Approximated European Union greenhouse gas inventory:

Proxy GHG emission estimates for 2016

European Environment Agency

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Abbreviations

AR4	IPCC Fourth Assessment Report: Climate Change 2007
BP	British Petroleum
CH_4	Methane
CO_2	Carbon dioxide
CO_2-eq	Carbon dioxide equivalent
CRF	Common reporting format
EC	European Commission
EEA	European Environment Agency The EEA has 33 member countries: the 28 European Union Member States together with Iceland, Liechtenstein, Norway, Switzerland and Turkey
ESD	Effort Sharing Decision
ETC/ACM	European Topic Centre on Air Pollution and Climate Change Mitigation
ETS	Emissions Trading System
EU	European Union
EU-28	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom
EU plus Iceland	'EU plus Iceland' refers to the EU plus Iceland. In figures and tables this may be abbreviated to EU + IS. The attribution 'EU-28' is used in contexts where Iceland is not included.
EUTL	European Union Transaction Log
F-gas	Fluorinated greenhouse gas; umbrella term including HFC, PFC, SF_6 and NF_3
GDP	Gross domestic product
GHG	Greenhouse gas
GWP	Global warming potential
HDD	Heating degree days
HFCs	Hydrofluorocarbons
IEA	International Energy Agency
IEF	Implied emission factor
kt	Kilotons (thousand tons)
IPCC	Intergovernmental Panel on Climate Change

IPPU	Industrial processes and product use
LULUCF	Land use, land-use change and forestry
MMR	Monitoring Mechanism Regulation (Regulation (EU) 525/2013)
Mt	Megatons (million tons)
N_2O	Nitrous oxide
NF_3	Nitrogen triflouride
ODS	Ozone-depleting substance
PFCs	Perfluorocarbons
QA/QC	Quality assurance and quality control
QELRC	Quantified emission limitation and reduction commitment
SF_6	Sulphur Hexafluoride
UNFCCC	United Nations Framework Convention on Climate Change

Abbreviations of Member States

AT	Austria	IT	Italy
BE	Belgium	IS	Iceland
BG	Bulgaria	LT	Lithuania
CH	Switzerland	LU	Luxembourg
CY	Cyprus	LV	Latvia
CZ	Czech Republic	MT	Malta
DE	Germany	NL	Netherlands
DK	Denmark	NO	Norway
EE	Estonia	PL	Poland
ES	Spain	PT	Portugal
FI	Finland	RO	Romania
FR	France	SE	Sweden
GR	Greece	SI	Slovenia
HR	Croatia	SK	Slovakia
HU	Hungary	UK	United Kingdom
IE	Ireland		

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Executive Summary

This report provides GHG emissions estimates for the EU-28 plus Iceland for 2016. This Executive Summary includes an analysis of the important changes in GHG emissions across the EU, by sector and by Member State.

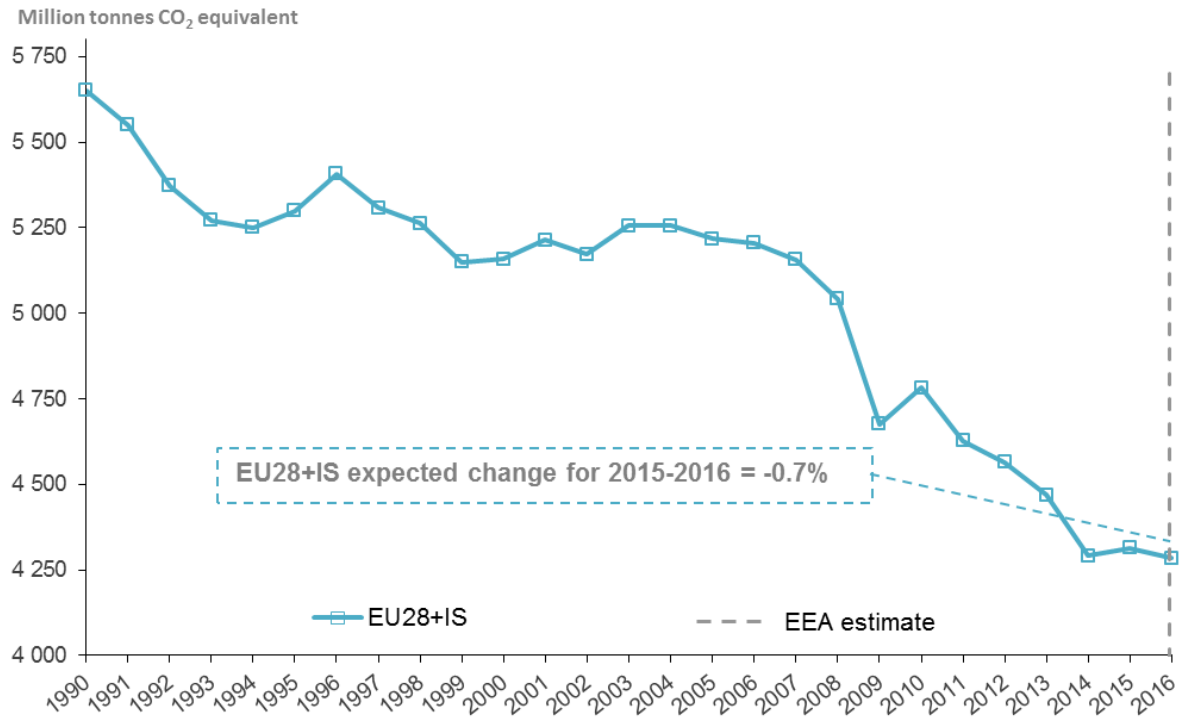
Emissions for EU plus Iceland have decreased by 30.6 million tonnes of CO_2-equivalents (Mt CO_2-eq) or 0.7 %. This amount is almost entirely matched by the significant reductions seen in the UK where most of the reductions were from fuel switching to natural gas in the energy sector which halved solid fuel consumption.

This summary begins by looking at the long-term trends and then provides detail on the changes in EU GHG emissions by sector and by Member State. The final figure in this summary (Figure ES.4) allows a comparison of the 2015-2016 changes in Member States' emissions.

Changes in GHG emissions across the EU

The estimates for 2016 indicate that the long-term trend in emissions reduction may be levelling off (Figure ES.1). While the 2016 emissions are below 2015 levels (which saw an increase for the first time since 2010), they are not much lower than 2014. The decrease in emissions between 2015 and 2016 is estimated to be 30.6 Mt CO_2-eq or 0.7 % for the EU plus Iceland (total GHG emissions without LULUCF and including indirect CO_2). The 2016 emissions total is only 7.4 Mt CO_2-eq or 0.2 % below 2014 levels and 24.2 % below 1990 levels.

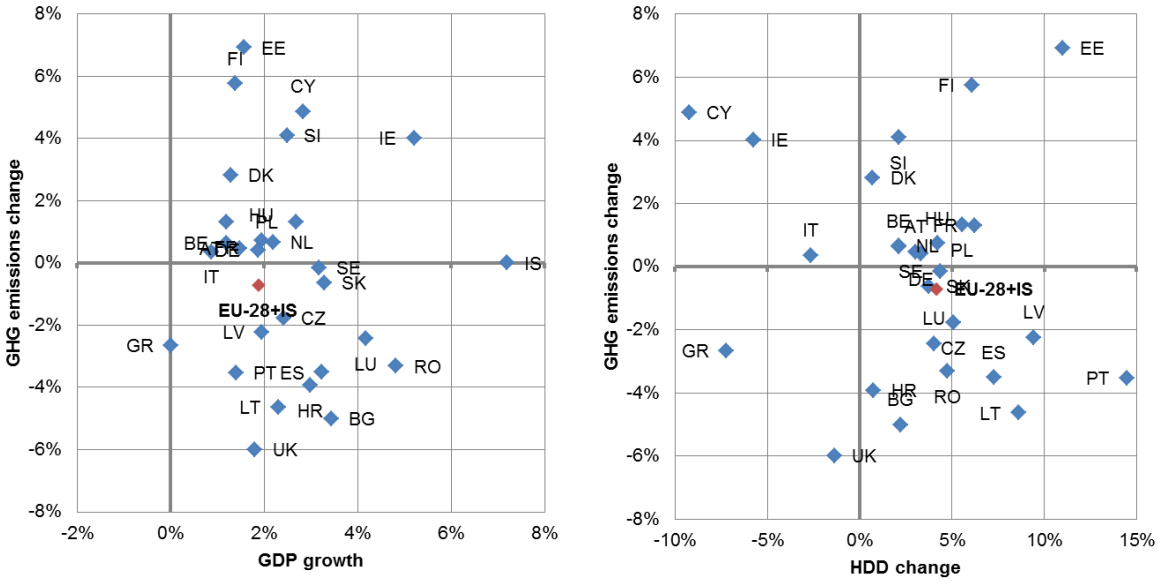
Figure ES.1 Trends in total GHG emissions, 1990-2016



Note: Total GHG emissions without LULUCF including indirect CO_2.

The 0.7 % decrease in emission for EU plus Iceland since 2015 contrasts with GDP growth of 1.9 % over the same period (Figure ES.2). If there is a common pattern between GDP and GHG emissions for 2016 across the EU, it is that for all Member States the economic situation improved and that for half of the Member States emissions decreased - with falls outweighing gains by 0.7 %. The emissions reductions and GDP growth continue to indicate a trend of decoupling of emissions and economic progress.

Figure ES.2 GHG emissions, GDP growth and heating degree days change 2015-2016



Note: Heating Degree Days (HDDs) are an indication of heat demand based on outdoor temperatures. Positive HDD change can correlate with increased heating demand. The situation for Malta could not be presented on this scale. Malta has a GHG emissions change of -13.5%, GDP change of 5.0% and an apparent HDD change of -40.7%. HDD data was not available for Iceland.

Climatic factors also affect energy demand, behaviour and GHG emission trends. Globally, 2016 was the warmest year on record. In Europe the year 2016 was colder than the years 2014 and 2015 which were the warmest years on record, however 2016 still was the sixth warmest year on a time series starting in 1950 (KNMI, 2016). Lower winter temperatures led to higher heating demand and higher emissions from the residential and commercial sectors, which partly explain the emission changes. Figure ES.2 also shows that even though 22 Member States saw an increase in heating degree days (HDD – a measure for heating demand), for half of the Member States emissions fell.

Changes in EU GHG emissions by sector

On a sectoral basis, the largest absolute emission decrease in the EU occurred in the energy sector (i.e. all combustion activities and fugitive emissions). Energy related emissions fell by 25.0 Mt CO_2-eq (−0.7 %) across the EU plus Iceland. This decline in emissions in the energy sector is despite a slight increase of gross inland energy consumption in the EU plus Iceland in 2016. Within the energy sector, emissions declined strongly in energy industries (−53.9 Mt CO_2-eq) while they increased significantly for transport (+18.7 Mt CO_2-eq) and the residential and commercial (Other) sector (+19.1 Mt CO_2-eq). In manufacturing industries and construction emissions decreased (−6.3 Mt CO_2-eq) as well as fugitive emissions from fuels (−1.1 Mt CO_2-eq).

After a period of decrease between 2010 and 2014, primary energy consumption increased again by 0.9 % in 2016, the second year in a row. The contribution of both fossil and renewable fuels to the energy mix increased in 2016 while the contribution of nuclear energy decreased slightly (BP 2017).

Monthly consumption data for solid, liquid and gaseous fuels (Eurostat, 2017) show that total fuel consumption was almost constant, with different trends for the different fossil fuel types.

Consumption of natural gas grew by 7.0 % and consumption of liquid fuels increased by only +1.2 %. Solid fossil fuel consumption (excluding peat) fell by 7.4 % and peat consumption grew by 42.4 %.

GHG emissions from industrial processes decreased in 2016 compared to 2015, by 0.8 % in the EU plus Iceland. The largest contribution to this emission decrease was from metal production (−3.0 %) and chemical industry (−2.7 %). Emissions from mineral products increased by 0.5 % and F-gas emissions from product use as substitutes for ozone depleting substances (ODS) by also 0.5 % across the EU plus Iceland.

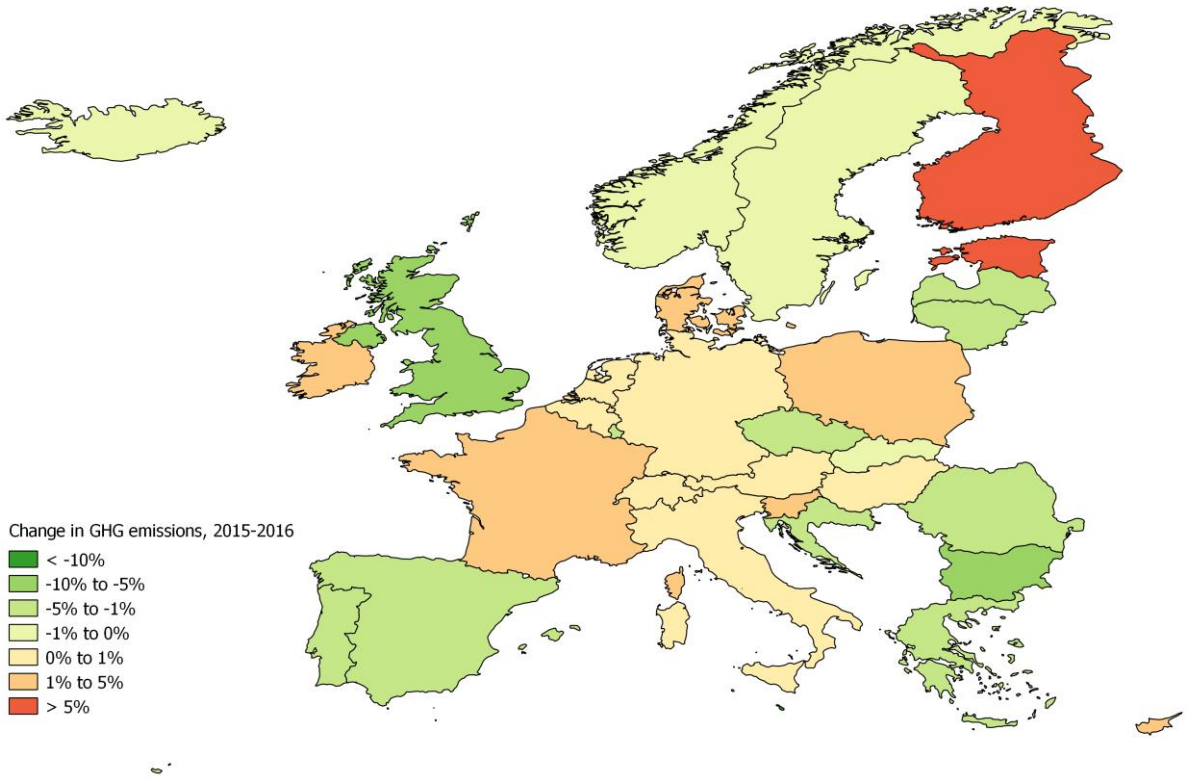
Agriculture emissions increased by 0.7 %, mainly from emission increases due to enteric fermentation. The trend in emissions from waste (−4.2 %) continues the decrease seen in previous years with largest reduction being in emissions from solid waste disposal.

Reporting under the Monitoring Mechanism Regulation requires separate detail for the EU ETS and non-ETS sectors. Between 2015 and 2016 the emissions decreased by 2.9 % across stationary installations covered by the EU ETS, whereas emissions in the non-ETS (= emissions covered by the Effort Sharing Decision (ESD)) sectors increased by 0.9 %.

Change in Member State GHG emissions

2015 to 2016 GHG emissions decreased in half of the EU Member States with falls outweighing gains by 0.7 %. Figure ES.3 depicts the regional distribution of these changes. The central and eastern European Member States increased emissions while reductions occurred mainly in south-western and south-eastern Europe and the United Kingdom.

Figure ES.3 Regional trends in 2015-2016 total GHG emissions change

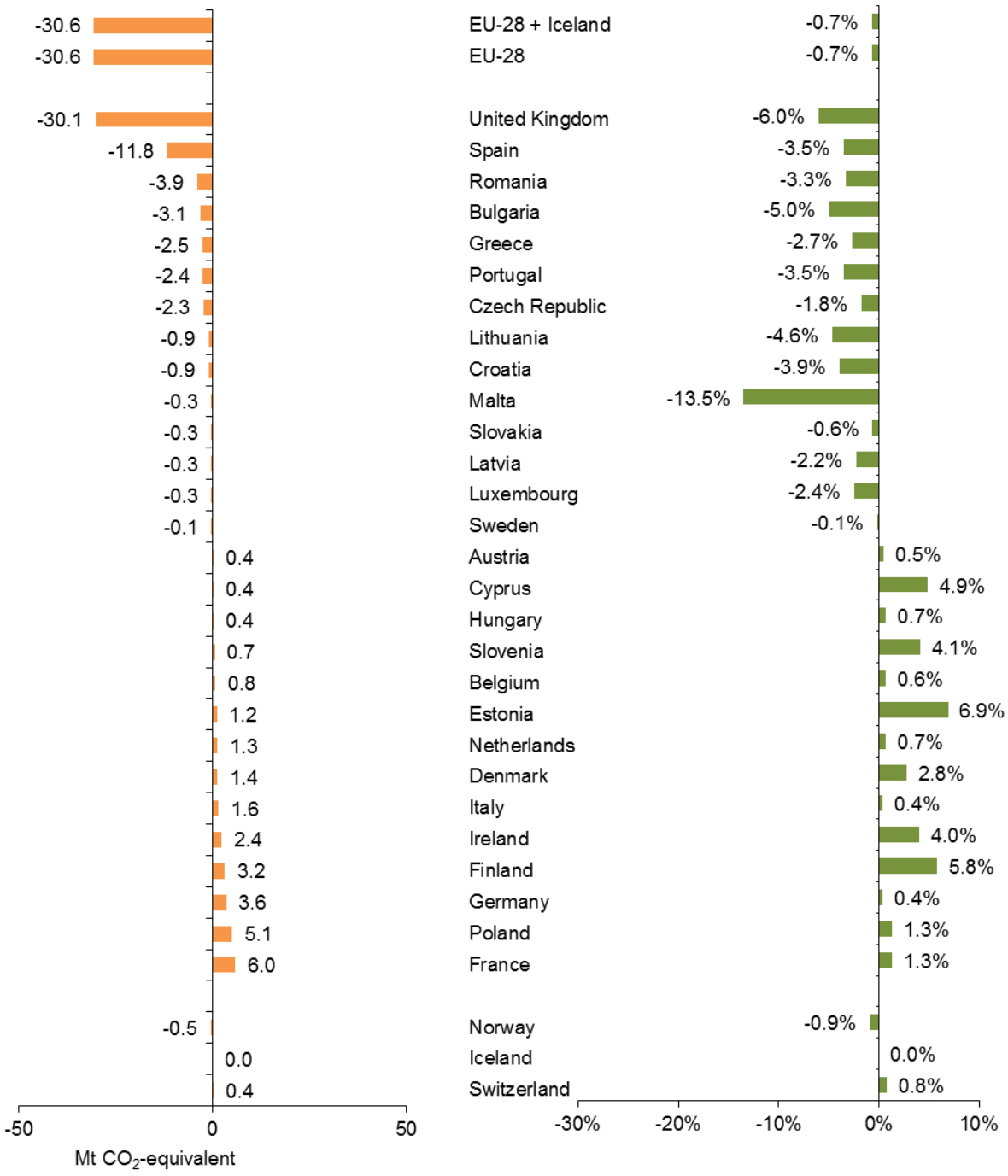


Note: Change in total GHG emissions excluding LULUCF and including indirect CO_2.
Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to the UNFCCC for 1990-2015 and proxy estimates for 2016.

Comparing the changes across Member States (Figure ES.4), the largest absolute decrease of emissions occurred in the United Kingdom (−30.1 Mt CO_2-eq compared to 2015). This is by far the largest emission change of all Member States and almost equal to the total decrease in EU plus Iceland emissions.

The second largest emission decreases occurred in Spain (−11.8 Mt CO_2-eq) followed by Romania (−3.9 Mt CO_2-eq). The largest relative decline in emissions compared to the previous year took place in Malta (−13.5 %), followed by the United Kingdom (−6.0 %) and Bulgaria (−5.0 %). The largest absolute growth of emissions occurred in France (+6.0 Mt CO_2-eq) followed by Poland (+5.1 Mt CO_2-eq) and Germany (+3.6 Mt CO_2-eq). The largest relative increases were in Estonia (+6.9 %), Finland (+5.8 %) and Cyprus (+4.9 %). Chapter 2 of the report includes explanations for some of the changes in emissions by Member State. In the non-EU member countries of the EEA GHG emissions decreased in Norway (−5 Mt CO_2-eq / −0.5 %) and increased in Switzerland (+0.4 Mt CO_2-eq / +0.8 %) while they were estimated to be constant for Iceland.

Figure ES. 4 Member States' emissions, change 2015-2016



Note: Total GHG emissions without LULUCF including indirect CO_2.

1. Background and objective

This approximated GHG inventory is an early estimate of the GHG emissions for the preceding year and is available by 30 September each year. The legal basis for the approximated GHG emission estimates is Regulation (EU) 525/2013 of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions (EU MMR). Article 8 requires Member States to submit to the Commission approximated greenhouse gas inventories for the year *t*-1 by 31 July every year. Iceland is not an EU Member State but has to report its approximated inventory, where possible, as any other EU Member State. The European Environment Agency (EEA) assists the Commission in the compilation of the Union approximated greenhouse gas inventory. These estimates are referred to as approximated ('proxy') estimates or inventories as they cover the year for which no official GHG inventories have been prepared. Should a Member State not provide their own proxy emission estimate, the EEA produces and uses gap-filled estimates in order to have a complete approximated GHG inventory for the European Union. Non-EU member countries of the EEA are invited to submit their proxy estimates on a voluntarily basis.

The scope of the proxy estimates covers total GHG emissions, for all gases, sectors, years and Member States, as reported under the Kyoto Protocol and the UNFCCC excluding the land use, land-use change and forestry (LULUCF) sector but including indirect CO_2.

Member States are responsible for the methodological choice regarding their own estimates. For gap-filling, the EEA uses the latest activity data available at country level to estimate the emissions. For emission sources for which no appropriate data sets exist, emissions are extrapolated from past trends, or emissions from the previous year are kept constant if historic data do not show a clear trend. The emission estimates assume no change in emission factors or methodologies as compared to the latest official inventory submissions to UNFCCC for the year *t*-2. On this basis, a detailed bottom-up approach was developed covering the full scope of emissions (excluding LULUCF) included in a GHG inventory submission. The EEA proxy estimates are used both for gap-filling purposes, when Member States do not provide their own proxy estimates, and as verification of the estimates provided by Member States.

The second commitment period of the Kyoto Protocol (2013–2020) was established in Doha in 2012 (COP 18/CMP8). The so-called Doha amendment includes new quantified emission limitation and reduction commitments (QELRCs) for Annex I Parties intending to take part in the second commitment period. The EU, its 28 Member States (EU-28) and Iceland agreed to a joint QELRC, corresponding to a 20 % reduction compared to the base year. They declared that they intended to fulfil this commitment jointly, under Article 4 of the Kyoto Protocol[1]. For this reason, the aggregates in

[1] Submission by Denmark and the European Commission on behalf of the European Union and its Member States (19 April 2012): http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_eu_19042012.pdf
Submission by Iceland (10 May 2012), available at:
http://unfccc.int/resource/docs/2012/awg17/eng/misc01a01.pdf

this report will refer to the EU-28 and Iceland to the extent possible. The Doha Amendment's entry into force is subject to acceptance by at least three quarters of the Parties to the Kyoto Protocol.

When Member States set national emission caps for installations under the ETS for the period 2013–2020, they allocated part of their Kyoto emission budget (Kyoto Assigned Amounts) to the EU ETS and fixed the overall contribution of the ETS sectors towards reaching Kyoto national targets. ETS information is available on a year *t*-1 timeline but success in reducing emissions from sectors not covered by the EU ETS (running on a year *t*-2 timeline) will determine whether governments need to use Kyoto flexible mechanisms to achieve their targets.

The official submission of 2016 inventories to the United Nations Framework Convention on Climate Change (UNFCCC) will take place in 2018.

Table 1 provides an overview of different emission estimates by EU bodies. More information can be found on the EEA website 'Note on different emission estimates by EU institutions': www.eea.europa.eu/publications/different-emission-estimates-by-eu-bodies-2

Table 1 Overview of EU data sources for GHG estimates

What	Who	When	Time-liness	Geographical scope	Sectoral Scope	EU reporting obligation
EU GHG inventory to UNFCCC	EEA and DG Climate Action	15 April (draft submission) and 30 May (final submission)	*t*-2	EU and its 28 Member States	All gases and sectors (100% of emissions)	EU MMR (525/2013)
Approximated / Proxy GHG inventory	EEA, DG Climate Action	30 September	*t*-1	EU and its 28 Member States, Iceland and other EEA member countries when available	All gases and sectors (100% of emissions) except LULUCF	EU MMR (525/2013)
EU ETS	DG Climate Action, EEA	Early April, May and summer (between July and September)	*t*-1	EU-28, Iceland, Norway and Liechtenstein	About 11,000 installations (~45% of total emissions)	EU ETS Directive (2003/87/EC)
CO_2 early estimates from fossil fuel combustion	Eurostat	April / May	*t*-1	EU and its 28 Member States	CO_2 from fossil fuel combustion (~80% of total emissions)	Eurostat's work programme
Air emissions accounts, air emission intensities and air emission footprints	Eurostat	annual	t-2	EU-28	Six greenhouse gases including CO2 and seven air pollutants	Regulation (EU) 691/2011 (Annex I)
EDGAR global database	DG JRC	August / September	*t*-1	Global coverage	All gases and sectors (100% of emissions)	JRC's work programme

Source: Adapted from www.eea.europa.eu/publications/different-emission-estimates-by-eu-bodies-2 .

2. European GHG emissions in 2016

A total of twenty-four EU-28 Member States submitted preliminary 2016 GHG data to the European Commission and the EEA by 31 July 2017[2]. Austria, Belgium, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom all submitted emissions in the form of largely[3] complete CRF Summary2 tables. The methodologies used for any gap-filling are described in chapter 4.1.3.

Hungary submitted preliminary GHG data on 2 August and EEA was able to include this late submission in the EU plus Iceland totals and analysis.

These 25 Member States that submitted 2016 proxy estimates represent more than 95 % of EU-28's total emissions.

As Bulgaria, Cyprus, and Romania did not submit preliminary GHG inventories by 31 July 2017 approximated GHG emissions calculated centrally by EEA and its ETC/ACM were used for these Member States (see chapter 4.1.2).

Additionally three EEA member countries submitted preliminary 2016 GHG data by 31 July 2017: Iceland, Norway and Switzerland.[4]

Approximated GHG inventories in CRF Summary2 table format are presented for the EU-28 and EU plus Iceland in chapter 2.1.5. Chapter 6.1 provides the CRF Summary2 tables for each of the 28 EU Member States and also for Iceland, Norway and Switzerland.

From the 2014 reporting year onwards new rules for inventory calculation for the second commitment period of the Kyoto Protocol apply. These changes include the implementation of the 2006 IPCC Guidelines for National GHG Inventories and the use of the Global Warming Potentials (GWPs) from the IPCC Fourth Assessment Report (AR4) and therefore limit direct comparisons with previously published emissions reports and data.

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[2] Where LULUCF data were provided, these data were not used, as for the approximated GHG inventories for EU-28 and EU plus Iceland, emissions from LULUCF are not calculated.

[3] While some Member States did not include in their CRF Summary2 sheets the full level of detail indicated in Article 17 of the Commission Implementing Regulation (EU) No 749/2014 referencing to Article 8 (1) of Regulation (EU) No 525/2013, the missing data were minor and no gap-filling was required. Denmark, Germany, Ireland, Sweden and the United Kingdom submitted CRF Summary2 tables which included some gaps or aggregation of data at a higher level. For these five countries, gap-filling methodologies were applied.

[4] Other non-EU Member States of the EEA are Liechtenstein and Turkey. As these two countries did not submit any GHG data for 2016 these countries are not considered in this report.

2.1 Trends and general results

2.1.1 Changes in GHG emissions across the EU

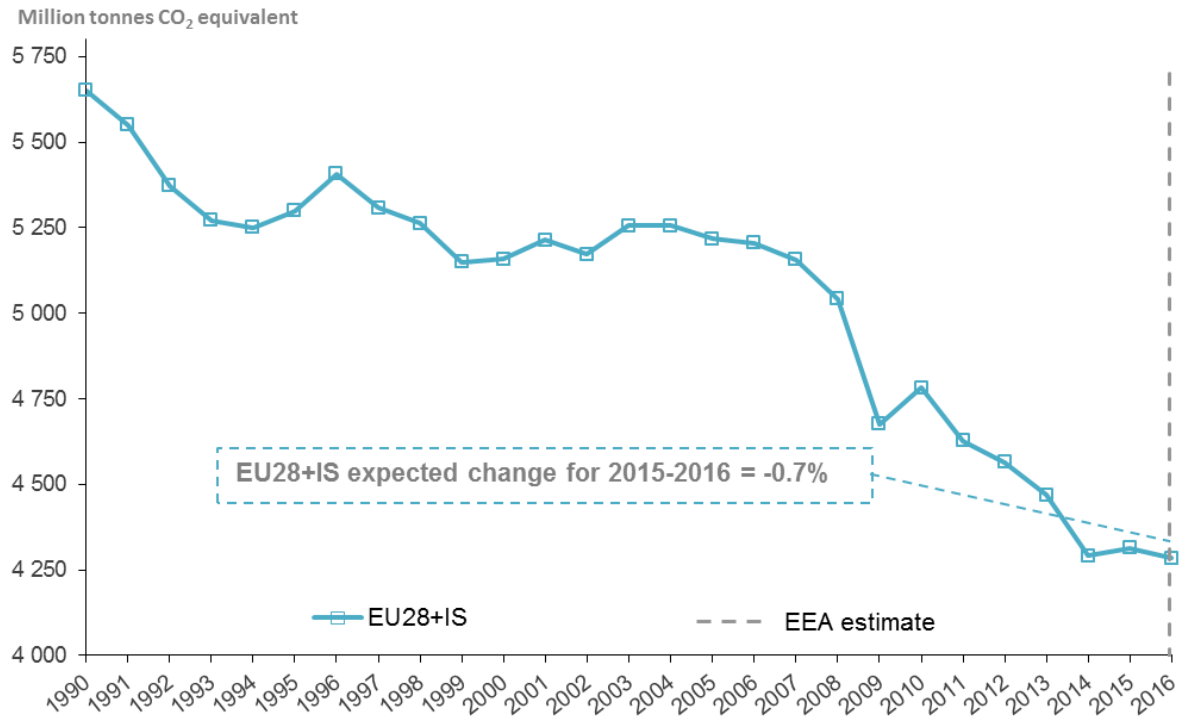
The estimates for 2016 indicate that the long-term trend in emissions reduction may be levelling off (Figure 1). While the 2016 emissions (4283.6 million tonnes of CO_2-equivalents (Mt CO_2-eq)), are below 2015 levels (which saw an increase for the first time since 2010), they are not much lower than 2014. The decrease in emissions between 2015 and 2016 is estimated to be 30.6 Mt CO_2-eq or 0.7 % for the EU plus Iceland[5] (total GHG emissions without LULUCF and including indirect CO_2)[6]. The 2016 emissions total is only 7.4 Mt CO_2-eq or 0.2 % below 2014 levels and 24.2 % below 1990 levels[7].

[5] EU plus Iceland refers to the EU-28 plus Iceland. In figures and tables this may be abbreviated to EU-28 + IS. The attribution 'EU-28' is used in contexts where Iceland is not included.

[6] According to the UNFCCC reporting guidelines, Annex I Parties may report indirect CO_2 from the atmospheric oxidation of CH_4, CO and NMVOCs. For Parties that decide to report indirect CO_2 the national totals shall be presented with and without indirect CO_2. The EU proxy estimates are based on national totals excluding LULUCF and including indirect CO_2 if reported by Member States.

[7] Change since 1990 is not equivalent to the change since the base year. Accounting rules such as the selection of the base year for fluorinated gases (F-gases) and the continuing recalculations of GHG inventories varies from country to country.

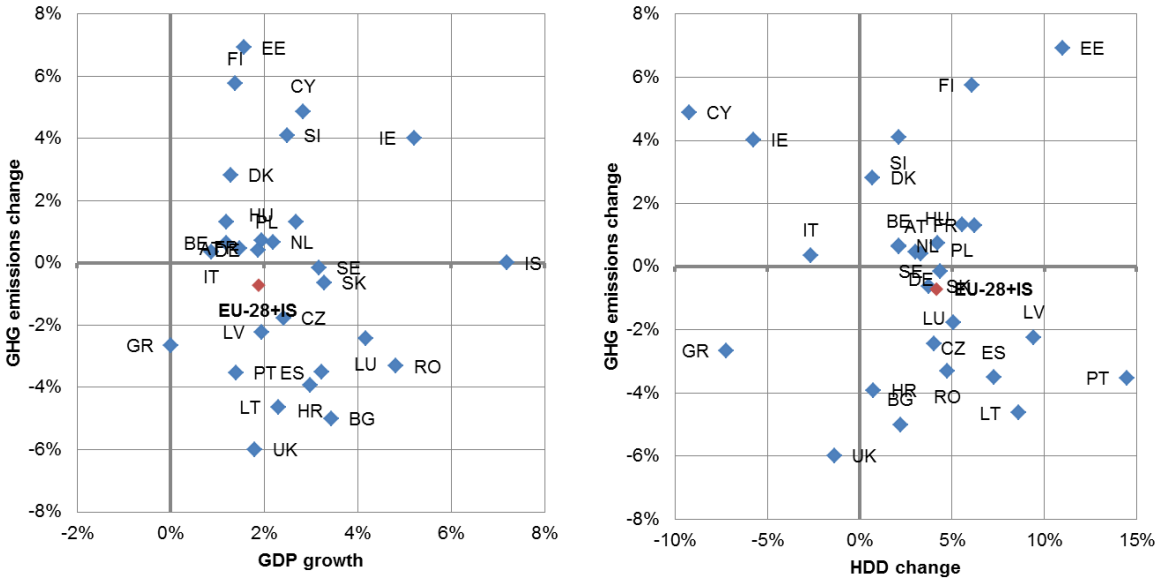
Figure 1 Trends in total greenhouse gas emissions, 1990-2016



Note: Total GHG emissions without LULUCF including indirect CO_2.
Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

The 0.7 % decrease in emissions for the EU plus Iceland since 2015 contrasts with GDP growth of 1.9 % over the same period (Figure 2). If there is a common pattern between GDP and GHG emissions for 2016 across the EU, it is that for all Member States the economic situation improved and that for half of the Member States emissions decreased - with falls outweighing gains by 0.7%. The emissions reductions and GDP growth continue to indicate a trend of decoupling of emissions and economic progress.

Figure 2 GHG emissions, GDP growth and heating degree days change 2015-2016



Note: Heating Degree Days (HDDs) are an indication of heat demand based on outdoor temperatures. Positive HDD change can correlate with increased heating demand. The situation for Malta could not be presented on this scale. Malta has a GHG emissions change of -13.5%, GDP change of 5.0% and an apparent HDD change of -40.7%. HDD data was not available for Iceland.

Source: GDP - AMECO database, European Commission http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm HDD based on the Eurostat methodology are calculated by the Joint Research Centre (Institute for Environment and Sustainability - IES/MARS Unit) at national and European level. http://ec.europa.eu/eurostat/web/energy/data

Climatic factors also affect energy demand, behaviour and GHG emission trends. Globally 2016 was the warmest year on record. In Europe the year 2016 was colder than the years 2014 and 2015 which were the warmest years on record, however 2016 still was the sixth warmest year on a time series starting in 1950 (KNMI, 2016). Lower winter temperatures led to higher heating demand and higher emissions from the residential and commercial sectors, which partly explain the emission changes. Figure 2 also shows that even though Member States saw an increase in heating degree days (HDD – a measure for heating demand), for half of the Member States emissions fell.

The strongest increases of HDD occurred in Portugal (+14.5 %), Estonia (+11.0 %), Latvia (+9.4 %), Spain (+7.3 %), France (+6.2 %) and Finland (+6.1 %). Further sixteen Member States had HDD increases. Only in Malta (−40.7 %), Cyprus (−9.2 %), Greece (−7.2 %), Ireland (−5.7 %), Italy (−2.6 %) and the United Kingdom (−1.3 %) heating degree days decreased in 2016 compared to 2015.

2.1.2 Changes in EU GHG emissions by sector

On a sectoral basis, the largest absolute emission decrease in the EU occurred in the energy sector (i.e. all combustion activities and fugitive emissions). Energy related emissions fell by 25.0 Mt CO_2-eq (−0.7 %) across the EU plus Iceland. This decline in emissions in the energy sector is despite a slight increase of gross inland energy consumption in the EU plus Iceland in 2016. Within the energy sector, emissions declined strongly in energy industries (−53.9 Mt CO_2-eq) while they increased significantly transport (+18.7 Mt CO_2-eq) and the residential and commercial (Other) sector (+19.1 Mt CO_2-eq). In

manufacturing industries and construction emissions decreased (−6.3 Mt CO_2-eq) as well as fugitive emissions from fuels (−1.1 Mt CO_2-eq).

After a period of decrease between 2010 and 2014, primary energy consumption increased again by 0.9 % in 2016, the second year in a row. The contribution of both fossil and renewable fuels to the energy mix increased in 2016 while the share of nuclear energy decreased (BP 2017).

Monthly consumption data for solid, liquid and gaseous fuels (Eurostat, 2017), show that total fuel consumption was almost constant, with different trends for the different fossil fuel types. Consumption of natural gas grew by 7.0 % and consumption of liquid fuels increased by only +1.2 %. Solid fossil fuel consumption (excluding peat) fell by 7.4 % and peat consumption grew by 42.4 %.

Natural gas consumption grew in 22 EU-28 Member States between 2015 and 2016 and five Member States saw increases of more than 10 %: Ireland by 11.6 %, Greece by 30.2 %, Portugal by 12.5 %, Sweden by 13 % and the United Kingdom by 12.9 %. In four Member States natural gas consumption fell with the largest decrease in Lithuania (−10.9 %) followed by Luxembourg (−8.8 %).

Liquid fossil consumption grew in twenty EU-28 Member States with the largest increase in Estonia by 83.2 %[8] followed by Sweden (+12.7 %), Poland (+10.8 %) and the Netherlands (+10.2 %). A decrease of liquid fuel consumption was observed in eight EU-28 Member States with largest decreases in Malta (−19.2 %) followed by Portugal (−8.2 %) and Italy (−7.1 %).

Twenty Member States showed decreasing solid fossil fuel consumption (excluding peat), most notably in Cyprus (−83.3 %)[9], followed by the United Kingdom (−51.3 %), Greece (−17.3 %) and Bulgaria (–15.3 %). On the other hand, solid fossil fuel consumption (excluding peat) increased in seven Member States, most notably in Denmark (+15.4 %), Finland (+13.4 %), Croatia (+8.7 %) and Sweden (+8.2 %). These changes in fossil fuel consumption are not only related to heating degree day (HDD) effects as described before but also strongly connected to the trends in electricity generation. Peat consumption strongly increased in Lithuania (+89 %)[10] and clearly increased in Finland (+13 %), but decreased in Ireland (-11.2 %) and remained constant in Romania and Sweden.

Hydroelectric generation (without pumped storage) increased by 3 % in the EU-28 with strong regional differences. Most parts of Europe experienced more advantageous conditions for hydro electricity production in 2016 than in 2015. In Portugal gross hydro generation grew by 82 % compared to the previous year, in Latvia by 35 %, Lithuania by 34 %[11], in Spain by 33 % and in Estonia by 24 %. Hydro production increased in further thirteen Member States. The largest decreases in gross hydro production were in Bulgaria (−32 %), followed by Sweden (−17 %) and the United Kingdom

[8] In Estonia oil shale production is important. This immense increase is probably an artefact as oil shale is accounted as solid fuel and shale oil as liquid fuel.

[9] As the solid fuel consumption in Cyprus is very small this huge absolute decrease corresponds to a little absolute increase of only 5 kilotons.

[10] Annual data from Lithuania Statistics has the percentage of +27 % (268 TJ of peat in 2015 and 340 TJ in 2016).

[11] According to Lithuania Statistics, hydroelectric generation increased by 30 %.

(−17 %). Less favourable hydro conditions also occurred in four further Member Stats with decreasing hydroelectric generation.

Electricity production from renewable sources other than hydro increased only slightly. Gross generation electricity generation from wind energy was almost constant (+0.3 %) in the EU-28 (EurObserv'ER, 2017a).[12] Wind generation grew in 16 Member States in 2016, but decreased in nine Member States. The largest relative increases were in Lithuania (+40 %), Finland (+32 %) and Croatia (+27 %). The largest absolute contributions from wind energy were observed in Germany followed by Spain, the United Kingdom, France, Italy, Sweden and Denmark. Electricity production from photovoltaics also increased in half of EU-28 Member States and by 2.5 % across Europe (EurObserv'ER, 2017b), with very large relative increases in Poland (+128 %), Ireland (+100 %), Denmark (+42 %), the Hungary (+41 %) and the Netherlands (+36 %). The largest absolute generation from photovoltaics was in Germany followed by Italy, the United Kingdom, France and Spain.

Thus, the use of renewables continues to play an important role in GHG mitigation efforts by the EU and its Member States. Strong relative growth of total renewable energy consumption (without hydro) is reported for many Member States such as Lithuania (+20 %), Hungary (+16 %), Finland (+9 %), Austria (+6 %) and further seven Member States (BP, 2017), some of these countries starting from very low shares of renewable consumption in total electricity consumption such as Lithuania and Hungary. But also ten Member States showed decreasing consumption of renewable energy according to BP data, most pronounced in Denmark, Ireland and Romania (−6 % each), followed by the Czech Republic (−4 %) and Poland (−2 %).

In 2016 nuclear electricity production across the EU-28 decreased by 2.1 % compared to 2015 according to Eurostat monthly data. The largest decreases in nuclear electricity generation occurred in the Czech Republic (−10 %) followed by Germany and France (−8 % each) and three other Member States while nuclear electricity generation increased very strongly in Belgium (+67 %) and Sweden (+11 %) and further six Member States.

GHG emissions from industrial processes decreased in 2016 compared to 2015, by 0.8 % in the EU plus Iceland. The largest contribution to this emission decrease was from metal production (−3.0 %) and chemical industry (−2.7 %). Emissions from mineral products increased by 0.5 % and F-gas emissions from product use as substitutes for ozone depleting substances (ODS) by also 0.5 % across the EU plus Iceland.

Agriculture emissions increased by 0.7 %, mainly from emission increases due to enteric fermentation. The trend in emissions from waste (−4.2 %) continues the decrease seen in previous years with largest reduction being in emissions from solid waste disposal.

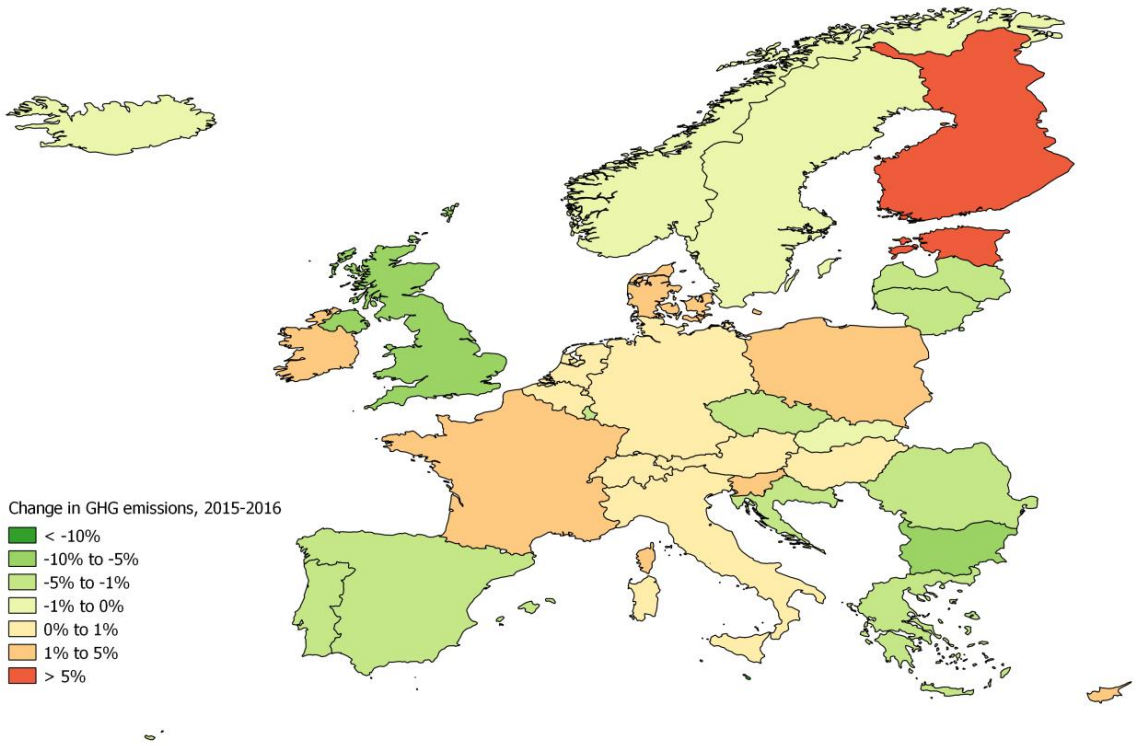
[12] Eurostat data were also analysed, however these data were partially incomplete for some EU Member States and were therefore not used for the assessment of trends.

