider the possible use of flexibility options as permitted and is therefore not an assessment of compliance.

The assessment of current progress towards achieving the 2018 Effort Sharing targets is based on a comparison between Effort Sharing GHG emissions and Effort Sharing emission targets (AEAs) for 2018 (Table A1.3):

- Member States with historical emissions below their annual Effort Sharing emission targets are considered to be currently on track towards achieving their targets under the Effort Sharing legislation.
- Member States with historical emissions higher than their Effort Sharing emission targets are considered to be currently not on track towards achieving their targets under the Effort Sharing legislation.

The data used for the assessment of current progress (Effort Sharing GHG emissions and absolute annual Effort Sharing emission targets, or AEAs) are consistent with the scope of the EU ETS for the period 2013-2020.

Table A1.3 Current progress towards achieving Effort Sharing Decision targets

Member State	2005	2018 progress under the ESD					2019 progress under the ESD (approximated)				
	Base-year emissions	ESD target	ESD emissions	Absolute gap	Relative gap	ESD emission change	ESD target	ESD emissions	Absolute gap	Relative gap	ESD emission change
	$MtCO_2e$	$MtCO_2e$	$MtCO_2e$	$MtCO_2e$	Share of 2005 base year (%)	vs 2005 base year (%)	$MtCO_2e$	Mt O_2e	$MtCO_2e$	Share of 2005 base year (%)	vs 2005 base year (%)
Austria	56.8	48.9	50.3	-1.4	-2.5	-11.5	48.3	50.7	-2.4	-4.2	-10.7
Belgium	80.3	71.1	74.3	-3.2	-4.0	-7.5	69.7	74.3	-4.6	-5.8	-7.5
Bulgaria	22.1	26.1	26.3	-0.2	-1.1	19.1	26.3	27.1	-0.8	-3.6	22.6
Croatia	17.4	18.9	16.2	2.7	15.4	-6.8	19.1	16.8	2.3	13.1	-3.4
Cyprus	4.2	4.1	4.2	-0.04	-1.0	-0.5	4.0	4.3	-0.26	-6.12	2.9
Czechia	61.7	65.9	60.6	5.3	8.5	-1.7	66.5	67.8	-1.2	-2.0	9.9
Denmark	40.1	33.9	33.1	0.7	1.8	-17.3	33.0	32.5	0.5	1.2	-18.9
Estonia	5.4	6.0	6.1	-0.2	-3.0	12.8	6.0	6.5	-0.5	-9.9	20.3
Finland	33.9	29.6	29.9	-0.3	-0.9	-11.9	29.1	29.3	-0.3	-0.7	-13.6
France	398.2	352.9	342.2	10.7	2.7	-14.1	347.7	341.1	6.6	1.7	-14.3
Germany	477.8	425.2	434.0	-8.8	-1.9	-9.2	418.1	439.7	-21.6	-4.5	-8.0
Greece	62.6	59.4	44.7	14.7	23.6	-28.5	59.7	44.3	15.5	24.7	-29.2
Hungary	48.0	51.0	43.2	7.7	16.1	-9.9	51.9	43.5	8.4	17.6	-9.5
Ireland	47.1	39.8	45.4	-5.6	-11.8	-3.6	38.7	44.6	-5.8	-12.4	-5.3
Italy	334.5	295.8	278.7	17.1	5.1	-16.7	293.4	272.3	21.1	6.3	-18.6
Latvia	8.5	9.8	9.1	0.7	8.1	6.9	9.9	9.0	0.9	10.1	5.9
Lithuania	13.3	14.5	14.3	0.21	1.6	7.8	14.9	14.4	0.5	3.8	8.4
Luxembourg	10.1	8.5	9.1	-0.545	-5.4	-10.6	8.3	9.2	-0.9	-8.9	-9.1
Malta	1.1	1.2	1.4	-0.2	-18.8	23.9	1.2	1.4	-0.2	-18.8	23.9
Netherlands	127.8	111.8	99.7	12.1	9.5	-22.0	109.6	100.2	9.4	7.4	-21.6
Poland	180.0	201.7	213.0	-11.3	-6.3	18.4	203.4	206.9	-3.4	-1.9	14.9
Portugal	48.6	48.3	40.6	7.7	15.9	-16.5	48.7	41.6	7.1	14.7	-14.5
Romania	75.5	86.0	77.6	8.3	11.0	2.9	87.9	75.5	12.4	16.5	0.0
Slovakia	23.0	25.3	21.1	4.3	18.6	-8.3	25.6	21.8	3.9	16.9	-5.2
Slovenia	11.8	12.2	11.0	1.2	10.2	-6.8	12.3	10.8	1.5	12.3	-8.6
Spain	236.0	216.3	203.0	13.3	5.6	-14.0	214.3	200.9	13.4	5.7	-14.9
Sweden	43.5	37.2	31.4	5.8	13.4	-27.8	36.7	30.5	6.2	14.2	-29.8
United Kingdom	417.8	357.2	329.9	27.4	6.6	-21.0	354.1	326.8	27.3	6.5	-21.8
EU-28	**2 887**	**2 659**	**2 551**	**108**	**3.7**	-11.7	**2 639**	**2 516**	**123**	**4.2**	-12.9
EU-27	**2 469**	**2 302**	**2 221**	**81**	**3.3**	-10.1	**2 284**	**2 189**	**95**	**3.9**	-11.4

Notes: Distances to targets (i.e. surpluses of emission allocations compared with existing emissions) are calculated as 'Effort Sharing target' — 'Effort Sharing GHG emissions'. A positive value indicates a surplus of AEAs (emissions lower than the target); a negative value indicates a shortfall of AEAs (emissions higher than the target).

See Section A1.2.6 regarding the EEA's calculation of 2005 base year emissions.