Reporting under the Monitoring Mechanism Regulation requires separate detail for the EU ETS and non-ETS sectors. Between 2015 and 2016 the emissions decreased by 2.9 %[13] across stationary installations covered by the European Emissions Trading System for the EU plus Iceland, whereas emissions in the non-ETS (= emissions covered by the Effort Sharing Decision (ESD)) sectors increased by 0.9 %.

2.1.3 Change in Member State GHG emissions 2015 to 2016

GHG emissions decreased in half of the EU Member States with falls outweighing gains by 0.7%. Figure 3 depicts the regional distribution of these changes. The central and eastern European Member States increased emissions while reductions occurred mainly in south-western and south-eastern Europe and the United Kingdom.

Figure 3 Regional trends in 2015-2016 total GHG emissions change



Note: Change in total GHG emissions excluding LULUCF and including indirect CO_2.

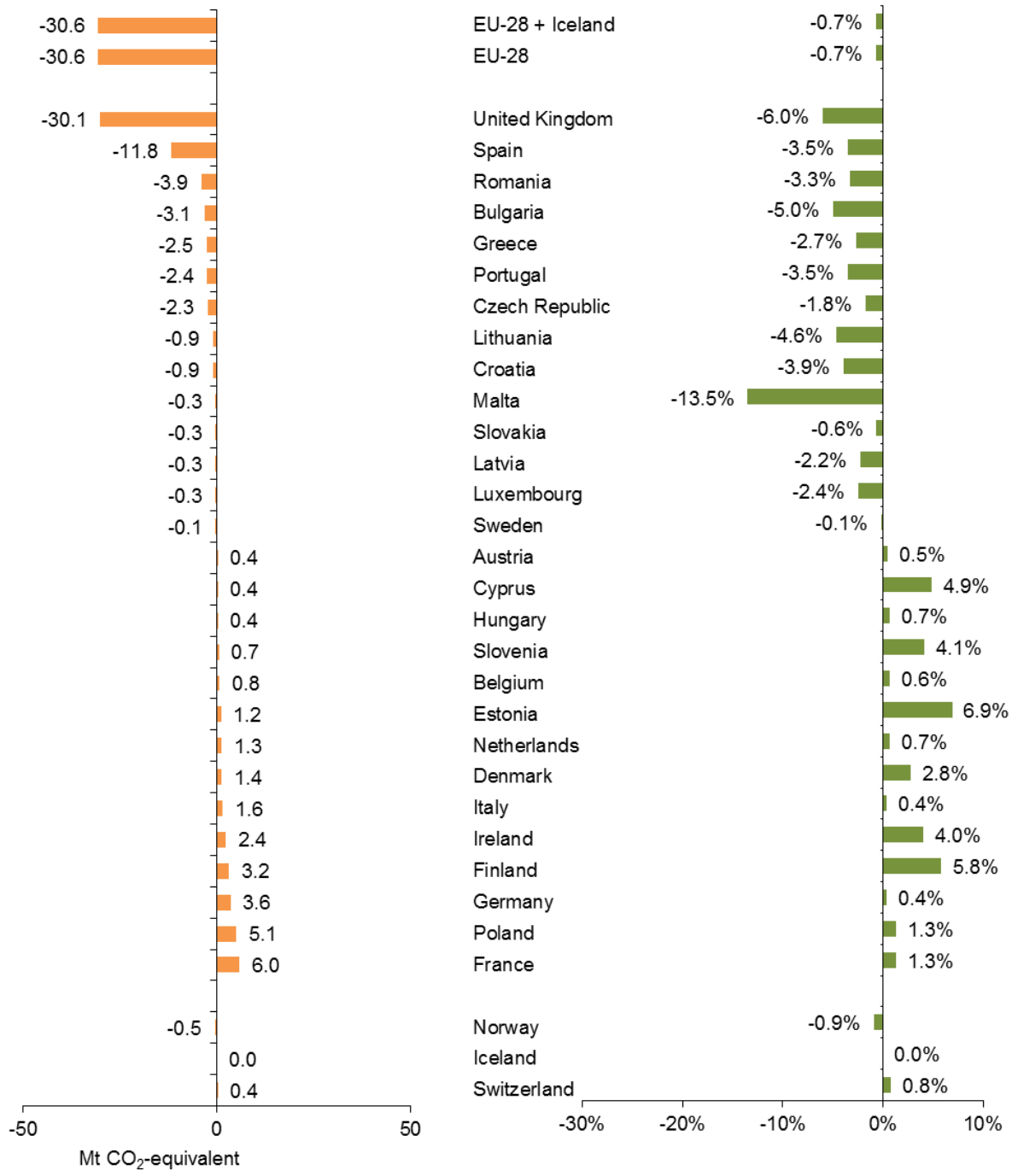
Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to the UNFCCC for 1990-2015 and proxy estimates for 2016.

[13] Including emissions from aviation covered under the ETS, the reduction was 2.6 %, based on data from the European Union Transaction Log (EUTL) extracted on 20 July 2017.

Comparing the changes across Member States (Figure 4), the largest absolute decrease of emissions occurred in the United Kingdom (−30.1 Mt CO_2-eq compared to 2015). This is by far the largest emission change of all Member States and larger than the total EU plus Iceland emission decrease.

Large absolute emissions decreases also occurred in Spain (−11.8 Mt CO_2-eq) and Romania (−3.9 Mt CO_2-eq). The largest relative decline in emissions compared to the previous year took place in Malta (−13.5 %), followed by the United Kingdom (−6.0 %) and Bulgaria (−5.0 %). The largest absolute growth of emissions occurred in France (+6.0 Mt CO_2-eq) followed by Poland (+5.1 Mt CO_2-eq) and Germany (+3.6 Mt CO_2-eq). The largest relative increases were in Estonia (+6.9%), Finland (+5.8 %) and Cyprus (+4.9%). In the non-EU member countries of the EEA GHG decreased in Norway (−5 Mt CO_2-eq / −0.5%) and increased in Switzerland (+0.4 Mt CO_2-eq / +0.8%) while they were estimated to be constant for Iceland.

Figure 4 Member States emissions change 2015-2016



Note: Total GHG emissions without LULUCF including indirect CO_2.
Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

The six Member States Germany, United Kingdom, France, Italy, Poland and Spain together contribute to about 70 % of total EU emissions. The following section examines the emission trends for these six as well as for Bulgaria, Estonia, Finland, and Malta which showed pronounced positive or

negative changes in emissions compared to the previous year. The data source for the explanation of energy trends is Eurostat unless otherwise noted.

Member States with decreasing 2015 to 2016 emission trends

The largest absolute decrease was seen in the **United Kingdom**, the second largest GHG emitter in the European Union. Most of the reductions in the UK are from fuel switching from coal to natural gas in the energy sector which halved solid fuel consumption.

Emissions in the UK decreased by 30.1 Mt CO_2-eq or 6.0 %, significantly more than in any other Member State and almost equal to the total decline of EU plus Iceland emissions (−30.6 Mt CO_2-eq). The 6.0 % emission reduction of UK's emissions is also the second largest relative emission decrease of all Member States. The decline in emissions is mainly due to halving of solid fossil fuels consumption (−51 %). In contrast consumption of natural gas (+13 %) and liquid fossil fuels (+2 %) increased. The largest share of the emissions decrease was in sub-category 1.A.1 Energy Industries (−25.5 Mt CO_2-eq or −13.5 %). According to national statistics[14] the emissions decrease of energy industries was mainly due to a shift from coal (−60 %) to natural gas (+44 %) in electricity generation. The second largest emission decrease was in sub-category 1.A.2 Manufacturing industries and construction where emissions fell by 7.5 Mt CO_2-eq or 13.9 % and the third largest emission decrease in sub-category 5.A Solid waste disposal with a reduction of 4.2 Mt CO_2-eq or 34.5 %. The largest emission increase was observed in 1.A.4 Other sectors which includes residential and commercial activities: +3.5 Mt CO_2-eq or +3.9 %. This emission increase is in contrast to a 1.3 % decrease of heating degree days, a measure for changed heating demand due to changed annual climate conditions. Emissions of 1.A.3 Transport increased by 1.4 Mt CO_2-eq (+1.2 %) and 1.B Fugitive emissions from fuels increased by 1.2 Mt CO_2-eq (11.2 %). Emissions of Industrial processes and product use declined by 1.7 Mt CO_2-eq (5.2 %) and of Waste (including the already mentioned solid waste disposal) by 3.6 Mt CO_2-eq (−19.7 %) while emissions from Agriculture increased by 2.5 Mt CO_2-eq (5.7 %).

Emissions in **Spain** also fell by a large absolute amount: 11.8 Mt CO_2eq or 3.5 %. This was the second largest absolute emission decrease of all Member States. Energy consumption from solid fossil fuels declined (−7 %) while liquid fossil fuel consumption (+5%) and natural gas consumption (+2 %) grew. By far the largest change in energy emissions were in 1.A.1 Energy Industries which decreased by 14.6 Mt CO_2-eq or 16.9 %. According to national data[15] the most important changes in the electricity sector were a 29 % reduction of electricity generation from coal and a 25 % increase of hydroelectricity The second largest emission change in the energy sector was from 1.A.3 Transport (+2.5 Mt CO_2-eq or +3.1 %) which corresponds well to increased consumption of diesel, gasoline and kerosene. Also emissions in 1.A.2 Manufacturing industries and construction (+0.6 Mt CO_2-eq or +1.4 %) grew due to

[14] Digest of UK Energy Statistics DUKES 2017 Chapter 5: Electricity www.gov.uk/government/uploads/system/uploads/attachment_data/file/633779/Chapter_5.pdf

[15] Red Eléctrica de España (REE): Estadística diaria del sistema eléctrico español nacional www.ree.es/es/balance-diario/nacional/2016/12/31

increased industrial activity while emissions in 1.A.4 Other sectors were almost constant (−0.03 Mt CO_2-eq or −0.1 %). The emissions in the Waste sector increased (+0.3 Mt CO_2-eq or +2.3 %) while emission in the Agriculture sector decreased (−0.2 Mt CO_2-eq or −0.5 %) and emissions from Industrial processes and product use were almost constant (+0.04 Mt CO_2-eq or +0.1 %).

In **Bulgaria** emissions fell by 3.1 Mt CO_2-eq or 5.0 %. This is the third largest relative decrease of all Member States. Consumption of solid fossil fuels fell much stronger (−13 %) than consumption of liquid fossil fuels and natural gas use grew (+4 % each). The emission reduction in 1.A.1 Energy industries (−3.6 Mt CO_2-eq or −11.7 %) was even larger than the total emission reduction. Conventional thermal electricity generation fell by 11 % and was primarily compensated by a reduced electricity exports surplus. In contrast emissions of further energy combustion sectors increased: In 1.A.2 Manufacturing industries and construction by 0.1 Mt CO_2-eq or 4.9 %, in 1.A.3 Transport by 0.2 Mt CO_2-eq or 2.0 % and in 1.A.4 Other sectors by 0.2 Mt CO_2-eq or 8.6 %. Emissions of Industrial processes and product use increased by 0.2 Mt CO_2-eq or 3.5 % while emissions from Agriculture grew only slightly (+0.02 Mt CO_2-eq or +0.3 %) and Waste emissions declined by 0.1 Mt CO_2-eq or 2.7 %

Malta decreased its GHG emissions by 0.3 Mt CO_2-eq in 2016 compared to 2015. As Malta is the smallest GHG emitter within the European Union this corresponds to an impressive relative decrease of 13.5 %, by far the largest relative emission change of all Member States. Consumption of liquid fuels decreased by 18 % with minimal consumption of other fossil fuels. Emissions of 1.A.1 Energy industries decreased by 0.31 Mt CO_2-eq or 34.7 %. During the year 2015 a subsea electricity interconnector between Malta and Sicily (Italy) was commissioned.[16] As 2016 is the first full year of interconnector operation electricity imports from Italy increased by 46 % and partly displaced electricity generation in Malta's oil-fired power plants (production −40 %). Malta reports also a switch to more efficient generation turbines as a reason for emission decline in energy industries. The second largest emission change was a 0.01 Mt CO_2-eq (+119 %) growth in 1.A.3 Transport mainly by an increase in emissions from road transportation caused by an increased number of vehicles and increased vehicle usage. Emission changes in all other sectors are within ±0.01 Mt CO_2-eq.

Member States with increasing 2015 to 2016 emission trends

The largest absolute emission increase of all Member States was found in **France**, the third largest GHG emitter within the European Union: emissions were 6.0 Mt CO_2-eq or 1.3 % higher. The increase is mainly due to greater energy use in all energy sectors. Energy statistics from Eurostat (2016) reveal that natural gas consumption grew by 9 % while liquid and solid fuel consumption fell by 2 % each. Largest emission increases were in 1.A.1 Energy industries (which includes coal and gas fired electricity generation and district heating as well as refineries) with +3.5 Mt CO_2-eq or +8.4 %. A significant role has the reduced nuclear electricity generation (−8 %) which was partly compensated by

[16] Enemalta: Malta-Italy interconnector, http://www.enemalta.com.mt/index.aspx?cat=2&art=247&jse=0, accessed 15 August 2016.

a 30 % increase in conventional thermal electricity generation besides a 35 % reduction of the electricity export surplus. Second largest increases were in 1.A.4 Other sectors (which includes residential and commercial) with +1.4 Mt CO_2-eq or +1.6 %. This is consistent with the increase of natural gas consumption and reflects the colder winter (heating degree days: +6 %). Emissions from 1.A.2 Manufacturing industries and construction increased by 1.0 Mt CO_2-eq (+2.0 %) and from 1.A.3 Transport increased by 0.6 Mt CO_2-eq (+0.5 %). Largest emissions change in the non-energy sector was the 0.4 Mt CO_2-eq (or 2.6 %) decrease in the Waste sector followed by a 0.2 Mt CO_2-eq (−0.2 %) decrease in Agriculture while emissions from Industrial Processes and product use increased slightly (+0.1 Mt CO_2-eq or +0.1 %).

In **Poland** emissions increased by 5.1 Mt CO_2-eq or 1.3 % which is the second largest absolute emission increase within the EU. However there were dissimilar changes across sectors. Consumption of solid fossil fuels decreased by 3 % while liquid fossil fuels increased by 11 % and natural gas increased by 7 %. These changes are in line with the reported increase (5.9 Mt CO_2-eq or 12.2 %) in 1.A.3 Transport and in 1.A.4 Other sectors (1.5 t CO_2-eq or 2.8 %). In transport fuel consumption grew strongly: petrol by 8 %, diesel by 15 % and LPG by 8 % as Poland reported. One reason for increases in 1.A.4 may be that apparent heating degree days also changed increased (+6 %). In contrast emissions in 1.A.1 Energy industries declined by 3.0 Mt CO_2-eq or 1.8 %. The reduction of solid fuels consumption is mainly a reduction of lignite consumption while hard coal stayed almost constant. This explains why emissions from energy industry declined besides an increase of 1 % in conventional thermal electricity production. Emissions of 1.A.2 Manufacturing industries and construction increased only slightly (0.2 Mt CO_2-eq or 0.7 %). Emissions from Industrial processes and process use decreased slightly (0.1 Mt CO_2-eq or 0.2 %) due to lower production of ammonia and ethylene while emissions from Agriculture increased (0.5 Mt CO_2-eq or 1.6 %), mainly from agricultural soils as a result from higher use of nitrogen and lime fertilizers. Emissions from Waste are estimated to stay constant.

In **Germany**, the largest GHG emitter in the European Union, there was an emissions increase of 3.6 Mt CO2-eq or 0.4 %. There has been a strong growth in the use of natural gas (+10 %) while solid fossil fuel consumption decreased by 3 % and liquid fuels remained at the same levels as in 2015. The largest emission increase was in 1.A.3 Transport with 5.4 Mt CO2-eq (or 3.4 %). According to national analyses[17] there are two reasons for this emission increase: Consumption of both diesel (+3.5 %) and gasoline (+2 %) increased. Also in the aviation sector was considerable growth in both passenger kilometres and freight volume. Heating degree days in 2016 were higher (+3 %) than in 2015. The upswing heating demand is reflected in the +3.3 Mt CO2-eq (2.6%) emissions increase in the residential and commercial sector (CRF sectors 1.A.4 and 1.A.5). While emissions in 1.A.2 Manufacturing industries and construction were almost constant, emissions from 1.A.1 Energy industries fell by 3.3 Mt CO2-eq (or 1.0 %) which is consistent with a 4 % decline of electricity generation from coal and a 30 % increase of electricity generation from natural gas, according to

[17] Umweltbundesamt: Climate footprint 2016: Transport sector and cool weather cause spike in emissions https://www.umweltbundesamt.de/en/press/pressinformation/climate-footprint-2016-transport-sector-cool

national statistics.[18] Emissions from Industrial processes and product use (−0.2 Mt CO_2-eq or −0.2 %) and Agriculture (−0.1 Mt CO_2-eq or −0.2 %) decreased at a much lower rate than emissions from Waste (−0.5 Mt CO_2-eq or −4.5%).

Finland had the second largest relative emission increase of all Member States: 3.2 Mt CO_2-eq or 5.8 %. Consumption of solid fossil fuels (including peat) grew by 13 % and liquid fossil fuels by 8 % while only consumption of natural gas fell by 7 %. This led to an increase of emissions in all energy sectors: The strongest emission growth was in 1.A.1 Energy industries (1.6 Mt CO_2-eq or 9.8 %), followed by 1.A.4 Other sectors (1.2 Mt CO_2-eq or 10.9 %). Heating degree days increased by 6 %. As Finland has a large share of combined heat and power plants (CHP) increased heating demand explains emission trends in both sectors despite an only slight increase (1 %) of conventional thermal electricity generation. Emissions of 1.A.3 Transport grew by 1.2 Mt CO_2-eq or 10.9 % due to the decline of biofuels in road transportation. In other energy sectors emissions increased by 2 % to 3 % each. The non-energy energy sectors showed diverse developments: While emissions from Industrial processes and product use increased (+0.2 Mt CO_2-eq or +2.9 %) emissions from Agriculture were almost constant (−0.01 Mt CO_2-eq or −0.2 %) and emissions from Waste decreased (−0.1 Mt CO_2-eq or −4.2 %).

In **Italy** 2016 emissions were 1.6 Mt CO_2eq or 0.4 % higher than in 2015. Fossil fuel consumption showed mixed changes: Natural gas consumption, the most important fossil fuel, increased by 5 % while consumption of liquid fossil fuels fell by 7 % and solid fossil fuels which have only minor importance fell by even 12 %. The largest emission increase was in 1.A.4 Other Sectors (7.4 Mt CO_2-eq or 9.0 %) which corresponds to an increased natural gas consumption but contrasts slightly lower heating degree days (−3 %). The next most significant emission change was in 1.A.3 Transport where emissions decreased by 2.7 Mt CO_2-eq (or 2.5 %). The decline of liquid fuel consumption is related to that. Second largest emissions decrease was in 1.A.1 Energy Industries (−0.9 Mt CO_2-eq or −0.8 %). A large decrease in net electricity imports (−20 %) was mainly compensated by an increase electricity generation from conventional power plants (+3 %) and a reduced electricity consumption (-2 %). According to national energy statistics[19] electricity production from natural gas increased while electricity production from solid fuels and mineral oil products decreased. This explains the observed decreasing emissions from energy industries whilst expanding conventional electricity production. The 1.B Fugitive emissions from fuel had a similar reduction (−0.9 Mt CO_2-eq or −11.4 %) as energy industries. The emissions from 1.A.2 Manufacturing industries and construction changed only slightly (−0.2 Mt CO_2-eq or −0.3 %).The largest emission change in the non-energy sectors was in Waste

[18] Arbeitsgemeinschaft Energiebilanzen: Bruttostromerzeugung in Deutschland ab 1990 nach Energieträgern, http://www.ag-energiebilanzen.de/index.php?article_id=29&fileName=20170207_brd_stromerzeugung1990-2016.xlsx

[19] Ministero dello sviluppo economico: La situazione energetica nazionale nel 2016, April 2017, http://dgsaie.mise.gov.it/dgerm/downloads/situazione_energetica_nazionale_2016.pdf

(−0.9 Mt CO_2-eq or −0.46 %) followed by Industrial processes and product use (−0.4 Mt CO_2-eq or −1.3 %) while emissions from Agriculture stayed almost constant (+0.02 Mt CO_2-eq or +0.1 %).

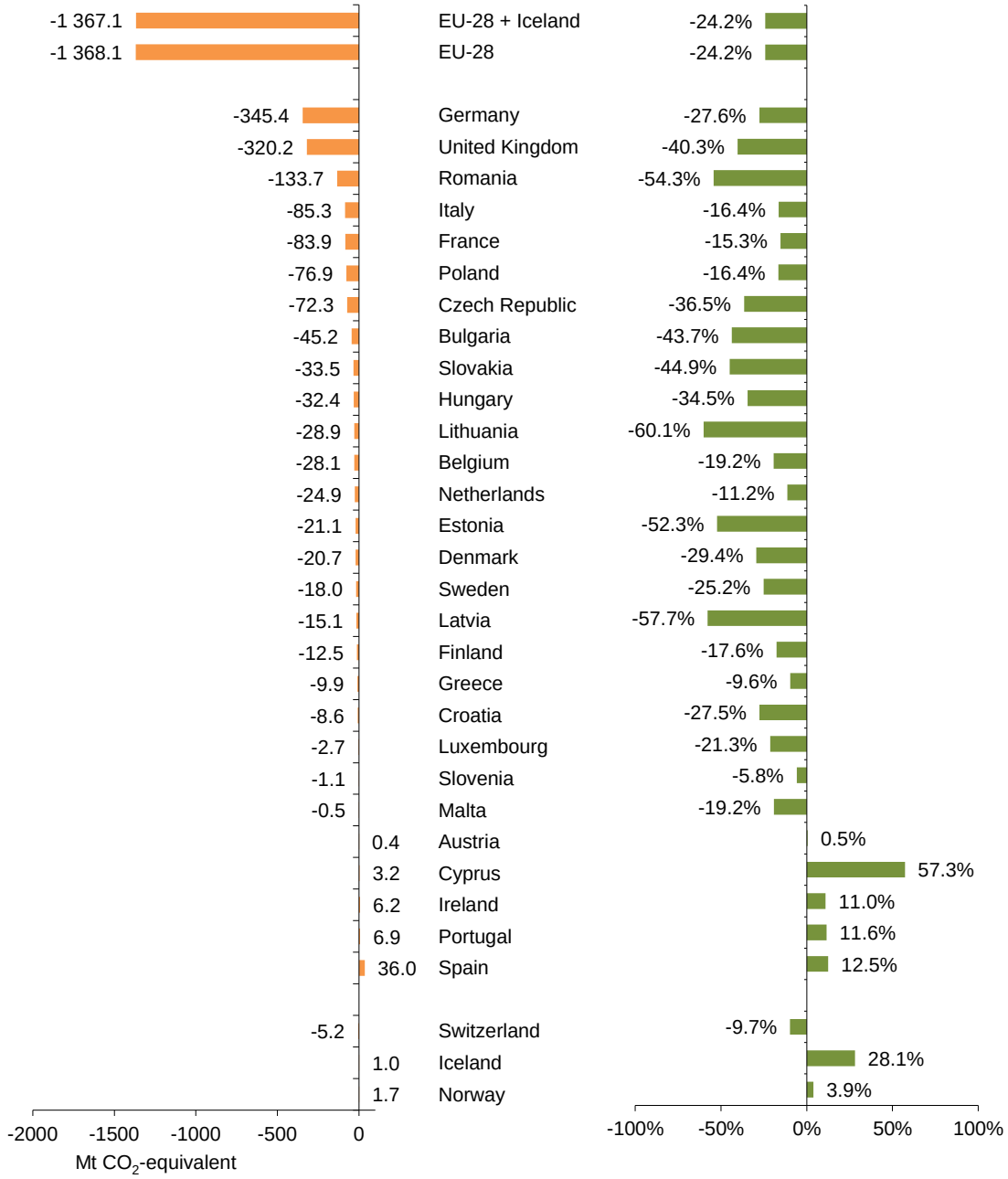
The largest relative increase was in **Estonia** where emissions were +6.9 % higher. This corresponds to an absolute increase of 1.2 Mt CO_2-eq. Patterns of fossil fuel consumption in Estonia are quite varied: solid fuels including oil shale decreased by 3 % each. Liquid fossil fuel consumption including shale oil (a product of oil shale) increased by 52 % and natural gas consumption increased by 10 %. By far the largest absolute emissions change occurred in 1.A.1 Energy industries with an increase of 1.4 Mt CO_2-eq or 11.2 %. Conventional electricity generation, mainly from oil shale, grew by 19 % which is partly due to a strong increase of electricity net exports (46 %) while electricity consumption increased by 7 %. As district heating in Estonia plays an important role in heat supply for buildings, the emissions reduction in energy industries is also related to an 11 % increase of heating degree days. Second largest emission increase was in sector 1.A.3 Transport (+0.1 Mt CO_2-eq or +5.3 %) due to an increased diesel fuel demand. Emission changes in all other energy sectors where less than 0.1 Mt CO_2-eq. Emissions from non-energy decreased in all domains: Emissions from Industrial processes decreased by 0.02 Mt CO_2-eq or 3.6 %, emissions from Agriculture decreased by 0.05 Mt CO_2-eq or 3.9 % and emissions from Waste decreased by 0.02 Mt CO_2-eq or 4.6 %.

2.1.4 Change in Member State GHG emissions 1990 to 2016

Total EU plus Iceland GHG emissions in 2016 are estimated to be −24.2 % or −1367.1 Mt CO_2eq below 1990 levels as shown in Figure 5.

Emissions for most EU-28 Member States were lower compared to 1990 while emissions in Cyprus, Spain, Portugal and Ireland all saw significant increases. The largest absolute decrease was in Germany, followed by the United Kingdom and Romania which all reduced their GHG emissions by more than 100 Mt CO_2-eq. The largest absolute increases experienced Spain with 36 Mt CO_2-eq. Absolute emission increases in the remaining five Member States are by an order of magnitude lower.

Figure 5 Member States emissions, change 1990-2016



Note: Total GHG emissions without LULUCF including indirect CO_2.
Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

The largest relative emission decreases were in Lithuania, Latvia, Romania and Estonia which all reduced their emissions by more than 50 % compared to 1990. The relative emission decreases of further nine Member States are stronger than the EU plus Iceland average. By far the largest relative emission increase was in Cyprus (+57.3 %) while the changes in other EU Member States with increased emissions compared to 1990 are all below +13 %.

Of the three non-EU member countries of the EEA considered in this report only Switzerland had in 2016 lower GHG emissions compared to 1990 level. Iceland has second largest relative emission increase of all EEA member countries. Norway's absolute emission increase is larger than Iceland's but the relative emission increase is considerably lower.

2.1.5 Detailed results for the EU-28 and EU plus Iceland

This section begins with a brief comparison of the effect of including emissions from international aviation in the totals. Table 2 summarises the emissions as CO_2-eq and percentage changes. Note that that in their proxy submissions, a number of Member States repeated the 2015 amount for emissions from international aviation. The same approach was used for gap filling where Member States did not include an estimate. For the EU plus Iceland 2016 proxy, 2015 values for international aviation emissions were repeated for 16 countries.

Table 2 Emissions including international aviation (kt CO_2-eq)

European Union (EU28)	**1990**	**2015**	**2016**	**2016-2015**	**2016/2015**	**2016-1990**	**2016/1990**
Total excl. LULUCF incl. indirect CO_2	**5 647 080**	**4 309 630**	**4 279 013**	**-30 617**	**-0.71%**	**-1 368 067**	**-24.23%**
International aviation	69 284	142 182	144 058	1 876	1.32%	74 775	107.93%
Total CO_2e including international aviation	**5 716 364**	**4 451 813**	**4 423 071**	**-28 741**	**-0.65%**	**-1 293 292**	**-22.62%**
European Union (EU28) plus Iceland							
Total excl. LULUCF incl. indirect CO_2	**5 650 623**	**4 314 169**	**4 283 552**	**-30 617**	**-0.71%**	**-1 367 071**	**-24.19%**
International aviation	69 503	142 855	144 731	1 876	1.31%	75 229	108.24%
Total CO_2e including international aviation	**5 720 125**	**4 457 025**	**4 428 283**	**-28 741**	**-0.64%**	**-1 291 842**	**-22.58%**

Table 3 and Table 4 show the detailed results for the EU-28 and the EU plus Iceland for 2016. Annex 6.1 includes summary tables for 2016 for each Member State as submitted by the Member States or by EEA for Member States which did not submit their own approximated emissions report.

Table 3 Summary table of approximated GHG emissions for 2016 for EU-28 (total emissions without LULUCF including indirect CO_2)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)
This sheet is a sum of the 28 MS_2016 (submitted or gapfilled) proxy sheets

Year 2016
Submission 2017
Country EU28
Geographical scope Sum of the 28 MS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]											
1. Energy	3 216 335	86 890	29 782						3 333 007		
A. Fuel combustion (sectoral approach)	3 190 286	24 864	29 668						3 244 819		
1. Energy industries	1 176 359	4 133	7 620						1 188 112		
2. Manufacturing industries and construction	470 858	2 132	4 103						477 093		
3. Transport	913 755	1 308	9 454						924 516		
4. Other sectors	623 784	17 249	8 414						649 447		
5. Other	5 531	42	77						5 650		
B. Fugitive emissions from fuels	26 049	62 031	109						88 189		
1. Solid fuels	4 238	29 015	0						33 253		
2. Oil and natural gas	21 812	33 016	108						54 936		
C. CO_2 transport and storage	-								-		
2. Industrial processes and product use	240 238	1 671	10 679	108 119	3 536	6 105	521	71	370 939		
A. Mineral industry	108 992								108 992		
B. Chemical industry	49 980	1 411	7 139	398	1 940	102	-	-	60 970		
C. Metal industry	71 207	159	26	55	403	143	38	-	72 031		
D. Non-energy products from fuels and solvent use	9 744	2	5						9 751		
E. Electronic Industry				56	544	133	5	71	809		
F. Product uses as ODS substitutes				107 594	107	-	-	-	107 702		
G. Other product manufacture and use	131	82	3 422	12	539	5 701	479	-	10 366		
H. Other	184	16	87	3	2	27	-	-	319		
3. Agriculture	10 546	244 557	184 848						439 951		
A. Enteric fermentation		194 789							194 789		
B. Manure management		44 914	20 877						65 792		
C. Rice cultivation		2 658							2 658		
D. Agricultural soils		-	163 384						163 384		
E. Prescribed burning of savannas		-	-						-		
F. Field burning of agricultural residues		703	255						958		
G. Liming	6 056								6 056		
H. Urea application	4 399								4 399		
I. Other carbon-containing fertilizers	92								92		
J. Other	-	1 493	332						1 825		
4. Land use, land-use change and forestry[1]	NE	NE	NE						NE		
A. Forest land	NE	NE	NE						NE		
B. Cropland	NE	NE	NE						NE		
C. Grassland	NE	NE	NE						NE		
D. Wetlands	NE	NE	NE						NE		
E. Settlements	NE	NE	NE						NE		
F. Other land	NE	NE	NE						NE		
G. Harvested wood products	NE								NE		
H. Other	NE	NE	NE						NE		
5. Waste	3 176	119 252	10 991						133 418		
A. Solid waste disposal	-	93 916							93 916		
B. Biological treatment of solid waste		4 625	3 142						7 767		
C. Incineration and open burning of waste	3 155	396	538						4 089		
D. Waste water treatment and discharge		20 286	7 236						27 522		
E. Other	21	29	75						125		
6. Other *(as specified in summary 1.A)*	-	-	-	-	-	-	-	-	-		

Memo items:[2]											
International bunkers	NE	NE	NE						NE		
Aviation	117 431	38	1 064						144 058		
Navigation	NE	NE	NE						NE		
Multilateral operations	NE	NE	NE						NE		
CO_2 emissions from biomass	NE								NE		
CO_2 captured	NE	NE							NE		
Long-term storage of C in waste disposal sites	NE	NE							NE		
Indirect N_2O			NE								
Indirect CO_2 [3]	1 697										
Total CO_2 equivalent emissions without land use, land-use change and forestry									4 277 316		
Total CO_2 equivalent emissions with land use, land-use change and forestry									-		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									4 279 013	1 723 311	2 555 702
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									-		

Source: Member States' proxy estimates, gap filled with EEA's proxy estimates

Table 4 Summary table of approximated GHG emissions for 2016 for EU plus Iceland (total emissions without LULUCF including indirect CO_2)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)
This sheet is a sum of the 28 MS_2016 plus IS_2016 (submitted or gapfilled) proxy sheets

Year 2016
Submission 2017
Country EU28+IS
Geographical scope Sum of the 28 MS plus IS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]											
1. Energy	3 217 979	86 897	29 827						3 334 703		
A. Fuel combustion (sectoral approach)	3 191 769	24 867	29 712						3 246 349		
1. Energy industries	1 176 363	4 133	7 620						1 188 116		
2. Manufacturing industries and construction	470 926	2 132	4 103						477 161		
3. Transport	914 610	1 310	9 482						925 402		
4. Other sectors	624 339	17 250	8 430						650 019		
5. Other	5 531	42	77						5 650		
B. Fugitive emissions from fuels	26 210	62 036	109						88 354		
1. Solid fuels	4 238	29 015	0						33 253		
2. Oil and natural gas	21 972	33 021	108						55 101		
C. CO_2 transport and storage	-								-		
2. Industrial processes and product use	241 942	1 672	10 682	108 326	3 640	6 106	521	71	372 960		
A. Mineral industry	108 993								108 993		
B. Chemical industry	49 980	1 411	7 139	398	1 940	102	-	-	60 970		
C. Metal industry	72 908	160	26	55	507	143	38	-	73 837		
D. Non-energy products from fuels and solvent use	9 746	2	5						9 754		
E. Electronic Industry				56	544	133	5	71	809		
F. Product uses as ODS substitutes				107 801	107	-	-	-	107 909		
G. Other product manufacture and use	132	82	3 425	12	539	5 702	479	-	10 371		
H. Other	184	16	87	3	2	27	-	-	319		
3. Agriculture	10 550	244 910	185 107						440 567		
A. Enteric fermentation		195 089							195 089		
B. Manure management		44 966	20 928						65 894		
C. Rice cultivation		2 658							2 658		
D. Agricultural soils		-	163 592						163 592		
E. Prescribed burning of savannas		-	-						-		
F. Field burning of agricultural residues		703	255						958		
G. Liming	6 059								6 059		
H. Urea application	4 399								4 399		
I. Other carbon-containing fertilizers	92								92		
J. Other	-	1 493	332						1 825		
4. Land use, land-use change and forestry[1]	NE	NE	NE						NE		
A. Forest land	NE	NE	NE						NE		
B. Cropland	NE	NE	NE						NE		
C. Grassland	NE	NE	NE						NE		
D. Wetlands	NE	NE	NE						NE		
E. Settlements	NE	NE	NE						NE		
F. Other land	NE	NE	NE						NE		
G. Harvested wood products	NE	NE	NE						NE		
H. Other	NE	NE	NE						NE		
5. Waste	3 185	119 442	10 999						133 625		
A. Solid waste disposal	-	94 098							94 098		
B. Biological treatment of solid waste		4 627	3 144						7 771		
C. Incineration and open burning of waste	3 163	397	538						4 098		
D. Waste water treatment and discharge		20 291	7 242						27 533		
E. Other	21	29	75						125		
6. Other ***(as specified in summary 1.A)***											

Memo items:[2]											
International bunkers	NE	NE	NE						NE		
Aviation	118 098	38	1 070						144 731		
Navigation	NE	NE	NE						NE		
Multilateral operations	NE								NE		
CO_2 emissions from biomass	NE								NE		
CO_2 captured	NE	NE							NE		
Long-term storage of C in waste disposal sites	NE	NE							NE		
Indirect N_2O			NE								
Indirect CO_2 [3]	1 697										
Total CO_2 equivalent emissions without land use, land-use change and forestry									4 281 855		
Total CO_2 equivalent emissions with land use, land-use change and forestry									NE		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									4 283 552	1 725 092	2 558 460
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NE		

Source: Member States' proxy estimates, gap filled with EEA's proxy estimates

2.2 Sectoral results

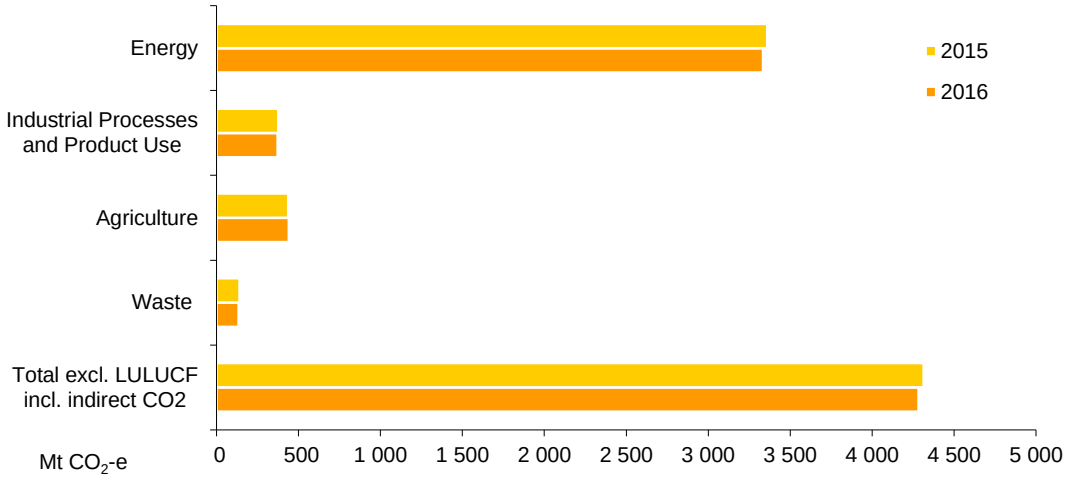
Table 5 and Figure 6 show the changes between 2015 and 2016 at sectoral level for the EU plus Iceland.

Table 5 Emissions by sector, change 2015-2016

Change 2015 / 2016, EU plus Iceland	Mt CO_2-eq	%
Energy	−25.0	−0.7%
Industrial Processes and Product Use	−3.0	−0.8%
Agriculture	3.2	0.7%
Waste	−5.9	−4.2%
Total excl. LULUCF incl. indirect CO_2	−30.6	−0.7%

Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

Figure 6 Emissions by sector, EU plus Iceland, 2015-2016



Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

On a sectoral basis, the largest absolute emission change occurred in the Energy sector (i.e. all combustion activities and fugitive emissions from energy). GHG emissions fell by 25.0 Mt CO_2-eq (−0.7 %) across the EU plus Iceland. More detailed explanations for the trends in the energy sector are provided in section 2.2.1 Energy.

The greenhouse gas emissions from Industrial Processes and Product Use decreased by 3.0 Mt CO_2-eq (−0.8%). The agricultural sector saw an increase of 3.2 Mt CO_2-eq (+0.7 %), the waste sector emissions had a reduction of 5.9 Mt CO_2-eq (−4.2%).

2.2.1 Energy

Emissions from the energy sector contributed about 78 % of total EU plus Iceland emissions in 2016. Emissions from fuel combustion saw a decrease of 23.9 Mt CO_2-eq or 0.7 % since 2015. Table 6 shows

that by far the largest change in fuel combustion emissions occurred in1.A.1 Energy industries with a reduction of 53.9 Mt CO_2-eq (−4.3 %). In the sector 1.A.2 Manufacturing industries and construction emissions also decreased emissions (−6.3 Mt CO_2-eq resp. −1.3 %). Emissions in 1.A.4 Other sectors (+19.1 Mt CO_2-eq) and 1.A.3 Transport (+18.7 Mt CO_2-eq) increased by similar absolute amounts. The relative increase in 1.A.4 Other sectors (+3.0 %) was significantly larger than that of 1.A.3 Transport (+2.1 %). "Other sectors" mainly consists of residential and commercial activities. The change of 1.A.5 is mainly an artefact.[20] 1.B Fugitive emissions from fuels decreased by 1.1 Mt CO_2-eq (−1.2 %).

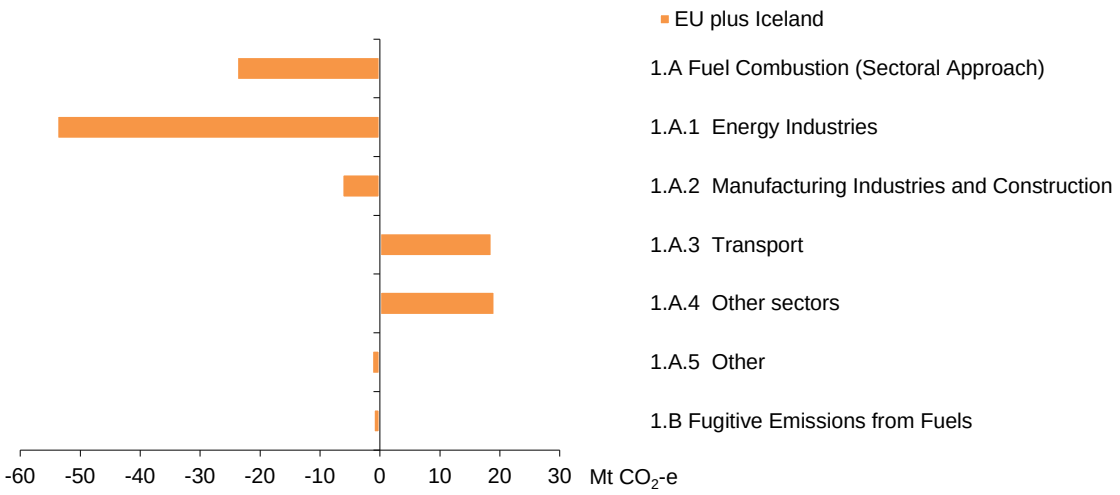
Table 6 Energy sector emissions, change 2015-2016

Change 2015 / 2016, EU plus Iceland	Mt CO_2eq	%
1.A Fuel Combustion (Sectoral Approach)	−23.9	−0.7%
1.A.1 Energy Industries	−53.9	−4.3%
1.A.2 Manufacturing Industries and Construction	−6.3	−1.3%
1.A.3 Transport	18.7	2.1%
1.A.4 Other sectors	19.1	3.0%
1.A.5 Other	−1.3	−19.2%
1.B. Fugitive Emissions from Fuels	−1.1	−1.2%

Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

[20] In its 2017 GHG inventory submission, Germany reported 1.0 Mt CO2eq emissions in source category 1.A.5 for year 2015. In the 2016 proxy these emissions were reported "included elsewhere" (IE) and included in 1.A.4 Other sectors. EEA and its ETC/ACM did not re-allocate these emissions.

Figure 7 Energy sector emissions, EU plus Iceland, change 2015-2016



Source: The EEA's ETC/ACM, based on the 2015 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

The largest emissions decrease for 1.A Fuel Combustion on Member States level was in the United Kingdom (−28.6 Mt CO_2-eq) followed by Spain (−11.6 Mt CO_2-eq), and Romania and Bulgaria (−3.1 Mt CO_2-eq each). Largest emission increase was in France (+6.6 Mt CO_2-eq) followed by Poland and Germany (+4.5 Mt CO_2-eq). Emissions from Fuel Combustion decreased in 14 Member States and increased in 11 Member States. Iceland estimated constant emissions.

Going to more detail, in the sub category 1.A.1 Energy Industries, largest reduction was in the United Kingdom (−25.5 Mt CO_2-eq), followed by Spain (−14.6 Mt CO_2-eq), Bulgaria (−3.6 Mt CO_2-eq), Greece (−3.5 Mt CO_2-eq), Germany (−3.3 Mt CO_2-eq) and Poland (−3.0 Mt CO_2-eq). Largest increases were in France (+3.5 Mt CO_2-eq) followed by Finland (+1.6 Mt CO_2-eq), Denmark (+1.5 Mt CO_2-eq) and Estonia (+1.4 Mt CO_2-eq).