Sources: EEA (2020i, forthcoming_b); EU (2009a, 2013b, 2017).

A1.3.2 Use of flexibilities under the Effort Sharing Decision

The assessment of progress towards achieving the Effort Sharing targets does not consider the possible use of flexibility options as permitted under the ESD, which can be used by Member States to achieve compliance under the ESD ([26]).

If flexibility options are considered, only Malta will need to buy additional AEAs from other Member States or use international project credits to comply in the period 2013-2018.

([26]) A Member State can carry forward (i.e. 'borrow') an emission allocation of up to 5 % from the following year, during the period 2013-2019, to guarantee compliance. A Member State can also carry over from a past year any surplus emission allocations. It is also possible to use other flexibilities under the ESD, such as buying AEAs from other Member States or using international project credits under the Kyoto Protocol up to a certain limit.

A1.3.3 Annual and cumulative gaps between emissions and Effort Sharing Decision targets

Table A1.4 Annual distance ($MtCO_2e$) between Effort Sharing emissions and annual Effort Sharing Decision targets

Member State	Historical						Proxy
	2013	2014	2015	2016	2017	2018	2019
Austria	2.5	3.9	2.2	0.4	-2.1	-1.4	-2.4
Belgium	4.1	6.8	2.6	-0.3	1.7	-3.2	-4.6
Bulgaria	4.7	4.3	2.1	2.1	-0.7	-0.2	-0.8
Croatia	4.5	5.1	4.4	4.2	2.0	2.7	2.3
Cyprus	2.0	2.0	1.9	1.8	-0.1	-0.04	-0.26
Czechia	1.0	5.6	2.7	1.9	2.8	5.3	-1.2
Denmark	3.1	3.3	2.5	1.0	2.1	0.7	0.5
Estonia	0.5	0.2	0.2	0.1	-0.3	-0.2	-0.5
Finland	0.2	1.1	0.9	-1.0	0.1	-0.3	-0.3
France	28.0	35.9	31.4	27.5	5.4	10.7	6.6
Germany	12.3	29.0	15.1	-1.7	-34.5	-8.8	-21.6
Greece	14.8	14.9	14.2	15.0	13.7	14.7	15.5
Hungary	12.0	13.1	11.2	11.7	6.9	7.7	8.4
Ireland	4.7	4.1	1.6	-0.3	-2.9	-5.6	-5.8
Italy	34.8	40.9	31.0	31.6	28.1	17.1	21.1
Latvia	0.5	0.3	0.4	0.4	0.5	0.7	0.9
Lithuania	0.5	0.4	0.4	0.1	0.00	0.21	0.51
Luxembourg	0.170	0.480	0.531	0.422	-0.002	-0.545	-0.903
Malta	-0.1	-0.1	-0.1	-0.2	-0.3	-0.2	-0.2
Netherlands	14.7	22.8	17.3	14.8	11.7	12.1	9.4
Poland	7.5	13.3	9.4	-1.3	-11.5	-11.3	-3.4
Portugal	10.7	10.7	9.3	8.6	7.7	7.7	7.1
Romania	2.9	4.9	4.7	8.0	8.7	8.3	12.4
Slovakia	2.9	4.6	4.7	5.3	3.8	4.3	3.9
Slovenia	1.4	1.9	1.7	1.2	1.3	1.2	1.5
Spain	27.3	25.9	27.6	23.3	17.2	13.3	13.4
Sweden	6.4	6.5	6.5	7.2	5.3	5.8	6.2
United Kingdom	19.3	29.8	23.7	11.3	28.4	27.4	27.3
EU-28	**223**	**292**	**230**	**173**	**95**	**108**	**123**
EU-27	**204**	**262**	**206**	**162**	**67**	**81**	**95**

Notes: A positive value (green shading) indicates a surplus of AEAs (emissions lower than the target). A negative value (red shading) indicates a shortfall of AEAs (emissions higher than the target). The darker the shading, the larger the gap (red) or the surplus (green). The shading always refers to the timeline of the individual country. The lowest negative value of an individual country is the darkest red, the median value and zero are white, and the highest value is the darkest green.

The calculations do not consider any possible use of the flexibilities provided under the ESD (such as trading Effort Sharing emission allocations or buying international certificates). For this calculation, recalculated AEAs for the years 2017-2020 were considered (EU, 2017).

The data are based on Effort Sharing emissions for 2013, 2014 2015, 2016 and 2017 as determined after the reviews of Effort Sharing emissions, 2018 as results from the forthcoming 2020 Comprehensive Review and approximated data for 2019. No national approximated data for GHG emissions were available for Cyprus and Bulgaria. For these countries, the EEA GHG emissions proxy was used instead. No projected assessment is provided this year. This is to avoid near-term uncertainties (e.g. weather-related uncertainties that cannot be considered in projections) and COVID-19 uncertainties in projections.

Sources: EEA (2020i, forthcoming_b); EU (2013b, 2017).

Table A1.5 Cumulative gaps between historical and projected Effort Sharing emissions and annual Effort Sharing Decision targets, 2013-2019