Emissions changes in the sector 1.A.2 Manufacturing Industries and Construction were significantly smaller. The largest decrease was in the United Kingdom (−7.5 Mt CO_2-eq) followed by the Czech Republic (−0.8 Mt CO_2-eq) and the largest increase in the Netherlands (+2.2 Mt CO_2-eq) followed by France (+1.0 Mt CO_2-eq).

Emissions from 1.A.3 Transport increased in 23 Member States. The largest increases were in Poland (+5.7 Mt CO_2-eq), Germany (+5.4 Mt CO_2-eq) and Spain (+2.5 Mt CO_2-eq), while largest decreases was in Italy (−2.7 Mt CO_2-eq) followed by Sweden (−0.8 Mt CO_2-eq).

In 1.A.4 Other Sectors (which include residential and commercial) emissions increased in 17 Member States. The largest increases occurred in Italy (+7.4 Mt CO_2-eq), United Kingdom (+3.5 Mt CO_2-eq),

Germany (+3.3 Mt CO_2-eq) and the Belgium (+2.3 Mt CO_2-eq). The largest decrease was in Romania (−1.1 Mt CO_2-eq) followed by the Czech Republic (−0.6 Mt CO_2-eq).

Emission changes in the sector 1.A.5 Other in all Member States are less than ±0.4 Mt CO_2-eq.[21]

1.B Fugitive Emissions from fuels decreased in most Member States. The largest increase was in the United Kingdom (+1.2 Mt CO_2-eq) and the largest decrease in Italy (−0.9 Mt CO_2-eq).

2.2.2 Industrial Processes and Product Use

Industrial Processes and Product Use (IPPU) contribute to about 9 % of total EU plus Iceland emissions and are the third most important source after energy and agriculture. Emissions from Industrial Processes decreased by 3.0 Mt CO_2-eq for the EU plus Iceland (−0.8 %). Table 7 and Figure 8 show the sub-sector contribution to this trend in emissions. The largest emission decrease occurred in the subsector 2.C Metal industry followed by subsector 2.B Chemical industry. For all other subsectors emissions changes are only small.

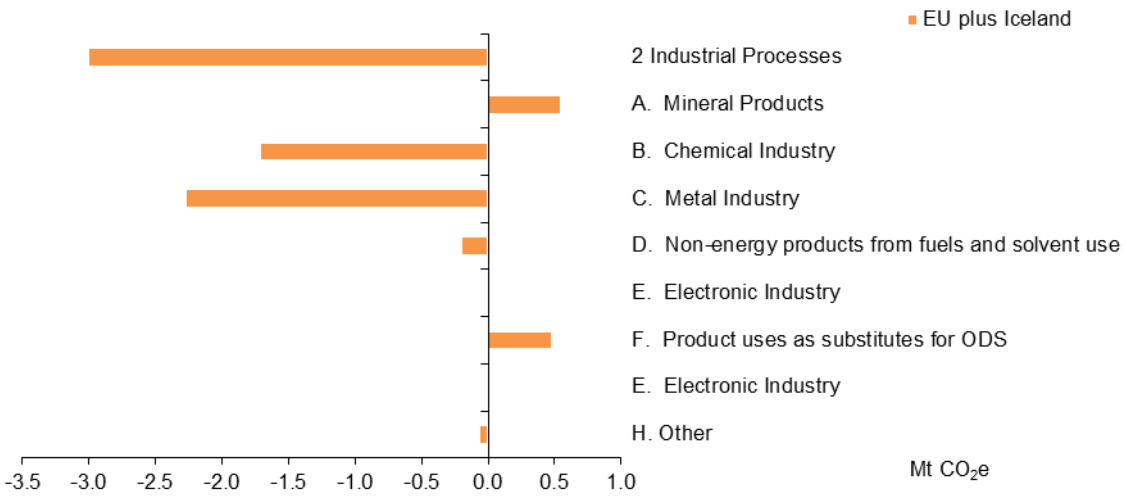
Table 7 Industrial Processes and Product Use emissions, change 2015-2016

Change 2015 / 2016, EU plus Iceland	Mt CO_2-eq	%
2 Industrial Processes	−3.0	−0.8%
A. Mineral Products	0.5	0.5%
B. Chemical Industry	−1.7	−2.7%
C. Metal Industry	−2.3	−3.0%
D. Non-energy products from fuels and solvent use	−0.2	-2.1%
E. Electronic Industry	−0.0	−0.5%
F. Product uses as substitutes for ODS	0.5	0.5%
G. Other Product Manufacture and Use	0.2	2.0%
H. Other	−0.1	−17.2%

Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

[21] For Germany see footnote 20.

Figure 8 Industrial Processes and Product Use emissions, EU plus Iceland, change 2015-2016



Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

In half of the EU-28 Member States emissions from Industrial Processes and Product Use (IPPU) decreased, in the other half they increased. The largest decrease of IPPU emissions was in the United Kingdom (−1.7 Mt CO_2-eq) followed by Hungary (−1.0 Mt CO_2-eq) and the Netherlands (−0.8 Mt CO_2-eq) while the largest increases were in the Czech Republic (+0.6 Mt CO_2-eq) followed by Sweden and Slovakia (+0.4 Mt CO_2-eq each).

Emissions from 2.A Mineral Products increased by 0.5 Mt CO_2-eq or 0.5 %. The largest increase was in Greece (+0.25 Mt CO_2-eq) and the largest decrease was in Italy (−0.4 Mt CO_2-eq).

Emissions from 2.B Chemical Products significantly decreased on the EU plus Iceland level (−1.7 Mt CO_2-eq or −2.7 %). The largest decreases were in Belgium, the Netherlands and Lithuania (−0.4 Mt CO_2-eq each) while the largest increase was in Slovakia (+0.3 Mt CO_2-eq).

The largest IPPU sub-sector decrease was in 2.C Metal Industry (−2.3 Mt CO_2-eq or −3.0 %) with the largest decrease in the United Kingdom (−1.5 Mt CO_2-eq) followed by the Netherlands (−0.5 Mt CO_2-eq) and largest increase in Belgium (0.5 Mt CO_2-eq).

The IPPU sub-sector 2.D Non-energy Products from Fuels and Solvent Use has for the EU plus Iceland had only a minor absolute emission decrease (−0.2 Mt CO_2-eq) but relative emission change (−2.1 %) is stronger than the whole IPPU sector. Largest emission decrease was in Germany (−0.2 Mt CO_2-eq).

The IPPU sub-sector 2.E Electronic Industry was almost constant for whole EU plus Iceland (−0.004 Mt CO_2-eq or −0.5%) while emission changes for individual Member States were within ±0.02 Mt CO_2-eq.

The IPPU sub-sector 2.F Product uses as substitutes for ODS saw emissions increase by 0.5 Mt CO_2-eq or 0.5 %. In 16 Member States emissions increased in this source category, for seven Member States constant 2.F emissions were estimated and in only six Member States emissions decreased. The largest growth of emissions was in Greece, the Czech Republic, Italy, Germany and Spain (+0.2 Mt CO_2-eq each) and the largest emission decrease was in Hungary (−0.5 Mt CO_2-eq) followed by Finland and Denmark (−0.1 Mt CO_2-eq each).

Emissions from 2.G Other Product Manufacture and Use increased for whole EU plus Iceland (+0.2 Mt CO_2-eq or +2.0 %) which is mainly caused by a 0.2 Mt CO_2-eq increase in Germany while emission changes of all other Member States are less than ±0.09 Mt CO_2-eq.

The decrease of emissions from 2.H Other for whole EU plus Iceland (−0.06 Mt CO_2-eq or −17.2 %) is smaller than individual Member State's emission changes. Largest changes were in Germany (−0.18 Mt CO_2-eq) and Belgium (+0.15 Mt CO_2-eq).

2.2.3 Agriculture

Agriculture (excluding LULUCF) contributes to just over 10 % of European GHG emissions. Emissions increased with an overall rise of 3.2 Mt CO_2-eq or 0.7 %. The largest greenhouse gas emitting activities within the sector are CH_4 from livestock and N_2O from soils. Enteric fermentation and soils contributed about 44 % and 37 % of the of the sector's emissions respectively. As shown in Table 8 and Figure 9 the small increase in agriculture sector emissions is almost completely due to increased emissions from enteric fermentation. Manure management, which contributes to about 15 % of agricultural emissions, also saw a small increase.

Table 8 and Figure 9 show the sub-sector 2015-2016 change, with CH_4 and N_2O emissions shown as CO_2 equivalents (Mt CO_2-eq).

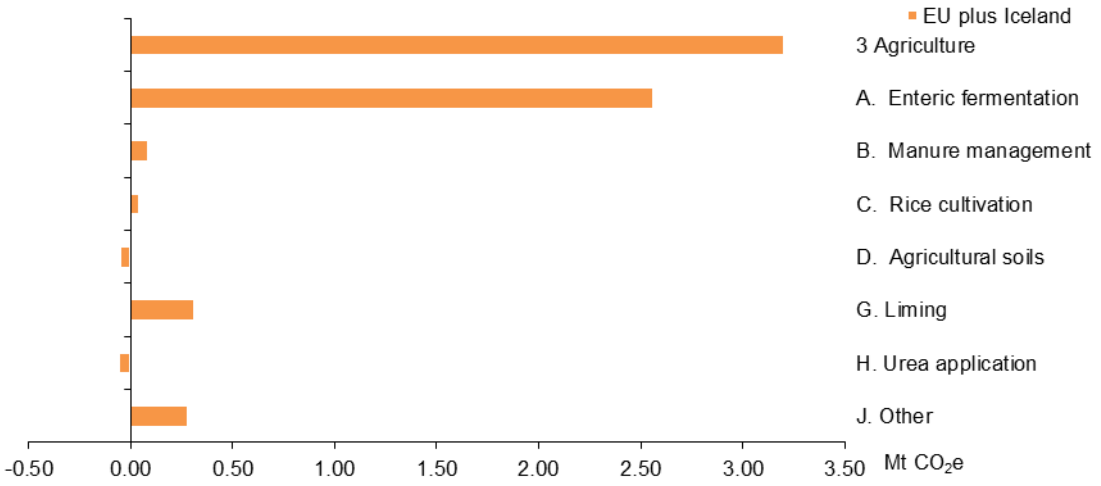
Table 8 Agriculture sector emissions, change 2015-2016

Change 2015 / 2016, EU plus Iceland	Mt CO_2-eq	%
3 Agriculture	3.2	0.7%
A. Enteric fermentation	2.6	1.3%
B. Manure management	0.1	0.1%
C. Rice cultivation	0.0	1.7%
D. Agricultural soils	-0.1	-0.0%
E. Prescribed burning of savannas	-	-
F. Field burning of agricultural residues	0.0	0.5%
G. Liming	0.3	5.4%
H. Urea application	-0.1	-1.3%
I. Other carbon-containing fertilizers	0.0	1.7%
J. Other	0.3	18.4%

Source: The EEA's ETC/ACM, based on 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

Total emissions from agriculture increased due to higher emissions from enteric fermentation.

Figure 9 Agriculture sector emissions, EU plus Iceland, change 2015-2016



Note: Although sub-sectors E. Prescribed burning of savannas, F. Field burning of agricultural residues, and I. Other carbon containing fertilizers are shown in Table 8, they only contribute to about 2% of EU Agricultural emissions and barely change over time so they are not shown in Figure 9.

Source: The EEA's ETC/ACM, based on the 2016 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

Emissions from Enteric Fermentation increased with a small overall rise of 2.6 Mt CO_2-eq or 1.3 %. The largest absolute and relative increases were in the United Kingdom (1.8 Mt CO_2-eq or 8 %), Greece (0.2 Mt CO_2-eq or 4 %), Ireland (0.4 Mt CO_2-eq or 3 %) and the Netherlands (0.3 Mt CO_2-eq or 3 %).

Emissions of CH_4 and N_2O from manure management contribute to about 15 % of agriculture sector and have changed very little over all in the last year with increases balancing decreases. The largest increase was in the Netherlands (0.5 Mt CO_2-eq or 10 %) and the largest decrease was in the UK (0.3 Mt CO_2-eq or 6 %).

Agricultural soils contribute to about 37 % of the emissions from agriculture and have changed very little since 2015 (-54 kt CO_2-eq, -0.03 %), with decreases just outweighing increases. Large decreases were seen in Slovakia (-318 kt CO_2-eq, -20 %) and Spain (-459 kt CO_2-eq, -4 %). The largest increase was in Poland (+518 kt CO_2-eq, +4 %).

2.2.4 Waste

The Waste sector contributes to about 3 % of European emissions. Waste related emissions continue to decrease reflecting the large relative proportion of emissions from solid waste disposal (70 % of Waste emissions are from Solid waste disposal) and the ongoing effect of restrictions on landfilling of organic degradable waste that was implemented decades ago.

Emissions from the Waste sector decreased by −5.9 Mt CO_2-eq compared to 2015. Table 9 and Figure 10 show the sub-sector contributions to this trend in emissions.

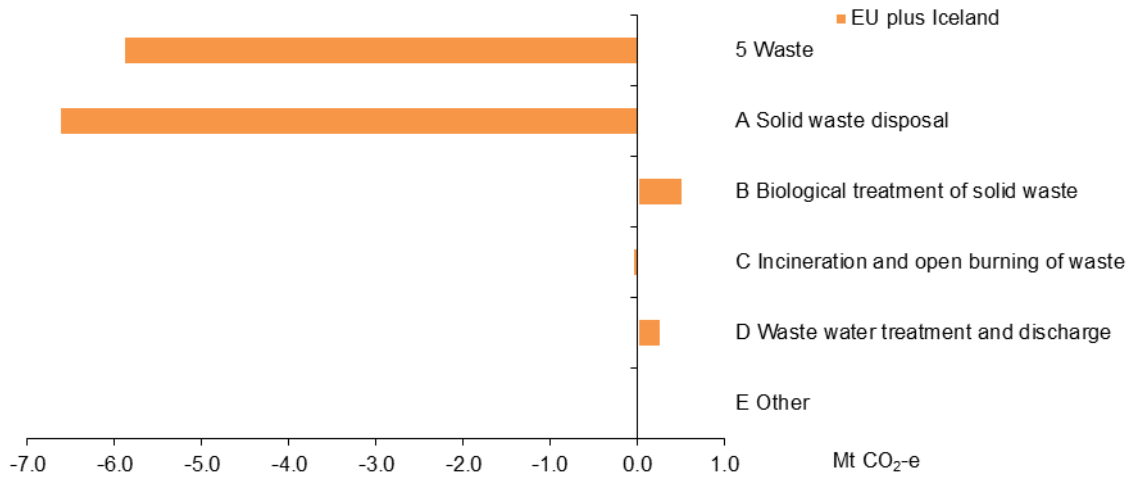
Table 9 Waste sector emissions, change 2015-2016

Change 2015 / 2016, EU plus Iceland	Mt CO_2-eq	%
5 Waste	-5.9	-4.2%

A Solid Waste Disposal	-6.6	-6.6%
B Biological Treatment of Solid Waste	0.5	7.1%
C Incineration and Open burning of Waste	-0.1	-1.2%
D Waste Water Treatment and Discharge	0.3	1.0%
E Other	0.0	-0.4%

Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015 and proxy estimates for 2016.

Figure 10 Waste sector emissions, EU plus Iceland, change 2015-2016



Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to the UNFCCC for 1990-2015 and proxy estimates for 2016

Waste emissions only increased in seven Member States (Croatia, Cyprus, the Czech Republic, Greece, Latvia, Luxembourg and Spain) while they did not change for Denmark, Poland, Slovakia, Slovenia and Iceland and decreased in all other Member States and in Norway. The largest decrease of waste emissions occurred in the United Kingdom (−3.6 Mt CO_2-eq), followed by Italy (−0.9 Mt CO_2-eq) and Germany (−0.5 Mt CO_2-eq) while the largest increase was in Spain (+0.3 Mt CO_2-eq), followed by Greece and Croatia (both +0.08 Mt CO_2-eq) and the Czech Republic (+0.06 Mt CO_2-eq).

The trends of 5.A Solid Waste emissions dominated the waste sector. Seventeen Member States decreased emissions from solid waste (largest decrease in the United Kingdom with −4.2 Mt CO_2-eq) while only six Member States had increasing emissions (largest Spain with +0.3 Mt CO_2-eq). For the remaining Member States constant emissions were estimated.

2.3 ETS versus ESD emissions

Within the European Union there are two policy instruments for achieving the GHG emission reductions: One part is covered by the EU Emissions Trading System (ETS) while the non-ETS sector is regulated by the Effort Sharing Decision (ESD). ESD emissions are calculated by deducting ETS emissions, CO_2 emissions from domestic aviation, NF_3 emissions and indirect CO_2 emissions from total emissions, see Equation 1.

Equation 1

$$E_{ESD} = E_{total} - E_{ETS} - E_{1A3a\_CO2} - E_{NF3} - E_{indirect\_CO2}$$

with

E_{ESD}	*Emissions under Effort Sharing Decision*
E_{total}	*Total emissions excl. LULUCF incl. indirect* CO_2
E_{ETS}	*Emissions under Emissions Trading Scheme without aviation*
E_{1A3a_CO2}	CO_2 *emissions from Domestic Aviation*
E_{NF3}	NF_3 *emissions*
$E_{indirect\_CO2}$	*Indirect* CO_2 *emission*

Table 10 shows total, ETS and ESD emissions per country. 2015 total emissions come from the latest inventory, 2016 total emissions from the proxies. ETS emissions are taken from the European Union Transaction Log (EUTL; European Commission, 2017) for stationary installations, ESD emissions are calculated as described in the formula above. Relative changes in emissions between the years 2016 and 2015 can be seen on the right.

Table 10 Total, ETS and ESD emissions 2015 and 2016, kt CO_2-eq

MS	2015 GHG emissions			2016 GHG emissions			Change 2016 versus 2015		
	Total	ETS	ESD	Total	ETS	ESD	Total	ETS	ESD
AT	78 851	29 492	49 295	79 222	29 000	50 157	0.5%	-1.7%	1.7%
BE	117 443	44 714	72 720	118 194	43 656	74 529	0.6%	-2.4%	2.5%
BG	61 483	36 261	25 182	58 405	33 411	24 954	-5.0%	-7.9%	-0.9%
CY	8 431	4 369	4 060	8 841	4 649	4 191	4.9%	6.4%	3.2%
CZ	127 926	66 631	61 282	125 664	67 520	58 132	-1.8%	1.3%	-5.1%
DE	901 932	455 700	444 005	905 545	452 897	450 422	0.4%	-0.6%	1.4%
DK	48 331	15 796	32 408	49 690	17 219	32 344	2.8%	9.0%	-0.2%
EE	18 040	11 895	6 144	19 289	13 448	5 840	6.9%	13.1%	-5.0%
ES	335 662	137 270	195 888	323 855	123 556	197 795	-3.5%	-10.0%	1.0%
FI	55 559	25 487	29 887	58 758	27 245	31 327	5.8%	6.9%	4.8%
FR	457 129	99 590	352 978	463 129	101 566	357 002	1.3%	2.0%	1.1%
GR	95 715	49 876	45 449	93 171	46 300	46 482	-2.7%	-7.2%	2.3%
HR	23 502	8 386	15 085	22 577	8 267	14 279	-3.9%	-1.4%	-5.3%
HU	61 092	19 650	41 438	61 539	19 401	42 134	0.7%	-1.3%	1.7%
IE	59 878	16 830	43 037	62 287	17 734	44 542	4.0%	5.4%	3.5%
IT	433 025	156 213	274 731	434 588	155 038	277 470	0.4%	-0.8%	1.0%
LT	20 096	6 845	13 249	19 165	6 160	13 003	-4.6%	-10.0%	-1.9%
LU	10 269	1 661	8 607	10 019	1 503	8 515	-2.4%	-9.5%	-1.1%
LV	11 319	2 313	9 005	11 066	2 197	8 868	-2.2%	-5.0%	-1.5%
MT	2 227	890	1 333	1 926	580	1 342	-13.5%	-34.9%	0.7%
NL	195 246	94 095	101 120	196 560	93 878	102 651	0.7%	-0.2%	1.5%
PL	385 843	198 701	187 018	390 979	198 052	192 802	1.3%	-0.3%	3.1%
PT	68 916	27 936	40 614	66 482	25 710	40 406	-3.5%	-8.0%	-0.5%
RO	116 427	42 396	73 904	112 562	39 778	72 658	-3.3%	-6.2%	-1.7%
SE	53 690	19 236	33 951	53 610	19 399	33 708	-0.1%	0.8%	-0.7%
SI	16 831	6 110	10 720	17 520	6 479	11 039	4.1%	6.0%	3.0%
SK	41 269	21 181	20 085	41 007	21 264	19 740	-0.6%	0.4%	-1.7%
UK	503 500	175 882	326 033	473 363	147 407	324 372	-6.0%	-16.2%	-0.5%
EU28	**4 309 630**	**1 775 405**	**2 519 228**	**4 279 013**	**1 723 311**	**2 540 774**	**-0.7%**	**-2.9%**	**0.9%**
IS	4 539	1 812	2 707	4 539	1 781	2 738	0.0%	-1.7%	1.1%
EU28+IS	**4 314 169**	**1 777 217**	**2 521 935**	**4 283 552**	**1 725 092**	**2 543 512**	**-0.7%**	**-2.9%**	**0.9%**

Note: Only emissions from stationary installations are included in these ETS data hence emission from aviation is excluded.

Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015, proxy estimates for 2016 totals. ETS data is from EUTL (verified emissions for 2015 and 2016, not from the Member States proxies).

In total, emissions changed by -0.7 % for EU plus Iceland between 2015 and 2016. They decreased by −2.9 % in the ETS sector while they increased by +0.9 % in the ESD sector. Figure 11 illustrates all emission trend changes.

In absolute terms, the total emission decrease in the EU plus Iceland was -30.6 Mt CO_2-eq. In the ETS sector emissions were reduced by −52.1 Mt CO_2-eq and in the ESD sector emissions rose by +21.5 Mt CO_2-eq.

At Member State level the trend change in emissions separated between ETS and ESD looks quite different. ETS emissions decreased in eighteen Member States (Austria, Belgium, Bulgaria, Croatia, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Spain and the United Kingdom) as well as in the EEA member country Iceland. By far the largest absolute decrease was in the United Kingdom (−28.5 Mt CO_2-eq) followed by Spain

(−13.7 Mt CO_2-eq). The largest relative decrease of ETS emissions was in Malta (−35.0 %) followed by the United Kingdom (−16.2 %), Lithuania and Spain (both −10.0 %).

In ten EU Member States (Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Ireland, Slovakia, Slovenia and Sweden) ETS emissions increased. The largest absolute growth was experienced in France (+2.0 Mt CO_2-eq) followed by Finland (+1.8 Mt CO_2-eq), Estonia (+1.6 Mt CO_2-eq) and Denmark (+1.4 Mt CO_2-eq). Estonia (+13.1 %) and Denmark (+9.0 %) saw the highest relative ETS emission increase.

ESD emissions decreased in thirteen Member States (Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Latvia, Lithuania, Luxembourg, Portugal, Romania, Slovakia, Sweden and the United Kingdom). The largest absolute decrease can be observed in the Czech Republic (-3.2 Mt CO_2-eq), followed by the United Kingdom (−1.7 Mt CO_2-eq) and Romania (−1.2 Mt CO_2-eq). The largest relative decline was in Croatia (−5.3 %), the second largest was in Estonia (−5.0 %).

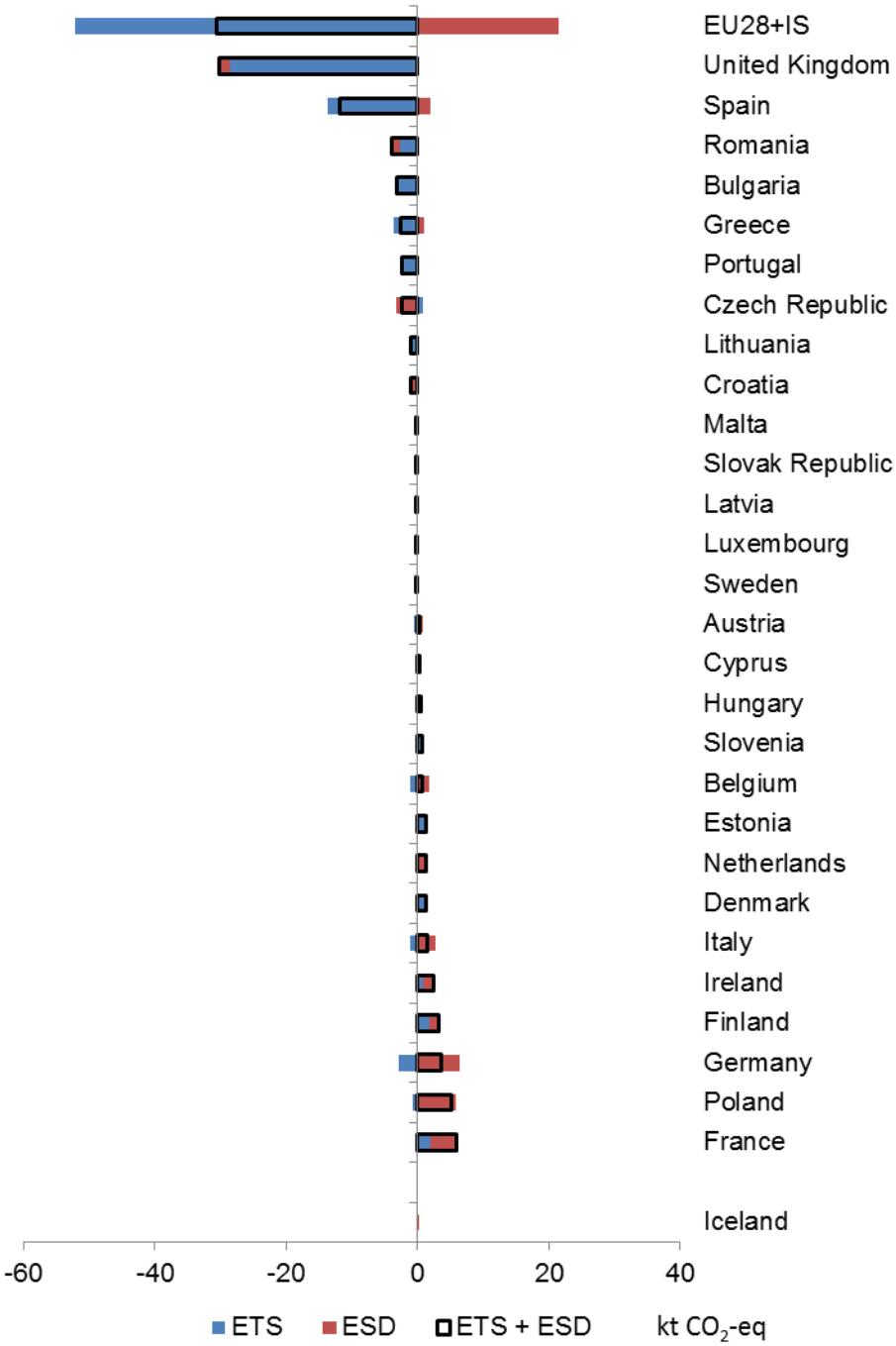
Fifteen Member States (Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Malta, the Netherlands, Poland, Slovenia and Spain) and also Iceland saw increases in ESD emissions. Largest absolute ESD emission increases were in Germany (+6.4 Mt CO_2-eq) followed by Poland (+5.8 Mt CO_2-eq), France (+4.0 Mt CO_2-eq) and Italy (+2.7 Mt CO_2-eq). The largest relative increase of ESD emissions was in Finland (+4.8 %) followed by Ireland (+3.5 %), Cyprus (+3.2 %), Poland (+3.1 %) and Slovenia (+3.0 %).

Decreases of both ETS and ESD emissions can hence be seen for eight Member States: Bulgaria, Croatia, Lithuania, Luxembourg, Latvia, Portugal, Romania and the United Kingdom. In contrary, there are five Member States which had increases in both ETS and ESD emissions: Cyprus, Finland, France, Ireland and Slovenia.

In ten Member States (Austria, Belgium, Germany, Greece, Hungary, Italy, Malta, the Netherlands, Poland and Spain) as well as in Iceland emissions in the ETS sector decreased while emissions in the ESD sector increased. A contrasting development can be observed in five Member States: The Czech Republic, Denmark, Estonia, Sweden and Slovakia where ETS emissions increased and ESD emissions decreased.

Norway and Switzerland are not presented in this chapter. Norway does not participate in the ESD and Switzerland does neither participate in the EU ETS nor the ESD.

Figure 11 ETS and ESD emissions, change 2015-2016



Source: The EEA's ETC/ACM, based on the 2017 Member States' GHG inventories submitted to UNFCCC for the years 1990-2015, proxy estimates for 2016 totals. ETS data is from EUTL (verified emissions for 2015 and 2016, not from the Member States proxies).

3. Performance of last year's EU proxy

National GHG inventories are required to fulfil certain principles as laid out in the UNFCCC reporting guidelines for GHG inventories: inventories must be transparent, consistent, comparable, complete and accurate (TCCCA). The IPCC Good Practice Guidance recommends Parties to perform QA/QC procedures that are important information to enable continuous improvement to inventory estimates. Through the quantification of deviations at the source level and for the inventory as a whole, improvements can be prioritised. Thus Parties may change methodologies in order to improve their greenhouse gas estimates at source level (e.g. moving from Tier 2 to Tier 3). Such methodological changes at Member States level cannot be captured in the calculation of the approximated GHG inventory for the EU. On-going quality improvements in Member States' inventories to take effect in next year's official submissions to UNFCCC are therefore a source of uncertainty for the proxy inventory.

This section compares the differences between the previous proxy estimates and the subsequent official inventory submissions.

Last year's proxy GHG estimates for 2015 overestimated the GHG emissions for EU plus Iceland by 0.06 %. It has to be taken into account that recent national improvements of GHG reporting methodologies could not be considered for the calculation of the approximated GHG inventory, as the 2016 estimates for the 2015 proxy inventory were based on the national methodologies used for 2016 inventory submissions (covering emissions until 2014). This is especially the case for those emission estimates performed by EEA and its ETC/ACM for gap-filling missing or partially incomplete submissions of proxy GHG inventories. Both Member States and ETC/ACM estimates rely in some categories on trend extrapolations or simply use previous year emissions as proxy estimates. This is in particular for the source categories some subcategories in industrial processes and product use, agriculture and waste where short-term activity data are lacking. Thus, revised methodologies and parameters at Member States level will always result in deviations between the final inventory and the proxy inventory.

The effect of Member States' recalculations of GHG estimates and methodological improvements dominate the differences of the 2015 proxy emission estimates compared to 2015 emissions officially reported in 2017. After taking these recalculations into account difference between the proxy GHG inventory for 2015 and final GHG inventory submission was only 0.11 % for total emissions (including indirect CO_2, excluding LULUCF) for EU plus Iceland.

3.1 Difference between MS proxy and final GHG inventories

The proxy submissions by Member States closely mirrored the slight increase in official emissions as reported to the UNFCCC this year. The differences per Member State given in Table 11 arise from several factors: different methodologies and data with varying precision used across the Member States (resp. ETC/ACM for gap-filling); the lack of updated (t-1) activity data for some key emission sources; and, from Member States' own recalculations of GHG estimates and methodological improvements which mainly cannot be reflected in the approximated data where usually constant methodologies and emission factors are assumed.

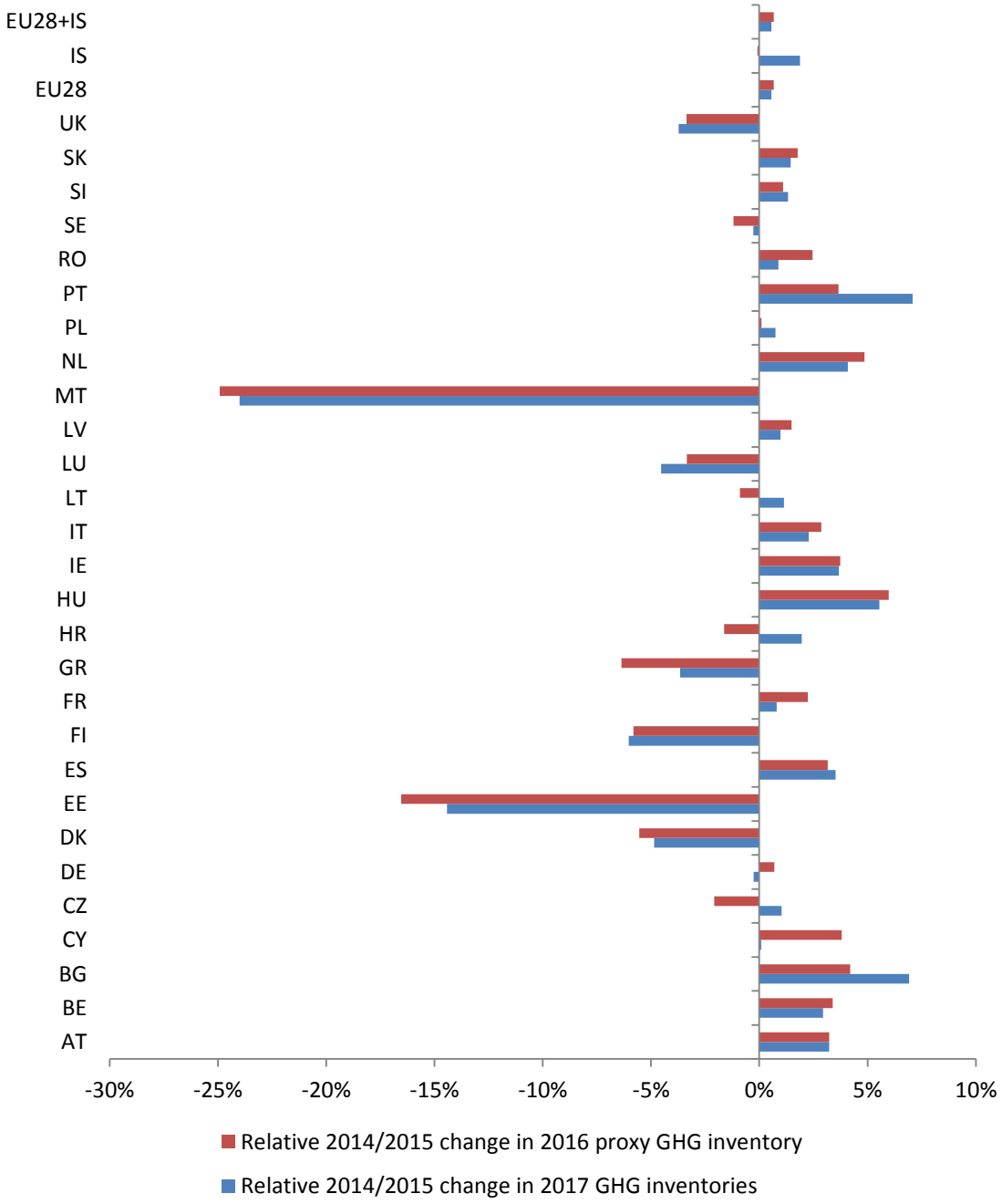
Table 11 Difference per Member State for year 2015 between proxy and final GHG inventories

MS	Inventory 2015 (Submission 2017)	Proxy 2015 (Submission 2016)	Deviation 2015		Recalcu-lations	Deviation 2015 cleared of impact of recalculations	Proxy calculated by
	kt CO2eq			%			
AT	78 851	78 802	-49	-0.1%	0.1%	0.0%	MS
BE	117 443	117 725	282	0.2%	0.2%	0.4%	MS
BG	61 483	59 599	-1 884	-3.1%	0.5%	-2.5%	ETC/ACM
CY	8 431	8 714	283	3.4%	0.3%	3.7%	MS
CZ	127 926	123 262	-4 664	-3.6%	0.6%	-3.1%	ETC/ACM
DE	901 932	906 499	4 567	0.5%	0.5%	1.0%	MS
DK	48 331	48 336	5	0.0%	-0.7%	-0.7%	MS
EE	18 040	17 576	-464	-2.6%	0.1%	-2.5%	MS
ES	335 662	339 326	3 664	1.1%	-1.4%	-0.3%	MS
FI	55 559	55 671	112	0.2%	0.0%	0.2%	MS
FR	457 129	469 184	12 055	2.6%	-1.2%	1.5%	MS
GR	95 715	94 945	-770	-0.8%	-2.0%	-2.8%	MS
HR	23 502	22 527	-976	-4.2%	0.7%	-3.5%	MS
HU	61 092	60 647	-445	-0.7%	1.1%	0.4%	MS
IE	59 878	60 429	551	0.9%	-0.9%	0.1%	MS
IT	433 025	430 558	-2 467	-0.6%	1.1%	0.6%	MS
LT	20 096	18 968	-1 128	-5.6%	3.8%	-1.8%	ETC/ACM
LU	10 269	10 410	141	1.4%	-0.1%	1.2%	MS
LV	11 319	11 543	223	2.0%	-1.4%	0.5%	MS
MT	2 227	2 240	13	0.6%	-1.8%	-1.2%	MS
NL	195 246	196 139	894	0.5%	0.3%	0.7%	MS
PL	385 843	380 412	-5 431	-1.4%	0.8%	-0.6%	MS
PT	68 916	66 880	-2 036	-3.0%	-0.3%	-3.2%	MS
RO	116 427	112 462	-3 965	-3.4%	5.2%	1.7%	ETC/ACM
SE	53 690	53 733	42	0.1%	-1.0%	-0.9%	MS
SI	16 831	16 765	-66	-0.4%	0.2%	-0.2%	MS
SK	41 269	41 378	109	0.3%	0.0%	0.3%	MS
UK	506 765	506 142	-624	-0.1%	0.5%	0.4%	MS
EU28	4 308 416	4 310 868	2 452	0.1%	0.1%	0.1%	ETC/ACM
IS	4 539	4 593	54	1.2%	-3.1%	-1.9%	MS
EU28+IS	4 312 955	4 315 461	2 506	0.1%	0.1%	0.11%	ETC/ACM

Source: Member States submissions to UNFCCC and proxy estimates for 2015

The largest deviations in relative terms occurred for Lithuania (proxy 5.6% lower), followed by Croatia (proxy 4.2 % lower), Czech Republic (proxy 3.6 % lower), Cyprus (proxy 3.4 % higher) and Romania (proxy 3.4% lower). In absolute terms the deviations were highest for France (overestimate by proxy of 12.1 Mt CO_2-eq), Poland (underestimate of proxy by 5.4 Mt CO_2-eq), Czech Republic (underestimate by proxy of 4.6 Mt CO_2-eq), Germany (overestimate by proxy of 4.6 Mt CO_2-eq) and Romania (underestimate by proxy of 4.0 Mt CO_2-eq). By comparing the percentage changes in emission levels 2014/2015 as derived from the 2016 proxy GHG inventory on the one hand and from the 2017 official GHG inventory submissions to UNFCCC on the other, the deviations are in almost all cases in the same order of magnitude, see Figure 12. Also the direction of the emission trend (increasing or decreasing) was estimated correctly except for the Czech Republic, Germany, Lithuania and Iceland which had only comparatively small 2014/2015 emission changes.

Figure 12 Differences between approximated and submitted inventories for relative 2014/2015 emission changes by Member State



Source: Member States submissions to UNFCCC and proxy estimates for 2015

In the following sections country-specific deviations are further explained for some Member States with high deviations in absolute terms (France, Poland, Czech Republic) and/or in relative terms (Lithuania, Czech Republic, Croatia) (see also Table 11):

- Croatia: Total emissions were underestimated by the 2015 proxy inventory by 0.98 Mt CO_2-eq (4.2 %). Of that underestimation 0.15 Mt CO_2-eq are related to recalculation. While the 2015 proxy inventory saw a 0.37 Mt CO_2-eq (-1.6 %) emissions decrease, emissions increased in final inventory

by 0.45 Mt CO_2-eq (2.0%). Sectors with largest deviations are Other sectors (1A.4) with an underestimation of 0.56 Mt CO_2-eq (17.5%) and Transport (1.A.3) with an underestimation of 0.36 Mt CO_2-eq (6.4%). In both cases recalculations play only minor roles. Most important recalculations occurred in Energy industries (1.A.1) with 0.16 Mt CO_2-eq. All other sectors differ by less than 0.2 Mt CO_2eq.

- Czech Republic: Total emissions were underestimated by the 2015 proxy inventory by 4.7 Mt CO_2-eq (3.6 %). Largest absolute deviations were found in Energy industries (1.A.1) with an underestimation of 2.2 Mt CO_2-eq (4.1%) followed by Other sectors (1.A.4) with an underestimation of 1.4 Mt CO_2-eq (12.3 %). The deviation in Other sectors is mainly caused by a recalculation of 1.2 Mt CO_2-eq, the largest recalculation of all sectors and larger than the recalculation effect of total emissions (0.7 Mt CO_2-eq). All other sectors deviate less than 0.8 Mt CO_2-eq.
- France: Total emissions were overestimated by the 2015 proxy inventory by 12.1 Mt CO_2-eq (2.6 %). Of that overestimation 5.4 Mt CO_2-eq are related to recalculation. Largest absolute deviation was found in Manufacturing industries and construction (1.A.2) with an overestimation of 10.1 Mt CO_2-eq (20.1 %) which is heavily influenced by a recalculation of 8.4 Mt CO_2-eq. Also in Other sectors (1.A.4) a recalculation of 1.6 Mt CO_2-eq contributes significantly to the underestimation of 4.9 Mt CO_2-eq (5.5 %). The third largest deviation was found in Chemical industry (2.B) where the underestimation and recalculation are both 3.7 Mt CO_2-eq (46.0 %). All other sectors deviate less than 1.4 Mt CO_2-eq.
- Lithuania: Total emissions were underestimated by the 2015 proxy inventory by 1.13 Mt CO_2-eq (5.6 %). Of that underestimation 0.73 Mt CO_2-eq are related to recalculation. Largest deviation occurred in Agricultural soils (3.D) with an underestimation of 0.60 Mt CO_2-eq (24.5 %) which reduces after clearing for recalculation to only 0.02 Mt CO_2-eq. All other sectors deviate less than 0.13 Mt CO_2-eq.
- Poland: Total emissions were underestimated by the 2015 proxy inventory by 5.4 Mt CO_2-eq (1.4 %). Of that underestimation 2.9 Mt CO_2-eq are related to recalculation. The largest difference occurred in Energy industries with an underestimation of 5.6 Mt CO_2-eq (3.4 %) which also remains taking recalculation effects into account. Second largest deviation was a 4.8 Mt CO_2-eq (20.9%) underestimation of Fugitive emissions (1.B). Of that 3.9 Mt CO_2-eqcan be explained by recalculations. Third largest deviation occurred in Manufacturing industries and construction (1.A.2) with an overestimation of 2.1 Mt CO_2-eq (7.4 %) where recalculations of 0.4 Mt explain about a quarter of the deviation. All other sectors deviate less than 1.5 Mt CO_2-eq.

After taking into account recalculations, the relative differences were largest for Cyprus (+3.7 %), Croatia (-3.5 %), Portugal (-3.2%) and Czech Republic (−3.1 %).

3.2 Sectoral differences between proxy and final GHG inventories

At the sectoral level, the largest difference between the proxy and the final GHG inventory in absolute terms was in 1.A.2 Manufacturing industries (+5.9 Mt CO_2-eq). The next the largest differences were in 2.C Metal production (−4.6 Mt CO_2-eq), sector 1.B Fugitive emissions (−4.4 Mt CO_2-eq) and 1.A.3 Transport (+4.2 Mt CO_2-eq). After accounting for recalculation effects, the differences for sectors 1.B Fugitive emissions and 2.C Metal production are significantly smaller. In 1.A.3 Transport and 1.A.4 Other sectors recalculations had only minor effects. Sectors with highest relative deviation after allowing for recalculation effects were 3.F Field burning of agricultural residues (20.3 %), 1.A.5 Other

[energy] (−19.5%), 3.J Other [agriculture] (18.3%) and 2.H Other [industrial processes and product use] (13.0 %), see Table 12.

Table 12 Difference per sector for year 2015 between proxy and final GHG inventories

Sector	Inventory 2015 (Submission 2017)	Proxy 2015 (Submission 2016)	Deviation 2015		Recalcu-lations	Deviation 2015 cleared of impact of recalculations
	kt CO2eq			%		
Total incl. indirect CO2 excl. LULUCF	4 312 955	4 315 461	2 506	0.1%	0.1%	0.1%
1 Energy	3 359 926	3 365 079	5 153	0.2%	0.1%	0.3%
1.A Fuel combustion	3 269 787	3 279 335	9 548	0.3%	0.1%	0.3%
1.A.1 Energy industries	1 242 003	1 240 145	-1 858	-0.1%	0.7%	0.5%
1.A.2 Manufacturing industries	483 819	489 697	5 878	1.2%	-2.2%	-1.0%
1.A.3 Transport	906 000	910 168	4 168	0.5%	0.2%	0.7%
1.A.4 Other sectors	630 976	634 100	3 125	0.5%	0.3%	0.8%
1.A.5 Other	6 990	5 225	-1 765	-25.2%	5.7%	-19.5%
1.B Fugitive emissions	90 138	85 744	-4 395	-4.9%	2.6%	-2.3%
2 Industrial processes & product use	375 917	371 140	-4 776	-1.3%	1.2%	-0.1%
2.A Mineral products	108 443	108 688	245	0.2%	0.1%	0.3%
2.B Chemical industry	62 682	59 130	-3 552	-5.7%	6.0%	0.3%
2.C Metal production	76 108	71 498	-4 611	-6.1%	2.1%	-3.9%
2.D Non-energy products	9 973	12 070	2 097	21.0%	-12.1%	8.9%
2.E Electronic Industry	813	835	22	2.8%	-2.0%	0.7%
2.F Product uses as ODS substitutes	107 399	107 680	281	0.3%	0.7%	1.0%
2.G Other product manufacture and use	10 126	10 596	470	4.6%	0.2%	4.8%
2.H Other	373	331	-42	-11.2%	24.2%	13.0%
3 Agriculture	437 451	436 493	-958	-0.2%	-0.2%	-0.5%
3.A Enteric fermentation	192 553	189 343	-3 210	-1.7%	1.9%	0.3%
3.B Manure management	65 832	66 815	983	1.5%	-2.9%	-1.4%
3.C Rice cultivation	2 612	2 738	125	4.8%	-4.7%	0.1%
3.D Agricultural soils	163 680	164 023	343	0.2%	-1.0%	-0.8%
3.F Field burning of agricultural residues	953	1 577	624	65.4%	-45.1%	20.3%
3.G Liming	5 735	6 007	272	4.7%	-2.6%	2.2%
3.H Urea application	4 454	3 985	-469	-10.5%	1.7%	-8.9%
3.I Other carbon-containing fertilizers	91	82	-8	-9.4%	0.0%	-9.4%
3.J Other	1 541	1 924	383	24.8%	-6.5%	18.3%
5 Waste	138 000	141 012	3 012	2.2%	-2.0%	0.2%
5.A Solid waste disposal	99 775	102 679	2 905	2.9%	-2.9%	0.0%
5.B Biological treatment of solid waste	7 258	7 089	-169	-2.3%	2.8%	0.5%
5.C Incineration & open burning of waste	4 150	3 842	-309	-7.4%	16.7%	9.2%
5.D Waste water treatment & discharge	26 691	27 300	609	2.3%	-2.3%	0.0%
5.E Other	125	102	-23	-18.2%	23.7%	5.5%
Indirect CO2	1 662	4 105	2 443	147.0%	-59.9%	87.1%

Source: Member States submissions to UNFCCC and proxy estimates for 2015

In the Energy sector, deviations after recalculation are very small. They are highest for 1.A.5 Other (-19.5 %) and within ±1% for all other energy combustion sectors. For 1.B Fugitive emissions deviations after recalculations are larger (+2.3%).

In Sector 2 (Industrial processes & product use) there were considerable recalculations for some subsectors. The largest relative deviations occurred in 2.D Non-energy products (21.0 %) and 2.H Other (−11.2 %). These are also the subsectors with the largest recalculation effect. The largest absolute difference was in subsector 2.C Metal production (−4.6 Mt CO_2-eq or −6.1 %) followed by 2.B Chemical industry (−3.5 Mt CO_2-eq resp. −5.7 %). Both are significantly reduced after taking recalculation effects into account. For the IPPU sector overall after allowing for recalculations, the proxy results align well with inventory results (−0.1 %).

The agricultural sector has the highest relative deviation (−0.5 %) after recalculation. There were also quite considerable recalculations in the subsectors. The largest absolute recalculation was in 3.A Enteric fermentation and the largest relative recalculation in 3.F Field burning of agricultural residues.

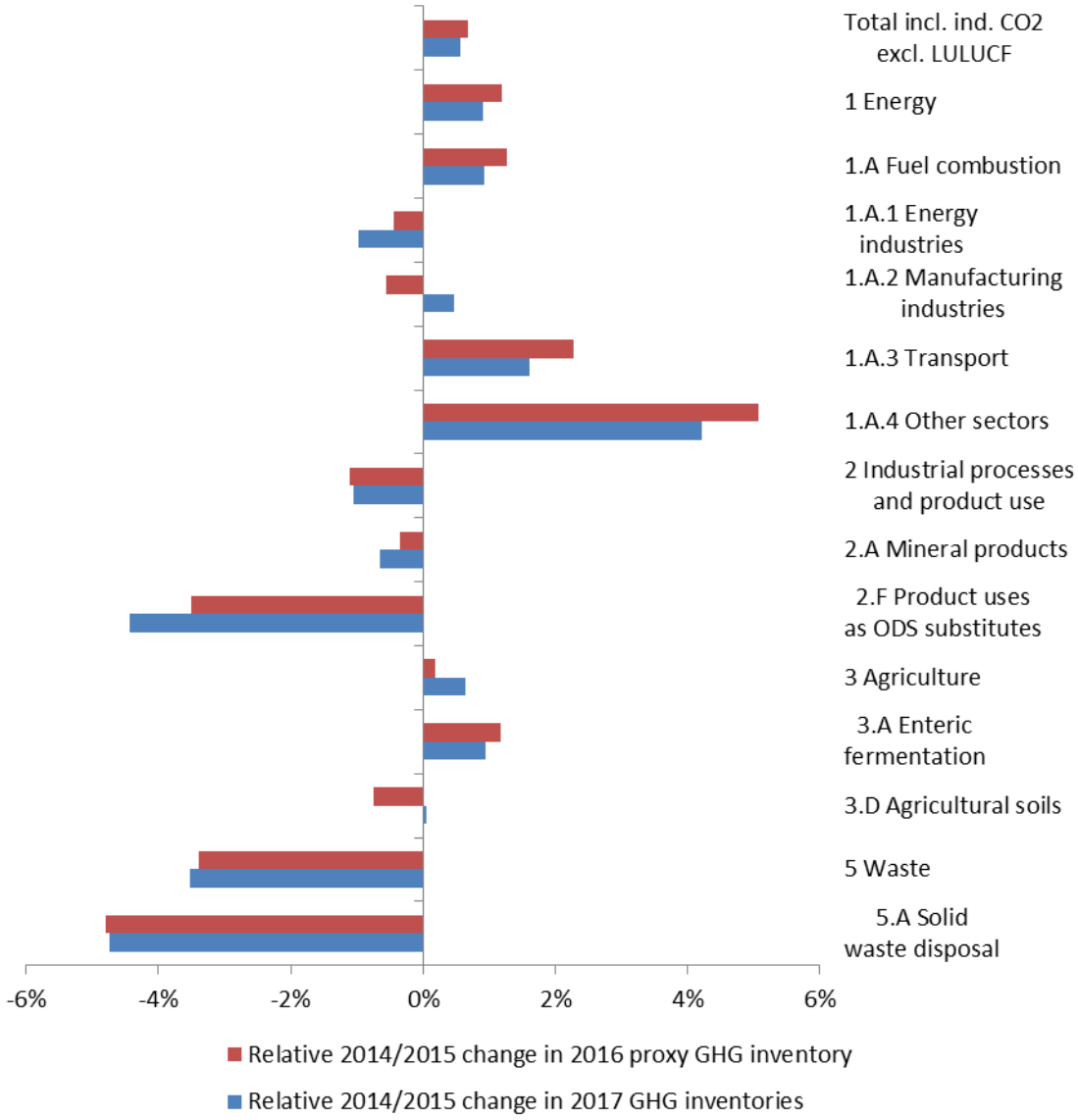
In the two most important subsectors, 3.A Enteric fermentation and 3.D Agricultural soils, deviations after adjusting for recalculation effects were less than ±1 %. The largest relative differences are in subsectors with less than 1 Mt CO_2-eq emissions.

In the waste sector recalculations reduced the difference between the proxy and the final GHG inventory for all subsectors. The highest relative deviation of all waste subsectors was in subsector 5.C Incineration and open burning of waste. Differences both before and after correction for recalculation effects are quite high. In the most important subsectors (5.A Solid waste disposal and 5.D Waste water treatment and discharge) the deviations can be fully explained by recalculation effects. The total deviation in the waste sector is 0.2 % after recalculation.

The differences for estimates for indirect CO_2 are significant. However the absolute amounts of indirect CO_2 emissions have only a very small share in total EU plus Iceland emissions.

By comparing the percentage changes in emission levels 2014/2015 as derived from the 2016 proxy GHG inventory on the one hand and from the 2017 official GHG inventory submissions to UNFCCC on the other by sectors, the differences are in the same order of magnitude in sectors with more than 100 Mt CO_2-eq, see Figure 13. Also the direction of the emission trend (increasing or decreasing) was estimated correctly except for 1.A.2 Manufacturing industries and construction and 3.D (Agricultural soils) which both had only comparatively small 2014/2015 emission changes.

Figure 13 Difference between proxy and submitted inventories for relative 2014/2015 emission changes by sector



Note: Only sectors with GHG emissions of more than 100 Mt CO_2-eq in 2015 are shown.
Source: Member States submissions to UNFCCC and proxy estimates for 2015

4. Methodologies and data sources at Member State level

4.1 Description of different approaches

This report presents the estimated GHG emissions for 2016 based on Member State emissions estimates, submitted to EEA by 31 July. The aggregated EU plus Iceland proxy GHG emission estimates are based on these submissions and gap filling where necessary.

Under the Regulation (EU) 525/2013 on the mechanism for monitoring and reporting GHG emissions (EU MMR) and its implementing provisions, Member States submit, where possible, to the European Commission approximated GHG inventories by 31 July every year for the preceding year *t*–1. Where a Member State has not submitted a 'proxy' inventory, the EEA uses its own estimates for gap-filling purposes in order to have a complete approximated GHG inventory at EU level.

For gap-filling, the EEA uses the latest activity data available at country level to estimate the emissions. For emission sources for which no appropriate data sets exist, emissions are extrapolated from past trends, or emissions from the previous year are kept constant where historic data do not show a clear linear trend. The emission estimates assume no change in emission factors or methodologies as compared to the latest official inventory submissions to UNFCCC for the year *t*–2.

The methodology developed to estimate GHG emissions using a 'bottom-up' approach is included in Annex II. It uses data sources (or estimates) that were published prior to the end of July for individual countries, sectors and gases to derive GHG estimates for the preceding year (*t*–1). The estimates cover total GHG emissions as reported under the Kyoto Protocol and the UNFCCC excluding the LULUCF sector but including indirect CO_2 emissions.

Approximated greenhouse gas inventories were missing for Bulgaria, Cyprus and Romania. These were gap-filled with estimates calculated by ETC/ACM for EEA with the same or improved bottom-up country specific methods that were used in previous years.

For some MS proxies, it has been necessary to allocate or distribute the reported emissions to sectors or within sub-sectors. This is done to allow for the aggregation and explanation of trends at EU level. These allocations were needed for Belgium, Denmark, Germany, Greece, Hungary, Ireland, Sweden and the United Kingdom.

4.1.1 MS proxies submitted under the EEA MMR

Member States are responsible for the methodological choice regarding their own estimates. The MS proxies should submit approximated GHG inventories for the preceding year (*t*–1) in accordance with the Summary2 table of the Common Reporting Format (CRF). The implementing regulation of the EU MMR requires the calculation at a level of disaggregation of source categories reflecting the activity data and methods available for the preparation of the proxy estimates. Therefore it is in line with the MMR if Member States submit only partially complete Summary2 tables with their proxy estimates.

Additionally Member States should split emissions – where available –into ETS and non-ETS emissions and shall provide information on drivers and trends for *t*–1.

4.1.2 Gap-filling for MS not submitting a 'proxy' inventory

Estimates by the EEA and ETC/ACM are made for all major source categories in all sectors. For the most important source categories, data sources with updated activity or emissions data for the year *t*–1were identified and used to calculate emissions. For source categories for which no international data sets with updated activity data exist or which are too complex for such an approach, emissions were extrapolated from past trends (linear extrapolation), or emissions from the previous year were kept constant or the average of three preceding years was used if historic data did not show a clear trend. On this basis, a detailed bottom-up approach was developed covering the full scope of emissions included in a GHG inventory submission.

The EEA estimates are based on publicly available data sets at the national, European and international levels. These data sets are disaggregated by major source categories in all sectors reported under the UNFCCC and the Kyoto Protocol. For the estimation of approximated emissions, the following data sources for emissions or activities were used:

- BP's Statistical Review of World Energy 2017[22];
- Verified emissions reported under the EU-ETS and recorded in the EUTL[23];
- Eurostat Monthly Oil and Gas Questionnaires and Monthly Coal Questionnaires;
- Eurostat monthly data on crude oil production (data set nrg_102m, indicator code 100100, product code 3100);
- Eurostat monthly total consumption data for natural gas (data set nrg_103m, indicator code 100900, product code 4100);
- Eurostat production data for natural gas (data set nrg_103m, indicator code 100100, product code 4100);
- Eurostat monthly gross inland deliveries observed data for total fuel oil, heating and other gas oil (data set nrg_102m, indicator code 100520, product codes 3270A and 3266);
- Eurostat monthly data for the internal market deliveries of motor spirit, automotive diesel oil and kerosene/jet fuels (data set nrg_102m, indicator code 100520, product codes 3234, 3234A, 3260, 3260A, 3247A, 5546O, 5547O, 5549O);
- Eurostat monthly data on hard coal and lignite production (data set 101m, indicator code 100100, product codes 2111 and 2210);
- Eurostat monthly data on supply of electricity (data set nrg_105m, indicator code 16_107104));
- Eurostat annual data on GDP and main components (output, expenditure and income) [nama_10_gdp] (Gross domestic product at market prices, Chain linked volumes (2010), million euro);

[22] BP, 2017, bp-statistical-review-of-world-energy-2017-underpinning-data.xlsx (www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy) accessed by 14 July 2017.

[23] European Commission 2017, EUTL data extract for EEA, July 20, 2017 www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1

- Eurostat annual data on livestock population for cattle, sheep and swine [apro_mt_lscatl, apro_mt_lssheep,_apro_mt_lspig];
- Eurostat heating degree days (HDD) for 1990–2016 [nrg_esdgr] and http://ec.europa.eu/eurostat/web/energy/data;
- Monthly production data for crude steel production and blast furnace iron production of the World Steel Association (previously IISI International Iron and Steel Institute)[24]; this data source has only data for some of the EU Member States[25];
- National preliminary energy balance data or energy statistics:

Bulgaria, 2017, Production and deliveries of energy products - monthly statistics , https://infostat.nsi.bg/infostat/pages/module.jsf?x_2=133, accessed 12 July 2017.

Cyprus, 2017, Imports, sales and stocks of petroleum products, www.mof.gov.cy/mof/cystat/statistics.nsf/energy_environment_81main_keyfarchive_en/energy_environment_81main_keyfarchive_en?OpenForm&yr=2017253116E50D172111DF059D0C7AAAE3E2&n=2017, accessed 12 July 2017.

Based on these data sources, 2017 emission estimates were made for the following source categories:

- 1. Energy
  - 1.A Fuel Combustion
    - 1.A.1 Energy Industries
      - 1.A.1.a Public electricity and heat production
      - 1.A.1.b Petroleum refining
    - 1.A.2 Manufacturing Industries and Construction
    - 1.A.3 Transport
    - 1.A.4 Other sectors
      - 1.A.4.a Commercial/institutional
      - 1.A.4.b Residential
      - 1.A.4.c Agriculture/forestry/fishing
  - 1.B Fugitive Emissions
    - 1.B.1 Solid Fuels
    - 1.B.2.a Oil
    - 1.B.2.b Natural Gas
    - 1.B.2.c Venting and Flaring
    - 1.B.2.d Other
- 2. Industrial Processes and Product Use
  - 2.A Mineral Industry

[24] Available at www.worldsteel.org, accessed by 20 June 2016

[25] Pig iron/Blast furnace iron production: AT, BE, CZ, DE, ES, FR, HU, IT, NL, PL, SK and UK.
Crude steel production: AT, BE, BG, CZ, DE, ES, FI, FR, GR, HR, HU, IT, LU, NL, PL, SI, SE, SK and UK.

        - 2.A.1 Cement Production
        - 2.A.2 Lime Production
        - 2.A.3 Glass Production
    - 2.B Chemical Industry
        - 2.B.1 Ammonia Production
        - 2.B.2 Nitric Acid Production
        - 2.B.3 Adipic Acid Production
        - 2.B.7 Soda Ash Production
    - 2.C Metal Production
        - 2.C.1 Iron and Steel Production
        - 2.C.2 Ferroalloy Production
        - 2.C.3 Aluminium Production
- 3. Agriculture
    - 3.A Enteric fermentation
    - 3.B Manure management
    - 3.D Agricultural soils

The alternative sources for activity data and emissions listed above were only used if the resulting emissions matched well with real inventories for past years. If large discrepancies occurred for individual Member States, different approaches (trend extrapolation, constant values from previous year) were used.

Values for Energy 1.A.5 were filled by using previous year emissions. For the waste sector and all other inventory source categories not listed above, no 2016 activity data were available that could be combined with IEFs from GHG inventories. Values these were extrapolated from GHG inventories, either by trend extrapolation or by taking the constant values of the year 2015 or by taking the average of 2013 to 2015 emissions and by following the gap filing rules in accordance with the implementing provisions under Council Decision 280/2004/EC. Constant values or averages were used when past trends were inconsistent and strongly fluctuating; trend extrapolation was used when historic time series showed good correlations with a linear trend.

Annex II provides a detailed overview of methods and data sources used for each source category and Member State.

The timing of these calculations depends on the release of the underlying data sources. The availability of data sources (including the MS GHG inventories) is shown in Table 13. A comprehensive data source on energy consumption is the BP statistical review of World Energy which is annually published in mid-June. Member States' national energy statistics are released at different points in time and the national websites do not always indicate the publication date and whether the publication is regularly made available at the same date.

Table 13 Time of availability of data used for the proxy inventory

Data source	**Availability**
EUTL verified emissions	Data as of 20 July 2017 was used for EEA proxy.

Data source	Availability
BP Statistical Review of World Energy	June each year
Eurostat monthly production data for hard coal and lignite	3 months after reporting period
Eurostat monthly production data on crude oil input to refineries	3 months after reporting period
Eurostat monthly production data for crude oil	3 months after reporting period
Eurostat monthly production data for natural gas	3 months after reporting period
World Steel Association monthly production data for crude steel production	two months after reporting
World Steel Association monthly production data for blast furnace iron production	two months after reporting
Eurostat annual statistics on livestock population for live bovine animals, swine and sheep	April-May after reporting period
GHG inventory data from EEA GHG MMR locator	early June
Member States' national energy balances and national energy statistics	different publication dates
Member States' own preliminary inventories	31 July

Source: EEA's ETC/ACM

National GHG inventories are required to fulfil certain principles as laid out in the UNFCCC reporting guidelines for GHG inventories: inventories must be transparent, consistent, comparable, complete and accurate (TCCCA). The IPCC Good Practice Guidance recommends Parties to perform QA/QC procedures that are important information to enable continuous improvement to inventory estimates. Through the quantification of uncertainty at the source level and for the inventory as a whole, improvements can be prioritised. Thus Parties may change methodologies in order to improve their greenhouse gas estimates at source level (e.g. moving from Tier 2 to Tier 3). Such methodological changes at Member States level cannot be captured in the calculation of the approximated GHG inventory for the EU. On-going quality improvements in Member States' inventories to take effect in next year's official submissions to UNFCCC are therefore a source of uncertainty for the proxy inventory.

It has to be taken into account that any recent national improvements of GHG reporting methodologies could not be considered for approximated GHG inventories calculated centrally by EEA and its ETC/ACM, as the 2017 estimates for the 2016 proxy inventory were based on the national methodologies used for 2017 inventory submissions (covering emissions until 2015). This is especially the case for those source categories for which linear trend extrapolation was performed. Thus, revised methodologies and parameters at Member States level can result in small differences between the final inventory and the proxy inventory.

4.1.3 Methodologies and data sources for gap-filling

The approximated GHG emissions data are submitted by Member States in a form consistent with CRF Summary2 tables. However, these tables are not always submitted at a sub-sector level of disaggregation. Because EU emissions are the sum of the Member States', in order to achieve a complete EU proxy inventory, some gap filling has been required.

4.1.3.1 Total CO_2e, including indirect CO_2, without LULUCF in ETS and non-ETS

Most Member States did report *Total CO_2 equivalent emissions, without LULUCF*. There has however been some ambiguity about how to report included indirect CO_2 emissions. In previous years, a total was included in cell J68 whether or not the total included indirect CO_2 emissions. This year most MS left this cell blank if they did report indirect CO_2 emissions. For consistency we edited this cell (J68 =SUM J66,B65), in all final proxy sheets so that there is a total shown in cell J68 whether or not the MS has calculated any indirect CO_2 emissions.

Most Member States provided a split of ETS and non-ETS emissions in their submissions.

4.1.3.2 F-gases

Emissions from fluorinated greenhouse gases (F-gases[26]) can appear in the following source categories of industrial processes and product use:

- 2.B Chemical industry
- 2.C Metal industry
- 2.E Electronic industry
- 2.F Product uses as ODS substitutes
- 2.G Other product manufacture and use
- 2.H Other

Germany, Ireland and the United Kingdom reported F-gas emissions but did not disaggregate into source categories. Reported F-gas emissions were allocated using the shares of F-gas emissions per source categories of the latest available GHG inventories.

Sweden submitted IPPU rounded emissions totals. The gap-filling described in chapter 4.1.3.5 was combined with the F-gas gap-filing method.

The complete gap-filling used for Bulgaria, Cyprus, and Romania, as described in chapter 6.2.2.4 of the Annex II only produces proxy estimates for whole industrial processes and product use but not detailed data at source category level. For these Member States the F-gas emissions were distributed in the same way as for Germany, Ireland and the United Kingdom using allocations derived from 2015 reports.

[26] F-gas emissions include emission of the following gases or groups of gases: hydroflourocarbons = HFCs; perflourocarbons = PFCs; sulphur hexafluoride = SF6; nitrogen triflouride =NF_3.

4.1.3.3 Denmark

The Danish Summary2 proxy for 2016 contains GHG estimates for source category 1.A (Fuel Combustion), but not disaggregated into subcategories. Energy sub-sector emissions were therefore allocated within sub-sectors, with allocation factors derived from the proxy estimates calculated centrally by EEA and its ETC/ACM.

4.1.3.4 Greece

Greece provided detailed emission estimates on detailed source category level but did not include estimates per gas on top-level for Energy, Fuel combustion, Fugitive emissions, Industrial processes and product use, Agriculture and Waste. This was gap-filled by summation of the respective detailed data. The results of these summations are consistent with the total emissions of all gases.

4.1.3.5 Sweden

The Swedish Summary2 proxy for 2016 was submitted with emissions units of mega tonnes and converted to kilotonnes to be comparable with other submissions. The submission contained only total GHG estimates, and apart from Fuel combustion, were not disaggregated into subsectors. To gap-fill these subcategories emissions were allocated against relevant gases and sub-sectors based on the subsector to sector ratios of Sweden's 2015 inventory Summary2 table.

The level of detail provided reflects the uncertainties of the estimates, given the limited data availability and differences in the methods used compared to the reported inventory, in line with Commission Implementing Regulation 749/2014, Article 17.1a.

4.1.3.6 United Kingdom

In United Kingdom's Summary2 proxy for 2016 only CO_2 emissions are shown with detailed emissions per source category. Estimates for all other GHG emissions are only given as totals per gas. To gap-fill the CH_4 and N_2O for the relevant sub-categories total CH_4 and N_2O emission estimate for 2016 was split into the subcategories using shares from 2016 proxy calculated centrally by EEA and its ETC/ACM.

The total F-gas emissions of UK were allocated to individual source subcategories of Industrial Processes and Product Use as described in chapter 4.1.3.2.

As mentioned in the description box below the proxy Summary2 table, CH_4 and N_2O from LULUCF emissions were included in the CH_4 and N_2O net emission totals. This was adjusted by subtracting the 2015 amounts of CH_4 and N_2O LULUCF emissions reported from the most recent relevant submission.

The UK included ETS emissions per sector but did not provide a total of ETS emissions. And the non-ETS was only CO_2 non-ETS (no non-CO_2). For these reasons UK ETS was gap-filled with verified emissions amounts reported under the EU-ETS and recorded in the EUTL

4.1.3.7 Norway and Switzerland

The proxy GHG inventories submitted by Norway and Switzerland largely follow the structure of the common reporting format (CRF). Switzerland reported in its proxy GHG inventory emissions per sector but not on sub-sectoral level. As Norway and Switzerland are not included in EU-28 total

emissions or EU plus Iceland total emissions; therefore no gap-filling was performed for these two countries.

4.2 Comparison of emission estimates between Member States and EEA calculations

The early estimates of GHG data submitted by Member States and the proxy inventories calculated by EEA matched well with differences inside ± 2 % for most countries. Only six Member States: Croatia (-6.7 %), Lithuania (-5.3 %), Sweden (3.9 %), Finland (3.8 %), Iceland (-3.2 %) and Latvia (-3.0 %); had estimates with differences outside ± 3 % for total emissions. In particular the estimates for the three Member States with highest total emissions match closely: Germany (-0.2 %), United Kingdom (-0.5 %) and France (0.3 %).

Overall there was a -16 543 Mt CO_2-eq or -0.4 % difference between the sum of the centrally calculated EEA proxies and the MS submitted proxies (gap filled for BG, CY and RO).

Bulgaria, Cyprus and Romania did not submit proxy estimates and EEA and its ETC/ACM did not calculate proxy estimates for Norway and Switzerland.

Table 14 Comparison of EEA and Member States proxies (total without LULUCF)

MS	Sector	2016 estimate		Difference		Comment
		EEA	MS	absolute	relative	
Austria	**Total**	**77 871**	**79 222**	**1 351**	**1.7%**	
	Energy	52 509	53 999	1 490	2.8%	
	IPPU	16 620	16 380	-240	-1.4%	
	Agriculture	7 180	7 271	91	1.3%	
	Waste	1 562	1 573	11	0.7%	
Belgium	**Total**	**117 120**	**118 194**	**1 074**	**0.9%**	
	Energy	85 564	86 854	1 290	1.5%	
	IPPU	20 353	19 794	-558	-2.7%	
	Agriculture	9 855	10 003	148	1.5%	
	Waste	1 348	1 543	194	14.4%	
Bulgaria	**Total**	**58 405**	**58 405**			Bulgaria's proxy was not received by 01/08/2017. EEA proxy used for all values.
	Energy	42 463	42 463			
	IPPU	5 899	5 899			
	Agriculture	5 958	5 958			
	Waste	4 084	4 084			
Croatia	**Total**	**24 193**	**22 577**	**-1 615**	**-6.7%**	
	Energy	17 579	16 210	-1 369	-7.8%	
	IPPU	2 441	2 359	-82	-3.4%	
	Agriculture	2 536	2 380	-155	-6.1%	
	Waste	1 637	1 629	-9	-0.5%	
Cyprus	**Total**	**8 841**	**8 841**			Cyprus's proxy was not received by 01/08/2017. EEA proxy used for all values.
	Energy	6 462	6 462			
	IPPU	1 307	1 307			
	Agriculture	555	555			
	Waste	517	517			

MS	Sector	2016 estimate		Difference		Comment
		EEA	MS	absolute	relative	
Czech Republic	**Total**	**127 165**	**125 664**	**-1 501**	**-1.2%**	
	Energy	96 785	94 976	-1 809	-1.9%	
	IPPU	15 756	16 063	307	1.9%	
	Agriculture	8 446	8 466	20	0.2%	
	Waste	5 380	5 319	-61	-1.1%	
	Indirect CO_2	799	840	41	5.2%	
Denmark	**Total**	**50 032**	**49 690**	**-341**	**-0.7%**	
	Energy	36 126	35 766	-360	-1.0%	
	IPPU	2 068	2 061	-7	-0.3%	
	Agriculture	10 284	10 299	15	0.1%	
	Waste	1 142	1 153	10	0.9%	
	Indirect CO_2	412	412	0	0.0%	
Estonia	**Total**	**19 550**	**19 289**	**-261**	**-1.3%**	
	Energy	17 400	17 198	-202	-1.2%	
	IPPU	500	494	-6	-1.2%	
	Agriculture	1 339	1 285	-54	-4.0%	
	Waste	310	311	1	0.2%	
Finland	**Total**	**56 581**	**58 758**	**2 177**	**3.8%**	
	Energy	41 783	43 941	2 157	5.2%	
	IPPU	6 311	6 255	-56	-0.9%	
	Agriculture	6 364	6 466	102	1.6%	
	Waste	2 070	2 043	-26	-1.3%	
	Indirect CO_2	52	52	0	0.0%	
France	**Total**	**461 929**	**463 129**	**1 200**	**0.3%**	
	Energy	322 902	323 402	500	0.2%	
	IPPU	44 385	44 577	191	0.4%	
	Agriculture	77 718	78 222	505	0.6%	
	Waste	16 924	16 927	4	0.0%	
Germany	**Total**	**907 202**	**905 545**	**-1 657**	**-0.2%**	
	Energy	767 546	766 689	-856	-0.1%	
	IPPU	61 411	61 332	-80	-0.1%	
	Agriculture	67 662	66 819	-843	-1.2%	
	Waste	10 583	10 705	122	1.2%	
Greece	**Total**	**92 419**	**93 171**	**752**	**0.8%**	
	Energy	67 053	67 940	887	1.3%	
	IPPU	12 795	12 083	-712	-5.6%	
	Agriculture	8 009	8 579	571	7.1%	
	Waste	4 563	4 568	6	0.1%	
Hungary	**Total**	**62 610**	**61 539**	**-1 072**	**-1.7%**	Hungary's proxy was received on 02/08/2017 and
	Energy	44 572	44 584	12	0.0%	
	IPPU	7 513	6 331	-1 182	-15.7%	

MS	Sector	2016 estimate EEA	2016 estimate MS	Difference absolute	Difference relative	Comment
	Agriculture	6 746	6 846	101	1.5%	is included.
	Waste	3 781	3 778	-2	-0.1%	
Ireland	**Total**	**62 495**	**62 287**	**-208**	**-0.3%**	
	Energy	38 398	38 023	-375	-1.0%	
	IPPU	3 349	3 383	34	1.0%	
	Agriculture	19 631	19 943	311	1.6%	
	Waste	1 116	938	-178	-15.9%	
Italy	**Total**	**440 914**	**434 588**	**-6 326**	**-1.4%**	
	Energy	361 007	357 045	-3 962	-1.1%	
	IPPU	30 811	29 649	-1 161	-3.8%	
	Agriculture	29 958	29 976	18	0.1%	
	Waste	19 139	17 918	-1 221	-6.4%	
Latvia	**Total**	**11 407**	**11 066**	**-341**	**-3.0%**	
	Energy	7 093	6 924	-169	-2.4%	
	IPPU	832	650	-182	-21.8%	
	Agriculture	2 773	2 785	12	0.4%	
	Waste	693	690	-2	-0.3%	
	Indirect CO_2	17	17	0	0.0%	
Lithuania	**Total**	**20 247**	**19 165**	**-1 082**	**-5.3%**	
	Energy	11 444	10 746	-698	-6.1%	
	IPPU	3 208	2 965	-243	-7.6%	
	Agriculture	4 620	4 536	-84	-1.8%	
	Waste	975	917	-57	-5.9%	
Luxembourg	**Total**	**10 149**	**10 019**	**-130**	**-1.3%**	
	Energy	8 737	8 590	-147	-1.7%	
	IPPU	646	648	1	0.2%	
	Agriculture	676	688	11	1.7%	
	Waste	89	93	4	4.3%	
Malta	**Total**	**1 896**	**1 926**	**29**	**1.6%**	
	Energy	1 406	1 464	59	4.2%	
	IPPU	263	258	-5	-2.0%	
	Agriculture	68	63	-5	-7.4%	
	Waste	159	140	-19	-11.8%	
Netherlands	**Total**	**199 081**	**196 560**	**-2 522**	**-1.3%**	
	Energy	164 856	163 391	-1 465	-0.9%	
	IPPU	11 435	10 687	-749	-6.5%	
	Agriculture	19 431	19 036	-395	-2.0%	
	Waste	3 153	3 240	87	2.8%	
	Indirect CO_2	207	207	0	0.0%	
Poland	**Total**	**393 463**	**390 979**	**-2 485**	**-0.6%**	
	Energy	323 029	320 845	-2 185	-0.7%	

MS	Sector	2016 estimate EEA	2016 estimate MS	Difference absolute	Difference relative	Comment
	IPPU	29 943	28 462	-1 481	-4.9%	
	Agriculture	29 350	30 114	764	2.6%	
	Waste	11 141	11 558	417	3.7%	
Portugal	**Total**	**66 283**	**66 482**	**199**	**0.3%**	
	Energy	45 853	46 211	357	0.8%	
	IPPU	7 215	7 217	2	0.0%	
	Agriculture	6 708	6 792	84	1.3%	
	Waste	6 333	6 094	-239	-3.8%	
	Indirect CO_2	175	168	-6	-3.7%	
Romania	**Total**	**112 562**	**112 562**			Romania's proxy was not received by 01/08/2017. EEA proxy used for all values.
	Energy	76 392	76 392			
	IPPU	11 916	11 916			
	Agriculture	18 428	18 428			
	Waste	5 825	5 825			
Slovakia	**Total**	**41 737**	**41 007**	**-730**	**-1.7%**	
	Energy	27 895	26 964	-931	-3.3%	
	IPPU	9 257	9 691	433	4.7%	
	Agriculture	3 013	2 828	-184	-6.1%	
	Waste	1 573	1 525	-48	-3.1%	
Slovenia	**Total**	**17 296**	**17 520**	**224**	**1.3%**	
	Energy	13 937	14 104	167	1.2%	
	IPPU	1 180	1 103	-77	-6.5%	
	Agriculture	1 706	1 792	86	5.1%	
	Waste	473	521	48	10.1%	
Spain	**Total**	**326 503**	**323 855**	**-2 648**	**-0.8%**	
	Energy	246 153	243 490	-2 663	-1.1%	
	IPPU	30 474	30 800	326	1.1%	
	Agriculture	36 956	35 783	-1 172	-3.2%	
	Waste	12 921	13 782	861	6.7%	
Sweden	**Total**	**51 615**	**53 610**	**1 995**	**3.9%**	
	Energy	39 486	38 480	-1 006	-2.5%	
	IPPU	3 974	6 830	2 856	71.9%	
	Agriculture	6 881	6 890	9	0.1%	
	Waste	1 275	1 400	125	9.8%	
United Kingdom	**Total**	**475 838**	**473 363**	**-2 475**	**-0.5%**	MS total adjusted to exclude LULUCF CH_4 and N_2O emissions.
	Energy	383 936	379 854	-4 082	-1.1%	
	IPPU	33 114	31 737	-1 377	-4.2%	
	Agriculture	45 097	47 146	2 049	4.5%	
	Waste	13 691	14 626	935	6.8%	
European Union	**Total**	**4 295 405**	**4 279 013**	**-16 392**	**-0.4%**	
	Energy	3 348 365	3 333 007	-15 357	-0.5%	

MS	Sector	2016 estimate		Difference		Comment
		EEA	MS	absolute	relative	
(EU-28)	IPPU	374 976	370 929	-4 047	-1.1%	
	Agriculture	437 947	439 951	2 005	0.5%	
	Waste	132 456	133 418	962	0.7%	
	Indirect CO_2	1 662	1 697	35	2.1%	
Iceland	**Total**	**4 690**	**4 539**	**-151**	**-3.2%**	
	Energy	1 819	1 695	-123	-6.8%	
	IPPU	2 072	2 021	-51	-2.5%	
	Agriculture	599	616	17	2.8%	
	Waste	200	207	7	3.4%	
European Union (EU-28) plus Iceland	**Total**	**4 300 095**	**4 283 552**	**-16 543**	**-0.4%**	
	Energy	3 350 183	3 334 703	-15 481	-0.5%	
	IPPU	377 048	372 950	-4 098	-1.1%	
	Agriculture	438 546	440 567	2 021	0.5%	
	Waste	132 656	133 625	969	0.7%	
	Indirect CO_2	1 662	1 697	35	2.1%	
Norway	**Total**		**53 427**			No EEA proxy was produced.
	Energy		39 106			
	IPPU		8 452			
	Agriculture		4 576			
	Waste		1 293			
Switzerland	**Total**		**48 540**			No EEA proxy was produced.
	Energy		37 436			
	IPPU		4 076			
	Agriculture		6 073			
	Waste		830			
	Other		12			
	Indirect CO_2		113			

Source: Member States' preliminary data provided to EEA for the purposes of this report, own calculations
Note: Lines for "Other" and "Indirect CO_2" are only shown where relevant

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  - Monthly total consumption data for natural gas (data set nrg_103m, indicator code 100900, product code 4100);
  - Production data for natural gas (data set nrg_103m, indicator code 100100, product code 4100);
  - Monthly data for the internal market deliveries of motor spirit, automotive diesel oil and kerosene/jet fuels (data set nrg_102m, indicator code 100520, product codes 3234, 3234A, 3260, 3260A, 3247A, 5546O, 5547O, 5549O);
  - Monthly data for gross inland deliveries observed for total fuel oil, heating and other gas oil (data set nrg_102m, indicator code 100520, product codes 3270A and 3266);
- Eurostat monthly data on hard coal and lignite production (data set 101m, indicator code 100100, product codes 2111 and 2210);
- Eurostat monthly data on net electricity generation from conventional thermal power plants (data set nrg_105m, indicator code 16_107104);
- Annual statistics on livestock population for cattle, sheep and swine [apro_mt_lscatl, apro_mt_lssheep,_apro_mt_lspig];

- Annual data on GDP and main components (output, expenditure and income) [na-ma_10_gdp] (Gross domestic product at market prices, Chain linked volumes (2010), million euro);

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6. Annexes

6.1 Annex I. Detailed results for each Member State

Country	Compiled by	Submission date
Austria	Member State	20 July 2017
Belgium	Member State	25 July 2017
Bulgaria	EEA, ETC/ACM	
Cyprus	EEA, ETC/ACM	
Czech Republic	Member State	26 July 2017
Germany	Member State	25 July 2017
Denmark	Member State	26 July 2017
Estonia	Member State	25 July 2017
Spain	Member State	13 July 2017
Finland	Member State	06 June 2017
France	Member State	25 July 2017
Greece	Member State	27 July 2017
Croatia	Member State	19 July 2017
Hungary	Member State	02 August 2017[27]
Ireland	Member State	28 July 2017
Italy	Member State	31 July 2017
Lithuania	Member State	21 July 2017
Luxembourg	Member State	12 July 2017
Latvia	Member State	21 July 2017
Malta	Member State	31 July 2017
Netherlands	Member State	31 July 2017
Poland	Member State	14 July 2017
Portugal	Member State	31 July 2017

[27] Submission after 31 July 2017. EEA, ETC/ACM was however able to include the proxy GHG inventory in the approximated GHG inventory for EU plus Iceland.