Member State	Historical						Proxy
	2013	2014	2015	2016	2017	2018	2019
Austria	2.5	6.4	8.6	9.0	6.9	5.4	3.0
Belgium	4.1	10.9	13.5	13.3	14.9	11.7	7.1
Bulgaria	4.7	9.0	11.1	13.3	12.6	12.4	11.6
Croatia	4.5	9.6	14.1	18.2	20.2	22.9	25.2
Cyprus	2.0	4.0	5.8	7.7	7.6	7.6	7.3
Czechia	1.0	6.6	9.3	11.2	14.0	19.2	18.0
Denmark	3.1	6.4	8.9	9.9	12.0	12.7	13.2
Estonia	0.5	0.8	1.0	1.1	0.9	0.7	0.2
Finland	0.2	1.3	2.2	1.2	1.3	1.0	0.8
France	28.0	63.9	95.3	122.8	128.2	138.9	145.5
Germany	12.3	41.4	56.4	54.7	20.2	11.3	-10.3
Greece	14.8	29.6	43.8	58.8	72.5	87.3	102.7
Hungary	12.0	25.1	36.2	47.9	54.9	62.6	71.0
Ireland	4.7	8.8	10.4	10.1	7.1	1.6	-4.3
Italy	34.8	75.7	106.7	138.3	166.4	183.5	204.6
Latvia	0.5	0.8	1.2	1.7	2.2	2.8	3.7
Lithuania	0.5	0.9	1.3	1.4	1.4	1.6	2.1
Luxembourg	0.170	0.650	1.181	1.603	1.600	1.056	0.153
Malta	-0.1	-0.2	-0.3	-0.5	-0.8	-1.0	-1.2
Netherlands	14.7	37.5	54.8	69.6	81.3	93.4	102.8
Poland	7.5	20.9	30.2	29.0	17.4	6.1	2.7
Portugal	10.7	21.4	30.7	39.3	47.0	54.7	61.8
Romania	2.9	7.8	12.5	20.5	29.2	37.6	50.0
Slovakia	2.9	7.5	12.2	17.6	21.3	25.6	29.5
Slovenia	1.4	3.3	4.9	6.1	7.4	8.6	10.1
Spain	27.3	53.2	80.8	104.1	121.3	134.5	147.9
Sweden	6.4	12.9	19.4	26.6	31.9	37.7	43.8
United Kingdom	19.3	49.1	72.7	84.0	112.4	139.8	167.0
EU-28	**223**	**515**	**745**	**918**	**1 013**	**1 121**	**1 244**
EU-27	**204**	**466**	**672**	**834**	**901**	**982**	**1 077**

Notes: A positive value (green shading) indicates a surplus of AEAs (emissions lower than the target). A negative value (red shading) indicates a shortfall of AEAs (emissions higher than the target). The darker the shading, the larger the gap (red) or the surplus (green). The shading always refers to the timeline of the individual country. The lowest negative value of an individual country is the darkest red, the median value and zero are white, and the highest value is the darkest green.

The calculation of the cumulative gap takes only previous years' gaps into account and does not consider any possible use of the flexibilities provided under the ESD (such as trading Effort Sharing emission allocations or buying international certificates). For this calculation, recalculated AEAs for the years 2017-2020 were considered (EU, 2017).

The data are based on Effort Sharing emissions for 2013, 2014 2015, 2016 and 2017, as determined after the reviews of Effort Sharing emissions, and approximated data for 2019. No approximated GHG data were available for Cyprus and Bulgaria. For these countries, the EEA GHG emissions proxy was used instead. No projected assessment is provided this year. This is to avoid near-term uncertainties (e.g. weather-related uncertainties that cannot be considered in projections) and projection uncertainties due to COVID-19.

Sources: EU (2013b, 2017).

Annex 2 Progress towards renewable energy targets: data and methodology

A2.1 Reporting requirements related to renewable energy

Under the Renewable Energy Directive (RED), Member States need to report on their progress towards deploying renewable sources of energy (EU, 2015a). Reporting under the RED takes place biennially in a standardised format. Furthermore, under the Energy Statistics Regulation, Member States also report data on their renewable energy deployment to Eurostat.

Box A2.1 Renewable energy targets

The EU-wide renewable energy target for 2020

To meet its target of increasing the use of renewable energy sources (RES) to 20 % of gross final energy consumption by 2020, the EU adopted the RED (EU, 2009b) as part of the climate and energy package.

The RED includes legally binding national renewable energy targets for 2020, consistent with an EU-wide target of increasing RES use to 20 % of gross final energy consumption by 2020 and to 10 % of transport-related fuel consumption by the same year (EU, 2009a). The RED also sets an indicative trajectory for each Member State for the period 2011-2018, intended to ensure that each Member State achieves its 2020 targets. An interim indicative RED target for the EU can be derived from the minimum indicative trajectories of the Member States in the run-up to 2020 (RED, Annex I, Part B).

Under the RED, Member States had to submit national renewable energy action plans (NREAPs) in 2010 (EEA, 2011). These plans outline the pathways (i.e. the expected trajectories) that Member States anticipate using to reach their legally binding national renewable energy targets by 2020. In 2011 (and every 2 years thereafter), Member States had to report on national progress towards the interim RED and expected NREAP targets. The NREAPs adopted by Member States in 2010 outline the expected trajectories for RES use, as a proportion of gross final energy consumption, towards the legally binding national 2020 RES targets.

Renewable energy targets for 2030

In June 2018, the EU endorsed an EU-level, binding renewable energy target of at least 32 % by 2030, measured as a share of the gross final energy consumption (EC, 2016). This target will be reached through the collective efforts of all Member States, and countries are free to set their own national contributions.

Under the Energy Union Governance Regulation (Regulation (EU) 2018/1999), Member States presented national energy and climate plans, or NECPs (EC, 2016). These included, inter alia, planned national objectives, targets and contributions related to all dimensions of the Energy Union, together with planned policies and measures and the anticipated investment needs to meet the national targets, objectives and contributions.

A2.2 Data sources for renewable energy deployment

The analysis presented in this report is based on several sources relating to renewable energy use in Europe.

A2.2.1 Historical trends in the share of energy from renewable sources in gross final energy consumption

The assessment of progress towards objectives and targets for the use of renewable energy sources (RES) is based, for the most part, on information reported by Member States to Eurostat under the Energy Statistics Regulation and the RED and published by Eurostat via its SHARES tool (Eurostat, 2020e).