Country	Compiled by	Submission date
Romania	EEA, ETC/ACM	
Sweden	Member State	05 July 2017
Slovenia	Member State	12 July 2017
Slovakia	Member State	11 July 2017
United Kingdom	Member State	28 July 2017
European Union	EEA, ETC/ACM	
Iceland	Country	26 July 2017
European Union and Iceland	EEA, ETC/ACM	
Switzerland	Country	11 July 2017
Norway	Country	29 June 2017

Source: EEA's ETC/ACM

6.1.1 Austria (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year Proxy 2016
Submission 2017
Country Austria

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	**66 971.27**	**6 529.51**	**3 590.06**	**1 681.38**	**41.52**	**393.15**	**NO,NA**	**15.50**	**79 222.40**		
1. Energy	**52 838.74**	**560.59**	**599.66**						**53 998.99**	**15 154.70**	**38 844.30**
A. Fuel combustion (sectoral approach)	52 624.49	297.92	599.66						53 522.07	15 154.70	38 367.37
1. Energy industries	10 639.17	25.62	105.55						10 770.34	8 497.16	2 273.18
2. Manufacturing industries and construction	10 123.21	21.98	131.28						10 276.47	6 097.06	4 179.41
3. Transport	23 178.24	9.10	207.72						23 395.05	560.48	22 834.58
4. Other sectors	8 634.81	241.18	154.14						9 030.13	0.00	9 030.13
5. Other	49.07	0.04	0.96						50.07	0.00	50.07
B. Fugitive emissions from fuels	214.25	262.67	0.00						476.93	0.00	476.93
1. Solid fuels	NO,NA	NO,NA	NO,NA						0.00	0.00	0.00
2. Oil and natural gas and other emissions from energy production	214.25	262.67	NO,IE,NA						476.93	0.00	476.93
C. CO_2 transport and storage	NO								0.00	0.00	0.00
2. Industrial processes and product use	**14 021.21**	**46.90**	**180.31**	**1 681.38**	**41.52**	**393.15**	**NA**	15.50	**16 379.97**	**13 842.32**	**2 537.66**
A. Mineral industry	2 776.80								2 776.80	2 767.07	9.74
B. Chemical industry	658.52	46.90	46.85	NA	NA	NA	NA	NA	752.26	694.89	57.37
C. Metal industry	10 380.36	NO,IE,NA	NO		0.00	2.31	NA		10 382.67	10 380.36	2.31
D. Non-energy products from fuels and solvent use	179.01	NA	NA						179.01	0.00	179.01
E. Electronic Industry				2.29	41.52	35.08	NA	15.50	94.39	0.00	94.39
F. Product uses as ODS substitutes				1 679.09	NO,IE		NO		1 679.09	0.00	1 679.09
G. Other product manufacture and use	26.53	NO,NA	133.46	NO	NO	355.76	NO		515.75	0.00	515.75
H. Other	NA	NA	NA				NO		NA	0.00	0.00
3. Agriculture	**109.27**	**4 606.20**	**2 555.43**						**7 270.90**	**0.00**	**7 270.90**
A. Enteric fermentation		4 168.38							4 168.38	0.00	4 168.38
B. Manure management		437.26	439.87						877.13	0.00	877.13
C. Rice cultivation		NO							NO	0.00	0.00
D. Agricultural soils		NA	2 115.46						2 115.46	0.00	2 115.46
E. Prescribed burning of savannahs		NO	NO						NO	0.00	0.00
F. Field burning of agricultural residues		0.56	0.10						0.65	0.00	0.65
G. Liming	85.66								85.66	0.00	85.66
H. Urea application	23.61								23.61	0.00	23.61
I. Other carbon-containing fertilizers	NA								NO	0.00	0.00
J. Other	NA	NA	NA						NA	0.00	0.00
4. Land use, land-use change and forestry[1]	NE	NE	NE						**NE**		
A. Forest land	NE	NE	NE						NE		
B. Cropland	NE	NE	NE						NE		
C. Grassland	NE	NE	NE						NE		
D. Wetlands	NE	NE	NE						NE		
E. Settlements	NE	NE	NE						NE		
F. Other land	NE	NE	NE						NE		
G. Harvested wood products	NE	NE	NE						NE		
H. Other	NE	NE	NE						NE		
5. Waste	2.05	1 315.83	254.66						**1 572.54**	**0.00**	**1 572.54**
A. Solid waste disposal	NO,NA	1 211.68	0.00						1 211.68	0.00	1 211.68
B. Biological treatment of solid waste		80.85	93.43						174.28	0.00	174.28
C. Incineration and open burning of waste	2.05	0.00	0.01						2.06	0.00	2.06
D. Waste water treatment and discharge		23.30	161.22						184.52	0.00	184.52
E. Other	NO	NO	NO						NA	NA	NA
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NA	NA	NA

Memo items:[2]											
International bunkers	2 374.08	1.19	25.32						2 400.59		
Aviation	2 321.21	1.16	21.02						2 343.39		
Navigation	52.87	0.03	4.30						57.20		
Multilateral operations	**NO**	**NO**	**NO**						**NO**		
CO_2 emissions from biomass											
CO_2 captured	**NO**								**NO**		
Long-term storage of C in waste disposal sites	**30 170.22**								**30 170.22**		
Indirect N_2O			NO,NE,NA								
Indirect CO_2 [3]	NO,IE,NA										
Total CO_2 equivalent emissions without land use, land-use change and forestry									**79 222.40**	**28 997.01**	**50 225.39**
Total CO_2 equivalent emissions with land use, land-use change and forestry									**NE**		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									**79 222.40**		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									**NE**		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
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Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
The trend of 1.A fuel combustion widely follows the trend in preliminary energy statistics (http://www.statistik.at/web_de/statistiken/energie_und_umwelt/energie/energiebilanzen/) **The most significant trends 2015-2016 in fuel consumption by type of fuel are:** Sales of transport diesel increased by 4.5% (approx. +0.8 Mt of CO2). (https://www.wko.at/Content.Node/branchen/oe/Mineraloelindustrie/Verbrauchsstatistik.html) Coal consumption of power plants decreased (-0.7 Mt CO2). Natural gas consumption (other than non energy use) increased by 4% (approx. +0.7 Mt of CO2) (http://www.e-control.at/de/statistik/gas) CO2 emissions from iron and steel industries (1.A.2.a and 2.C.1) decreased by approx -0.4 Mt CO2 which correlates with a decrease in crude steel production (-0.3 Mt) **Fertilizer Use:** two-year mean value increased by 4.6% (https://www.ama.at/Marktinformationen/Getreide-und-Olsaaten/Dungemittel) **Animals numbers:** total cattle decreased by 0,2%, whereas milk cows increased by 1.1 % (and milk yield increased by 2.7%); swine number decreased by 1.9% (https://www.ama.at/Marktinformationen/Vieh-und-Fleisch/Produktion)

6.1.2 Belgium (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017_proxy
Country BELGIUM
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]									**116288.29**		
1. Energy	**85077.63**	**1056.36**	**720.40**						**86854.38**		
A. Fuel combustion (sectoral approach)	84999.35	512.97	720.40						86232.72		
1. Energy industries	19755.101	31.310	163.531						19949.942	17 618.435	2 331.508
2. Manufacturing industries and construction	13234.061	55.461	197.120						13486.642	9 761.599	3 725.043
3. Transport	25981.161	17.642	263.193						26261.997	59.837	26 202.160
4. Other sectors	25929.734	408.404	95.516						26433.654	76.277	26 357.376
5. Other	99.289	0.157	1.039						100.485		100.485
B. Fugitive emissions from fuels	78.279	543.386							621.664		0.000
1. Solid fuels	NA,NO	6.075	NA,NO						6.075		6.075
2. Oil and natural gas	78.279	537.311	NA,NO,IE						615.589	77.792	537.798
C. CO_2 transport and storage	NO										
2. Industrial processes and product use	**15544.181**	**22.044**	**1073.331**	2786.85	275.85	91.36	NA	0.85	**19794.468**		
A. Mineral industry	4384.269								4384.269	4 364.673	19.597
B. Chemical industry	6588.245	6.924	970.405	0.27	265.88	NO,NA	NA	NA	7831.722	6 993.829	837.893
C. Metal industry	4308.630	15.119	NA						4323.749	4 309.231	14.518
D. Non-energy products from fuels and solvent use	94.375	NA	NA						94.375		94.375
E. Electronic Industry				1.67	7.91	2.57		0.85	12.996		12.996
F. Product uses as ODS substitutes				2784.92	2.05				2786.973		2 786.973
G. Other product manufacture and use	NO	NO	102.926		NO	88.80			191.721		191.721
H. Other	168.663	NA	NA						168.663	168.663	**0.000**
3. Agriculture	**152.266**	**5837.654**	**4012.859**						**10002.778**		
A. Enteric fermentation		4582.758							4582.758		4 582.758
B. Manure management		1254.896	736.306						1991.202		1 991.202
C. Rice cultivation		NO									
D. Agricultural soils		NA	3276.553						3276.553		3 276.553
E. Prescribed burning of savannas											
F. Field burning of agricultural residues		NO	NO								
G. Liming	130.728								130.728		130.728
H. Urea application	21.538								21.538		21.538
I. Other carbon-containing fertilizers	NO										
J. Other	NO	NO	NO								
4. Land use, land-use change and forestry[1]	**-2086.932**	**0.000**	**181.058**						**-1905.87**		
A. Forest land	-4185.897	NO	0.021						-4185.88		
B. Cropland	1174.713	NO	97.670						1272.38		
C. Grassland	-419.266	NO	5.421						-413.84		
D. Wetlands	-10.813	NO,NA	NO,NA						-10.81		
E. Settlements	1053.219	NO	77.946						1131.17		
F. Other land	NO	NO	NO								
G. Harvested wood products	301.110								301.11		
H. Other	NO	NO	NO								
5. Waste	**243.409**	**1161.559**	**137.565**						**1542.53**		
A. Solid waste disposal	NA,NO	934.034							934.034		934.034
B. Biological treatment of solid waste		25.342	38.666						64.009		64.009
C. Incineration and open burning of waste	243.409	0.000104	0.093						243.502	225.085	18.417
D. Waste water treatment and discharge		202.183	98.805						300.989		300.989
E. Other	NO	NO	NO								
6. Other ***(as specified in summary 1.A)***											
										43 655	
Memo items:[2]											
International bunkers	22232.95	3.92	21.10								
Aviation	4175.27	3.35	20.02								
Navigation	18057.68	0.57	1.08								
Multilateral operations	NO	NO	NO								
CO_2 emissions from biomass	12133.87										
CO_2 captured	NO										
Long-term storage of C in waste disposal sites											
Indirect N_2O			NO								
Indirect CO_2[3]	NO										
Total CO_2 equivalent emissions without land use, land-use change and forestry									118194.164		
Total CO_2 equivalent emissions with land use, land-use change and forestry									116288.289		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									118194.164		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									116288.289		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2 the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.									
*First estimates of the emissions in the **Flemish region** for 2016 shows little changes compared to 2015 emissions (+40 kt CO2eq). The decrease of emissions in the electricity sector due to the decrease of use of solid fuels (coal) due to the closing of the last coal-fired power plant in April of 2016. This is more or less compensated by the increase of emissions in the category 1A4 (households, commercial sector) due to increase of use of natural gaz and liquid fuels in this sector (colder year).*									
*First estimates of the emissions in the **Brussels and Walloon region** shows an increase of emissions to 2015 emissions. This increases is mainly due to an increase of emissions in the category 1A4 due to a colder winter.*									
*First estimates of the total greenhouse gas emissions in 2016 in **Belgium** shows an increase of emissions of 751 kt CO2eq or 0,6% compared to 2015 emissions (i.e. excl. LULUCF). This increases is mainly due to an increase of emissions in the category 1A4 due to a colder year.*									

6.1.3 Bulgaria (calculated centrally by EEA and its ETC/ACM)

SUMMARY 2 SUMMARY REPORT FOR CO2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2016
Submission 2017 v EEA proxy 1.0
BULGARIA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO2(1)	CH4	N2O	HFCs	PFCs	SF6	Unspecified mix of HFCs and PFCs	NF3	Total	ETS	non-ETS
	CO2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)(1)	**45 354**	**7 072**	**4 695**	**1 266**	**0**	**18**	**0**	**0**	**58 405**		
1. Energy	**40 807.05**	**1 365**	**291**						**42 463**		
A. Fuel combustion (sectoral approach)	40 796.78	304	291						41 392		
1. Energy industries	26 645.79	8	104						26 759		
2. Manufacturing industries and construction	2 964.03	11	28						3 003		
3. Transport	9 437.41	28	85						9 551		
4. Other sectors	1 687.63	257	73						2 018		
5. Other	61.92	0	0						62		
B. Fugitive emissions from fuels	10.27	1 060	0						1 071		
1. Solid fuels	NO	856	IE						856		
2. Oil and natural gas	10.27	204	IE						214		
C. CO2 transport and storage	NO								0		
2. Industrial processes and product use	**4 469.18**	**0**	**145**	**1 266**	**0**	**18**	**NO**	**NO**	**5 899**		
A. Mineral industry	2 512.26								2 512		
B. Chemical industry	1 635.05	NO,NA	131						1 766		
C. Metal industry	208.96	0							209		
D. Non-energy products from fuels and solvent use	85.48	NO,NA	NO,NA						85		
E. Electronic Industry				NO	NO	NO	NO	NO	0		
F. Product uses as ODS substitutes				1 266	0	NO	NO	NO	1 266		
G. Other product manufacture and use	21.73	NO	14			18			55		
H. Other	5.71	NA	NA						6		
3. Agriculture	**67.27**	**1 798**	**4 094**						**5 958**		
A. Enteric fermentation		1 532							1 532		
B. Manure management		120	485						605		
C. Rice cultivation		121							121		
D. Agricultural soils		NO	3 601						3 601		
E. Prescribed burning of savannas		NE	NE						NE		
F. Field burning of agricultural residues		25	7						32		
G. Liming	NO								0		
H. Urea application	67.27								67		
I. Other carbon-containing fertilizers	NO								0		
J. Other									0		
4. Land use, land-use change and forestry(1)	0.00	0	0						0		
A. Forest land	NE	NE	NE						NE		
B. Cropland	NE	NE	NE						NE		
C. Grassland	NE	NE	NE						NE		
D. Wetlands	NE	NE	NE						NE		
E. Settlements	NE	NE	NE						NE		
F. Other land	NE	NE	NE						NE		
G. Harvested wood products	NE								NE		
H. Other	NE	NE	NE						NE		
5. Waste	10.10	3 909	165						4 084		
A. Solid waste disposal	NO	3 021							3 021		
B. Biological treatment of solid waste		31	22						53		
C. Incineration and open burning of waste	10.10	0	1						11		
D. Waste water treatment and discharge		857	142						999		
E. Other									0		
6. Other (as specified in summary 1.A)				IE	IE	IE	IE	IE	0		

Memo items:(2)											
International bunkers	NE	NE	NE						NE		
Aviation	NE	NE	NE						NE		
Navigation	NE	NE	NE						NE		
Multilateral operations	NE	NE	NE						NE		
CO2 emissions from biomass	NE								NE		
CO2 captured	NE								NE		
Long-term storage of C in waste disposal sites	NE								NE		
Indirect N2O			NE								
Indirect CO2 (3)	NA										
Total CO2 equivalent emissions without land use, land-use change and forestry									**58 405**	**33 410.83**	**24 993.85**
Total CO2 equivalent emissions with land use, land-use change and forestry									**NE**		
Total CO2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry									**58 405**		
Total CO2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry									**NE**		

(1) For carbon dioxide (CO2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO2, the national totals shall be provided with and without indirect CO2.

The estimates in this table have been compiled according to the methodology described in Annex chapter 6.2. The EEA proxy estimates are based on a bottom up approach (by sector, gas and country). The confidence in the numbers decreases at finer levels of detail, particularly for non-CO_2 emissions. Confidence is highest for CO_2 emissions from fuel combustion.

6.1.4 Croatia (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017
Country CROATIA
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	17 429.91	3 370.87	1 344.19	426.30	0.03	6.01	NA,NO	NA,NO	22 577.31		
1. Energy	15 564.08	512.20	133.23						16 209.52	**6 445.24**	**9 764.28**
A. Fuel combustion (sectoral approach)	15 260.55	343.12	133.07						15 736.74	6 445.24	9 291.50
1. Energy industries	5 132.56	4.44	21.10						5 158.11	4 618.62	539.49
2. Manufacturing industries and construction	1 714.95	2.57	4.62						1 722.14	1 826.62	-104.48
3. Transport	5 898.82	11.76	55.37						5 965.95	NO	5 965.95
4. Other sectors	2 514.21	349.92	122.08						2 986.22	NO	2 986.22
5. Other	NO	NO	NO						NO	NO	NO
B. Fugitive emissions from fuels	303.53	190.01	0.19						493.73	NO	493.73
1. Solid fuels	NO	NO	NO						NO	NO	NO
2. Oil and natural gas	303.53	190.01	0.19						493.73	NO	493.73
C. CO_2 transport and storage	NO								NO	NO	NO
2. Industrial processes and product use	1 812.85	0.16	113.35	426.30	0.03	6.01	NA,NO	NA,NO	2 358.71	**1 821.87**	**536.84**
A. Mineral industry	1 238.53								1 238.53	1 201.24	37.29
B. Chemical industry	510.22	0.16	109.55	NA	NA	NA	NA	NA	619.93	619.58	0.35
C. Metal industry	1.05	NA	NA	NA	NA	NA	NA	NA	1.05	1.05	NO
D. Non-energy products from fuels and solvent use	63.05	NA	NA						63.05	NO	63.05
E. Electronic Industry				NO	NO	NO	NO	NO	NO	NO	NO
F. Product uses as ODS substitutes				426.30	0.03	NA	NA	NA	426.34	NO	426.34
G. Other product manufacture and use	NA	NA	3.81	NA	NA	6.01	NA	NA	9.82	NO	9.82
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NO	NA
3. Agriculture	52.93	1 316.26	1 011.30						2 380.49		
A. Enteric fermentation		987.43							987.43		
B. Manure management		328.83	139.05						467.88		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NA	872.25						872.25		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		NO	NO						NO		
G. Liming	12.55								12.55		
H. Urea application	40.38								40.38		
I. Other carbon-containing fertilizers	NA								NO		
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]	NE	NE	NE						NE		
A. Forest land	NE	NE	NE						NE		
B. Cropland	NE	NE	NE						NE		
C. Grassland	NE	NE	NE						NE		
D. Wetlands	NE	NE	NE						NE		
E. Settlements	NE	NE	NE						NE		
F. Other land	NE	NE	NE						NE		
G. Harvested wood products	NE								NE		
H. Other	NE	NE	NE						NE		
5. Waste	0.05	1 542.24	86.31						1 628.59		
A. Solid waste disposal	NA	1 328.94							1 328.94		
B. Biological treatment of solid waste		6.16	4.41						10.57		
C. Incineration and open burning of waste	0.05	NA	NA						0.05		
D. Waste water treatment and discharge		207.14	81.90						289.04		
E. Other	NO	NO	NO						NO		
6. Other *(as specified in summary 1.A)*	NO	NO	NO						NO	8 267.11	14 310.20

Memo items:[2]											
International bunkers	359.45	0.71	0.92						361.08		
Aviation	354.08	0.70	0.87						355.65		
Navigation	5.37	0.01	0.04						5.42		
Multilateral operations	C	C	C						C		
CO_2 emissions from biomass	6 010.65								6 010.65		
CO_2 captured	NO								NO		
Long-term storage of C in waste disposal sites	NE								NE		
Indirect N_2O			NA,NO								
Indirect CO_2 [3]	NA,NO										
Total CO_2 equivalent emissions without land use, land-use change and forestry									22 577.31	8 267.11	14 310.20
Total CO_2 equivalent emissions with land use, land-use change and forestry									NE		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									NA		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NA		

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
(2) See footnote 7 to table Summary 1.A.
(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
(4) Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
1. Energy
1A1 - 90% of total CO2 emissisons is from ETS, according to 2015. It is assumed that the distribution stayed the same in 2016. For CH4 and N2O emissions is assumed that ratio CH4/CO2 and N2O/CO2 in 1A2 -106.1% of total CO2 emissisons is from ETS, according to data for 2015. It is assumed that the distribution stayed the same in 2016. For CH4 and N2O emissions is assumed that ratio CH4/CO2 and 1A3 - Transport, 1A4. Other Sectors, 1B2. Oil and Natural Gas all GHG were extrapolated based on emissions from 2012-2015 1B2 - all GHG are extrapolated based on emissions from 2012-2015
2. Industrial processes and product use
2.A.2 factories of lime); 2.A.3; 2.A.4.a and 2.A.4.d are provided by Croatian Agency for the Environment and Nature. Emission for 2.A.2 (sugar refineries) is assessed by extrapolation, according to emissions trend from 2012 to 2015, due to the lack of the information. Emission for 2.A.4.b is assessed by extrapolation, according to emissions trend from 2014 to 2015, due to the lack of the information.
2.B.1 - ETS: natural gas consumption as fuel and feedstock in ammonia production is included, CO2 recovered is subtracted according to 2006 IPCC Guidelines. Verified ETS CO2 emission for 2.B.1 is provided by Croatian Agency for the Environment and Nature. Non-ETS: CH4 and N2O emissions from combustion of natural gas as fuels are assessed by extrapolation, according to CO2 emissions trend from 2015 to 2016, due to the lack of the information.
2.B.2 - ETS: The methodology used to determine N2O emission is based on the measurement. Catalytic decomposition is implemented as a measure for N2O emission reduction in nitric acid production. Verified N2O emission is provided by Croatian Agency for the Environment and Nature.
2.B.8 - non-ETS: CO2 and CH4 emissions are assessed according to data for 2015 due to the lack of the information.
2.C.1 - ETS: Verified CO2 emission from steel production is included. Data are provided by Croatian Agency for the Environment and Nature.
2.D.1; 2.D.2; 2.D.3 - non-ETS: CO2 emission is assessed by extrapolation, according to emissions trend from 2014 to 2015, due to the lack of the information.
2.E - Activities do not exist within a country.
2.F - non-ETS: HFC and PFC emissions are assessed by extrapolation, according to emissions trend from 2014 to 2015, due to the lack of the information.
2.G.1 - non-ETS: SF6 emission is assessed by extrapolation, according to emissions trend from 2014 to 2015, due to the lack of the information.
2.G.3 - non-ETS: N2O emission is assessed according to data for 2015 due to the lack of the information.
2.H.1; 2.H.2; 2.H.3 - non-ETS: Only information on CO2 emission of non-biogenic origin should be reported.
3. Agriculture
3.A-3.H. linear extrapolation is based on trend from 2011 to 2015
5. Waste
5.A.1; 5.A.2 - non-ETS: CH4 emissions are assessed by extrapolation, according to emissions trend from 2014 to 2015, due to the lack of the information.
5.B - non-ETS: CH4 and N2O emissions are assessed according to data for 2015 due to the lack of the information.
5.C.1 - non-ETS: CO2 and N2O emissions are assessed according to data for 2015 due to the lack of the information.
5.D. linear extrapolation is based on trend from 2011 to 2015

6.1.5 Cyprus (calculated centrally by EEA and its ETC/ACM)

SUMMARY 2 SUMMARY REPORT FOR CO2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2016
Submission 2017 v EEA proxy 1.0
CYPRUS

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO2(1)	CH4	N2O	HFCs	PFCs	SF6	Unspecified mix of HFCs and PFCs	NF3	Total	ETS	non-ETS
	CO2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)(1)	**7 264**	**896**	**322**	**359**	**0**	**0**	**0**	**0**	**8 841**		
1. Energy	**6 379.00**	**21**	**63**						**6 462**		
A. Fuel combustion (sectoral approach)	6 379.00	21	63						6 462		
1. Energy industries	3 300.00	3	7						3 311		
2. Manufacturing industries and construction	591.37	1	1						594		
3. Transport	2 049.09	12	55						2 116		
4. Other sectors	416.27	5	-1						420		
5. Other	22.27	0	0						22		
B. Fugitive emissions from fuels	0.00	0	NO,NE						0		
1. Solid fuels	NO	NO	IE						0		
2. Oil and natural gas	NO,NE	NO,NE	IE						0		
C. CO2 transport and storage	NO								0		
2. Industrial processes and product use	**884.33**	**0**	**63**	**359**	**NO**	**0**	**NO**	**NO**	**1 307**		
A. Mineral industry	873.61								874		
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	0		
C. Metal industry	NO	NO		NO	NO	NO	NO	NO	0		
D. Non-energy products from fuels and solvent use	10.70	NE,NA	NE,NA						11		
E. Electronic Industry				NO	NO	NO	NO	NO	0		
F. Product uses as ODS substitutes				359		NO	NO	NO	359		
G. Other product manufacture and use	0.01	NE	63	NO	NO	NO	NO	NO	63		
H. Other									0		
3. Agriculture	**0.40**	**379**	**176**						**555**		
A. Enteric fermentation		231							231		
B. Manure management		147	63						210		
C. Rice cultivation		NO							0		
D. Agricultural soils		NE	113						113		
E. Prescribed burning of savannas		NE	NE						NE		
F. Field burning of agricultural residues		0	0						0		
G. Liming	NO								0		
H. Urea application	0.40								0		
I. Other carbon-containing fertilizers	NO								0		
J. Other									0		
4. Land use, land-use change and forestry(1)	0.00	0	0						0		
A. Forest land	NE	NE	NE						NE		
B. Cropland	NE	NE	NE						NE		
C. Grassland	NE	NE	NE						NE		
D. Wetlands	NE	NE	NE						NE		
E. Settlements	NE	NE	NE						NE		
F. Other land	NE	NE	NE						NE		
G. Harvested wood products	NE								NE		
H. Other	NE	NE	NE						NE		
5. Waste	0.00	497	20						517		
A. Solid waste disposal	NO,NA	467							467		
B. Biological treatment of solid waste		6	4						9		
C. Incineration and open burning of waste	NO	NO	NO						0		
D. Waste water treatment and discharge		24	16						40		
E. Other	NO	NO	NO						0		
6. Other (as specified in summary 1.A)				IE	IE	IE	IE	IE	0		

Memo items:(2)											
International bunkers	NE	NE	NE						NE		
Aviation	NE	NE	NE						NE		
Navigation	NE	NE	NE						NE		
Multilateral operations	NE	NE	NE						NE		
CO2 emissions from biomass	NE								NE		
CO2 captured	NE								NE		
Long-term storage of C in waste disposal sites	NE								NE		
Indirect N2O			NE								
Indirect CO2 (3)	NA										
Total CO2 equivalent emissions without land use, land-use change and forestry									**8 841**	**4 649.22**	**4 192.10**
Total CO2 equivalent emissions with land use, land-use change and forestry									**NE**		
Total CO2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry									**8 841**		
Total CO2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry									**NE**		

(1) For carbon dioxide (CO2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO2, the national totals shall be provided with and without indirect CO2.

The estimates in this table have been compiled according to the methodology described in Annex chapter 6.2. The EEA proxy estimates are based on a bottom up approach (by sector, gas and country). The confidence in the numbers decreases at finer levels of detail, particularly for non-CO_2 emissions. Confidence is highest for CO_2 emissions from fuel combustion.

6.1.6 Czech Republic (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 26/07/2017
Country Czech Republi
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	94539.59	13779.40	6128.75	3659.62	0.89	72.57	NE, NO	2.57	118183.39		
1. Energy	89133.35	5041.77	800.86						94975.98	**53 871**	**36 797**
A. Fuel combustion (sectoral approach)	88941.31	926.34	800.84						90668.48	53 871	**36 797**
1. Energy industries	50642.00	32.52	238.31						50912.83	IE	IE
2. Manufacturing industries and construction	9008.12	35.15	56.50						9099.76	IE	IE
3. Transport	18584.64	26.91	362.77						18974.32	IE	IE
4. Other sectors	10334.34	830.75	132.21						11297.29	IE	IE
5. Other	372.21	1.02	11.05						384.28	IE	IE
B. Fugitive emissions from fuels	192.04	4115.43	0.02						4307.49	NO	4 307
1. Solid fuels	187.07	3514.86	NO,NA						3701.93	NO	3 702
2. Oil and natural gas	4.98	600.57	0.02						605.57	NO	606
C. CO_2 transport and storage	NO								NO	NO	NO
2. Industrial processes and product use	11654.56	57.29	615.45	3659.62	0.89	72.57	NE, NO	2.57	16062.95	**9 976**	**1 998**
A. Mineral industry	2628.62								2628.62	2 578	**50**
B. Chemical industry	1765.53	42.57	391.95	NO	NO	NO	NO	NO	2200.05	1 215	**985**
C. Metal industry	7130.67	14.73	NA	NO	NO	NO	NO	NO	7145.39	6 183	**962**
D. Non-energy products from fuels and solvent use	129.75	NA,NO	NA,NO						129.75	0	**130**
E. Electronic Industry				NO	0.43	0.83	NE,NO	2.57	3.83	0	**4**
F. Product uses as ODS substitutes				3659.62	0.46	NO	NO	NO	3660.09	0	**3 660**
G. Other product manufacture and use	NO	NO	223.50	NO	NO	71.73	NO	NO	295.23	0	**295**
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	**NO**
3. Agriculture	350.00	3667.68	4448.45						8466.14		
A. Enteric fermentation		2894.53							2894.53		
B. Manure management		773.15	1006.50						1779.65		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NO	3441.95						3441.95		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		NO	NO						NO		
G. Liming	163.00								163.00		
H. Urea application	187.00								187.00		
I. Other carbon-containing fertilizers	NO								NO		
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]	-6735.41	81.91	12.81						-6640.69		
A. Forest land	-6141.46	81.91	6.71						-6052.84		
B. Cropland	-0.31	NO	4.98						4.67		
C. Grassland	-550.34	NO	NA,NO						-550.34		
D. Wetlands	25.18	NO	NO						25.18		
E. Settlements	88.12	NO,NA	NO						88.12		
F. Other land	7.55	NO	NO						7.55		
G. Harvested wood products	-164.15								-164.15		
H. Other	NO	NO	NO						NO		
5. Waste	137.09	4930.75	251.18						5319.02		
A. Solid waste disposal	NE,NO	3375							3375.00		
B. Biological treatment of solid waste		674.00	51.49						725.49		
C. Incineration and open burning of waste	137.09	0.00	2.24						139.33		
D. Waste water treatment and discharge		881.75	197.45						1079.20		
E. Other	NO	NO	NO						NO		
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO		

Memo items:[2]											
International bunkers	946.22	0.17	7.98						954.37		
Aviation	946.22	0.17	7.98						954.37		
Navigation	NO	NO	NO						NO		
Multilateral operations	NO	NO	NO						NO		
CO_2 emissions from biomass	14052.40								14052.40		
CO_2 captured	NO								NO		
Long-term storage of C in waste disposal sites	40945.18								40945.18		
Indirect N_2O			335.99								
Indirect CO_2[3]	839.84										
Total CO_2 equivalent emissions without land use, land-use change and forestry									124824.09	63 847	38 795
Total CO_2 equivalent emissions with land use, land-use change and forestry									118183.39		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									125663.93		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									119023.24		

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
(2) See footnote 7 to table Summary 1.A.
(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2 the national totals shall be provided with and without indirect CO_2.
(4) Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
Approximated GHG inventory was created using linear regression for the last 5 years (in some cases for 1990 - 2014) and further extrapolation for year 2015. For more accurate estimations outliers from the activity data were removed. In sectors, where preliminary data was available, the approximation was calculated from it. Linear regression was applied on the lowest levels of sectors and subsectors. This way a better accuracy was reached. IPPU: Approximated GHG inventory was created using prediction model. Prediction model produces predicted values, obtained by evaluating the regression function in the frame (in most cases time series 2010-2015, for NF3 time series 2012-2015). Standard errors of the predictions are also calculated. For more accurate estimations outliers from the activity data were removed, also overall trend across whole time series was checked. In some cases, input for prediction model was based on expert judgement, mainly in cases where was observed trend change and it is expected that trend will be very similar as in few past years after the change of trend. Transport: Emission estimates from Transport are calculated on basis of fuel consumption in particular sectors. Fuel consumption is delivered by Czech Statistical Office, and emission factors stated in IPCC guidelines in g/km are transfered with the help of average fule consumpion stated in IPCC Guidelines to g/kg of fuel. We can expect slight increase in emission estimates in all Transort subsectors, because of increasing fule consumption. Agriculture: The approximated GHG inventory of the Agriculture sector was prepared partly using the available actual activity data (population of livestock, yield) and partly the data from 2015 (urea application, amount of N fertilizer and sewage sludge used for cultivation). No regression trend could be used for trend estimations because of the accidental development of data registered during the recent period. The ERT recommendation concerning calculation of indirect N_2O emissions from agricultural soils has been taken into account. This change in calculation decreased the total GHG emissions from agricultural soils by about 2.5 %. Nevertheless, the total emissions are expected to remain at the same level because the yield of crops, potatoes, green fodder was about 14 % higher in 2016. The emissions from LULUCF correspond to CRF data in 2017 submission. The trend in LULUCF sector is negligible within the time step of one year. ETS and non-ETS data: The ETS data for IPPU sector is based on expert judgement since not all verified data were available at the time of processing the proxy inventory

6.1.7 Denmark (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission Approximated GHG inventory, 2017 submis
Country Denmark

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	**36 588.85**	**6 851.48**	**5 190.48**	**566.64**	**4.08**	**76.46**	**0.00**	**0.00**	**49277.99**		
1. Energy	**35 000.23**	**368.00**	**397.74**						**35765.97**	**16028.29**	**19737.68**
A. Fuel combustion (sectoral approach)	34 718.13	266.57	355.19						35339.90	15756.14	19583.75
1. Energy industries											
2. Manufacturing industries and construction											
3. Transport											
4. Other sectors											
5. Other											
B. Fugitive emissions from fuels	282.09	101.43	42.55						426.07	272.15	153.92
1. Solid fuels	NA,NO	NA,NO	NA,NO						NA,NO		
2. Oil and natural gas and other emissions from energy production	282.09	101.43	42.55						426.07	272.15	153.92
C. CO_2 transport and storage	NO								NO		
2. Industrial processes and product use	**1 389.90**	**3.91**	**19.88**	**566.64**	**4.08**	**76.46**	**0.00**	**0.00**	**2060.87**	**1191.03**	**869.84**
A. Mineral industry	1 215.74								1215.74	1191.03	24.71
B. Chemical industry	1.56	NA,NO	NA,NO	NA	NA	NA	NA	NA	1.56	0	1.56
C. Metal industry	0.18	NO	NO		NO	NO			0.18	0	0.18
D. Non-energy products from fuels and solvent use	172.17	0.49	0.18						172.84	0	172.84
E. Electronic Industry				NO	NO	NO	NO	NO	0.00	0	0.00
F. Product uses as ODS substitutes				566.64	4.08	NA	NA	NA	570.73	0	570.73
G. Other product manufacture and use	0.25	3.41	19.70	NA	NA	76.46	NA	NA	99.82	0	99.82
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA		
3. Agriculture	**177.45**	**5 524.30**	**4 596.87**						**10298.62**	**0.00**	**10298.62**
A. Enteric fermentation		3 667.23							3667.23	0	3667.23
B. Manure management		1 854.08	732.02						2586.10	0	2586.10
C. Rice cultivation		NO							NO		
D. Agricultural soils		NE	3 863.92						3863.92	0	3863.92
E. Prescribed burning of savannahs		NO	NO						NO		
F. Field burning of agricultural residues		2.99	0.92						3.91	0	3.91
G. Liming	165.56								165.56	0	165.56
H. Urea application	1.39								1.39	0	1.39
I. Other carbon-containing fertilizers	10.49								10.49	0	10.49
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]											
A. Forest land											
B. Cropland											
C. Grassland											
D. Wetlands											
E. Settlements											
F. Other land											
G. Harvested wood products											
H. Other											
5. Waste	**21.27**	**955.27**	**175.99**						**1152.53**	**0.00**	**1152.53**
A. Solid waste disposal	NO,NA	655.40							655.40	0	655.40
B. Biological treatment of solid waste		188.08	113.13						301.21	0	301.21
C. Incineration and open burning of waste	NA,NO	0.02	0.26						0.28	0	0.28
D. Waste water treatment and discharge		109.33	62.59						171.92	0	171.92
E. Other	21.27	2.44	NA						23.72	0	23.72
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO		

Memo items:[2]											
International bunkers											
Aviation											
Navigation											
Multilateral operations											
CO_2 emissions from biomass											
CO_2 captured											
Long-term storage of C in waste disposal sites											
Indirect N_2O											
Indirect CO_2[3]	412.49										
									Total CO_2 equivalent emissions without land use, land-use change and forestry	**49 277.99**	**17 219.32**	**32 058.67**
									Total CO_2 equivalent emissions with land use, land-use change and forestry			
									Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	**49 690.48**		
									Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry			

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

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Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.

The short term trend in Danish greenhouse gas emissions is dominated by the trend in the energy sector. This is caused by the open electricity market and especially the import/export of electricity within the Nordic electricity market. Changes in production of renewable energy (mainly hydropower) in the Nordic countries influences directly the need for fossil power generation in Denmark.
In 2016, Denmark imported less electricity compared to 2015. However, the production of renewable energy increased. The result was an increase in coal consumption in the Danish power plants by about 15 %. The consumption of natural gas and oil products increased, but only by 1.0 and 3.1 % respectively. The overall result is an increase in the CO2 emission from fuel combustion. More information on the preliminary energy statistics is available from the Danish Energy Agency (https://ens.dk/en/press#/pressreleases/energy-consumption-increased-in-2016-due-to-less-wind-1883949 & https://ens.dk/sites/ens.dk/files/Statistik/foreloebig_energistatistik_2016_eng.pdf).
For industrial processes, most emissions of CO2, CH4 and N2O have been assumed constant at 2015 levels. However, 2016 ETS infomation has been taken into account for cement production. For f-gases, the emissions of HFCs are expected to continue to decrease due to the measures in place to reduce the use of HFCs. For SF6, the emissions have peaked, this is caused by the fact that SF6 was used in double glazed windows and according to the model the lifetime of these windows started to expire in 2011 causing the remaining SF6 to be emitted. Hence, the emissions of SF6 increased since 2011 and now they decrease again.
Emissions from agriculture and waste have been kept constant for the purpose of this proxy.

6.1.8 Estonia (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017
Country Estonia

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	**17 240.26**	**1 032.05**	**783.91**	**230.16**	**NO**	**2.54**	**NO**	**NO**	**19 288.9164549879**	13 447.85	5 838.95
1. Energy	**16 964.68**	**158.37**	**75.26**						**17 198.31**	**13 211.14**	**3 985.05**
A. Fuel combustion (sectoral approach)	16 964.64	138.85	75.26						17 178.76	13 211.14	3 965.50
1. Energy industries	13 557.69	15.65	31.59						13 604.93	12 965.72	639.21
2. Manufacturing industries and construction	400.71	1.37	2.30						404.38	241.33	163.04
3. Transport	2 421.35	4.03	21.60						2 446.98	NO	2 444.86
4. Other sectors	558.11	117.77	19.34						695.21	4.09	691.12
5. Other	26.78	0.04	0.44						27.26	0.00	27.26
B. Fugitive emissions from fuels	0.03	19.51	NO						19.55	0.00	19.55
1. Solid fuels	NO	NO	NO						NO	0.00	0.00
2. Oil and natural gas and other emissions from energy production	0.03	19.51	NO						19.55	0.00	19.55
C. CO_2 transport and storage	NO								NO	0.00	0.00
2. Industrial processes and product use	**258.49**	**NO**	**3.12**	**230.16**	**NO**	**2.54**	**NO**	**NO**	**494.31**	**236.71**	**257.60**
A. Mineral industry	236.96								236.96	236.71	0.25
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.00
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.00
D. Non-energy products from fuels and solvent use	21.53	NO	NO						21.53	0.00	21.53
E. Electronic Industry				NO	NO	NO	NO	NO	NO	0.00	0.00
F. Product uses as ODS substitutes				230.16	NO	NO	NO	NO	230.16	0.00	230.16
G. Other product manufacture and use	NO	NO	3.12	NO	NO	2.54	NO	NO	5.66	0.00	5.66
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.00
3. Agriculture	**16.16**	**607.15**	**661.99**						**1 285.30164**	**0.00**	**1 285.30**
A. Enteric fermentation		533.66							533.66	0.00	533.66
B. Manure management		73.50	60.06						133.56	0.00	133.56
C. Rice cultivation		NO							NO	0.00	0.00
D. Agricultural soils		NO	601.92						601.92	0.00	601.92
E. Prescribed burning of savannahs		NO	NO						NO	0.00	0.00
F. Field burning of agricultural residues		NO	NO						NO	0.00	0.00
G. Liming	13.21									0.00	0.00
H. Urea application	2.95								NO	0.00	0.00
I. Other carbon-containing fertilizers	NO								NO	0.00	0.00
J. Other	NO	NO	NO						NO	0.00	0.00
4. Land use, land-use change and forestry[1]											
A. Forest land											
B. Cropland											
C. Grassland											
D. Wetlands											
E. Settlements											
F. Other land											
G. Harvested wood products											
H. Other											
5. Waste	**0.92**	**266.53**	**43.54**						**311.00**	**0.00**	**311.00**
A. Solid waste disposal	NO	171.29	NO						171	0.00	171.29
B. Biological treatment of solid waste		17.16	12.27						29	0.00	29.43
C. Incineration and open burning of waste	0.92	0.42	0.12						1.47	0.00	1.47
D. Waste water treatment and discharge		56.63	30.16						87	0.00	86.79
E. Other	NO	21.04	0.99						22	0.00	0.00
6. Other *(as specified in summary 1.A)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**0.00**	**0.00**

Memo items:[2]											
International bunkers	958.40	2.16	2.73						963.29		
Aviation	73.72	0.04	0.61						74.37		
Navigation	884.68	2.12	2.12						888.92		
Multilateral operations	NO	NO	NO						NO		
CO_2 emissions from biomass	3 661.05										
CO_2 captured	NO								NO		
Long-term storage of C in waste disposal sites											
Indirect N_2O			NE, NO								
Indirect CO_2[3]	NE, NO, IE										
Total CO_2 equivalent emissions without land use, land-use change and forestry									**19 288.92**		
Total CO_2 equivalent emissions with land use, land-use change and forestry									**NE**		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									**19 288.92**		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									**NE**		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

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Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
TOTAL GHG emissions: Total Estonian GHG emissions in 2016 rose 6.9% compared to 2015. The drivers underpinning the increase are ellaborated by the sector. **Total ETS/non-ETS emissions:** Total 2016 ETS emissions increased 13.1%, mainly due to an increased electricity production in Estonian oil shale power stations, and ESD emissions have fallen 5% compared to 2015 due to declining fuel use in Energy industries. **Energy:** Total GHG emissions have increased 8.4% compared to year 2015 due to an increase in emissions from Energy industries and the Transport sector, which increased 11.2% and 5.3%, respectively. Emissions mainly increased because electricity production in oil shale power stations increased and diesel fuel demand increased in the transport sector. **IPPU:** Decrease of CO2 emissions from IPPU sector by 3.6% in 2016 was mainly caused by continuous reduction of mineral industry produce. **Agriculture:** Total emissions from agriculture sector in 2016 decreased 3.9% compared with 2015 agriculture emissions. The emissions from Enteric fermentation and Manure management have decreased due to falling numbers of dairy cattle and swine. The dairy industry has suffered a decline in production due to economic sanctions imposed by Russia on EU starting from August 2014. Consequently, the number of dairy cattle in 2016 dropped 4.7% in comparison with 2015. The outbreak of African swine fever in the region has had a serious impact on swine farming sector in 2016 which resulted in a 13% decline in swine population compared to 2015 . The emissions from Agricultural soils in 2016 dropped 7% compared to previous year as the cereal production decreased, influenced by the setbacks in dairy and swine farming industries. *Sources* :https://valitsus.ee/en/news/prime-minister-roivas-swine-fever-can-only-be-tackled-cooperation-between-pig-farmers-and-state; http://russia-insider.com/en/politics/european-dairy-industry-crisis-due-russian-food-embargo/ri9181. **Waste:** Compared with the 2015, the total waste sector CO2 eq emissions in 2016 decreased 4.6%. The preliminary data used for calculating the proxy emissions is under inspection by the Estonian Environment Agency. CO2 eq emission 8.5% decrease from Solid waste disposal is caused by the decrease of biodegradable waste going to landfills and increasing amount of recycling waste. Emissions from Biological treatment of solid waste increased 15.1%, which is caused by the increase of solid waste treated biologically. CO2 eq emissions under Incineration and open burning of waste increased 5.1%. Wastewater treatment and discharge increased 2.5%, which is influenced by the industry production and the number of people living in the low density settlements. Biogas burnt in a flare is reported first time under the section Other

6.1.9 Finland (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2016
Submission 2017 proxy
FINLAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	21713.08	5705.34	5947.35	1440.07	7.65	37.55	NO	NO	34851.05		
1. Energy	43077.25	294.72	568.85						43940.82	**22 945**	**20 793**
A. Fuel combustion (sectoral approach)	42969.00	258.13	568.24						43795.37		
1. Energy industries	17510.00	27.00	272.00						17809.00		
2. Manufacturing industries and construction	8470.00	22.33	144.00						8636.33		
3. Transport	12220.00	20.31	80.14						12320.45		
4. Other sectors	3640.00	185.40	63.86						3889.26		
5. Other	1129.00	3.09	8.24						1140.33		
B. Fugitive emissions from fuels	108.25	36.59	0.61						145.44		
1. Solid fuels	NO	NO	NO						NO		
2. Oil and natural gas	108.25	36.59	0.61						145.44		
C. CO_2 transport and storage	NA,NO								NA,NO		
2. Industrial processes and product use	4491.58	0.15	278.39	1440.07	7.65	37.55	NO	NO	6255.40	**4 300**	**1 955**
A. Mineral industry	1082.73								1082.73		
B. Chemical industry	1051.00	NA,NO	253.66	NO	NO	NO	NO	NO	1304.65		
C. Metal industry	2221.62	0.00	NO			NA,NO			2221.62		
D. Non-energy products from fuels and solvent use	136.24	0.15	0.89						137.29		
E. Electronic Industry				NO,IE	NO,IE	NO,IE	NO	NO	NO,IE		
F. Product uses as ODS substitutes				1436.83	5.46				1442.29		
G. Other product manufacture and use	NO	NO	23.84	NO	NO	10.85	NO	NO	34.69		
H. Other	NO	NO	NO	3.24	2.20	26.70			32.14		
3. Agriculture	181.85	2572.38	3712.10						6466.33	**0**	**6 466**
A. Enteric fermentation		2107.31							2107.31		
B. Manure management		463.13	286.21						749.34		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NE,NO	3425.30						3425.30		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		1.94	0.60						2.54		
G. Liming	179.75								179.75		
H. Urea application	2.10								2.10		
I. Other carbon-containing fertilizers	NA								NA		
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]	-26037.60	920.06	1262.81						-23854.73		
A. Forest land	-33956.34	843.75	1127.96						-31984.62		
B. Cropland	6665.66	IE,NA	11.71						6677.37		
C. Grassland	681.79	0.01	1.51						683.31		
D. Wetlands	2128.33	76.30	99.57						2304.20		
E. Settlements	775.97	NE,NA	22.05						798.02		
F. Other land	NO,NA	NA	NA						NO,NA		
G. Harvested wood products	-2333.01								-2333.01		
H. Other	NA	NA	NA						NA		
5. Waste	NE,NO,IE	1918.03	125.20						2043.23	**0**	**2 043**
A. Solid waste disposal	NO	1675.92							1675.92		
B. Biological treatment of solid waste		68.89	43.97						112.85		
C. Incineration and open burning of waste	NE,NO,IE	NE,NO,IE	NE,NO,IE						NE,NO,IE		
D. Waste water treatment and discharge		173.22	81.23						254.46		
E. Other	NO	NO	NO						NO		
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NO		
Memo items:[2]											
International bunkers	2832.55	2.50	22.04						2857.09		
Aviation	1967.62	0.62	16.02						1984.26		
Navigation	864.93	1.88	6.02						872.83		
Multilateral operations	NO	NO	NO						NO		
CO_2 emissions from biomass	39483.52								39483.52		
CO_2 captured	138.28								138.28		
Long-term storage of C in waste disposal sites	54737.26								54737.26		
Indirect N_2O			182.16								
Indirect CO_2 [3]	52.00										
Total CO_2 equivalent emissions without land use, land-use change and forestry									58705.78	**27 245**	**31 258**
Total CO_2 equivalent emissions with land use, land-use change and forestry									34851.05		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									58757.78	**27 245**	**31 310**
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									34903.05		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
According to Statistics Finland's instant preliminary data, the total emissions of greenhouse gases in 2016 corresponded with 58.8 million tonnes of carbon dioxide (CO_2 eq.). Emissions grew by six per cent compared with the previous year but were still 18 per cent lower than in 1990. The biggest reasons for the growth in the emissions were the increase in coal consumption and the decline in the proportion of biofuels used in transport. Emissions from the non-emissions trading sector went up by five per cent compared to 2015. According to the instant preliminary data, total emissions increased by six per cent from 2015. Emissions in the energy sector grew by eight per cent year-on-year. The biggest reasons for the growth in the emissions were the increase in coal consumption and the decline in the proportion of biofuels used in (road) transport. Preliminary data on total energy consumption in 2016 released by Statistics Finland have been used in the calculation of the energy sector. In the industrial processes and product use sector, emissions rose by three per cent year-on-year, the growth was most affected by emissions from the mineral industry (13 per cent) and the chemical industry (11 per cent.) Emissions from agriculture remained at the same level as in 2015. Emissions from waste management decreased by around four per cent. The carbon sink of the LULUCF sector decreased by eight per cent. http://tilastokeskus.fi/til/khki/2016/khki_2016_2017-05-24_tie_001_en.html http://tilastokeskus.fi/til/ehk/2016/04/ehk_2016_04_2017-03-23_tie_001_en.html (Energy statistics, Preliminary data) https://www.energiavirasto.fi/-/suomen-paastokauppasektorin-paastot-kasvoivat-1-7-miljoonaa-tonnia-vuonna-2016?redirect=https%3A%2F%2Fwww.energiavirasto.fi%2Fmedia%3Fp_p_id%3D101_INSTANCE_ooKNxg1qkv7p%26p_p_lifecycle%3D0%26p_p_state%3Dnormal%26p_p_mode%3Dview%26p_p_col_id%3Dcolumn-1%26p_p_col_pos%3D1%26p_p_col_count%3D3 (Energy authority, EU Emissions trading Scheme, The data on the verified emissions of the emissions trading sector in Finland in 2016)

6.1.10 France (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

	France Kyoto (including Mayotte) Proxy 2016									France Kyoto (including Mayotte) Proxy 2016	
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	**CO2(1)**	**CH4**	**N2O**	**HFCs**	**PFCs**	**Unspecified mix of HFCs**	**SF6**	**NF3**	**Total**	**ETS**	**non-ETS**
	CO2 equivalent (kt)									**CO2 equivalent (Gg)**	
Total (net emissions)(1)	303 935.65	59 656.93	43 391.11	19 263.86	540.18	0.00	520.70	10.63	427 319.07		
1. Energy	316 603.37	2 997.58	3 801.41						323 402.36	**80 601.70**	**242 800.66**
A. Fuel combustion (sectoral approach)	313 729.33	1 760.46	3 787.29						319 277.07	**77 730.39**	**241 546.69**
1. Energy industries	45 298.30	36.49	286.82						45 621.61	**38 181.93**	**7 439.68**
2. Manufacturing industries and construction	51 061.32	107.55	360.09						51 528.96	**38 872.74**	**12 656.22**
3. Transport	131 316.90	159.45	1 653.92						133 130.27	**377.92**	**132 752.36**
4. Other sectors	86 052.81	1 456.97	1 486.45						88 996.23	**297.80**	**88 698.43**
5. Other	0.00	0.00	0.00						0.00	-	-
B. Fugitive emissions from fuels	2 874.04	1 237.12	14.12						4 125.29	**2 871.31**	**1 253.97**
1. Solid fuels	0.00	4.93	0.00						4.93	-	**4.93**
2. Oil and natural gas	2 874.04	1 232.19	14.12						4 120.36	**2 871.31**	**1 249.05**
C. CO2 transport and storage	0.00								0.00	-	-
2. Industrial processes and product use	22 908.75	49.68	1 282.78	19 263.86	540.18	0.00	520.70	10.63	44 576.59	**21 029.63**	**23 546.95**
A. Mineral industry	10 811.37								10 811.37	**9 973.83**	**837.54**
B. Chemical industry	6 464.17	48.51	1 147.72	208.85	2.42	0.00	0.00	0.00	7 871.66	**6 991.74**	**879.92**
C. Metal industry	3 940.49	0.96	0.00	0.00	62.15	0.00	37.64	0.00	4 041.24	**4 036.83**	**4.41**
D. Non-energy products from fuels and solvent use	1 692.67	0.21	2.74						1 695.63	**27.19**	**1 668.43**
E. Electronic Industry				6.42	78.58	0.00	4.51	10.63	100.15	-	**100.15**
F. Product uses as ODS substitutes				19 048.07	0.00	0.00	0.00	0.00	19 048.07	-	**19 048.07**
G. Other product manufacture and use	0.00	0.00	132.32	0.52	397.03	0.00	478.55	0.00	1 008.43	-	**1 008.43**
H. Other	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	**0.04**	**0.00**
3. Agriculture	2 005.60	40 929.68	35 287.12						78 222.40	-	**78 222.40**
A. Enteric fermentation		34 580.16							34 580.16	-	**34 580.16**
B. Manure management		6 219.19	1 858.70						8 077.88	-	**8 077.88**
C. Rice cultivation		81.37							81.37	-	**81.37**
D. Agricultural soils		0.00	33 413.30						33 413.30	-	**33 413.30**
E. Prescribed burning of savannas		0.00	0.00						0.00	-	-
F. Field burning of agricultural residues		48.96	15.13						64.09	-	**64.09**
G. Liming	862.72								862.72	-	**862.72**
H. Urea application	1 142.88								1 142.88	-	**1 142.88**
I. Other carbon-containing fertilizers	0.00								0.00	-	-
J. Other	0.00	0.00	0.00						0.00	-	-
4. Land use, land-use change and forestry(1)	-39 087.21	1 110.35	2 167.10						-35 809.76	**0.00**	**-35 809.76**
A. Forest land	-54 130.06	592.23	310.00						-53 227.83	0.00	-53 227.83
B. Cropland	16 016.41	116.43	1 794.67						17 927.52	0.00	17 927.52
C. Grassland	-10 747.84	113.39	58.51						-10 575.94	0.00	-10 575.94
D. Wetlands	498.29	9.16	0.75						508.20	0.00	508.20
E. Settlements	10 944.00	58.41	3.17						11 005.58	0.00	11 005.58
F. Other land	0.16	0.00	0.00						0.16	0.00	0.16
G. Harvested wood products	-1 747.11								-1 747.11	0.00	-1 747.11
H. Other	78.93	220.73	0.00						299.66	0.00	299.66
5. Waste	1 505.15	14 569.64	852.69						16 927.49		
A. Solid waste disposal	0.00	12 077.74							12 077.74		
B. Biological treatment of solid waste		268.36	349.10						617.46		
C. Incineration and open burning of waste	1 505.15	27.90	46.34						1 579.39		
D. Waste water treatment and discharge		2 195.65	457.25						2 652.90		
E. Other	0.00	0.00	0.00						0.00		
6. Other (as specified in summary 1.A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

Memo items:(2)											
International bunkers											
Aviation											
Navigation											
Multilateral operations											
CO2 emissions from biomass											
CO2 captured											
Long-term storage of C in waste disposal sites											
Indirect N2O											
Indirect CO2 (3)											
Total CO2 equivalent emissions without land use, land-use change and forestry									**463 128.83**	**101 631.33**	**344 570.01**
Total CO2 equivalent emissions with land use, land-use change and forestry									**427 319.07**		
Total CO2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry									**463 128.83**		
Total CO2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry									**427 319.07**		

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Emissions indirectes de CO2	0.00								0.00	-	-

6.1.11 Germany (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016 (proxy)
Submission 25/07/2017
Country GERMANY
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO_2 equivalent (Gg)	
Total (net emissions)[1]	**779 582**	**56 267**	**39 774**	**11 300**	**280**	**3 750**	**IE**	**12**	**890 965**		
1. Energy	**748 540**	**12 654**	**5 494**						**766 689**	**412 102**	**354 587**
A. Fuel combustion (sectoral approach)	745 990	4 501	5 494						755 986	412 102	**343 884**
1. Energy industries	326 558	2 942	2 609						332 108	306 568	**25 540**
2. Manufacturing industries and construction	125 976	275	806						127 057	104 079	**22 979**
3. Transport	164 466	148	1 615						166 229	1 051	**165 178**
4. Other sectors	128 990	1 136	465						130 591	404	**130 187**
5. Other	IE	IE	IE						IE	IE	**IE**
B. Fugitive emissions from fuels	2 550	8 153	0						10 703	NE	**10 703**
1. Solid fuels	705	3 096	NO						3 801	IE	**3 801**
2. Oil and natural gas	1 846	5 057	0						6 903	IE	**6 903**
C. CO_2 transport and storage	NO								NO	NO	**NO**
2. Industrial processes and product use	44 291	529	1 170	11 300	280	3 750	IE	12	61 332	**40 771**	**20 560**
A. Mineral industry	18 905								18 905	14 516	**4 389**
B. Chemical industry	5 571	485	760						6 816	13 208	**-6 392**
C. Metal industry	17 508	7	16	IE	IE	IE	IE	IE	17 531	13 037	**4 495**
D. Non-energy products from fuels and solvent use	2 306	NO	1						2 308	11	**2 297**
E. Electronic Industry				IE	IE	IE	IE	IE	IE	0	**IE**
F. Product uses as ODS substitutes				IE	IE	IE	IE	IE	IE	0	**IE**
G. Other product manufacture and use	NO	37	393	IE	IE	IE	IE	IE	429	0	**429**
H. Other	NA	NA	NA	IE	IE	IE	IE	IE	IE	IE	**NA**
3. Agriculture	3 052	32 365	31 402						66 819		
A. Enteric fermentation		24 860							24 860		
B. Manure management		6 209	3 846						10 054		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NO	27 312						27 312		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		NO	NO						NO		
G. Liming	2 205								2 205		
H. Urea application	847								847		
I. Other carbon-containing fertilizers	NO								NO		
J. Other	NO	1 296	245						1 541		
4. Land use, land-use change and forestry[1]	-16 301	867	855						-14 580		
A. Forest land	-57 927	20	146						-57 761		
B. Cropland	14 348	247	289						14 885		
C. Grassland	22 092	514	103						22 709		
D. Wetlands	4 007	43	22						4 072		
E. Settlements	3 302	43	194						3 539		
F. Other land	NO	NO	NO						NO		
G. Harvested wood products	-2 124								-2 124		
H. Other		NA	100						100		
5. Waste	NA, NO	9 852	853						10 705		
A. Solid waste disposal	NA	8 475							8 475		
B. Biological treatment of solid waste		777	326						1 103		
C. Incineration and open burning of waste	NO	NO	NO						NO		
D. Waste water treatment and discharge		597	452						1 049		
E. Other		4	74						78		
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO		

Memo items:[2]											
International bunkers	31 251	5	317						31 573		
Aviation	24 320	2	228						24 550		
Navigation	6 932	2	89						7 023		
Multilateral operations	NE	NE	NE						NE		
CO_2 emissions from biomass	104 218								104 218		
CO_2 captured	NO								NO		
Long-term storage of C in waste disposal sites	NO								NO		
Indirect N_2O			NO						NO		
Indirect CO_2 [3]											
Total CO_2 equivalent emissions without land use, land-use change and forestry									**905 545**	**452 873**	**452 671**
Total CO_2 equivalent emissions with land use, land-use change and forestry											
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry											
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry											

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.

https://www.umweltbundesamt.de/en/press/pressinformation/climate-footprint-2016-transport-sector-cool

6.1.12 Greece (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017
Country Greece

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions) [1]											
1. Energy									**67 940**		
A. Fuel combustion (sectoral approach)									66 901		
1. Energy industries	37 311.08	11.95	112.76						37 436	36 917	518
2. Manufacturing industries and construction	5 064.99	7.26	66.06						5 138	3 895	1 243
3. Transport	17 219.44	84.17	214.29						17 518		17 518
4. Other sectors	6 448.91	16.75	91.61						6 557		6 557
5. Other	250.00	0.05	1.79						252		252
B. Fugitive emissions from fuels									1 039		
1. Solid fuels	NO	937	NA,NO						937		937
2. Oil and natural gas and other emissions from energy production	4	99	0						102		102
C. CO_2 transport and storage	NO										
2. Industrial processes and product use									**12 083**		
A. Mineral industry	4 208								4 208	4 192	15
B. Chemical industry	223		20						244	244	
C. Metal industry	1 128	0	NO		65.90667751				1 194	1 051	143
D. Non-energy products from fuels and solvent use	35	NA,NO	NA,NO						35		35
E. Electronic Industry				NO	NO	NO	NO	NO	NO		
F. Product uses as ODS substitutes				6112.640878	53.90782059				6 167		6 167
G. Other product manufacture and use	82	NA	149		NO	5.073138291			236		236
H. Other	NA	NA	NA								
3. Agriculture									**8 579**		
A. Enteric fermentation		4 082							4 082		4 082
B. Manure management		689	316						1 005		1 005
C. Rice cultivation		148							148		148
D. Agricultural soils			3 275						3 275		3 275
E. Prescribed burning of savannahs											
F. Field burning of agricultural residues		34	10						45		45
G. Liming	NO										
H. Urea application	25								25		25
I. Other carbon-containing fertilizers	NO										
J. Other											
4. Land use, land-use change and forestry [1]	-3723.90	28.72	10.62						-3684.57		
A. Forest land	-2272.15	8.03	0.66						-2263.45		
B. Cropland	-315.14	NO	0.01						-315.13		
C. Grassland	-1231.94	20.68	2.01						-1209.24		
D. Wetlands	1.79	NO	0.15						1.94		
E. Settlements	14.65	NO	0.90						15.56		
F. Other land	90.68	NO	6.88						97.56		
G. Harvested wood products	-11.79								-11.79		
H. Other	NO	NO	NO						NO		
5. Waste									**4 568**		
A. Solid waste disposal	NA,NO	3 176							3 176		3 176
B. Biological treatment of solid waste		46	33						78		78
C. Incineration and open burning of waste	5	0	1						6		6
D. Waste water treatment and discharge		980	328						1 308		1 308
E. Other	NO	NO	NO								
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO			

Memo items: [2]											
International bunkers	9 171.01	13.69	179.27						9 363.98		
Aviation	2 846.17	0.50	23.75						2 870.41		
Navigation	6 324.85	13.20	155.52						6 493.56		
Multilateral operations											
CO_2 emissions from biomass											
CO_2 captured											
Long-term storage of C in waste disposal sites											
Indirect N_2O											
Indirect CO_2 [3]											
Total CO_2 equivalent emissions without land use, land-use change and forestry									**93 170.97**	**46 299.72**	**46 871.25**
Total CO_2 equivalent emissions with land use, land-use change and forestry									**89 486.40**		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry											
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry											

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

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Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
The ETS in column L does not include aviation. The emissions from national aviation are included in column M (non-ETS). The estimation of emissions from categories 1 (power sector, refineries and industry) and 2 is based on ETS data. The estimation of emissions from the rest sectors is based on extrapolation of historic emissions and expert judgement. Concerning LULUCF, GHG emissions in t-1 year (proxy) were based on BAU scenario projections.

6.1.13 Hungary (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission Proxy
Country Hungary

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]											
1. Energy	**42 796.93**	**1 443.95**	**342.84**						**44583.72**	**15 318.21**	**29 265.52**
A. Fuel combustion (sectoral approach)	42 661.69	720.00	342.58						43724.28	15 251.87	28 472.40
1. Energy industries	13 673.62	25.61	64.86						13764.09	13 259.21	504.88
2. Manufacturing industries and construction	4 298.93	7.95	18.67						4325.55	1 867.05	2 458.51
3. Transport	12 628.31	26.75	141.29						12796.36	114.99	12 681.37
4. Other sectors	12 042.94	659.69	117.60						12820.23	10.63	12 809.61
5. Other	17.89	0.00	0.15						18.04	0.00	18.04
B. Fugitive emissions from fuels	135.24	723.95	0.26						859.45	66.33	793.11
1. Solid fuels	NA	53.91	NA						53.91	0.00	53.91
2. Oil and natural gas and other emissions from energy production	135.24	670.04	0.26						805.54	66.33	739.21
C. CO_2 transport and storage	NE								NE	NO	NO
2. Industrial processes and product use	**4371.49**	**44.02**	**83.07**	**1727.30**	**1.62**	**103.17**	**0.00**	**0.00**	**6330.68**	**4 082.32**	**2 248.36**
A. Mineral industry	1156.57								1156.57	1 155.59	0.98
B. Chemical industry	2264.12	40.74	27.14	NO	NO	NO	NO	NO	2332.00	2 135.00	197.00
C. Metal industry	810.97	3.29	NO	NO	NO	NO	NO	NO	814.26	791.73	22.53
D. Non-energy products from fuels and solvent use	139.83	NO,NA	NO,NA						139.83	0.00	139.83
E. Electronic Industry				NO	NO	NO	NO	NO	NO	0.00	0.00
F. Product uses as ODS substitutes				1727.30	1.62	NO	NO	NO	1728.92	0.00	1 728.92
G. Other product manufacture and use	NO	NO	55.94	NO	NO	103.17	NO	NO	159.11	0.00	159.11
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.00
3. Agriculture	**182.39**	**2 725.84**	**3 937.97**						**6846.19**	**NA**	**6846.19**
A. Enteric fermentation		2049.17							2049.17	NA	2049.17
B. Manure management		656.77	460.74						1117.52	NA	1117.52
C. Rice cultivation		19.90							19.90	NA	19.90
D. Agricultural soils		NA	3477.22						3477.22	NA	3477.22
E. Prescribed burning of savannahs		NO	NO						NO	NA	NO
F. Field burning of agricultural residues		NO	NO						NO	NA	NO
G. Liming	17.91								17.91	NA	17.91
H. Urea application	82.84								82.84	NA	82.84
I. Other carbon-containing fertilizers	81.64								81.64	NA	81.64
J. Other									NO	NA	NO
4. Land use, land-use change and forestry[1]	**NE**	**NE**	**NE**						**NE**		
A. Forest land	NE	NE	NE						NE		
B. Cropland	NE	NE	NE						NE		
C. Grassland	NE	NE	NE						NE		
D. Wetlands	NE	NE	NE						NE		
E. Settlements	NE	NE	NE						NE		
F. Other land	NE	NE	NE						NE		
G. Harvested wood products	NE	NE	NE						NE		
H. Other	NE	NE	NE						NE		
5. Waste	**194.33**	**3 470.64**	**113.26**						**3 778.22**	**NA**	**3778.22**
A. Solid waste disposal	NO,NA	2 998.40							2998.40	NA	2998.40
B. Biological treatment of solid waste		98.85	34.25						133.10	NA	133.10
C. Incineration and open burning of waste	194.33	0.31	2.14						196.77	NA	196.77
D. Waste water treatment and discharge		373.08	76.86						449.94	NA	449.94
E. Other	NO	NO	NO						NO	NA	NO
6. Other ***(as specified in summary 1.A)***									NO	NA	NO

Memo items:[2]											
International bunkers	**546.24**	**17.00**	**4.55**						**567.79**		
Aviation	546.24	17.00	4.55						567.79		
Navigation	NO,NE	NO,NE	NO,NE						NO,NE		
Multilateral operations	**NO**	**NO**	**NO**						NO		
CO_2 emissions from biomass	**NE**								NE		
CO_2 captured	**NO**								NO		
Long-term storage of C in waste disposal sites	**NE**								NE		
Indirect N_2O											
Indirect CO_2[3]	NE										
Total CO_2 equivalent emissions without land use, land-use change and forestry									**61 538.82**	**19 400.52**	**42 138.29**
Total CO_2 equivalent emissions with land use, land-use change and forestry									**NE**		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									**NE**		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									**NE**		

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

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Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
Compared to 2015, total emissions in 2016 were estimated to be somewhat higher by 1 per cent. ETS emissions decreased slightly by 1 per cent. ENERGY (+3%) Electricity production increased by 5% within which conventional thermal plants using fossil fuels had the greatest contribution. Import decreased. Considering large power plants, natural gas based electricity production increased significantly whereas the share of coal and renewables decreased. Motor gasoline and diesel oil sales increased by 4 to 6 per cent which led to increased emissions in the transport sector; Natural gas consumption increased further for the second consecutive year; the increase was most probably above average in the residential sector. Higher natural gas consumption also increased fugitive emissions from natural gas. IPPU (-13%) Iron and steel production decreased more than 30% compared to 2015. Also small decreasing (-4%) can be found at chemical industry. Emission of fluorinated gases has descreased because of significant reduction of import in the 2F1 subcategory (-24%). AGRICULTURE (+3%) Higher N input from crop residues (+18%) and synthetic fertilizer use (2%). Livestock related emissions remained quasy unchanged. WASTE (-2%) The decreasing trend is expected to continue.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
Compared to 2015, total emissions in 2016 were estimated to be somewhat higher by 1 per cent. ETS emissions decreased slightly by 1 per cent. ENERGY (+3%) Electricity production increased by 5% within which conventional thermal plants using fossil fuels had the greatest contribution. Import decreased. Considering large power plants, natural gas based electricity production increased significantly whereas the share of coal and renewables decreased. Motor gasoline and diesel oil sales increased by 4 to 6 per cent which led to increased emissions in the transport sector; Natural gas consumption increased further for the second consecutive year; the increase was most probably above average in the residential sector. Higher natural gas consumption also increased fugitive emissions from natural gas. IPPU (-13%) Iron and steel production decreased more than 30% compared to 2015. Also small decreasing (-4%) can be found at chemical industry. Emission of fluorinated gases has descreased because of significant reduction of import in the 2F1 subcategory (-24%). AGRICULTURE (+3%) Higher N input from crop residues (+18%) and synthetic fertilizer use (2%). Livestock related emissions remained quasy unchanged. WASTE (-2%) The decreasing trend is expected to continue.

6.1.14 Ireland (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2018
Country Ireland

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	40025.12	13702.03	7300.19	1192.96	20.50	45.04	NO	0.96	62286.80		
1. Energy	37450.58	221.53	351.18						38023.29	15764.40	22258.89
A. Fuel combustion (sectoral approach)	37449.22	181.97	351.18						37982.37	15764.40	22217.97
1. Energy industries	12337.23	7.56	141.50						12486.29	12320.92	165.38
2. Manufacturing industries and construction	4654.46	9.10	15.21						4678.76	3403.74	1275.02
3. Transport	12152.37	15.72	123.32						12291.41	11.53	12279.88
4. Other sectors	8305.17	149.59	71.15						8525.90	28.21	8497.70
5. Other	IE	IE	IE						IE		
B. Fugitive emissions from fuels	1.35	39.57	NO						40.92		40.92
1. Solid fuels	NO	19.24	NO						19.24		19.24
2. Oil and natural gas and other emissions from energy production	1.35	20.32	NO						21.68		21.68
C. CO_2 transport and storage	NO								NO		
2. Industrial processes and product use	2080.47	NO	42.57	1192.96	20.50	45.04	NO	0.96	3382.50	1968.40	1414.10
A. Mineral industry	1968.40								1968.40	1968.40	0.00
B. Chemical industry	NO	NO	NO						NO		
C. Metal industry	NO	NO							NO		
D. Non-energy products from fuels and solvent use	112.07	NO	NO						112.07		112.07
E. Electronic Industry				1192.96	20.50	21.55		0.96	1235.97		1235.97
F. Product uses as ODS substitutes									0.00		0.00
G. Other product manufacture and use	NO	NO	42.57	NO	NO	23.49	NO	NO	66.06		66.06
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO		
3. Agriculture	461.40	12706.36	6774.75						19942.52		19942.52
A. Enteric fermentation		11298.88							11298.88		11298.88
B. Manure management		1407.49	501.24						1908.72		1908.72
C. Rice cultivation		NO							NO		
D. Agricultural soils		NE	6273.51						6273.51		6273.51
E. Prescribed burning of savannahs		NO	NO						NO		
F. Field burning of agricultural residues		NO	NO						NO		
G. Liming	425.60								425.60		425.60
H. Urea application	35.80								35.80		35.80
I. Other carbon-containing fertilizers	NO								NO		
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]									0.00		
A. Forest land									0.00		
B. Cropland									0.00		
C. Grassland									0.00		
D. Wetlands									0.00		
E. Settlements									0.00		
F. Other land									0.00		
G. Harvested wood products									0.00		
H. Other											
5. Waste	32.66	774.13	131.69						938.49		938.49
A. Solid waste disposal	NO	706.65							706.65		706.65
B. Biological treatment of solid waste		11.58	8.28						19.87		19.87
C. Incineration and open burning of waste	32.66	0.07	0.34						33.08		33.08
D. Waste water treatment and discharge		55.83	123.06						178.90		178.90
E. Other	NO	NO	NO						NO		
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NO		

Memo items:[2]											
International bunkers	3 013.21	1.38	28.59						3 043.18		
Aviation	2 522.29	0.21	24.61						2 547.11		
Navigation	490.92	1.17	3.98						496.07		
Multilateral operations	NO	NO	NO						NO		
CO_2 emissions from biomass	2 064.69								2 064.69		
CO_2 captured	NO,IE								NO,IE		
Long-term storage of C in waste disposal sites	NE								NE		
Indirect N_2O			NO,NE								
Indirect CO_2 [3]											
Total CO_2 equivalent emissions without land use, land-use change and forestry									**62 286.80**	**17 732.80**	**44 553.99**
Total CO_2 equivalent emissions with land use, land-use change and forestry									**62 286.80**		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									**62 286.80**		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									**62 286.80**		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
Power Generation: 23% increase in Natural Gas use in Electricity Generation,reduced proportion of renewables, increased demand and a net exporter of electricity in Transport: 8% increase in diesel use in road transport and a 6.7% decrease in road gasoline. (net +3.7% increase). IPPU: Cement combustion and process CO2 emissions increased by 6.8%. Agriculture: 6.2% increase in Dairy cow numbers, milk production up 4%. A 2.5% increase in fertiliser use and a 8.4% increase in liming.

6.1.15 Italy (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission Proxy GHG emission inventory 2016
Country Italy
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	334816.29	41886.13	19498.28	12449.03	1614.43	372.25	NO	28.42	410664.82		
1. Energy	344592.08	7191.52	5261.80						357045.40	**141 877**	**215 168**
A. Fuel combustion (sectoral approach)	341946.35	3156.26	5252.02						350354.63	137 357	212 998
1. Energy industries	104452.97	111.76	429.89						104994.62	102 742	2 253
2. Manufacturing industries and construction	51430.18	274.42	705.17						52409.77	33 129	19 281
3. Transport	102240.59	188.66	905.78						103335.03	690	102 645
4. Other sectors	83365.46	2579.01	3190.17						89134.64	796	88 339
5. Other	457.15	2.42	21.01						480.58	0	481
B. Fugitive emissions from fuels	2645.73	4035.26	9.78						6690.77	4 520	2 170
1. Solid fuels	0.23	52.41	NA						52.64	0	53
2. Oil and natural gas	2645.50	3982.84	9.78						6638.13	4 520	2 118
C. CO_2 transport and storage	NO								NO	0	0
2. Industrial processes and product use	14554.67	47.37	583.05	12449.03	1614.43	372.25	NO	28.42	29649.21	**13 071**	**16 578**
A. Mineral industry	10721.96								10721.96	10 269	453
B. Chemical industry	1291.27	4.19	116.09	NA	1478.00	NA	NO	NA	2889.55	1 226	1 663
C. Metal industry	1585.70	43.17	0.00	4.29	NA	NA	NO	NA	1633.17	1 468	165
D. Non-energy products from fuels and solvent use	955.74	NA	NA						955.74	108	848
E. Electronic Industry				9.48	136.43	47.31	NO	28.42	221.64	0	222
F. Product uses as ODS substitutes				12435.26	NA	NA	NO	NA	12435.26	0	12 435
G. Other product manufacture and use	NA	NA	466.96	NA	NA	324.93	NO	NA	791.89	0	792
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0
3. Agriculture	438.43	18412.52	11124.94						29975.89		
A. Enteric fermentation		13712.93							13712.93		
B. Manure management		2972.96	2111.95						5084.91		
C. Rice cultivation		1709.95							1709.95		
D. Agricultural soils		NA	9008.77						9008.77		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		16.68	4.22						20.90		
G. Liming	13.50								13.50		
H. Urea application	424.93								424.93		
I. Other carbon-containing fertilizers	NO								NO		
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]	-24880.12	397.15	559.49						-23923.49		
A. Forest land	-28181.62	258.37	0.71						-27922.55		
B. Cropland	2088.63	3.31	0.91						2092.85		
C. Grassland	-7064.52	135.47	37.04						-6892.02		
D. Wetlands	NO	NO	NO						NO		
E. Settlements	7418.08	NO	520.83						7938.91		
F. Other land	NO	NO	NO						NO		
G. Harvested wood products	859.31								859.31		
H. Other	NO	NO	NO						NO		
5. Waste	111.23	15837.58	1968.99						17917.80		
A. Solid waste disposal	0.00	13160.04							13160.04		
B. Biological treatment of solid waste		145.48	626.82						772.30		
C. Incineration and open burning of waste	111.23	58.21	20.88						190.32		
D. Waste water treatment and discharge		2473.85	1321.28						3795.13		
E. Other	NO	NO	NO						NO		
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0

Memo items:[2]											
International bunkers									15812.18		
Aviation									9922.80		
Navigation									5889.38		
Multilateral operations									NE		
CO_2 emissions from biomass									54236.58		
CO_2 captured									NO		
Long-term storage of C in waste disposal sites									NO		
Indirect N_2O											
Indirect CO_2[3]											
Total CO_2 equivalent emissions without land use, land-use change and forestry									434588.30	**154 948**	**279 640**
Total CO_2 equivalent emissions with land use, land-use change and forestry									410664.82		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									434588.30		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									410664.82		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
Total national emissions without LULUCF are expected to slightly increase in 2016 with respect 2015 (+0.4%) as a consequence of an increase of fuel consumption in th and commercial sectors. The iron and steel sector increased its production level while the cement industry continued to decrease their productions.

6.1.16 Latvia (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission v1
Country Latvia
Geographical scope[4] Latvia

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO_2 equivalent (kt)	
Total (net emissions)[1]	6986.42	1872.19	1944.74	237.35	NA,NO	9.07	NA,NO	NA,NO	11049.76		
1. Energy	6555.50	227.58	141.02						6924.10	1826.42296	5097.68
A. Fuel combustion (sectoral approach)	6555.49	140.90	141.02						6837.41	1 826	5010.98
1. Energy industries	1821.60	13.18	20.68						1855.46	1 483	372.59
2. Manufacturing industries and construction	476.65	10.89	17.30						504.84	288	216.77
3. Transport	3091.38	3.90	51.65						3146.92	NA	3146.92
4. Other sectors	1157.37	112.92	51.32						1321.62	55	1266.12
5. Other	8.49	0.02	0.07						8.57	NO	8.57
B. Fugitive emissions from fuels	0.01	86.68	NA,NO						86.69	NO	86.69
1. Solid fuels	NO	NO	NA,NO						NA,NO	NO,NA	NO,NA
2. Oil and natural gas	0.01	86.68	NO						86.69	NA	86.69
C. CO_2 transport and storage	NO								NO	NO	NO
2. Industrial processes and product use	400.22	0.00	3.49	237.35	NA,NO	9.07	NA,NO	NA,NO	650.12	370.57	294.016637
A. Mineral industry	356.11								356.11	370.57	NO
B. Chemical industry	NO	NO	NO	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NA,NO	NO,NA	NO,NA
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Non-energy products from fuels and solvent use	44.11	NO,NA	NO,NA						44.11	NA	44.11
E. Electronic Industry				NO	NO	NO	NO	NO	NO	NO	NO
F. Product uses as ODS substitutes				237.35	NO	NO,NA	NO	NO,NA	237.35	NA	237.35
G. Other product manufacture and use	NA	NA	3.49	NO	NO,NA	9.07	NA	NO,NA	12.56	NO	12.56
H. Other	NO,NA	NO,NA	NO,NA	NA	NA	NA	NA	NA	NA,NO	NO,NA	NO,NA
3. Agriculture	30.53	996.54	1758.12						2785.18	NA	2785.18255
A. Enteric fermentation		875.87							875.87	NA	875.870867
B. Manure management		120.67	93.17						213.83	NA	213.832975
C. Rice cultivation		NO							NO	NA	NO
D. Agricultural soils		NE	1664.95						1664.95	NA	1664.95188
E. Prescribed burning of savannas		NO	NO						NO	NA	NO
F. Field burning of agricultural residues		NO	NO						NO	NA	NO
G. Liming	22.60								22.60	NA	22.5958333
H. Urea application	7.93								7.93	NA	7.931
I. Other carbon-containing fertilizers	NO								NO	NA	NO
J. Other	NO	NO	NO						NO	NA	NO
4. Land use, land-use change and forestry[1]	NE	NE	NE						NE		
A. Forest land	NE	NE	NE						NE		
B. Cropland	NE	NE	NE						NE		
C. Grassland	NE	NE	NE						NE		
D. Wetlands	NE	NE	NE						NE		
E. Settlements	NE	NE	NE						NE		
F. Other land	NE	NE	NE						NE		
G. Harvested wood products	NE	NE	NE						NE		
H. Other	NE	NE	NE						NE		
5. Waste	0.17	648.07	42.11						690.35	NA	690.35
A. Solid waste disposal	NA,NO	383.97							383.97	NA	383.97
B. Biological treatment of solid waste		30.36	21.72						52.08	NA	52.08
C. Incineration and open burning of waste	0.17	NA,NO	1.75						1.92	NA	1.92
D. Waste water treatment and discharge		233.73	18.64						252.38	NA	252.38
E. Other	NO	NO	NO						NO	NA	NO
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Memo items:[2]											
International bunkers	1366.98	1.54	69.13						1437.65		
Aviation	368.86	0.06	3.05						371.98		
Navigation	998.12	1.48	66.08						1065.67		
Multilateral operations	NA	NA	NA						NA		
CO_2 emissions from biomass	5986.14								5986.14		
CO_2 captured	NO								NO		
Long-term storage of C in waste disposal sites	NA								NA		
Indirect N_2O			NO,IE,NA								
Indirect CO_2[3]	16.72										
Total CO_2 equivalent emissions without land use, land-use change and forestry									11049.76	2197.00	8867.23
Total CO_2 equivalent emissions with land use, land-use change and forestry									NE		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									11066.48		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NE		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
General Latvia`s approximate GHG emissions for 2016 were estimated using available activity data from Central Statistical Bureau of Latvia, annual GHG reports under EU ETS and data from national databases or extrapolation in cases activity data were not available yet. In sectors where stable trend was not observed the emissions were left in 2015 levels. Compared to previous inventory (GHG inventory submission to UNFCCC on 13th of April 2017) Latvia`s total GHG emissions excluding LULUCF, including indirect CO_2 have decreased by 2.2% in 2016. Under 2A1 (Cement production) two different CO_2 emission calculation approaches are used . Under EU ETS clinker producer uses Monitoring reporting Regulation (COMMISSION REGULATION (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council) to calculate CO_2 emissions from clinker and cement kiln dust using default EFs, but for GHG inventory CO_2 emissions are calculated according to 2006 IPCC Guidelines and EFs are calculated using plant specific data. This results in a 4.2% (14.49 kt) difference between ETS CO_2 emissions from clinker production reported under Article 21 of the ETS directive (column L) and GHG inventory (column J) calculated in 2016. Very minor differences occur also for glass production due to the same reason and rounding.
Energy Total GHG emissions in Energy sector (excluding Transport) have decreased by 5.2% in 2016 in comparison with 2015. In 2016 emissions in sector 1A1 Energy industries have increased by 4.7% compared to 2015 due to increased use of natural gas and coal. In sector 1A2 25.2% emission decrease can be explained with sharp decline (-88.5%) in emissions in sector 1A2a due to bankruptcy of the largest enterprise of the category. In 2016 emissions have reduced by 7.2% compared to 2015 in 1A4 due to slight decrease in consumption of solid and liquid fossil fuels.
Transport Total GHG emissions in a transport sector have been increased in 2016 by around 0.5% compare to 2015. The main reason for this increase is fuel consumption increasing by around 1.7% in road transport, mainly diesel oil consumption. GHG emissions have been decreased in 2016 compare to 2015 in all other transport subsectors. The road transport constitutes a convincing majority of the total GHG emissions in the transport sector. In 2016, it gave around 93.3 % of total emissions but the next largest emission source is railway – 6.1 %.
IPPU For approximate emission calculations the annual EU ETS GHG reports for cement, lime, glass and bricks production as well as available provisional national statistics from CSB were used as activity data. For emission calculation from Lubricant, Paraffin wax and Urea use the proxy energobalance was used. For Road paving with asphalt and asphalt roofing, as well as Food and beverage industry data were taken from CSB as provisional data. Emissions from IPPU sector in 2016 have been decreasing by 14.5% compared to 2015 mainly due to decrease of demand for mineral products ecpecially cement (in 2016 CO_2 emissions from Cement production decreased by 35.8% in comparison to 2015 due to decrease of export amounts and reduced activity in building sector which caused lower demand for cement). The only lime production company stopped lime production from dolomite thus CO_2 emissions from 2.A.2 are NO. The same for the only iron and steel plant which didn`t produce steel anymore but only rolls armature not causing CO_2 emissions thus CO_2 emissions from 2.C.1 are NO. **F-gases** Activity data from annual F-gases reports for proxy emission calculation were not available yet, therefore emissions were calculated by either using previous three years average F-gases amounts filled into new manufactured products or keeping previous year`s emission amount. F-gases emissions have increased by 3.9% compared to 2015. **Solvents** Activity data for the Solvent Use sector was not available in 2016. There is a stability in trends of CO_2 emissions from Solvent use sector in later 3 years either, therefore emissions in 2016 were assumed were extrapolated taking into account emission rates from these previous years (average). There are negligible changes in emissions compared with the previous year (+0.67%). For N_2O from product use activity data wasn't available. There is a stability in trends of N_2O emissions from N_2O from product use sector in later 3 years therefore emissions were extrapolated taking into account emission rates from previous these years (average). There are no changes compared with 2015.
Agriculture According to preliminary results of GHG inventory in agriculture sector, total amount of emissions from agriculture increased by 1.7% (45.6 kt CO_2 eq.) reaching 2785.2 CO_2 eq. in 2016, comparing to 2015. Actually, emissions increased into all categories: enteric fermentation (+2.1% or 17.6 kt CO_2 eq.), manure management (+8.2% or 16.2 kt CO_2 eq.), agricultural soils (+0.4% or 7.3 kt CO_2 eq.), liming (+13.3% or 2.7 kt CO_2 eq.) and urea application (+27.7% or 1.7 kt CO_2 eq.). According to Central Statistical Bureau information, the total area of utilised agricultural land in the country has grown by 124.9 thousand hectares or 6.9%, reaching 1 930.6 thousand hectares in 2016. In 2016, 716.0 thousand hectares of land were covered with cereals, which is 43.6 thousand hectares or 6.5% more than in 2015, leading to the largest cereal cropland area observed during 1990-2016. Due to unfavourable meteorological conditions, the average yield per one hectare fell from 44.9 quintals in 2015 to 37.8 quintals in 2016. The sown areas of pulses continued to grow. In 2016, the total area of pulses increased by 32.1 %, of which the area of field beans rose by 5.4 thousand hectares or 20.9%. The increase was encouraged by the introduction of a new support payment for climate and environment-friendly farming practices or agricultural greening in 2015. In 2016, 134.2 thousand tonnes of mineral fertilizers (expressed as 100 % of nutrients) were used on the sown area of agricultural crops – 4.2% more than in 2015. The amount of use of synthetic nitrogen fertilizers increased by 3.3%. At the end of 2016, agricultural holdings were breeding 412.3 thousand cattle, which is 6.8 thousand heads or 1.6% less than in 2015; the drop was due to the reduction in the number of dairy cows of 5.2%. However, the number of other cattle increased by 1.6 thousand or 0.6%, as compared to 2015. The total increase in the milk output was affected by the rise in milk yield per dairy cow – by 277 kg or 4.7%, reaching 6182 kg annually. Over the year, the number of pigs increased by 2.2 thousand or 0.7%. Also, compared to the end of 2015, the number of sheep has risen by 4.2% and the number of poultry has risen by 4.0%, in 2016. The number of horses, rabbits and fur-bearing animals slightly declined during the 2016. (Source of statistical information: AGRICULTURE IN LATVIA. Collection of Statistics. Rīga, Central Statistical Bureau, 2017)
Waste (5A,5B,5C) In 2016 total GHG emissions from waste constitute 6.2% from Latvia`s total GHG emissions excluding LULUCF, including indirect CO_2. In 2016 emissions from waste increased by 0.4% compared to 2015. Increase could be explained with increase of industrial composted waste amounts. CH_4 emissions from waste disposal are stable due to no big changes in disposed amounts and recovery does not have big increase in 2016. For waste incineration is small decrease byu 3.6% due to decrease of incinerated waste amount. **(5D)** In 2016 emissions from Waste water treatment and discharge have decreased by 0.5% compared to 2015. Decrease of CH_4 emissions from domestic waste water handling was observed due to decrease of population using poorly managed biological treatment plants (from 1.73% to 1.5% of national population) and decrease of national population; Small decrease of N_2O emissions from domestic waste water handling occurs due to decrease of national population; More significant decrease of N_2O from industrial waste water handling due to decrease of content of Nitrogen in the industrial waste water.

6.1.17 Lithuania (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017
Country LITHUANIA
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	5279.24	3194.58	3371.94	488.74	NO	5.98	NO	0.36	12235.17		
1. Energy	10127.91	490.60	127.71						10746.22	3507.39	7237.45
A. Fuel combustion (sectoral approach)	10123.90	204.07	127.69						10455.65	3507.39	6946.89
1. Energy industries	2929.76	15.33	24.51						2969.60	2902.63	66.97
2. Manufacturing industries and construction	934.20	3.49	5.73						943.42	604.15	339.27
3. Transport	5170.37	16.22	67.49						5254.08	0.58	5252.12
4. Other sectors	1054.68	169.03	29.66						1253.37	0.03	1253.34
5. Other	34.89	0.01	0.29						35.19	NA	35.19
B. Fugitive emissions from fuels	4.01	286.53	0.02						290.56	NA	290.56
1. Solid fuels	NO	NO	NO						NO	NA	NO
2. Oil and natural gas	4.01	286.53	0.02						290.56	NA	290.56
C. CO_2 transport and storage	NO								NO	NO	NO
2. Industrial processes and product use	2255.95	NO	214.19	488.74	NO	5.98	NO	0.36	2965.21	2 652.18	313.03
A. Mineral industry	511.39								511.39	502.16	9.23
B. Chemical industry	1694.29	NO	209.51	NO	NO	NO	NO	NO	1903.80	2 150.02	-246.22
C. Metal industry	1.46	NO	NO	NO	NO	NO	NO	NO	1.46	NO	1.46
D. Non-energy products from fuels and solvent use	48.74	NO	NO						48.74	NO	48.74
E. Electronic Industry				NO	NO	4.75	NO	0.36	5.11	NO	5.11
F. Product uses as ODS substitutes				488.74	NO	NO	NO	NO	488.74	NO	488.74
G. Other product manufacture and use	NO	NO	4.68	NO	NO	1.22	NO	NO	5.90	NO	5.90
H. Other	0.07	NO	NO	NO	NO	NO	NO	NO	0.07	NO	0.07
3. Agriculture	59.33	1851.03	2625.68						4536.04		
A. Enteric fermentation		1590.65							1590.65		
B. Manure management		260.37	195.44						455.81		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NA	2430.25						2430.25		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		NO	NO						NO		
G. Liming	15.86								15.86		
H. Urea application	43.47								43.47		
I. Other carbon-containing fertilizers	NO								NO		
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]	-7164.71	1.45	339.38						-6929.55		
A. Forest land	-8899.36	0.42	36.09						-8862.85		
B. Cropland	4083.97	0.01	301.17						4385.16		
C. Grassland	-2454.99	1.02	2.12						-2451.86		
D. Wetlands	972.44	NE,NO	4.77						977.21		
E. Settlements	372.65	NO	29.45						402.10		
F. Other land	50.11	NO,NE	4.12						54.22		
G. Harvested wood products	-1289.53								-1289.53		
H. Other	NO	NO	NO						NO		
5. Waste	0.76	851.51	64.98						917.25		
A. Solid waste disposal	NO,NA	680.66							680.66		
B. Biological treatment of solid waste		36.80	20.67						57.47		
C. Incineration and open burning of waste	0.76	0.00	0.02						0.79		
D. Waste water treatment and discharge		134.05	44.28						178.33		
E. Other											
6. Other ***(as specified in summary 1.A)***											

Memo items:[2]											
International bunkers	490.14	0.60	3.98						494.71		
Aviation	251.59	0.04	2.09						253.73		
Navigation	238.55	0.55	1.89						240.99		
Multilateral operations	NO	NO	NO						NO		
CO_2 emissions from biomass	5398.29								5398.29		
CO_2 captured	NO								NO		
Long-term storage of C in waste disposal sites	NE								NE		
Indirect N_2O			NE								
Indirect CO_2[3]	NE										
Total CO_2 equivalent emissions without land use, land-use change and forestry									19164.72		
Total CO_2 equivalent emissions with land use, land-use change and forestry									12235.17		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									NA		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NA		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2 the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.	
1. Energy	Although GHG emissions increased in transport subsector, they were firmly compensated by a decrease in ETS sector in 2016, mostly in public electricity and heat production. This happened mainly because the largest Lithuanian electricity producer (Elektrėnai thermal power plant) reduced its electricity production more than twice (https://gamyba.le.lt/lt/veikla/pagrindiniai-veiklos-ir-pardavimu-rodikliai). The missing amount of electricity demand for Lithuania was imported and also partly compensated by increased production in wind power plants. As usual, larger share of biomass use put its contribution in reducing GHG emissions in public heat production subsector too.
2. Industrial processes and product use	Emissions from IPPU in 2016 have decreased by 12.7% compared to 2015 due to decrease of clinker, ammonia, nitric acid and cast iron production.
3. Agriculture	Emissions from agriculture sector in 2016 have decreased by 1.4% compared to 2015. Emissions from enteric fermentation and manure management has decreased due to decrease in livestock populations which are responsible for the biggest share of agriculture emissions from these categories. Also decrease in consumption of liming materials had an impact of decrease of overall agriculture emissions.
5. Waste	Emissions from waste sector in 2016 have decreased by 12% compared to 2015. Emissions from solid waste disposal have decreased due to reduction of disposed waste, increase of biodegradable waste composting and increase of the recovered gas use for energy. The hazardous waste incineration facility has started incineration with energy recovery in 2016, therefore the emissions form this category has decreased significantly (87%).