A2.2.2 Share of energy from renewable sources in gross final energy consumption in 2018

The shares of RES in gross final energy consumption in 2018 stem from Eurostat, based on national data transmitted under Regulation (EC) No 1099/2008 on energy statistics (EU, 2008b) — the Energy Statistics Regulation. In accordance with the accounting rules in the RED, electricity generated by hydro- and wind power was normalised to account for annual variations (hydropower over 15 years and wind power over 5 years). For details of the normalisation rules, see the SHARES manual provided by Eurostat (Eurostat, 2020e). Because of their insular and peripheral geography, Cyprus and Malta's gross inland energy consumption is disproportionally high for aviation, and they are thus strongly affected by current technological and regulatory constraints. Therefore, they have exemptions regarding the amounts by which they exceed the EU's average gross final consumption of energy in aviation in 2005 as assessed by Eurostat, i.e. 4.12 %.

A2.2.3 Approximated shares of renewable energy use in 2019

Approximated shares of renewable energy use in 2019 were estimated by the EEA (EEA, 2019f, 2020d). National estimates were provided by Belgium, Germany, Ireland, Finland (biofuels in transport only), Lithuania, the Netherlands and Portugal.

A2.2.4 The 2020 targets for energy from renewable sources and indicative trajectories for the period from 2011 to 2018

The 2020 RES targets for each Member State were taken from Part A of Annex I of the RED, and the indicative trajectories for the period 2011-2018 were taken from Part B of Annex I of the RED (EU, 2009b).

A2.2.5 National renewable energy action plan trajectories for the period 2010-2020

National RES trajectories for the period 2010-2020 were derived from information submitted by Member States to the European Commission in 2010, in the context of their adopted national renewable energy action plans (NREAPs), also considering some updates made thereafter. These trajectories reflect how Member States themselves anticipate that their renewable energy deployment will develop up to 2020 (EC, 2013b; EEA, 2011).

A2.2.6 The share of energy from renewable sources on a sectoral level

The report also presents data on RES deployment on a sectoral level (for electricity, heating and cooling, and transport). These data are based on Eurostat's SHARES tool (Eurostat, 2020e). Approximate 2019 values were estimated by the EEA (EEA, 2020d).

A2.3 Tracking progress towards renewable energy targets

The progress of Member States towards their targets under the RED is assessed by comparing the share of energy from renewable sources in gross final energy consumption with the indicative trajectory set under the RED for the period 2017-2018. This assessment is complemented by preliminary estimates for the year 2019 and is illustrated in Table A2.1.

Similarly, Member States' progress towards achieving their NREAP trajectories are calculated and illustrated in Table A2.2 and Figure A2.1 in the next section.

Table A2.1 Current progress towards achieving indicative trajectories under the Renewable Energy Directive

Member State	RES shares			Renewable Energy Directive: indicative trajectory			
				Trajectory shares		Gaps to trajectory	
	2017	2018	2019 (proxy)	2017-2018	2020	2017-2018 average vs 2017-2018 trajectory	2019 vs 2020 target
	%	%	%	%	%	Percentage points	
Austria	33.1	33.4	33.9	30.3	34.0	3.0	-0.1
Belgium	9.1	9.4	9.9	9.2	13.0	0.0	-3.1
Bulgaria	18.7	20.5	21.3	13.7	16.0	5.9	5.3
Croatia	27.3	28.0	28.7	17.4	20.0	10.2	8.7
Cyprus	10.5	13.9	14.2	9.5	13.0	2.7	1.2
Czechia	14.8	15.1	15.5	10.6	13.0	4.4	2.5
Denmark	34.7	35.7	36.9	25.5	30.0	9.8	6.9
Estonia	29.1	30.0	31.4	22.6	25.0	7.0	6.4
Finland	40.9	41.2	42.2	34.7	38.0	6.4	4.2
France	16.0	16.6	17.2	18.6	23.0	-2.3	-5.8
Germany	15.5	16.5	17.1	13.7	18.0	2.2	-0.9
Greece	17.0	18.0	19.6	14.1	18.0	3.4	1.6
Hungary	13.5	12.5	12.6	10.0	13.0	3.0	-0.4
Ireland	10.6	11.1	12.0	11.5	16.0	-0.7	-4.0
Italy	18.3	17.8	18.4	12.9	17.0	5.2	1.4
Latvia	39.0	40.3	40.8	37.4	40.0	2.2	0.8
Lithuania	26.0	24.4	24.8	20.2	23.0	5.0	1.8
Luxembourg	6.3	9.1	9.7	7.5	11.0	0.2	-1.3
Malta	7.3	8.0	8.5	6.5	10.0	1.1	-1.5
Netherlands	6.5	7.4	8.4	9.9	14.0	-3.0	-5.6
Poland	11.0	11.3	11.6	12.3	15.0	-1.1	-3.4
Portugal	30.6	30.3	30.4	27.3	31.0	3.1	-0.6
Romania	24.5	23.9	24.3	21.8	24.0	2.3	0.3
Slovakia	11.5	11.9	11.2	11.45	14.0	0.2	-2.8
Slovenia	21.1	21.1	21.8	21.9	25.0	-0.7	-3.2
Spain	17.6	17.5	18.0	16.0	20.0	1.5	-2.0
Sweden	54.2	54.6	55.8	45.8	49.0	8.6	6.8
United Kingdom	9.7	11.0	12.4	10.21	15.0	0.2	-2.6
EU-28	**17.5**	**18.0**	**18.7**	**16.0**	**20.0**	**1.7**	**-1.3**
EU-27	**18.5**	**18.9**	**19.5**	**16.6**	**20.0**	**2.1**	**-0.5**
Iceland	70.7	72.2	73.2	60.9	64.0	11.36	9.2
Norway	71.6	72.8	72.2	64.3	67.5	8.50	4.7

Notes: The distance to trajectory is calculated as 'RES share' – 'RES target'. A positive value indicates a RES share higher than the relevant indicative trajectory.