6.1.18 Luxembourg (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017
Country Luxembourg
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	9048.63	624.46	267.16	69.48	NA,NO	9.06	NA,NO	NA,NO	10018.79		
1. Energy	8476.30	48.32	65.41						8590.03	966.91	7 623.12
A. Fuel combustion (sectoral approach)	8476.26	16.46	65.41						8558.13	966.91	7 591.22
1. Energy industries	182.14	1.66	2.61						186.40	68.69	117.71
2. Manufacturing industries and construction	1147.03	2.08	9.66						1158.77	898.22	260.55
3. Transport	5535.70	1.03	48.40						5585.13	NA	5 585.13
4. Other sectors	1611.27	11.69	4.73						1627.69	NA	1 627.69
5. Other	0.12	0.00	0.00						0.13	NA	0.13
B. Fugitive emissions from fuels	0.04	31.86	NA,NO						31.90	NA	31.90
1. Solid fuels	NO	NO	NO						NO	NO	NO
2. Oil and natural gas	0.04	31.86	NA,NO						31.90	NA	31.90
C. CO_2 transport and storage	NE								NO	NO	NO
2. Industrial processes and product use	566.52	NA,NO	2.82	69.48	NA,NO	9.06	NA,NO	NA,NO	647.88	536.28	111.60
A. Mineral industry	416.95								416.95	416.95	0.00
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C. Metal industry	119.33	NA	NA	NA	NA	NA	NA	NA	119.33	119.33	0.00
D. Non-energy products from fuels and solvent use	30.24	NA	NA						30.24	NA	30.24
E. Electronic Industry				NO	NO	NO	NO	NO	NO	NO	NO
F. Product uses as ODS substitutes				67.49	NO	NO	NO	NO	67.49	NA	67.49
G. Other product manufacture and use	NO	NO	2.82	1.99	NO	9.06	NO	NO	13.87	NA	13.87
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3. Agriculture	5.81	498.42	183.45						687.68		
A. Enteric fermentation		433.05							433.05		
B. Manure management		65.37	35.17						100.54		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NA	148.28						148.28		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		NO	NO						NO		
G. Liming	5.81								5.81		
H. Urea application	NO								NO		
I. Other carbon-containing fertilizers	NO								NO		
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]	-474.29	NO	10.42						-463.87		
A. Forest land	-536.58	NO	NO						-536.58		
B. Cropland	38.21	NO	3.71						41.92		
C. Grassland	-42.52	NO	0.26						-42.26		
D. Wetlands	4.79	NO	0.49						5.28		
E. Settlements	61.60	NO	5.93						67.54		
F. Other land	0.22	NO	0.02						0.24		
G. Harvested wood products	NO	NO	NO						NO		
H. Other	NO	NO	NO						NO		
5. Waste	NA,NO	77.72	15.48						93.20		
A. Solid waste disposal	NA	54.20	NO						54.20		
B. Biological treatment of solid waste		19.93	8.22						28.16		
C. Incineration and open burning of waste	IE	IE	IE						IE		
D. Waste water treatment and discharge		3.58	7.26						10.84		
E. Other	NO	NO	NO						NO		
6. Other *(as specified in summary 1.A)*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Memo items:[2]											
International bunkers									NE		
Aviation									NE		
Navigation									NE		
Multilateral operations									NE		
CO_2 emissions from biomass									NE		
CO_2 captured									NO		
Long-term storage of C in waste disposal sites									NE		
Indirect N_2O											
Indirect CO_2[3]											
ɛnt emissions without land use, land-use change and forestry									10018.79	1503.191	8515.59711
ѵalent emissions with land use, land-use change and forestry									9554.92		
Total CO_2 equivalent emissions, including indirect CO_2,									NA		
ıg indirect CO_2, with land use, land-use change and forestry									NA		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
The key driver for the decrease in GHG emissions in 2016 compared to 2015 is the reduced natural gas consumption in subcategory "1A1a-Public Electricity and Heat Production" because the gas-fired combined heat and power plant TWINerg was shut down during 2016. Indeed, GHG emissions from 1A1a-gaseous fuels have decreased by 279 Gg CO2eq in 2016 compared to 2015. On the other hand, emissions from "1A2f-Non-metallic Minerals-Gaseous fuels" increased by 219 Gg CO2eq from 2015 to 2016 due to an increase of natural gas combustion in the cement industry. GHG emissions from subcategory 1A3b-Road transportation were 110Gg CO2eq lower in 2016 as compared to 2015 due to a decrease in the amounts of sold fuels (for both gasoline and diesel).

6.1.19 Malta (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017
Country Malta
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	1458.25	173.08	42.15	255.39	0.00	0.19	0.00	0.00	**1929.05**		
1. Energy	**1 453.68**	**3.99**	**6.54**						**1464.21**	**578.56**	**881.61**
A. Fuel combustion (sectoral approach)	1 453.68	3.99	6.54						1464.21	**578.56**	**881.61**
1. Energy industries	578.56	1.83	1.31						581.70	578.56	3.14
2. Manufacturing industries and construction	42.99	0.04	0.09						43.11	0	43.11
3. Transport	637.10	1.55	4.78						643.43	0	639.38
4. Other sectors	191.58	0.56	0.35						192.50	0	192.50
5. Other	3.46	0.01	0.01						3.48	0	3.48
B. Fugitive emissions from fuels	NO	NO	NO						NO	0	NO
1. Solid fuels	NO	NO	NO						NO	0	NO
2. Oil and natural gas	NO	NO	NO						NO	0	NO
C. CO_2 transport and storage	NO								**NO**	0	**NO**
2. Industrial processes and product use	**0.47**	**0.00**	**1.98**	**255.39**	**0.00**	**0.19**	**0.00**	**0.00**	**258.03**	**0**	**258.03**
A. Mineral industry	0.05								0.05	0	**0.05**
B. Chemical industry	0.03	NO	NO	NO,NA	NO	NO,NA	NO	NO	0.03	0	**0.03**
C. Metal industry	NO	NO	NA	NO	NO	NO,NA	NO	NO	0.00	0	**0.00**
D. Non-energy products from fuels and solvent use	0.38	NA	NA						0.38	0	**0.38**
E. Electronic Industry				NO	NO	NO	NO	NO	0.00	0	**0.00**
F. Product uses as ODS substitutes				255.39	NO	NO	NO	NO	255.39	0	**255.39**
G. Other product manufacture and use	NO	NO	1.98	NO	0.00	0.19	NO	NO	2.17	0	**2.17**
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0	**0.00**
3. Agriculture	**0.00**	**34.69**	**28.25**						**62.94**		**62.94**
A. Enteric fermentation		30.95							30.95		
B. Manure management		3.74	9.86						13.61		
C. Rice cultivation		NO							0.00		
D. Agricultural soils		NO	18.39						18.39		
E. Prescribed burning of savannas		NO	NO						0.00		
F. Field burning of agricultural residues		NO	NO						0.00		
G. Liming	NO								0.00		
H. Urea application	NE								0.00		
I. Other carbon-containing fertilizers	NO								0.00		
J. Other	NO	NO	NO						0.00		
4. Land use, land-use change and forestry[1]	**3.41**	**0.00**	**0.00**						**3.41**		**3.41**
A. Forest land	NO	NO	NO						0.00		
B. Cropland	2.19	NO	IE						2.19		
C. Grassland	-0.56	NO	NO						-0.56		
D. Wetlands	NO	NO	NO						0.00		
E. Settlements	0.98	NO	NO						0.98		
F. Other land	0.79	NO	NO						0.79		
G. Harvested wood products	NO								0.00		
H. Other	NO	NO	NO						0.00		
5. Waste	**0.68**	**134.40**	**5.38**						**140.46**		**140.46**
A. Solid waste disposal	NO, NA	134.40							134.40		
B. Biological treatment of solid waste		NA	NO, NA						0.00		
C. Incineration and open burning of waste	0.68	0.00	0.16						0.84		
D. Waste water treatment and discharge		NA, IE	5.22						5.22		
E. Other	NO	NO	NO						0.00		
6. Other *(as specified in summary 1.A)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0	0

Memo items:[2]											
International bunkers	**4 526.31**	**14.81**	**10.59**						**4 551.71**		
Aviation	374.83	1.31	0.94						377.08		
Navigation	4151.47	13.50	9.66						4174.63		
Multilateral operations	NO	NO	NO						NO		
CO_2 emissions from biomass	NO								NO		
CO_2 captured	NO								NO		
Long-term storage of C in waste disposal sites	NO								NO		
Indirect N_2O			IE								
Indirect CO_2[3]	NA										
Total CO_2 equivalent emissions without land use, land-use change and forestry									1925.64	**578.56**	**1343.03**
Total CO_2 equivalent emissions with land use, land-use change and forestry									1929.05		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									1925.64		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									1929.05		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2 the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
Changes in the agriculture sector were due to revisions in livestock populations, agricultural land areas and nitrogen application rates, the improvement in methodology of manure management emissions from rabbits (upgraded to Tier 2), updates in the crop area and correction of nitrogen excretion for poultry (broilers, and other poultry).
The decrease in GHG emissions observed in 1A1 Energy Industries is due to the use of the electricity interconnector, the reduction of heavy fuel oil from the fuel mix and the switch to more efficient generation turbines.
The increase in GHG emissions observed in 1A3 Transport is due to the increase in fuel use observed in 1A3b Road Transportation. This is, in turn, driven by an increase in the number of licensed vehicles and an increase in the use of these vehicles (on average). NOTE: It is to note that the difference of 4.0503 Gg CO2 equivalent between the total emissions for category 1.A.3 Transport and the value inscribed for the same category in the non-ETS column represents the amount of emissions attributed to aviation activities which, for regulatory purposes, fall neither under the ETS nor the ESD. This is also reflected in the reported 'Total CO2 equivalent emissions without land use, land-use change and forestry, compared to the total for ETS and non-ETS emissions.

6.1.20 Netherlands (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017 v5
Country NLD
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	**173 461.54**	**18 595.74**	**8 294.44**	**2 365.48**	**151.81**	**132.35**	**NO**	**NO,IE**	**203 001.37**		
1. Energy	**160 431.16**	**2 290.94**	**668.70**						**163 390.80**		
A. Fuel combustion (sectoral approach)	158 316.73	1 649.74	668.70						160 635.17		
1. Energy industries	67 389.52	117.79	304.37						67 811.68		
2. Manufacturing industries and construction	26 171.41	62.07	46.71						26 280.19		
3. Transport	30 937.31	61.59	246.22						31 245.13		
4. Other sectors	33 657.31	1 407.93	68.83						35 134.07		
5. Other	161.17	0.36	2.57						164.10		
B. Fugitive emissions from fuels	2 114.43	641.20	NO,IE,NA						2 755.63		
1. Solid fuels	1 082.01	5.01	NO						1 087.02		
2. Oil and natural gas	1 032.42	636.19	NO,IE,NA						1 668.61		
C. CO_2 transport and storage	NO								NO		
2. Industrial processes and product use	**6 449.80**	**474.19**	**1 113.04**	**2 365.48**	**151.81**	**132.35**	**NO**	NO,IE	**10 686.68**		
A. Mineral industry	1 212.55								1 212.55		
B. Chemical industry	4 434.60	431.36	1 024.92	178.24	45.82	NO	NO	NO,IE	6 114.94		
C. Metal industry	482.75	NO,IE,NA	NO	NO	13.62	NO	NO		496.37		
D. Non-energy products from fuels and solvent use	318.86	0.31	NO,NA						319.16		
E. Electronic Industry				NO	92.37	NO,IE	NO	NO,IE	92.37		
F. Product uses as ODS substitutes				2 187.24	NO	NO	NO	NO	2 187.24		
G. Other product manufacture and use	0.77	42.53	88.12			132.35			263.77		
H. Other	0.27	NO	NO						0.27		
3. Agriculture	**68.72**	**12 739.18**	**6 227.83**						**19 035.73**		
A. Enteric fermentation		8 788.28							8 788.28		
B. Manure management		3 950.90	690.25						4 641.15		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NO	5 537.58						5 537.58		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		NO	NO						NO		
G. Liming	68.72								68.72		
H. Urea application	IE								IE		
I. Other carbon-containing fertilizers	NO								NO		
J. Other	NO	NA	NA						NO,NA		
4. Land use, land-use change and forestry[1]	**6 511.86**	**0.33**	**136.31**						**6 648.50**		
A. Forest land	-2 478.60	0.27	6.29						-2 472.03		
B. Cropland	2 730.73	NO,NE,IE	84.00						2 814.73		
C. Grassland	4 390.13	0.05	6.14						4 396.32		
D. Wetlands	61.71	NO,NE,IE	3.31						65.02		
E. Settlements	1 677.01	NO	28.77						1 705.78		
F. Other land	130.88	NO	7.81						138.69		
G. Harvested wood products											
H. Other	IE,NE,NO	IE,NE,NO	IE,NE,NO						NO,NE,IE		
5. Waste	**NO,IE,NA**	**3 091.10**	**148.56**						**3 239.66**		
A. Solid waste disposal	NO,NA	2 801.05							2 801.05		
B. Biological treatment of solid waste		73.78	77.16						150.95		
C. Incineration and open burning of waste	NO,IE,NA	NO,IE,NA	NO,IE,NA						NO,IE,NA		
D. Waste water treatment and discharge		216.27	71.40						287.67		
E. Other	NO	NO	NO						NO		
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO		

Memo items:[2]											
International bunkers	51 877.55	93.07	407.65						52 378.27		
Aviation	11 675.24	2.04	97.32						11 774.60		
Navigation	40 202.32	91.02	310.32						40 603.67		
Multilateral operations	IE	IE	IE						IE		
CO_2 emissions from biomass	12 706.22								12 706.22		
CO_2 captured	NO								NO		
Long-term storage of C in waste disposal sites	NO								NO		
Indirect N_2O			NO,NE								
Indirect CO_2[3]	207.04										
Total CO_2 equivalent emissions without land use, land-use change and forestry									196 352.87	93 878.03	102 474.84
Total CO_2 equivalent emissions with land use, land-use change and forestry									203 001.37		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									196 559.91		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									203 208.41		

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
All change can be explained by corresponding changes in activty level. The highlights are: **Energy** Energy industries: decrease due to less coal combustion partly counter balanced by increase in natural gass combustion Manufacturing , transport: Increased emissions due to economic growth Other sectors: increase in natural gas use due to colder winter and economicgrowth **Industry** Decrease N2O emissions due to less Caprolactam production and maintanance programmes in the fertilizer industry Increased F-gas emissions due to changes in the specific products which are repacked (can change annually) Metal industry: less carbon inputs in production **Agriculture** Enteric fermentation: increased number of cattle Manure management: increase in manure fermentation

6.1.21 Poland (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016 Proxy
Submission 2017 v 0.0
Country Poland
Geographical scope[4] -

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	285 167.32	47 151.35	20 775.84	8 948.85	13.21	77.03	0.00	0.00	362 133.59		
1. Energy	**295 216.39**	**23 177.30**	**2 450.91**						**320 844.61**		
A. Fuel combustion (sectoral approach)	291 698.83	3 587.15	2 450.39						297 736.37		
1. Energy industries	159 731.80	117.01	759.87						160 608.69		
2. Manufacturing industries and construction	28 035.00	105.31	174.85						28 315.16		
3. Transport	51 703.16	116.12	526.72						52 345.99		
4. Other sectors	52 228.87	3 248.71	988.95						56 466.52		
5. Other	NO,IE	NO,IE	NO,IE						NO,IE		
B. Fugitive emissions from fuels	3 517.57	19 590.15	0.52						23 108.23		
1. Solid fuels	1 678.68	17 044.59	NA						18 723.27		
2. Oil and natural gas and other emissions from energy production	1 838.88	2 545.56	0.52						4 384.96		
C. CO_2 transport and storage											
2. Industrial processes and product use	**18 395.45**	**57.12**	**970.13**	**8 948.85**	**13.21**	**77.03**	**0.00**	**0.00**	**28 461.78**		
A. Mineral industry	10 191.35								10 191.35		
B. Chemical industry	4 909.56	43.20	838.17	NO	NO	NO	NO	NO	5 790.93		
C. Metal industry	2 577.00	13.92	0.00	NA	NA,NO	4.15	NA	NA	2 595.06		
D. Non-energy products from fuels and solvent use	717.54	NA,NO	NA,NO						717.54		
E. Electronic Industry				NO	NO	NO	NO	NO	NO		
F. Product uses as ODS substitutes				8 948.85	13.21				8 962.06		
G. Other product manufacture and use	NA	NA	131.95	NA	NA	72.88	NA	NA	204.84		
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	0.00		
3. Agriculture	**1 040.62**	**13 758.52**	**15 315.05**						**30 114.19**		
A. Enteric fermentation		12 162.10							12 162.10		
B. Manure management		1 571.66	2 066.29						3 637.95		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NA	13 236.91						13 236.91		
E. Prescribed burning of savannahs		NO	NO						NO		
F. Field burning of agricultural residues		24.76	11.85						36.61		
G. Liming	661.60								661.60		
H. Urea application	379.02								379.02		
I. Other carbon-containing fertilizers											
J. Other											
4. Land use, land-use change and forestry[1]	**-29 972.75**	**34.12**	**1 093.63**						**-28 844.99**		
A. Forest land	-30 622.92	31.85	5.97						-30 585.10		
B. Cropland	362.12	NO,NA	0.31						362.42		
C. Grassland	-544.66	2.27	0.42						-541.97		
D. Wetlands	4 526.55	NO,NA	NO,NA						4 526.55		
E. Settlements	1 646.71	NO	1 086.94						2 733.66		
F. Other land	NO,NA	NO,NA	NO,NA						NO,NA		
G. Harvested wood products	-5 340.55								-5 340.55		
H. Other	NA	NA	NA						NA		
5. Waste	**487.60**	**10 124.29**	**946.12**						**11 558.01**		
A. Solid waste disposal	NA,NO	9 111.69							9 111.69		
B. Biological treatment of solid waste		183.56	131.28						314.84		
C. Incineration and open burning of waste	487.60	0.00	54.66						542.25		
D. Waste water treatment and discharge		829.04	760.18						1 589.22		
E. Other	NO	NO	NO						NO		
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NO		

Memo items:[2]											
International bunkers	2 665.37	1.73	22.00						2 689.10		
Aviation	2 080.15	0.36	17.34						2 097.86		
Navigation	585.22	1.37	4.66						591.25		
Multilateral operations									NA		
CO_2 emissions from biomass	34 767.31								34 767.31		
CO_2 captured									NO,IE		
Long-term storage of C in waste disposal sites									33 449.02		
Indirect N_2O											
Indirect CO_2 [3]											
Total CO_2 equivalent emissions without land use, land-use change and forestry									**390 978.58**	**198 051.726**	**192 802.417**
Total CO_2 equivalent emissions with land use, land-use change and forestry									**362 133.59**		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									NA		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NA		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.

Total GHG emissions slightly increased by about 1.3% between 2015 and 2016

Main drivers for change in GHG emissions 2016/2015:

Energy - stationary fuel combustion

The main reason of slight decrease of GHG emission from fuel combustion in stationary sources (by 0.5%) is decrease in consumption of hard coal by about 1% and lignite by 4

Transport:

Increase in emissions triggered by growing fuels use: petrol by 8%, diesel by 15% and LPG by 8%

Industrial processes:

Generally slight decrease in emissions by about 0.7% is observed, mostly due to lower production of ammonia and ethylen

Agriculture:

Slight increase (by about 1.6%) in emissions relates mostly to the higher use of nitrogen and lime fertilisers use (respectively by about 5% and 77%)

Emissions/removals for sectors **4. LULUCF and 5. Waste** are the same as for 2015

6.1.22 Portugal (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year **Proxy 2016**
Submission **July 2017**
Country **Portugal**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	**42 087.94**	**10 632.03**	**3 252.69**	**2 679.24**	**13.89**	**26.19**	**NO**	**NO**	**58 692**		
1. Energy	**45 278.59**	**431.19**	**500.91**						**46 211**	**22 924**	**23 287**
A. Fuel combustion (sectoral approach)	44 154.92	336.12	497.91						44 989	21 850	23 139
1. Energy industries	16 919.00	13.82	123.01						17 056	16 677	379
2. Manufacturing industries and construction	7 091.20	44.91	84.94						7 221	4 775	2 446
3. Transport	16 035.66	27.84	144.74						16 208	397	15 811
4. Other sectors	4 027.09	249.53	144.53						4 421	0	4 421
5. Other	81.98	0.01	0.68						83	0	83
B. Fugitive emissions from fuels	1 123.67	95.06	3.00						1 222	1 075	147
1. Solid fuels	0.00	8.65	0.00						9	8	1
2. Oil and natural gas and other emissions from energy production	1 123.67	86.42	3.00						1 213	1 067	146
C. CO_2 transport and storage	0.00								0	0	0
2. Industrial processes and product use	**4369.97**	**43.62**	**84.12**	**2679.24**	**13.89**	**26.19**	**0.00**	**0.00**	**7 217**	**3 211**	**4 006**
A. Mineral industry	3468.05								3 468	3 057	411
B. Chemical industry	650.22	26.61	38.00	NO	NO	NO	NO	NO	715	95	620
C. Metal industry	60.00	16.13	NO	NO	NO	NO	NO	NO	76	60	16
D. Non-energy products from fuels and solvent use	191.69	0.87	NO						193	0	193
E. Electronic Industry				NO	NO	NO	NO	NO	0	0	NO
F. Product uses as ODS substitutes				2679.24	13.89	NO	NO	NO	2 693	0	2 693
G. Other product manufacture and use	NO	NO	46.12	NO	NO	26.19	NO	NO	72	0	72
H. Other	NO	NO	NO						NO	0	NO
3. Agriculture	**55.19**	**4 344.01**	**2 392.95**						**6 792**	**0**	**6 792**
A. Enteric fermentation		3 576.26							3 576	0	3 576
B. Manure management		602.72	191.00						794	0	794
C. Rice cultivation		135.87							136	0	136
D. Agricultural soils		NO	2 185.35						2 185	0	2 185
E. Prescribed burning of savannahs		NO	NO						NO	NO	NO
F. Field burning of agricultural residues		29.15	16.60						46	0	46
G. Liming	7.52								8	0	8
H. Urea application	47.67								48	0	48
I. Other carbon-containing fertilizers	NO								0	NO	0
J. Other	NO	NO	NO						0	NO	0
4. Land use, land-use change and forestry[1]	**-7 638.51**	**15.60**	**1.30**						**-7 622**		
A. Forest land	-9 871.06	6.74	0.17						-9 864		
B. Cropland	559.95	0.35	0.17						560		
C. Grassland	55.91	0.20	0.10						56		
D. Wetlands	374.18	0.00	0.10						374		
E. Settlements	2 411.98	0.00	0.60						2 413		
F. Other land	-997.68	8.31	0.17						-989		
G. Harvested wood products	-171.80	NA	NA						-172		
H. Other	NO	NO	NO						NO		
5. Waste	**22.70**	**5 797.61**	**273.41**						**6 094**	**0**	**6 094**
A. Solid waste disposal	0.00	3 412.57	0.00						3 413	0	3 413
B. Biological treatment of solid waste		27.18	20.81						48	0	48
C. Incineration and open burning of waste	22.70	0.15	0.72						24	0	24
D. Waste water treatment and discharge		2 357.72	251.88						2 610	0	2 610
E. Other	0.00	0.001	0.001						0	0	0
6. Other ***(as specified in summary 1.A)***											
Memo items:[2]											
International bunkers	NE	NE	NE						NE		
Aviation	NE	NE	NE						NE		
Navigation	NE	NE	NE						NE		
Multilateral operations	NE	NE	NE						NE		
CO_2 emissions from biomass	NE								NE		
CO_2 captured	NE								NE		
Long-term storage of C in waste disposal sites	NE								NE		
Indirect N_2O			NE								
Indirect CO_2 [3]	168.45										
Total CO_2 equivalent emissions without land use, land-use change and forestry									**66 313.58**	**26 135.20**	**40 178.39**
Total CO_2 equivalent emissions with land use, land-use change and forestry									**58 691.98**		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									**66 482.04**		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									**58 860.44**		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
The -3.5% decrease of emissions in the Energy sector is explained with the decrease of consumption of solid fuels. The Emssion impact related to the decrease in coal consumption in the electricity generation sector was partly softened due to the increase in consumption of Natura Fuel/Energy consumption: http://www.dgeg.pt/
There is an increase of about 2.5% in the agriculture GHG emissions mostly due to an increase in livestock numbers- dairy cattle (1.1%), non dairy cattle (3.90%) and sw
The -4.5% decrease of emissions in the waste sector are mainly determined by the reduction of the waste quantities deposited on land (5A) and the increase of bioga

6.1.23 Romania (calculated centrally by EEA and its ETC/ACM)

SUMMARY 2 SUMMARY REPORT FOR CO2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2016
Submission 2017 v EEA proxy 1.0
ROMANIA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO2(1)	CH4	N2O	HFCs	PFCs	SF6	Unspecified mix of HFCs and PFCs	NF3	Total	ETS	non-ETS
	CO2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)(1)	**74 881**	**28 855**	**7 117**	**1 650**	**7**	**52**	**0**	**0**	**112 562**		
1. Energy	**65 027.82**	**10 879**	**485**						**76 392**		
A. Fuel combustion (sectoral approach)	64 123.21	1 037	483						65 643		
1. Energy industries	27 157.74	14	101						27 273		
2. Manufacturing industries and construction	12 039.93	23	37						12 100		
3. Transport	16 242.66	37	203						16 483		
4. Other sectors	8 261.53	930	136						9 327		
5. Other	421.36	33	6						461		
B. Fugitive emissions from fuels	904.61	9 842	2						10 749		
1. Solid fuels	NO,NA	1 061	IE						1 061		
2. Oil and natural gas	904.61	8 782	IE						9 686		
C. CO2 transport and storage	NO								0		
2. Industrial processes and product use	**9 770.20**	**16**	**421**	**1 650**	**7**	**52**	**NO**	**NO**	**11 916**		
A. Mineral industry	4 494.70								4 495		
B. Chemical industry	772.49	11	416	NO	NO	NO	NO	NO	1 200		
C. Metal industry	4 066.32	5	NO	NO	7	NA,NO	NO	NO	4 078		
D. Non-energy products from fuels and solvent use	436.70	NE,NO	NE,NO						437		
E. Electronic Industry				NO	NO	NO	NO	NO	0		
F. Product uses as ODS substitutes				1 650	NO	NO	NO	NO	1 650		
G. Other product manufacture and use	NO	NO	4	NO	NO	52	NO	NO	57		
H. Other	NE,NO	NE,NO	NE,NO	NO	NO	NO	NO	NO	0		
3. Agriculture	**76.70**	**12 675**	**5 677**						**18 428**		
A. Enteric fermentation		10 630							10 630		
B. Manure management		1 550	597						2 148		
C. Rice cultivation		0							0		
D. Agricultural soils		NE	4 899						4 899		
E. Prescribed burning of savannas		NE	NE						NE		
F. Field burning of agricultural residues		495	180						675		
G. Liming	13.75								14		
H. Urea application	62.95								63		
I. Other carbon-containing fertilizers	NO								0		
J. Other	NO	NO	NO						0		
4. Land use, land-use change and forestry(1)	0.00	0	0						0		
A. Forest land	NE	NE	NE						NE		
B. Cropland	NE	NE	NE						NE		
C. Grassland	NE	NE	NE						NE		
D. Wetlands	NE	NE	NE						NE		
E. Settlements	NE	NE	NE						NE		
F. Other land	NE	NE	NE						NE		
G. Harvested wood products	NE								NE		
H. Other	NE	NE	NE						NE		
5. Waste	6.61	5 284	534						5 825		
A. Solid waste disposal	NA	3 526							3 526		
B. Biological treatment of solid waste		28	20						47		
C. Incineration and open burning of waste	6.61	0	1						8		
D. Waste water treatment and discharge		1 730	514						2 244		
E. Other	NA	NA	NA						0		
6. Other (as specified in summary 1.A)				IE	IE	IE	IE	IE	0		

Memo items:(2)											
International bunkers	NE	NE	NE						NE		
Aviation	NE	NE	NE						NE		
Navigation	NE	NE	NE						NE		
Multilateral operations	NE	NE	NE						NE		
CO2 emissions from biomass	NE								NE		
CO2 captured	NE								NE		
Long-term storage of C in waste disposal sites	NE								NE		
Indirect N2O			NE								
Indirect CO2 (3)	NA										
Total CO2 equivalent emissions without land use, land-use change and forestry									**112 562**	**39 778.38**	**72 783.81**
Total CO2 equivalent emissions with land use, land-use change and forestry									**NE**		
Total CO2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry									**112 562**		
Total CO2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry									**NE**		

(1) For carbon dioxide (CO2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO2, the national totals shall be provided with and without indirect CO2.

The estimates in this table have been compiled according to the methodology described in Annex chapter 6.2. The EEA proxy estimates are based on a bottom up approach (by sector, gas and country). The confidence in the numbers decreases at finer levels of detail, particularly for non-CO_2 emissions. Confidence is highest for CO_2 emissions from fuel combustion.

6.1.24 Slovakia (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS | Year 2016
(Sheet 1 of 1) | Submission v1.1 (11-07-2017)
Country Slovakia - total territory

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	**27 620.66**	**4 287.77**	**2 050.18**	**742.79**	**6.49**	**14.46**	**NO**	**NO**	**34 722.35**		
1. Energy	**25 136.59**	**1 634.04**	**193.12**						**26 963.75**	**13 160.31**	**13 803.44**
A. Fuel combustion (sectoral approach)	25 114.07	241.86	193.12						25 549.05	13 160.31	12 388.73
1. Energy industries	7 212.59	18.65	44.47						7 275.71	6 697.44	578.27
2. Manufacturing industries and construction	6 937.23	19.48	40.01						6 996.72	6 143.77	852.94
3. Transport	6 486.62	13.80	60.98						6 561.40	298.00	6 263.40
4. Other sectors	4 427.16	189.89	47.66						4 664.71	21.10	4 643.61
5. Other	50.48	0.03	0.00						50.51	NO	50.51
B. Fugitive emissions from fuels	22.51	1 392.19	0.00						1 414.70	NO	1 414.70
1. Solid fuels	21.32	329.55	NO						350.86	NO	350.86
2. Oil and natural gas and other emissions from energy production	1.20	1 062.64	0.00						1 063.84	NO	1 063.84
C. CO_2 transport and storage	NO								NO	NO	NO
2. Industrial processes and product use	**8 724.51**	**0.52**	**201.97**	**742.79**	**6.49**	**14.46**	**NO**	**NO**	**9 690.75**	**8 104.07**	**1 586.68**
A. Mineral industry	2 303.29								2 303.29	2 151.95	151.34
B. Chemical industry	1 658.43	0.52	121.94	NO	NO	NO	NO	NO	1 780.89	1 308.57	472.32
C. Metal industry	4 637.12	NO	NO	NO	6.49	NO	NO	NO	4 643.61	4 643.55	0.06
D. Non-energy products from fuels and solvent use	125.68	NO	NO						125.68	NO	125.68
E. Electronic Industry				NO	NO	NO	NO	NO	NO	NO	NO
F. Product uses as ODS substitutes				742.79	NO	NO	NO	NO	742.79	NO	742.79
G. Other product manufacture and use	NO	NO	80.03	NO	NO	14.46	NO	NO	94.49	NO	94.49
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3. Agriculture	**81.92**	**1 255.41**	**1 490.87**						**2 828.21**	**NO**	**2 828.21**
A. Enteric fermentation		1 002.98							1 002.98	NO	1 002.98
B. Manure management		252.43	182.43						434.86	NO	434.86
C. Rice cultivation		NO							NO	NO	NO
D. Agricultural soils		NO	1 308.44						1 308.44	NO	1 308.44
E. Prescribed burning of savannahs		NO	NO						NO	NO	NO
F. Field burning of agricultural residues		NO	NO						NO	NO	NO
G. Liming	16.41								16.41	NO	16.41
H. Urea application	65.51								65.51	NO	65.51
I. Other carbon-containing fertilizers	NO								NO	NO	NO
J. Other	NO	NO	NO						NO	NO	NO
4. Land use, land-use change and forestry[1]	**-6 329.33**	**15.94**	**28.37**						**-6 285.02**		
A. Forest land	-4 762.38	15.94	10.51						-4 735.92		
B. Cropland	-830.21	NO	8.44						-821.77		
C. Grassland	-178.81	NO	0.41						-178.40		
D. Wetlands	NO	NO	NO						NO		
E. Settlements	79.88	NO	4.07						83.95		
F. Other land	97.75	NO	4.93						102.68		
G. Harvested wood products	-735.56	NO	NO						-735.56		
H. Other	NO	NO	NO						NO		
5. Waste	**6.97**	**1 381.86**	**135.84**						**1 524.67**	**NO**	**1 524.67**
A. Solid waste disposal	NO	960.55							960.55	NO	960.55
B. Biological treatment of solid waste		113.55	81.21						194.76	NO	194.76
C. Incineration and open burning of waste	6.97	0.71	5.42						13.10	NO	13.10
D. Waste water treatment and discharge		307.05	49.21						356.26	NO	356.26
E. Other	NO	NO	NO						NO	NO	NO
6. Other *(as specified in summary 1.A)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo items:[2]											
International bunkers	**166.28**	**0.09**	**1.35**						**167.72**		
Aviation	144.40	0.03	1.17						145.60		
Navigation	21.89	0.05	0.18						22.12		
Multilateral operations	NO	NO	NO						NO		
CO_2 emissions from biomass	**8 050.67**								**8 050.67**		
CO_2 captured	**NO**								**NO**		
Long-term storage of C in waste disposal sites	**11 653.58**								**11 653.58**		
Indirect N_2O			**4.90**								
Indirect CO_2 [3]	**NO,NE,IE**										
Total CO_2 equivalent emissions without land use, land-use change and forestry									**41 007.37**	**21 264.38**	**19 742.98**
Total CO_2 equivalent emissions with land use, land-use change and forestry									**34 722.35**		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									**41 007.37**		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									**34 722.35**		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.

ENERGY: Emissions increased moderately what is also observed in the IPPU sector. Increase occurred in "big" energy industry (category 1.A.1.a) what is partly saturated by the decrease in fuel consumption in Slovak Electricity Plant (decrease of lignite consumption). In relative numbers, decrease occurred in services (caused by two sources shout-down). More significant changes occurred in the IEF (increase) of industrial waste incineration caused by the decrease of NCV.

MEMO ITEMS: Emissions are not significant and therefore are estimated on the same level as in the previous year 2015

IPPU: Categories 2.A, 2.B and 2.C were estimated based on the EU ETS report of verified GHG emissions. ESD emissions in categories 2.A, 2.B, 2.C, 2.D and 2.G were extrapolated based on the 5-years increase. In the category 2.C significant increase is expected.

AGRICULTURE: Activity data for the most important categories of animals were downloaded from the SLOVSTAT database. Numbers of livestock for non-key categories, such as goats and horses, were not available during approximation, therefore method of extrapolation was used. Extrapolation was applied also for not key sources like following: Liming, Inorganic N- fertilizers, Urea application, Sewage sludge. The methodology for the approximation was consistent with the IPCC 2006 GL. We assumed that 2015 emissions will remain on the same value, or it will slightly decrease caused by decrease in animal numbers of livestock except dairy cattle, laying hens, turkeys, and ducks. Methane emissions from enteric fermentation for Dairy cattle category increased, because Ym parameter increased comparing to previous year. Consumption of Inorganic N-Fertilizer increased, what caused an increase in this category.

LULUCF: A. FOREST LAND: Emissions of CO2, CH4 and N2O are preliminary calculated using new input data from 2016 and the same method as in the NIR. **4.B CROPLAND** - Emissions of CO2, CH4 and N2O are preliminary calculated using new input data from 2016 and the same method as in the NIR. **C. GRASSLAND:** Emissions of CO2, CH4 and N2O are preliminary calculated using new input data from 2016 and the same method as in the NIR. **D. WETLANDS**: Slovakia does not report this category. **E. SETTLEMENTS:** Emissions of CO2 and N2O are preliminary calculated using new input data from 2016. **F. OTHER LAND:** Emissions of CO2 and N2O are preliminary calculated using new input data from 2016. **G. HWP:** New input data for 2016 are not yet available. Emissions were estimated using the harvested wood volume from 2016. **Indirect N2O emissions** are calculated from the Forest Land for the first time.

WASTE: Emissions stable, on the same level as previous year.

6.1.25 Slovenia (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017
Country SI
Geographical scope[4] NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	**14280.62**	**2057.11**	**818.66**	**329.06**	**19.78**	**14.58**	**0.00**	**0.00**	**17519.80**		
1. Energy	13532.42	422.40	149.07						14103.88	5 858	8 245.948
A. Fuel combustion (sectoral approach)	13404.06	163.89	149.07						13717.02	5 793	7 923.895
1. Energy industries	4901.56	2.68	22.93						4927.17	4 782	145.298
2. Manufacturing industries and construction	1530.84	5.04	16.51						1552.39	1 011	541.138
3. Transport	5631.01	6.72	61.03						5698.76		5 698.763
4. Other sectors	1336.97	149.46	48.57						1534.99		1 534.994
5. Other	3.67	0.00	0.03						3.70		3.701
B. Fugitive emissions from fuels	128.36	258.51	0.00						386.87	65	322.053
1. Solid fuels	128.29	229.57	NA						357.86	65	293.045
2. Oil and natural gas	0.07	28.94	0.00						29.01		29.009
C. CO_2 transport and storage	NO								0.00		NO
2. Industrial processes and product use	**701.41**	**0.00**	**38.00**	**329.06**	**19.78**	**14.58**	**0.00**	**0.00**	**1102.82**	**621**	**482.098**
A. Mineral industry	431.92								431.92	412	20.014
B. Chemical industry	49.45	NA,NO	NO	NO	NO	NO	NO	NO	49.45	NO	49.446
C. Metal industry	198.22	NA,NO	NA	NO	19.78	NO	NO	NO	218.00	209	9.180
D. Non-energy products from fuels and solvent use	21.83	NA	NA						21.83		21.827
E. Electronic Industry				NO	NO	NO	NO	NO	NO		NO
F. Product uses as ODS substitutes				329.057	NO	NO	NO	NO	329.06		329.057
G. Other product manufacture and use	NO	NO	38.00	NO	NO	14.579	NO	NO	52.57		52.574
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA		NO
3. Agriculture	**19.52**	**1195.34**	**577.42**						**1792.28**		
A. Enteric fermentation		944.11							944.11		
B. Manure management		251.23	128.37						379.60		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NO	449.05						449.05		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		NO	NO						NO		
G. Liming	10.78								10.78		
H. Urea application	8.74								8.74		
I. Other carbon-containing fertilizers	NO								NO		
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]											
A. Forest land											
B. Cropland											
C. Grassland											
D. Wetlands											
E. Settlements											
F. Other land											
G. Harvested wood products											
H. Other											
5. Waste	**27.26**	**439.36**	**54.18**						**520.81**		
A. Solid waste disposal	NO,NA	340.40							340.40		
B. Biological treatment of solid waste		7.24	5.18						12.41		
C. Incineration and open burning of waste	27.26	0.00	0.11						27.37		
D. Waste water treatment and discharge		91.72	48.90						140.62		
E. Other	NO	NO	NO						NO		
6. Other *(as specified in summary 1.A)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Memo items:[2]											
International bunkers											
Aviation											
Navigation											
Multilateral operations											
CO_2 emissions from biomass											
CO_2 captured											
Long-term storage of C in waste disposal sites											
Indirect N_2O											
Indirect CO_2 [3]											
Total CO_2 equivalent emissions without land use, land-use change and forestry									17519.80	6 479	
Total CO_2 equivalent emissions with land use, land-use change and forestry											
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry											
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry											

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2 the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.

In 2016, emissions of GHG increased by 4.1% compare to 2015.

Emissions in Energy sector increased by 5.3%, due to the increase in electricity production in thermo power plants and increase in fuel consumption in road traffic.
The trend of 1.A fuel combustion of gaseous and liquid fuels widely follows the trend in preliminary energy statistics:
http://pxweb.stat.si/pxweb/Database/Environment/18_energy/01_18179_balance_indicators/01_18179_balance_indicators.asp
Natural gas consumption decreased by -2.9% (approx. +0.8 PJ) and consumption of liquid fuels sincreased by 4.9% (4.5 PJ).
According to the ETS data on consumption of solid fuels, use of coal in power plants increased by 7.8% (+3.3 PJ).

Emissions from IPPU decreased by 5.9%,
Emissions decreased in all categories except in cemical and metal production.

Emissions in agriculture sector increased by 2.8% due to increase in animal population.
http://pxweb.stat.si/pxweb/Database/Environment/15_agriculture_fishing/05_animal_production/01_15174_number_livestock/01_15174_number_livestock.asp

In the proxy inventory no changes are expected in the waste sector.

6.1.26 Spain (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 1
Country SPAIN
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	**221 704.9**	**38 618.9**	**15 884.5**	**9 318.2**	**87.5**	**229.8**	**NO,NA**	**NO,NA**	**285 843.9**		
1. Energy	**239 315.3**	**2 509.0**	**1 665.4**						**243 489.7**	**106 879**	**136 611**
A. Fuel combustion (sectoral approach)	235 590.6	2 055.3	1 665.3						239 311.1	105 791	133 520
1. Energy industries	71 226.8	93.5	294.9						71 615.2	70 829	786
2. Manufacturing industries and construction	40 655.3	863.9	224.7						41 743.9	32 224	9 519
3. Transport	84 979.2	94.0	861.2						85 934.4	2 618	83 317
4. Other sectors	38 443.7	1 003.8	282.0						39 729.6	120	39 610
5. Other	285.6	0.0	2.4						288.0	0	288
B. Fugitive emissions from fuels	3 724.7	453.7	0.1						4 178.6	1 088	3 091
1. Solid fuels	25.9	87.7	NA,NE						113.6	0	114
2. Oil and natural gas	3 698.8	366.0	0.1						4 064.9	1 088	2 977
C. CO_2 transport and storage	NO								NO	NO	NO
2. Industrial processes and product use	**20 248.2**	**178.8**	**737.7**	**9 318.2**	**87.5**	**229.8**	NO,NA	NO,NA	**30 800.2**	**19 295**	**11 505**
A. Mineral industry	12 146.1								12 146.1	11 938	208
B. Chemical industry	3 215.2	157.5	427.6	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	3 800.3	3 362	438
C. Metal industry	4 019.0	21.2	NA	NO,NA	85.1	NO,NA	NO,NA	NA	4 125.4	3 995	130
D. Non-energy products from fuels and solvent use	867.9	NA	NA						867.9	0	868
E. Electronic Industry				NO	NO	NO	NO	NO	NO	NO	NO
F. Product uses as ODS substitutes				9 318.2	2.4	NO,NA	NO,NA	NO,NA	9 320.6	0	9 321
G. Other product manufacture and use	NO	NO	309.9	NO,NA	NO,NA	229.8	NO,NA	NO,NA	539.7	0	540
H. Other	IE,NA	IE,NA	0.2	NA	NA	NA	NA	NA	0.2	0	0
3. Agriculture	**515.7**	**23 599.4**	**11 668.1**						**35 783.2**		
A. Enteric fermentation		14 504.3							14 504.3		
B. Manure management		8 629.0	1 810.1						10 439.1		
C. Rice cultivation		442.3							442.3		
D. Agricultural soils		IE	9 850.6						9 850.6		
E. Prescribed burning of savannas		NO	NO						NO		
F. Field burning of agricultural residues		23.9	7.4						31.2		
G. Liming	39.0								39.0		
H. Urea application	476.6								476.6		
I. Other carbon-containing fertilizers	NO								NO		
J. Other	NO	NO	NO						NO		
4. Land use, land-use change and forestry[1]	**-38 374.3**	**104.5**	**258.4**						**-38 011.3**		
A. Forest land	-37 011.3	45.0	30.9						-36 935.4		
B. Cropland	-2 489.7	NE,NO,IE	90.9						-2 398.8		
C. Grassland	1 534.5	59.5	78.0						1 672.0		
D. Wetlands	-19.7	NO	NE,NO						-19.7		
E. Settlements	1 146.9	NO	54.0						1 200.8		
F. Other land	54.4	NO	4.6						59.0		
G. Harvested wood products	-1 589.4								54.4		
H. Other	NO	NO	NO						NO		
5. Waste	NO,IE,NA	**12 227.2**	**1 555.0**						**13 782.1**		
A. Solid waste disposal	NO,NA	10 152.1							10 152.1		
B. Biological treatment of solid waste		383.1	248.4						631.5		
C. Incineration and open burning of waste	NO,IE	302.3	347.6						649.9		
D. Waste water treatment and discharge		1 388.9	959.0						2 347.8		
E. Other	NA	0.8	NA						0.8		
6. Other *(as specified in summary 1.A)*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Memo items:[2]											
International bunkers									39 925.4		
Aviation									15 602.6		
Navigation									24 322.8		
Multilateral operations									NO		
CO_2 emissions from biomass									27 276.9		
CO_2 captured									NO		
Long-term storage of C in waste disposal sites									NE		
Indirect N_2O											
Indirect CO_2[3]											
Total CO_2 equivalent emissions without land use, land-use change and forestry									323 855.2	126 174	197 681.3
Total CO_2 equivalent emissions with land use, land-use change and forestry									285 843.9		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									NA		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NA		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.