Sources: EEA (2020d); EU (EU, 2009b); Eurostat (2020e).

A2.3.1 Progress towards the objectives of national renewable energy action plans

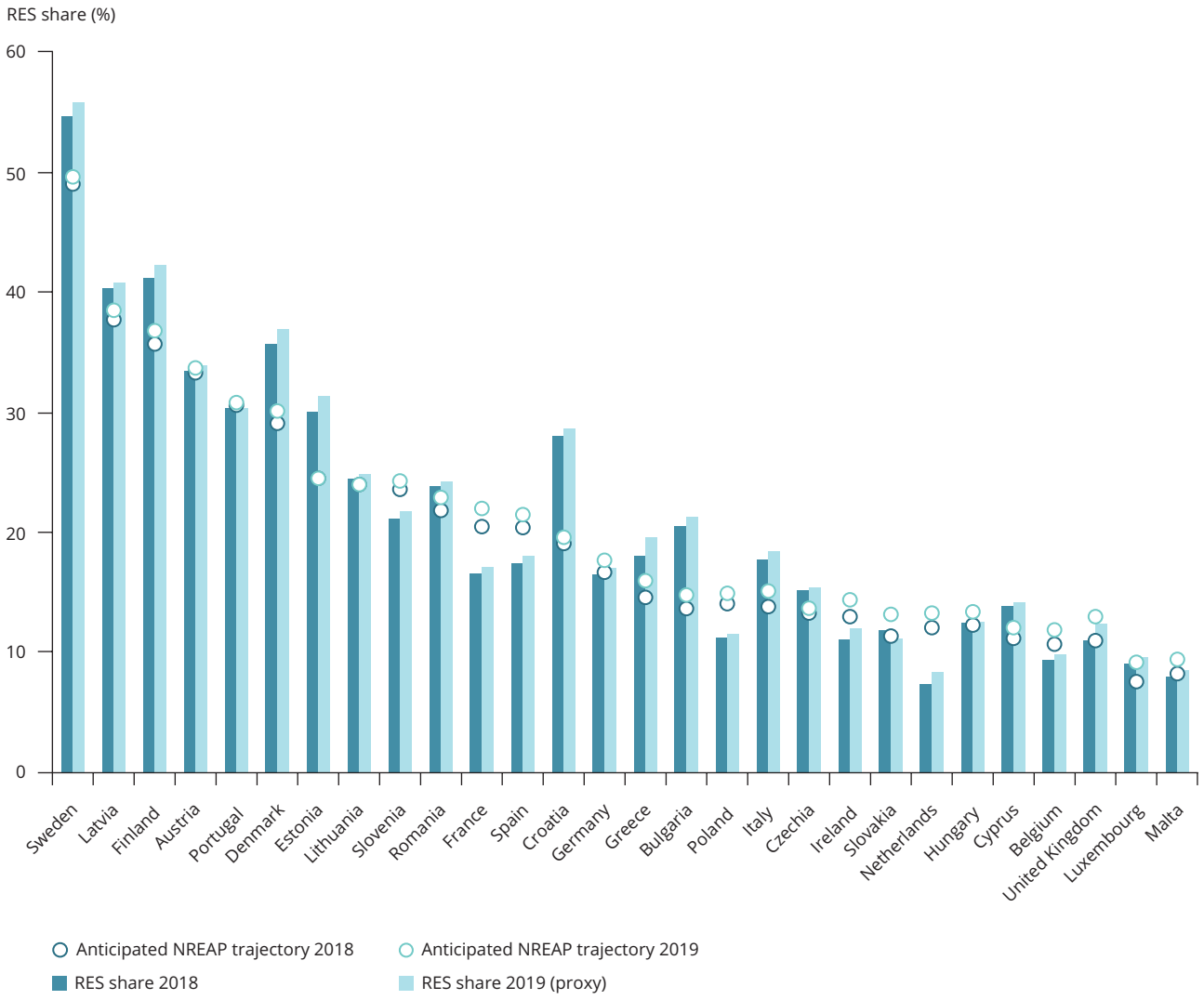
Table A2.2 Current progress towards achieving national renewable energy action plan trajectories

Member State	RES shares		National action plan trajectory			
			Trajectory shares		Gaps to trajectory	
	2018	2019 (proxy)	2018	2019	2018	2019 (proxy)
	%	%	%	%	Percentage points	Percentage points
Austria	33.4	33.9	33.3	33.7	0.1	0.2
Belgium	9.4	9.9	10.7	11.9	-1.3	-2.0
Bulgaria	20.5	21.3	13.7	14.8	6.8	6.5
Croatia	28.0	28.7	19.1	19.6	8.9	9.1
Cyprus	13.9	14.2	11.2	12.1	2.7	2.1
Czechia	15.1	15.5	13.3	13.7	1.8	1.8
Denmark	35.7	36.9	29.1	30.1	6.6	6.8
Estonia	30.0	31.4	24.5	24.5	5.5	6.9
Finland	41.2	42.2	35.7	36.8	5.5	5.4
France	16.6	17.2	20.5	22.0	-3.9	-4.8
Germany	16.5	17.1	16.7	17.7	-0.2	-0.6
Greece	18.0	19.6	14.6	16.0	3.4	3.6
Hungary	12.5	12.6	12.3	13.4	0.2	-0.8
Ireland	11.1	12.0	13.0	14.4	-1.9	-2.4
Italy	17.8	18.4	13.8	15.1	3.9	3.3
Latvia	40.3	40.8	37.7	38.5	2.6	2.3
Lithuania	24.4	24.8	24.0	24.0	0.4	0.8
Luxembourg	9.1	9.7	7.5	9.2	1.6	0.5
Malta	8.0	8.5	8.3	9.5	-0.3	-0.9
Netherlands	7.4	8.4	12.1	13.3	-4.7	-4.9
Poland	11.3	11.6	14.1	14.9	-2.8	-3.4
Portugal	30.3	30.4	30.6	30.8	-0.3	-0.4
Romania	23.9	24.3	21.8	22.9	2.0	1.3
Slovakia	11.9	11.2	11.4	13.2	0.5	-2.0
Slovenia	21.1	21.8	23.6	24.3	-2.5	-2.5
Spain	17.5	18.0	20.4	21.5	-2.9	-3.5
Sweden	54.6	55.8	49.0	49.6	5.6	6.2
United Kingdom	11.0	12.4	11.0	13.0	0.0	-0.6
EU-28	**18.0**	**18.7**	**18.9**	**19.9**	**-0.9**	**-1.2**
EU-27	**18.5**	**19.5**	**19.2**	**20.2**	**-0.7**	**-0.7**
Iceland	72.2		76.2	76.5	-4.0	
Norway	72.75		0.0	0.0	72.8	

Notes: The distance to a trajectory is calculated as 'RES share' — 'RES target'. A positive value indicates a RES share higher than the relevant anticipated trajectory from the NREAP.

Sources: EEA (2011); EC (2013b); Eurostat (2020g).

Figure A2.1 National shares of energy from renewable sources in relation to trajectories from national renewable energy action plans



Sources: EEA (2011, 2020d); EC (2013b); EU (2009b); Eurostat (2020e).

Annex 3 Progress towards energy efficiency targets: data and methodology

A3.1 Reporting requirements for energy efficiency/energy consumption

Under Article 3 of the Energy Efficiency Directive (EED) (EU, 2012), Member States have to set their own indicative national energy efficiency targets for 2020 as well as for 2030. Depending on country preferences, these targets are based on primary or final energy consumption, primary or final energy savings or energy intensity. Each national target reflects the specific situation of the Member State that adopted it.

Related to the 2030 targets, the revised EED 2018/2002 (EU, 2018d) asks Member States not only to set indicative national energy efficiency contributions towards achieving the EU's 2030 targets (notified as part of their national energy and climate plans, or NECPs) but also to set an indicative trajectory for primary and final energy consumption for that contribution from 2021 onwards.

Box A3.1 Energy efficiency targets

Energy efficiency targets for 2020

In 2007, the Council of the European Union stressed the need to increase energy efficiency to achieve the 20 % energy savings target for 2020, for primary energy consumption, and agreed binding targets for reductions in emissions of greenhouse gases (GHGs) and renewable energy (Council of the European Union, 2007). Reducing primary energy consumption by 20 % by 2020 is a non-binding objective in the EU.

The climate and energy package does not address the energy efficiency target directly, although the CO_2 performance standards for cars and vans (EU, 2009d, 2014b, 2019c), the revised EU Emissions Trading System (ETS) Directive and the Effort Sharing Decision (ESD) all contribute to fostering energy efficiency. Since the adoption of the package, the EU energy efficiency policy framework has advanced in line with the priorities identified in the 2006 action plan for energy efficiency 2006 (EC, 2006). The energy efficiency action plan was reviewed in 2011, after the following pieces of legislation were revised:

- the Ecodesign Directive (EU, 2012);
- the Energy Labelling Directive (EU, 2010a);
- the Energy Performance of Buildings Directive (EU, 2010b).

One of the key developments in the energy efficiency policy framework was the adoption of the Energy Efficiency Directive (EED) in 2012, which was updated in 2018 (EU, 2018d). The EED establishes a common framework of measures for promoting energy efficiency within the EU and aims to help remove barriers and overcome market failures that impede efficiency in the supply and use of energy.

The EED stipulates that primary energy consumption in the EU-28 should not exceed 1 483 Mtoe (million tonnes of oil equivalent) in 2020, and that final energy consumption in the EU-28 should not exceed 1 086 Mtoe in 2020. These absolute targets were set using the European Commission's 2007 energy baseline scenario (EC, 2008), based on the PRIMES (Price-driven and Agent-based Simulation of Markets Energy System) model.

Implementing the EED was expected to lead to a 15 % reduction in primary energy consumption compared with the 2007 energy baseline scenario, with an additional 2 % reduction expected from the transport sector (Ecofys, 2012).

Box A3.1 Energy efficiency targets (cont.)

Under the EED, Member States had to set indicative national targets and implement a set of mandatory requirements, one of the most significant being establishing an energy efficiency obligation (EEO) scheme or implementing alternative measures.

Member States have adopted various base years against which the progress towards national energy efficiency targets can be measured. Member States also chose different approaches for setting national targets, based on primary or final energy consumption, primary or final energy savings or energy intensity. Each national target reflects the specific situation of the Member State that adopted it. Consequently, ambition levels vary greatly. Compared with 2005 levels, currently 20 Member States have aimed to reduce primary energy consumption and 21 Member States have aimed to reduce final energy consumption. Eight Member States have set primary energy targets for 2020 that are higher than their 2005 energy consumption levels, and seven for final energy consumption.

Energy efficiency targets for 2030

On 14 June 2018, the European Commission, the Parliament and the Council reached a political agreement that includes a binding energy efficiency target for the EU for 2030 of 32.5 %, with a clause for an upwards revision by 2023 (EU, 2018d). The Governance Regulation (EU, 2018g) states that Member States should set indicative national energy efficiency contributions to achieve the 2030 targets based on primary or final energy consumption, primary or final energy savings or energy intensity. Member States should also set an indicative trajectory for that contribution from 2021 onwards, based on their indicative contributions to the EU 2020 and 2030 targets.

A3.2 Data sources for energy consumption

The analysis presented in this report is based on several sources relating to energy consumption in Europe.

A3.2.1 Historical trends in primary and final energy consumption

The assessment of progress towards energy efficiency targets is based, for the most part, on information reported by Member States to Eurostat under the Energy Statistics Regulation, and published by Eurostat via its energy statistics database (Eurostat, 2020d, 2020a).

A3.2.2 Approximated estimates for primary and final energy consumption in 2019

Early estimates of 2019 primary and final energy consumption were prepared by the EEA (EEA, 2020b). National estimates, sometimes only for selected fuel types, were provided by Austria, Belgium, Germany, Denmark, Finland, France, Hungary, Ireland, Lithuania, Latvia, the Netherlands, Portugal, Slovenia and the United Kingdom.

A3.2.3 National targets 2020 for primary and final energy consumption

Article 3 of the EED requires Member States to express their targets in terms of an absolute level of primary energy consumption and final energy consumption in 2020, although Member States can choose the basis of their indicative energy efficiency targets (final or primary energy consumption, savings or intensity). The EEA's assessment of progress towards the 2020 energy efficiency targets is based on indicative values of final energy consumption to assess the consistency of progress among Member States. Primary energy consumption progress is also monitored. Target values are adopted as notified by Member States in their 2017 national energy efficiency action plans (NEEAPs) or in a separate notification to the European Commission in 2017 and 2018 (EC, 2019d, 2020h).

A3.3 Tracking progress towards energy efficiency targets for 2020

Analysis of the progress made towards achieving the 2020 energy efficiency targets at national level involves assessing whether or not the efforts undertaken since 2005 have been sufficient to reduce or limit final energy consumption to meet the 2020 target. This question is addressed by comparing 2018 and 2019 levels with a linear trajectory between final energy consumption levels in 2005 and the 2020 national targets. To remain consistent with the assessments presented for GHG emissions and energy from renewable sources, 2005 was chosen as a single base year to allow the comparable assessment of trends across Member States.

This methodology does not consider the level of ambition of the national target (which varies

significantly across the EU), nor does it capture the complexity of the national context (economic development, ability to attract financing for energy efficiency projects, etc.). As the methodology is based on absolute final energy consumption values, it may differ from the approach adopted by individual Member States themselves.

The numerical results of this assessment per Member State are shown in greater detail in Table A3.1.

Table A3.1 Member States' progress towards achieving their 2020 energy efficiency targets

Member State	Final energy consumption (Mtoe)			Linear trajectory 2005-2020 target (Mtoe)			Distance to trajectory (share of 2005 levels)	
	2005	2018	2019 proxy	2018	2019	2020	2018 (%)	2019 proxy (%)
EU-28	**1 193.8**	**1 123.9**	**1 123.5**	**1 100.4**	**1 093.2**	**1 086.0**	**-2.0**	**-2.5**
Austria	27.9	27.9	28.3	25.4	25.3	25.1	-8.8	-10.8
Belgium	36.6	36.3	35.7	33.0	32.8	32.5	-9.0	-7.9
Bulgaria	10.1	9.9	9.9	8.8	8.7	8.6	-10.6	-11.8
Croatia	7.2	6.9	7.0	7.0	7.0	7.0	2.0	-0.2
Cyprus	1.8	1.9	1.9	1.9	1.9	1.9	2.5	-0.4
Czechia	26.1	25.3	25.8	25.4	25.4	25.3	0.4	-1.7
Denmark	15.5	14.9	15.1	14.8	14.8	14.7	-0.3	-2.1
Estonia	2.9	3.0	3.0	2.8	2.8	2.8	-5.1	-5.6
Finland	25.2	25.8	25.5	26.5	26.6	26.7	2.5	4.4
France	160.1	146.6	145.9	135.2	133.3	131.4	-7.1	-7.9
Germany	219.7	215.4	216.6	197.7	196.0	194.3	-8.0	-9.4
Greece	21.0	15.9	15.9	18.7	18.6	18.4	13.4	13.0
Hungary	18.7	18.5	19.0	15.0	14.7	14.4	-19.0	-22.8
Ireland	12.7	12.3	12.6	11.8	11.8	11.7	-3.5	-6.3
Italy	137.2	116.5	114.0	125.8	124.9	124.0	6.8	7.9
Latvia	4.0	4.2	4.1	4.4	4.4	4.5	5.8	9.1
Lithuania	4.7	5.5	5.5	4.3	4.3	4.3	-25.7	-26.0
Luxembourg	4.5	4.3	4.4	4.3	4.3	4.2	-1.7	-4.0
Malta	0.5	0.7	0.7	0.6	0.6	0.6	-10.5	-9.3
Netherlands	54.1	50.3	49.8	52.4	52.3	52.2	4.0	4.6
Poland	58.5	71.9	72.3	69.9	70.7	71.6	-3.6	-2.7
Portugal	19.0	16.9	17.4	17.6	17.5	17.4	3.7	0.7
Romania	24.6	23.6	24.1	29.6	29.9	30.3	24.2	23.8
Slovakia	11.6	11.1	11.3	9.5	9.4	9.2	-13.5	-16.3
Slovenia	4.9	5.0	4.9	5.1	5.1	5.1	1.8	3.5
Spain	98.1	86.9	87.9	88.7	88.0	87.2	1.8	0.1
Sweden	33.5	32.0	32.1	30.7	30.5	30.3	-3.7	-4.8
United Kingdom	153.0	134.5	133.1	132.4	130.8	129.2	-1.4	-1.5

Notes: The distance to a trajectory is calculated as 'linear trajectory value' — 'final energy consumption'. A positive value indicates energy consumption below the linear trajectory and a negative value indicates consumption above the linear trajectory. Mtoe, million tonnes of oil equivalent.

Sources: EC (2020h); EEA (2020b); Eurostat (2020a, 2020d).

Annex 4 National targets until 2020 and 2030

Table A4.1 and Table A4.2 provide an overview of the EU and national targets for each of the topic areas covered in this report — greenhouse gas (GHG) emissions, renewable energy and energy efficiency.

They reflect the information provided throughout the report and are included here as a comprehensive reference.

Table A4.1 Main national climate and energy targets until 2020

Country	Participating in EU ETS	ETS target (2020)	Effort Sharing target (2020)	2020 Effort Sharing emission allocation	2005 Effort Sharing Decision base-year emissions	Renewable target 2020 (RED)	Primary energy target 2020	Final energy target 2020
		% vs 2005		Mt	Mt	% gross final energy consumption	Mtoe	Mtoe
EU-28		**-21**	**-9**	**2 618.2**	**2 887.1**	**20**	**1 483.0**	**1 086.0**
EU-27		**-21**	**-8**	**2 267.2**	**2 469.3**	**20**	**1 305.4**	**956.8**
Austria	×		-16	47.8	56.8	34	31.5	25.1
Belgium	×		-15	68.2	80.3	13	43.7	32.5
Bulgaria	Since 2007		20	26.5	22.1	16	16.9	8.6
Croatia	Since 2013		11	19.3	17.4	20	10.7	7.0
Cyprus	×		-5	4.0	4.2	13	2.2	1.9
Czechia	×		9	67.2	61.7	13	44.3	25.3
Denmark (a)	×		-20	32.1	40.1	30	16.9	14.7
Estonia	×		11	6.0	5.4	25	6.5	2.8
Finland	×		-16	28.5	33.9	38	35.9	26.7
France	×		-14	342.5	398.2	23	219.9	131.4
Germany	×		-14	410.9	477.8	18	276.6	194.3
Greece	×		-4	60.0	62.6	18	24.7	18.4
Hungary	×		10	52.8	48.0	13	24.1	14.4
Ireland	×		-20	37.7	47.1	16	13.9	11.7
Italy	×		-13	291.0	334.5	17	158.0	124.0
Latvia	×		17	10.0	8.5	40	5.4	4.5
Lithuania	×		15	15.2	13.3	23	6.5	4.3
Luxembourg	×		-20	8.1	10.1	11	4.5	4.2
Malta	×		5	1.2	1.1	10	0.8	0.6
Netherlands	×		-16	107.4	127.8	14	60.7	52.2
Poland	×		14	205.2	180.0	15	96.4	71.6
Portugal	×		1	49.1	48.6	31	22.5	17.4
Romania	Since 2007		19	89.8	75.5	24	43.0	30.3
Slovakia	×		13	25.9	23.0	14	16.4	9.2
Slovenia	×		4	12.3	11.8	25	7.1	5.1
Spain	×		-10	212.4	236.0	20	122.6	87.2
Sweden	×		-17	36.1	43.5	49	43.4	30.3
United Kingdom (a)	×		-16	350.9	417.8	15	177.6	129.2
Iceland	Since 2008					64.0		
Liechtenstein	Since 2008							
Norway	Since 2008					67.5		
Switzerland	Since 2020							
Turkey	-							

Notes: (a) The Faroe Islands and Greenland (Denmark), and the United Kingdom's overseas territories, are not part of the EU and therefore are not covered by the targets presented here.

ETS, Emissions Trading System; Mtoe, million tonnes of oil equivalent; RED, Renewable Energy Directive; ×, yes; -, no.

Sources: EC (2019c); EU (2009a, 2009b, 2009c, 2012, 2013a, 2013b).

Table A4.2 Main EU and national climate and energy targets and contributions for 2030

Member State	GHG target (2030)	ETS target (2030)	Effort Sharing target (2030)	Renewable energy contribution 2030	Primary energy contribution 2030	Final energy contribution 2030
	% vs. 1990	% vs. 2005		% gross final energy consumption	Mtoe	Mtoe
EU-27	**-40**	**-43**	**-30**	**32.0**	**1 128.0**	**846.0**
Austria			-36	46.0	30.8	25.6
Belgium			-35	17.5	42.7	35.2
Bulgaria			0	27.1	17.5	10.3
Croatia			-7	36.4	8.2	6.9
Cyprus			-24	22.9	2.4	2.0
Czechia			-14	22.0	41.4	23.7
Denmark ([a])			-39	55.0	18.3	15.8
Estonia			-13	42.0	5.5	2.9
Finland			-39	51.0	34.8	24.9
France			-37	33.0	202.2	120.9
Germany			-38	30.0	216.0	185.0
Greece			-16	35.0	20.5	16.5
Hungary			-7	21.0	30.7	18.7
Ireland			-30	34.1	13.7	11.2
Italy			-33	30.0	125.1	103.8
Latvia			-6	50.0	4.1	3.6
Lithuania			-9	45.0	5.5	4.5
Luxembourg			-40	25.0	3.5	3.1
Malta			-19	11.5	1.1	0.8
Netherlands			-36	27.0	46.6	43.9
Poland			-7	21.0	91.3	67.1
Portugal			-17	47.0	21.5	14.9
Romania			-2	30.7	32.3	25.7
Slovakia			-12	19.2	15.7	10.3
Slovenia			-15	27.0	6.4	4.7
Spain			-26	42.0	98.5	73.6
Sweden			-40	65.0	40.2	29.7

Notes: ([a]) The Faroe Islands and Greenland are not part of the EU and therefore are not covered by the targets presented here.

Not all NECP contributions are consistent with Member States' projections in their WPM, as submitted in final NECPs in 2020.

ETS, Emissions Trading System; GHG, greenhouse gas; Mtoe, million tonnes of oil equivalent.

Sources: EC (2019a, 2020f); EU (2018f); European Council (2014).