CRF1+CRF2: Interannual drop of ETS emissions of -10%. http://www.eea.europa.eu/data-and-maps/data/data-viewers/emissions-trading-viewer
1A1a: decrease of electricity generation (-2.2%). Increased participation of renewable energies in the mix (hydro: +25%) and reduction of coal -29% compared to 2
1A1b: decrease of ETS emissions in refinery sector (-0.05%). http://www.eea.europa.eu/data-and-maps/data/data-viewers/emissions-trading-viewer
1A2: wide increase of industrial activity (+1,4% in emissions).
1A3: rise of national aviation kerosene consumption (+4.6 %); rise of road fossil fuels (+3.2 % diesel; +2.3 % gasoline). http://www.cores.es/es/estadisticas
1A4: rise of natural gas consumption in RCI (+3.5%) and drop of gasoil (-7.6%) and coal (-5.5%) in a rather warm year. [Several sources]
2F: rise of fluorinated gas consumption (-1.7%).
3A-3B: cattle rise (Non dairy: +3.2% and swine: +2.6%). http://www.magrama.gob.es/es/estadistica/temas/estadisticas-agrarias/ganaderia/encuestas-ganaderas/
3D: reduction (-8%) of mineral fertilizers consumption http://www.magrama.gob.es/es/estadistica/temas/estadisticas-agrarias/agricultura/estadisticas-medios-p

6.1.27 Sweden (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission Subm 2018 proxy
Country Sweden

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kilotonnes)									CO_2 eq. (kilotonnes)	
Total (net emissions)[1]	**43 280.00**	**4 870.00**	**4 600.00**	**770.00**	**30.00**	**60.00**	**0.00**	**0.00**	**53 610.00**		
1. Energy	**37360**	**490**	**630**						**38480**		
A. Fuel combustion (sectoral approach)	36750	430	630						37810		
1. Energy industries	9220	50	230						9490		
2. Manufacturing industries and construction	7320	50	160						7530		
3. Transport	17210	40	140						17390		
4. Other sectors	2800	290	100						3180		
5. Other	200	0	0						200		
B. Fugitive emissions from fuels	610	60	0						670		
1. Solid fuels											
2. Oil and natural gas and other emissions from energy production											
C. CO_2 transport and storage											
2. Industrial processes and product use	**5730**	**10**	**220**	**770**	**30**	**60**			**6830**		
A. Mineral industry											
B. Chemical industry											
C. Metal industry											
D. Non-energy products from fuels and solvent use											
E. Electronic Industry											
F. Product uses as ODS substitutes											
G. Other product manufacture and use											
H. Other											
3. Agriculture	**120**	**3260**	**3510**						**6890**		
A. Enteric fermentation											
B. Manure management											
C. Rice cultivation											
D. Agricultural soils											
E. Prescribed burning of savannahs											
F. Field burning of agricultural residues											
G. Liming											
H. Urea application											
I. Other carbon-containing fertilizers											
J. Other											
4. Land use, land-use change and forestry[1]											
A. Forest land											
B. Cropland											
C. Grassland											
D. Wetlands											
E. Settlements											
F. Other land											
G. Harvested wood products											
H. Other											
5. Waste	**60.00**	**1 100.00**	**240.00**						**1400**		
A. Solid waste disposal											
B. Biological treatment of solid waste											
C. Incineration and open burning of waste											
D. Waste water treatment and discharge											
E. Other											
6. Other ***(as specified in summary 1.A)***											

Memo items:[2]											
International bunkers											
Aviation											
Navigation											
Multilateral operations											
CO_2 emissions from biomass											
CO_2 captured											
Long-term storage of C in waste disposal sites											
Indirect N_2O											
Indirect CO_2[3]											
									Total CO_2 equivalent emissions without land use, land-use change and forestry	**53 610.00**	**19 740.00**	**33 870.00**
									Total CO_2 equivalent emissions with land use, land-use change and forestry			
									Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry			
									Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry			

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

(extra blank rows deleted so submission matches template) (submitted as Mtonnes -> converted to kilotonnes)

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.

Key drivers for emission trend

Domestic transportation (CRF 1A3) accounts for one third of the total Swedish emissions and decreased by around 4%, comparing the approximated greenhouse gas inventory for 2016 with the reported inventory for 2015. Increased use of biofuels and more fuel-efficient cars contribute to decreasing emissions while increased transportation limit the impact of these measures on the emissions. The estimates for 2016 are based on available energy statistics.

Energy industries (CRF 1A1) accounts for 18% of the total Swedish emissions and increased by around 6%, comparing the approximated greenhouse gas inventory for 2016 with the reported inventory for 2015. The year 2016 was slightly colder than 2014 and 2015, which contributed to the increasing emissions. The estimates for the heat and power facilities are based on available energy statistics. Emissions from coke ovens and refineries were considered equal to 2015. Changes in emissions for these facilities were adjusted for other sectors (CRF 1A2, 1B and 2).

Industrial emissions (including stationary, fugitive and process from manufacturing industries, construction, refineries and coke ovens) increased by around 4% when comparing the approximated greenhouse gas inventory for 2016 with the reported inventory for 2015. Industrial emissions are described at the aggregate level since the method for allocation of facilities' emissions to different CRF-codes is based on a model in the case of the approximated greenhouse gas inventory.

The increasing industrial emissions can partly be explained by favorable economic conditions resulting in increased production, and by a steel mill being operated at full capacity again after having been partly under maintenance in 2015. In 2016, one of the refinery facilities was partly under maintenance, which explains the decreasing emissions in fugitive emissions and, also affects emissions from stationary combustion. Industrial emissions are based on energy statistics and adjusted based on information provided from the ETS-reporting.

Agricultural emissions (CRF 3) and emissions from waste (CRF 5) were assumed to be equal to the previous year due to lack of data to support an approximated estimate for 2016.

Additional information on the approximated greenhouse gas emissions inventory is available at (in Swedish):
http://www.naturvardsverket.se/Sa-mar-miljon/Klimat-och-luft/Klimat/utslappen-av-vaxthusgaser/Snabbstatistik-utslapp-av-vaxthusgaser-2015/

Please note that the Swedish EPA use a different sectoral division than CRF-categories in national reporting that is more closely related to implemented and

6.1.28 United Kingdom (submitted by MS)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2016 provisional inventory
Country United Kingdom of Great Britain and N

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO_2 equivalent (Gg)	
Total (net emissions) [1]	**383 000**	**52 200**	**23 100**	**15 800**	**300**	**500**	**NO**	**0**	**474 900**		
1. Energy	**367 300**	**IE**	**IE**							**147 000**	**220 300**
A. Fuel combustion (sectoral approach)	362 800	IE	IE							143 900	218 900
1. Energy industries	106 200	IE	IE							104 800	1 400
2. Manufacturing industries and construction	45 600	IE	IE							25 600	20 000
3. Transport	117 900	IE	IE							11 800	106 000
4. Other sectors	91 600	IE	IE							1 700	89 900
5. Other	1 600	IE	IE							NO	1 600
B. Fugitive emissions from fuels	4 500	IE	IE							3 100	1 400
1. Solid fuels	400	IE	IE							0	400
2. Oil and natural gas and other emissions from energy production	4 100	IE	IE							3 100	1 000
C. CO_2 transport and storage	NO									NO	NO
2. Industrial processes and product use	**14 200**	**IE**	**IE**	**IE**	**IE**	**IE**	**NO**	**IE**		**13 700**	**500**
A. Mineral industry	6 600									IE	IE
B. Chemical industry	4 400	IE	IE	IE	IE	NO	NO	NO		IE	IE
C. Metal industry	2 900	IE	IE	IE	IE	IE	NO			IE	IE
D. Non-energy products from fuels and solvent use	300	NO,IE	NO,NE,IE							NO	300
E. Electronic Industry				IE	NO,IE	NO,IE	NO	IE		NO	NO
F. Product uses as ODS substitutes				IE	NO	NO	NO	NO		NO	NO
G. Other product manufacture and use	NO	NO	IE		IE	IE				NO	NO
H. Other	NO,NE,IE	IE	NO							NO	NO,NE,IE
3. Agriculture	**1 200**	**IE**	**IE**								
A. Enteric fermentation		IE									
B. Manure management		IE	IE								
C. Rice cultivation		NO									
D. Agricultural soils		NE	IE								
E. Prescribed burning of savannahs		NO	NO								
F. Field burning of agricultural residues		NO	NO								
G. Liming	800										
H. Urea application	400										
I. Other carbon-containing fertilizers	NO										
J. Other	NO	NO	NO								
4. Land use, land-use change and forestry [1]											
A. Forest land											
B. Cropland											
C. Grassland											
D. Wetlands											
E. Settlements											
F. Other land											
G. Harvested wood products											
H. Other											
5. Waste	**300**	IE	IE								
A. Solid waste disposal	NO,NE	IE									
B. Biological treatment of solid waste		IE	IE								
C. Incineration and open burning of waste	300	IE	IE								
D. Waste water treatment and discharge		IE	IE								
E. Other	NO	NO	NO								
6. Other ***(as specified in summary 1.A)***		0	0	0.00	0.00	0.00	0.00	0.00			

Memo items: [2]											
International bunkers											
Aviation											
Navigation											
Multilateral operations											
CO_2 emissions from biomass											
CO_2 captured											
Long-term storage of C in waste disposal sites											
Indirect N_2O											
Indirect CO_2 [3]											
Total CO_2 equivalent emissions without land use, land-use change and forestry											
Total CO_2 equivalent emissions with land use, land-use change and forestry											
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry											
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry											

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
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Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
Estimated CO_2 emissions for 2016 have been calculated using the quarterly energy consumption statistics for the UK. The statistical release and methodology document describing the calculations are available below: https://www.gov.uk/government/statistics/provisional-uk-greenhouse-gas-emissions-national-statistics-2016 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416820/methodology_summary.pdf The calculations described in the above document are carried out using UK only data excluding the Crown Dependencies and Overseas Territories The data presented above is consistent with this data set, no changes have been made to the geographical coverage. Emissions are presented in Gg and rounded to the nearest 100 Gg, consistent with the UK's statistical release. Note that totals are rounded from full precision data, and therefore do not match the sum of the rounded data presented here CO2 from LULUCF is excluded in accordance with Article 17 of the Implementing Regulation 749/214 The non-CO2 emissions from LULUCF are included in the national total. Emissions from LULUCF in 2015 for non-CO2 gases were 0.026 MtCO2e CH4 and 1.511 MtCO2e for N2O. As only aggregated figures for non-CO_2 gases are available, the comparison of ETS and non-ETS emissions in columns M and N are CO_2 only. EU ETS emissions for sector 2 are presented at an aggregated level only. There is a small residual (<0.2%) of total EU ETS emissions that we have not been able to allocate to a category, these are not included in the totals above.

6.1.29 Iceland (submitted by country)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year
Submission
Country
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	11314.16	2791.18	395.73	206.98	103.70	1.53	NO	NO	14813.28		
1. Energy	1643.37	7.74	44.12						1695.23		
A. Fuel combustion (sectoral approach)	1482.89	3.13	44.12						1530.14		
1. Energy industries	3.63	0.00	0.01						3.64		
2. Manufacturing industries and construction	68.21	0.06	0.14						68.41	12	**56**
3. Transport	855.85	1.86	28.69						886.41		
4. Other sectors	555.20	1.20	15.28						571.69		
5. Other											
B. Fugitive emissions from fuels	160.48	4.61	NA,NO						165.09		
1. Solid fuels	NO	NO	NA,NO						NA,NO		
2. Oil and natural gas	160.48	4.61	NA,NO						165.09		
C. CO_2 transport and storage	NO								NO		
2. Industrial processes and product use	1704.47	1.37	2.92	206.98	103.70	1.53	NO	NO	2020.97		
A. Mineral industry	0.75								0.75		
B. Chemical industry	NO,IE	NO,IE	NO	NO	NO	NO	NO	NO	NO,IE		
C. Metal industry	1700.82	1.34	NO	NO	103.69	NO	NO	NO	1805.84	1 769	**37**
D. Non-energy products from fuels and solvent use	2.88	NE,NA,NO	NE,NA,NO						2.88		
E. Electronic Industry				NO	NO	NO	NO	NO	NO		
F. Product uses as ODS substitutes				206.98	0.02				206.99		
G. Other product manufacture and use	0.03	0.03	2.92		NO	1.53			4.51		
H. Other	NA	NA	NA						NA		
3. Agriculture	4.19	352.93	258.65						615.77		
A. Enteric fermentation		300.93							300.93		
B. Manure management		52.01	50.61						102.61		
C. Rice cultivation		NO							NO		
D. Agricultural soils		NA,NE,NO	208.04						208.04		
E. Prescribed burning of savannas											
F. Field burning of agricultural residues		NO,NA	NO,NA						NO,NA		
G. Liming	3.61								3.61		
H. Urea application	0.58								0.58		
I. Other carbon-containing fertilizers											
J. Other											
4. Land use, land-use change and forestry[1]	7953.51	2238.92	81.88						10274.30		
A. Forest land	-339.78	0.67	5.50						-333.62		
B. Cropland	1667.71	82.00	NA,IE						1749.71		
C. Grassland	7213.31	547.49	0.62						7761.41		
D. Wetlands	-592.77	1608.76	0.04						1016.04		
E. Settlements	4.82	NE	NE,IE						4.82		
F. Other land	NE,NA	0.00	0.00						0.00		
G. Harvested wood products	0.22								0.22		
H. Other			75.71						75.71		
5. Waste	8.62	190.22	8.16						207.00		
A. Solid waste disposal	NO,NE,NA	182.25							182.25		
B. Biological treatment of solid waste		2.13	1.90						4.03		
C. Incineration and open burning of waste	8.62	0.34	0.30						9.26		
D. Waste water treatment and discharge		5.50	5.96						11.46		
E. Other											
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NO		

Memo items:[2]											
International bunkers	974.34	0.84	8.07						983.25		
Aviation	667.26	0.12	5.62						672.99		
Navigation	307.08	0.72	2.46						310.26		
Multilateral operations	NO	NO	NO						NO		
CO_2 emissions from biomass	NA,NO								NA,NO		
CO_2 captured	NA,NO								NA,NO		
Long-term storage of C in waste disposal sites	NO								NO		
Indirect N_2O			NO,NE								
Indirect CO_2 [3]	NO,NE										
Total CO_2 equivalent emissions without land use, land-use change and forestry									4538.98	1 781	93
Total CO_2 equivalent emissions with land use, land-use change and forestry									14813.28		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									NA		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NA		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

6.1.30 Norway (submitted by country)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year 2016
Submission 2017
Country Norway
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	**44 071.76**	**5 177.87**	**2 554.95**	**1 384.03**	**189.01**	**49.34**	-	-	**53 426.96**	**25 146.50**	**28 280.46**
1. Energy	**37 548.89**	**1 336.36**	**221.21**						**39 106.45**	**18 684.86**	**20 421.59**
A. Fuel combustion (sectoral approach)	*34 931.26*	*503.83*	*218.52*						*35 653.62*	*16 377.74*	*19 283.71*
1. Energy industries	15 100.53	146.97	29.69						15 277.19	14 110.21	1 174.82
2. Manufacturing industries and construction	3 652.14	19.72	30.43						3 702.29	2 195.52	1 506.77
3. Transport	12 649.11	171.96	106.25						12 927.32		12 927.32
4. Other sectors	3 308.01	154.66	49.05						3 511.73		3 511.73
5. Other	221.46	10.52	3.10						235.09	72.02	163.07
B. Fugitive emissions from fuels	*2 575.66*	*832.53*	*2.68*						*3 410.87*	*2 307.12*	*1 095.91*
1. Solid fuels	10.85	74.69	NO,NA						85.55		85.55
2. Oil and natural gas	2 564.80	757.83	2.68						3 325.32	2 314.96	1 010.36
C. CO_2 transport and storage	*41.97*								*41.97*		*41.97*
2. Industrial processes and product use	**6 450.98**	**32.24**	**346.31**	**1 384.03**	**189.01**	**49.34**	-	-	**8 451.91**	**6 461.64**	**1 990.27**
A. Mineral industry	966.34								966.34	943.10	23.24
B. Chemical industry	745.06	10.79	322.45	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	1 078.30	874.52	203.78
C. Metal industry	4 434.46	1.10	3.68		189.01	NO			4 628.26	4 547.78	80.48
D. Non-energy products from fuels and solvent use	197.87	20.35	18.61						236.83		236.83
E. Electronic Industry						1.02			1.02		1.02
F. Product uses as ODS substitutes				1 384.03	NO				1 384.03		1 384.03
G. Other product manufacture and use	NO	NO	1.56			48.32			49.89		49.89
H. Other	107.25	NA	NA						107.25	96.24	11.01
3. Agriculture	**71.89**	**2 626.33**	**1 877.79**						**4 576.01**		**4 576.01**
A. Enteric fermentation		2 354.44							2 354.44		2 354.44
B. Manure management		268.69	180.05						448.74		448.74
C. Rice cultivation		NO							-		-
D. Agricultural soils		NE	1 696.77						1 696.77		1 696.77
E. Prescribed burning of savannas		NO	NO						-		-
F. Field burning of agricultural residues		3.20	0.97						4.17		4.17
G. Liming	71.72								71.72		71.72
H. Urea application	0.17								0.17		0.17
I. Other carbon-containing fertilizers	NO								-		-
J. Other	NO	NO	NO						-		-
4. Land use, land-use change and forestry[1]									-		
A. Forest land									-		
B. Cropland									-		
C. Grassland									-		
D. Wetlands									-		
E. Settlements									-		
F. Other land									-		
G. Harvested wood products									-		
H. Other									-		
5. Waste	**NO,NE,IE**	**1 182.94**	**109.64**						**1 292.58**		**1 292.58**
A. Solid waste disposal	NO	1 081.41							1 081.41		1 081.41
B. Biological treatment of solid waste		55.43	32.93						88.36		88.36
C. Incineration and open burning of waste	NO,NE,IE	IE	IE						-		-
D. Waste water treatment and discharge		46.09	76.71						122.81		122.81
E. Other											
6. Other *(as specified in summary 1.A)*											

Memo items:[2]											
International bunkers	2 321.66	1.64	20.40						2 343.71		
Aviation	1 521.96	0.19	14.40						1 536.55		
Navigation	799.71	1.45	6.01						807.16		
Multilateral operations	NO	NO	NO						xO		
CO_2 emissions from biomass	4 389.62								4 389.62		
CO_2 captured	NO								xO		
Long-term storage of C in waste disposal sites	7 254.24								7 254.24		
Indirect N_2O			221.12								
Indirect CO_2[3]	NE,IE,NA										
Total CO_2 equivalent emissions without land use, land-use change and forestry									**53426.96**	**25 146.50**	**28 280.46**
Total CO_2 equivalent emissions with land use, land-use change and forestry											
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry											
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry											

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.

The reduced net emissions of about 0,5 million tonnes from 2015 (inventory 2017) to 2016 (proxy data) is mainly a result of:
1) changes in operation and market conditions in the ETS sector (CRF 1A1 and 1B)
2) increased use of biofuels in the transport sector (CRF 1A3)

Please note that data under Memo items (row 56-65) is from the 2017-inventory submission (i.e. 2015-emission data). For these sources, we do not have proxy-data.

6.1.31 Switzerland (submitted by country)

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year
Submission 11/07/2017
Country
Geographical scope[4]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total	ETS	non-ETS
	CO_2 equivalent (kt)									CO2 equivalent (Gg)	
Total (net emissions)[1]	39 128.44	5 052.33	2 367.26	1 579.30	61.66	237.75	NO	0.49	48 427.23		
1. Energy	36 914.93	286.45	235.06						37 436.44	NE	NE
A. Fuel combustion (sectoral approach)											
1. Energy industries											
2. Manufacturing industries and construction											
3. Transport											
4. Other sectors											
5. Other											
B. Fugitive emissions from fuels											
1. Solid fuels											
2. Oil and natural gas											
C. CO_2 transport and storage											
2. Industrial processes and product use	2 144.88	2.12	49.30	1 579.30	61.66	237.75	NO	0.49	4 075.50	NE	NE
A. Mineral industry											
B. Chemical industry											
C. Metal industry											
D. Non-energy products from fuels and solvent use											
E. Electronic Industry											
F. Product uses as ODS substitutes											
G. Other product manufacture and use											
H. Other											
3. Agriculture	47.34	4 136.05	1 889.41						6 072.80		
A. Enteric fermentation											
B. Manure management											
C. Rice cultivation											
D. Agricultural soils											
E. Prescribed burning of savannas											
F. Field burning of agricultural residues											
G. Liming											
H. Urea application											
I. Other carbon-containing fertilizers											
J. Other											
4. Land use, land-use change and forestry[1]	NE	NE	NE						NE		
A. Forest land											
B. Cropland											
C. Grassland											
D. Wetlands											
E. Settlements											
F. Other land											
G. Harvested wood products											
H. Other											
5. Waste	9.94	627.11	192.98						830.03		
A. Solid waste disposal											
B. Biological treatment of solid waste											
C. Incineration and open burning of waste											
D. Waste water treatment and discharge											
E. Other											
6. Other *(as specified in summary 1.A)*	11.35	0.60	0.51	NO	NO	NO	NO	NO	12.46	NO	12.46

Memo items:[2]											
International bunkers	NE	NE	NE						NE		
Aviation											
Navigation											
Multilateral operations	NO	NO	NO						NO		
CO_2 emissions from biomass	NE								NE		
CO_2 captured	NO								NO		
Long-term storage of C in waste disposal sites	NE								NE		
Indirect N_2O			NE								
Indirect CO_2[3]	113.18										
Total CO_2 equivalent emissions without land use, land-use change and forestry									48 427.23	NE	NE
Total CO_2 equivalent emissions with land use, land-use change and forestry									NE		
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									48 540.41		
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NE		

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for
[2] See footnote 7 to table Summary 1.A.
[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.
[4] Where applicable: for Member States with geographical scopes which differ between the Kyoto Protocol, the EU-territory scope, and the Party coverage under the Convention, please clarify the geographical scope of the Proxy GHG inventory submitted under the EU Monitoring Mechanism Regulation.

Brief description of the key drivers underpinning the increase or decrease in GHG emissions in t-1 (proxy) compared to t-2 (inventory). If this information is publicly available please include the hyperlink to the relevant website.
The Swiss Kyoto target includes direct and indirect emissions from sectors 1, 2, 3, and 5, but not from sector 6. Indirect CO2 emissions from sector 6 account for 1.04 kt (and are included in the 113.18 kt indicated above as total indirect CO2 emissions).
In the different sectors, emission changes from 2015 to 2016 were mainly caused by the following drivers: ***Sector 1 'Energy'*** (i) Cooler meteorological conditions during winter time, leading to an increase in CO2 emissions from heating fuels. ***Sector 2 'Industrial processes and product use'*** (i) Increased CO2 emissions from cement production (based on data from cement plants). (ii) Increased HFC emissions and decreased SF6 emissions. ***Sector 3 'Agriculture'*** (i) Reduced livestock, leading to a decrease of CH4 emissions. (ii) Increased use of mineral fertilizer, leading to an increase of N2O emissions from soils. **Sector 5 'Waste'** (i) Reduced emissions of CH4 from waste disposal sites (based on model simulations, disposal of burnable solid waste is prohibited since the year 2000).

6.2 Annex II. Methodology for the proxy inventories calculated centrally

The proxy inventory is largely based on estimates from Member States with gap filling only where necessary. Provisional calculations are made for all EU-28 Member States and Iceland in case complete or partially gap-filling is necessary. Detail on the methodology of the proxy calculated by EEA that is used for gap filling is provided here.

For the central calculation of proxy inventories inventory data submitted with a cut-off date of 06 June 2017 was used.

6.2.1 Energy

6.2.1.1 1.A Energy – Fuel combustion

Methods and data sources used

Up to four different approaches for the estimation of CO_2 emissions from Fuel Combustion based on different data sources and methods were calculated for each Member State as presented in Table 15.

Table 15 Overview of approaches used for the estimation of CO_2 emissions from 1.A fuel combustion

	Approach I	Approach II	Approach III	Approach IV
Data sources	BP energy review	Eurostat monthly energy statistics	EUTL data, Eurostat data , World Steel data and further data source	Member States' national energy statistics
Method	2016 consumption trend for solid, liquid and gaseous fuels applied to inventory data for 2015	2016 consumption trend for solid, liquid and gaseous fuels applied to inventory data for 2015	detailed estimation for inventory source categories 1A1, 1A2, 1A3 and 1A4, constant emissions for 1A5	2016 consumption trend for solid, liquid and gaseous fuels applied to inventory data for 2015

Source: Öko-Institut

In Approach I, the main source for the estimation of CO_2 emissions from source category 1.A (Energy - Fuel Combustion) is the most recent BP Statistical Review of World Energy, which contains individual data for 21 EU Member States. No data are published for Croatia, Cyprus, Estonia, Latvia, Luxembourg, Malta, Slovenia and Iceland in this source. The share of these (small) countries in primary energy consumption amounts to approximately 2 % of total EU consumption, with some differences regarding individual energy sources. The BP data refer to primary energy consumption and covers only commercially traded fuels.

Approach II is based on Eurostat monthly energy statistics which reflect Member States' submissions of monthly Oil and Gas Questionnaires and monthly Coal Questionnaires to Eurostat. No data are published for Iceland in this source.

In contrast to all other approaches for CO_2 emissions from sector 1.A (Fuel Combustion), Approach III makes use of CO_2 estimates for categories 1.A.1 (Energy Industries – chapter 6.2.1.2), 1.A.2 (Manufacturing Industries and Construction – chapter 6.2.1.3), 1.A.3 (Transport – chapter 6.2.1.4) and 1.A.4 (Other sectors i.e. Commercial/Institutional, Residential and Agriculture/Forestry/Fishing – chapter 6.2.1.5). In this 'bottom up' approach those CO_2 emission estimates for 2015 are complemented with reported 2014 CO_2 emissions for category 1.A.5 (Other) in order to estimate 2015 CO_2 emissions for 1.A (Fuel Combustion) CO_2 emissions.

In Approach IV, finally, early national energy statistics are used: For a considerable number of Member States, preliminary energy statistics are available. Fuel consumption data were (if necessary) converted in energy units and aggregated to solid, liquid & gaseous and – if available – to peat and other fuel categories.

CO_2 emissions reported in source category 1.A (Fuel Combustion) are split up in the CRF by the fuel categories solid fuels, liquid fuels, gaseous fuels, peat and other fuels. CO_2 emissions from other fuels cover mostly municipal or industrial waste incineration or co-incineration of secondary waste-type fuels. CO_2 emissions from the biomass fuel category are not accounted for in CRF category 1.A (Fuel Combustion) and were consequently not included in the estimation.

All data sources were used in order to derive specific information for the development of CO_2 emissions from the fuel categories solid, liquid, gaseous and peat fuels, as defined in the CRF with source category 1.A (Fuel Combustion). For each of those fuel categories a fuel consumption trend 2015 to 2016 was derived from the respective data sources (this applies to approaches I (BP), II (Eurostat) and IV (national energy statistics)). 2016 CO_2 emissions per fuel category were then estimated by multiplying the CO_2 emissions in that fuel category of the previous year by the fuel category specific consumption trend. None of the data sources provided information on the development of CO_2 emissions from the other fuels category. Thus 2016 CO_2 emissions from other fuels in source category 1.A (Fuel Combustion) were approximated using the respective emissions as reported by the Member States for 2016. The general approach to the CO_2 emission calculation for 1.A (Fuel combustion) is depicted in Equation 2 (applies to approaches I (BP), II (Eurostat) and IV (national energy statistics)):

Equation 2

$$E^{Y}_{1A,CO2} = \frac{C^{Y}_{solid}}{C^{Y-1}_{solid}} \cdot E^{Y-1}_{solid,CO2} + \frac{C^{Y}_{liquid}}{C^{Y-1}_{liquid}} \cdot E^{Y-1}_{liquid,CO2} + \frac{C^{Y}_{gaseous}}{C^{Y-1}_{gaseous}} \cdot E^{Y-1}_{gaseous,CO2} + \frac{C^{Y}_{peat}}{C^{Y-1}_{peat}} \cdot E^{Y-1}_{peat,CO2} + E^{Y-1}_{other\ fuels,CO2}$$

with

$E^{Y}_{1A,CO2}$ *CO_2 emissions in source category 1A*

$C^{Y}_{solid/liquid/gaseous/peat}$ *consumption of solid/liquid/gaseous fuels*

$C^{Y-1}_{solid/liquid/gaseous/peat}$ *consumption of solid/liquid/gaseous fuels in the previous year*

$E^{Y-1}_{...,CO2}$ *CO_2 emissions in the respective fuel category in the previous year*

In approach III (Bottom-up) the calculation approach is as follows:

Equation 3

$$E^{Y}_{1A,CO2} = E^{Y}_{1A1,CO2} + E^{Y}_{1A2,CO2} + E^{Y}_{1A3,CO2} + E^{Y-1}_{1A4,CO2} + E^{Y-1}_{1A,5CO2}$$

with

$E^{Y}_{1A,CO2}$ *CO_2 emissions in source category 1A*

$E^{Y}_{1A1/1A2/1A3/1A4,CO2}$ *CO_2 emission estimates in source category 1A1 / 1A2 / 1A3 / 1A4*

$E^{Y-1}_{1A5,CO2}$ *CO_2 emissions in source category 1A5 in the previous year*

All approaches were calculated for the years 2009 to 2015 (for BP data longer time series were available) and were compared with Member States' final inventory emissions.

Subsequently, for each Member State the result of one approach was chosen as final result for the CO_2 emission estimate from fuel combustion. Criteria for this final choice based on the analysis of time series and an expert judgement of the validity of the provisional Eurostat and Member States' energy statistics include:

- Deviation of approaches' estimates to final Member State's inventory data in past years.
- An analysis of the likeliness of trend change year X vs. year X-1 with different approaches.
- If available, deviation between approaches' estimates and Member States proxy inventory submissions.
- A check how well different approaches compare and whether the selected approach seems to be an outlier (i.e. if the results of one approach differ strongly from others do not use that approach).

The BP data source (approach I) was chosen for Bulgaria, France, Greece, Ireland, Poland, Spain and Slovakia. Approach II using Eurostat data was chosen for Belgium, Croatia, Cyprus, Germany, Hungary and Lithuania. The bottom-up approach (Approach III) relying on EUTL data, Eurostat energy and transport data, World Steel data and earlier officially reported emission data was chosen

for Austria, Czech Republic, Denmark, Estonia, Latvia, Malta, Portugal, Romania, Sweden and Slovenia. Early national energy statistics data (Approach IV) were chosen for Finland, Italy, Luxembourg, the Netherlands, the United Kingdom and Iceland.

The estimation for CH_4 emissions from source category 1.A (Fuel Combustion) is based on the approximated trend of CO_2 emissions and depicted in Equation 4:

Equation 4

$$E^{Y}_{1A,CH4} = \frac{E^{Y}_{1A,CO2}}{E^{Y-1}_{1A,CO2}} \cdot E^{Y-1}_{1A,CH4}$$

with

$E^{Y}_{1A,CH4}$ CH_4 *emissions for source category 1A*

$E^{Y}_{1A,CO2}$ CO_2 *emissions for source category 1A as estimated in this report*

$E^{Y-1}_{1A,CO2}$ CO_2 *emissions for source category 1A from previous year*

$E^{Y-1}_{1A,CH4}$ CH_4 *emissions for source category 1A from previous year*

The estimation for N_2O emissions from source category 1.A (Fuel Combustion) is similar to CH_4 (Equation 5):

Equation 5

$$E^{Y}_{1A,N2O} = \left(\frac{E^{Y}_{1A,CO2}}{E^{Y-1}_{1A,CO2}}\right) \cdot E^{Y-1}_{1A,N2O}$$

with

$E^{Y}_{1A,N2O}$ N_2O *emissions for source category 1A*

$E^{Y}_{1A,CO2}$ CO_2 *emissions for source category 1A as estimated in this report*

$E^{Y-1}_{1A,CO2}$ CO_2 *emissions for source category 1A from previous year*

$E^{Y-1}_{1A,N2O}$ N_2O *emissions for source category 1A from previous year*

Results for 2016

The CO_2 emissions in category 1.A (Fuel Combustion) account for approximately 75 % of overall greenhouse gas emissions (without LULUCF) in EU plus Iceland. As mentioned above, 2016 CO_2 emissions in this category are based on different approximation approaches. Table 16 shows the calculation results for all Member States, used for gap-filling for proxies submitted by Member States, and highlights the approaches chosen per Member State.

Table 16 2016 CO_2 emissions for source category 1.A Fuel combustion in various approximation approaches

Gg CO2	**Approach I** BP (Trend)	**Approach II** Eurostat monthly (trend)	**Approach III** Bottom up: 1A1+1A2+1A3+ 1A4+ $(1A5)_{Y-1}$	**Approach IV** preliminary national energy statistics (trend)
AT	53 133	53 349	51 154	52 898
BE	85 612	83 716	85 433	0
BG	40 797	40 797	39 609	42 648
CY	not available	6 379	6 178	6 390
CZ	92 949	91 178	91 334	0
DE	749 638	746 721	738 660	746 362
DK	35 233	35 277	35 091	35 336
EE	not available	15 439	17 099	0
ES	237 735	250 794	228 860	0
FI	40 751	43 125	41 678	40 857
FR	313 116	309 940	319 572	313 507
UK	367 180	368 421	366 299	367 691
GR	65 550	66 995	63 824	0
HR	not available	16 275	15 949	16 819
HU	42 646	42 712	42 127	0
IE	37 809	37 662	37 028	37 015
IT	341 154	329 106	348 414	345 341
LT	10 652	10 815	9 999	10 895
LU	not available	8 428	9 237	8 625
LV	not available	6 907	6 662	6 850
MT	not available	1 435	1 396	0
NL	158 767	156 480	155 843	159 904
PL	294 844	290 030	285 110	298 817
PT	44 635	43 638	43 785	0
RO	67 551	66 453	64 123	0
SE	38 597	37 929	37 580	38 297
SI	not available	13 454	13 223	13 297
SK	25 822	25 843	25 246	0
IS	not available	not available	not available	1 616

Note: The result for the approach chosen as the best guess per Member State are highlighted.
Source: EEA's proxy GHG emissions

6.2.1.2 1.A.1 Energy Industries

The GHG emissions for source category 1.A.1 (Energy Industries) were estimated on the basis of a separate analysis of the following source categories

- Public Electricity and Heat Production (1.A.1.a)
- Petroleum Refining (1.A.1.b)
- Manufacture of Solid Fuels and Other Energy Industries (1.A.1.c)

The main data source for the estimation of CO_2 emissions from source category 1.A.1.a (Public Electricity and Heat Production) is an analysis of the verified emissions data reported by installations covered under the EU ETS and recorded in the EUTL. Öko-Institut undertook a supplementary analysis on an installation-by-installation basis to separate the electricity generation installations from industrial combustion installations which are both reported under main activity code 20 in the ETS

data (Combustion installations with a rated thermal input exceeding 20 MW). Based on these data the emissions were calculated as follows:

Equation 6

$$E^{Y}_{1A1aCO2} = \frac{E^{Y}_{CITL(1/power)}}{E^{Y-1}_{CITL(1/power)}} \cdot E^{Y-1}_{1A1aCO2}$$

with

$E^{Y}_{1A1aCO2}$ CO_2 *emissions for source category 1A1a*

$E^{Y-1}_{1A1aCO2}$ CO_2 *emissions for source category 1A1a from previous year*

$E^{Y}_{CITL(...)}$ *CITL emissions for combustion / electricity generation installations*

$E^{Y-1}_{CITL(...)}$ *CITL emissions for combustion / electricity generation installations from previous year*

A second approach based on monthly Eurostat data on net electricity generation data from conventional power plants (Eurostat time series nrg_105m, Eurostat energy indicator 16_107104) was also analysed.

Equation 7

$$E^{Y}_{1A1aCO2} = \frac{AR^{Y}_{MS(power\ production)}}{AR^{Y-1}_{MS(power\ production)}} \cdot E^{Y-1}_{1A1aCO2}$$

with

$E^{Y}_{1A1aCO2}$ CO_2 *emissions for source category 1A1a*

$E^{Y-1}_{1A1aCO2}$ CO_2 *emissions for source category 1A1a from previous year*

$AR^{Y}_{MS(...)}$ *Eurostat data on net electricity production (conventional power plants)*

$AR^{Y-1}_{MS(...)}$ *Eurostat data on net electricity production (conventional power plants) from previous year*

Finally, CO_2 emissions from source category 1.A.1.a were calculated using EUTL emission data on power plants identified by Öko-Institut for Czech Republic, Denmark, Germany, Ireland, Italy, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and United Kingdom. EUTL main activity code 20 emission data were used to estimate 1.A.1.a CO_2 emissions for Austria, Belgium, Bulgaria, Croatia, Estonia, Finland, Hungary, Latvia, Lithuania, Luxembourg and Malta. Monthly Eurostat data on net electricity generation from conventional power plants were used to estimate 1.A.1.a CO_2 emissions for France and Sweden.

Two different approaches were used for CH_4 or N_2O emissions from source category 1.A.1.a (Public Electricity and Heat Production):

1. For the Member States with no strong correlation between CO_2 and CH_4 respectively N_2O emissions in the previous years the average 2013–2015 of the CH_4 respectively N_2O emission data from the last inventory submissions were used.

2. For the Member States with a significant correlation for the trends of CO_2 and CH_4 respectively N_2O emissions in the previous years, the projection of CH_4 respectively N_2O emissions is based on the following equation:

Equation 8

$$E^{Y}_{1A1a,CH4\ or\ N2O} = \frac{E^{Y}_{1A1a,CO2}}{E^{Y-1}_{1A1a,CO2}} \cdot E^{Y-1}_{1A1a,CH4\ or\ N2O}$$

with

$E^{Y}_{1A1a,CH4\ or\ N2O}$ CH_4 *or* N_2O *emissions for source category 1A1a*

$E^{Y-1}_{1A1a,CH4\ or\ N2O}$ CH_4 *or* N_2O *emissions for source category 1A1a from previous year*

$E^{Y}_{1A1a,CO2}$ CO_2 *emissions for source category 1A1a (see above)*

$E^{Y-1}_{1A1a,CO2}$ CO_2 *emissions for source category 1A1a from previous year*

To estimate 1.A.1.a CH_4 emissions the first option (average of 2013–2015) was used for all EU-28 member States except Belgium, Bulgaria, Cyprus, Greece, Malta and Sweden where the second option (estimates on the basis of trend dynamics) was chosen.

To estimate 1.A.1.a N_2O emissions the first (average of 2013–2015) was used for Austria, Belgium, Denmark, Estonia, Finland, France, Hungary, Italy, Latvia, Lithuania, Luxembourg, Portugal, Slovakia, Spain, Sweden and United Kingdom. The second option (estimates on the basis of trend dynamics) was chosen for Bulgaria, Croatia, Cyprus, Czech Republic, Germany, Greece, Ireland, Malta, the Netherlands, Poland, Romania and Slovenia.

Two different approaches were used to estimate CO_2 emissions from 1.A.1.b (Refineries):

1. For the Member States with no strong correlation between CO_2 emissions and EUTL data Main activity code 21 (Refining of mineral oil) in the previous years the average 2013–2015 of the CO_2 emission data from the last inventory submissions were used.
2. For the Member States with a significant correlation between CO_2 emissions and EUTL data Main activity code 21 in the previous years, the projection of CO_2 emissions is based on the following equation:

Equation 9

$$E^{Y}_{1A1b,CO2} = \frac{E^{Y}_{EUTL}}{E^{Y-1}_{EUTL}} \cdot E^{Y-1}_{1A1b,CO2}$$

with

$E^{Y}_{1A1b,CO2}$ CO_2 *emissions for source category 1A1b*

$E^{Y-1}_{1A1b,CO2}$ CO_2 *Emissions for source category 1A1b from previous year*

E^{Y}_{EUTL} *EUTL emissions from refineries*

E^{Y-1}_{EUTL} *EUTL emissions from refineries for previous year*

The first option (average of 2013–2015) was used for Bulgaria, Croatia, Hungary, Italy and Romania. The second option (estimates on the basis of trend dynamics) was chosen for Austria, Belgium, Czech Republic, Denmark, Germany, Finland, France, Greece, Ireland, Lithuania, the Netherlands, Poland, Portugal, Slovakia, Spain, and United Kingdom. Some countries (Cyprus, Estonia, Latvia, Luxembourg, Malta and Slovenia) did not report CO_2 emissions for 1.A.1.b therefore no emissions were estimated. Sweden reported 1.A.1.b CO_2 emissions for the year 2015 as confidential but included these emissions in 1.A.1 CO_2. Therefore 2016 emissions were estimated as difference of 1.A.1 and 1.A.1.a emissions.

For CH_4 and N_2O emissions from source category 1.A.1.b (Petroleum Refining) two different approaches were used

1. For the Member States with no strong correlation between CO_2 and CH_4 respectively N_2O emissions in the previous years the average 2013–2015 of the CH_4 respectively N_2O emission data from the last inventory submission were used.
2. For the Member States with a significant correlation for the trends of CO_2 and CH_4 respectively N_2O emissions in the previous years, the projection of CH_4 respectively N_2O emissions is based on the following formula:

Equation 10

$$E^{Y}_{1A1b,CH4\ or\ N2O} = \frac{E^{Y}_{1A1b,CO2}}{E^{Y-1}_{1A1b,CO2}} \cdot E^{Y-1}_{1A1b,CH4\ or\ N2O}$$

with

$E^{Y}_{1A1b,CH4\ or\ N2O}$ CH_4 *or* N_2O *emissions for source category 1A1b*

$E^{Y-1}_{1A1b,CH4\ or\ N2O}$ CH_4 *or* N_2O *emissions for source category 1A1b from previous year*

$E^{Y}_{1A1b,CO2}$ CO_2 *emissions for source category 1A1b (see above)*

$E^{Y-1}_{1A1b,CO2}$ CO_2 *emissions for source category 1A1b from previous year*

To estimate 1.A.1.b CH_4 emissions the first option (average of 2013–2015) was used for Croatia, Hungary, Ireland, Italy, Poland, Portugal, Romania, Slovakia and United Kingdom. The second option (estimates on the basis of trend dynamics) was chosen for Austria, Bulgaria, Czech Republic, Denmark, Germany, Finland, France, Greece, Lithuania, the Netherlands and Spain. Some countries (Belgium, Cyprus, Estonia, Latvia, Luxembourg, Malta, Slovenia and Sweden) did not report CH_4 emissions for 1.A.1.b therefore no emissions were estimated.

To estimate 1.A.1.b N_2O emissions the first option (average of 2013–2015) was used for Austria, Belgium, Bulgaria, Croatia, Czech Republic, Finland, France, Greece, Hungary, Ireland, Italy, Poland, Portugal, Slovakia, Spain and United Kingdom. The second option (estimates on the basis of trend dynamics) was chosen for Germany, Denmark and Latvia. Some countries (Cyprus, Estonia, Latvia, Luxembourg, Malta, Slovenia and Sweden) did not report N_2O emissions for 1.A.1.b therefore no emissions were estimated.

For the source category 1.A.1.c (Manufacture of Solid Fuels and Other Energy Industries) for CO_2, CH_4 as well as N_2O no relevant other data source for activity data or emission data of year 2016 was identified. Therefore the emission data from the last inventory submission were used as proxy estimate for 2016.

The total greenhouse gas emissions for source category 1.A.1 (Energy Industries) were calculated as the sum of the estimates for the source categories 1.A.1.a, 1.A.1.b and 1.A.1.c (see above).

CO_2, CH_4 and N_2O emissions from 1.A.1 Energy industries in Iceland were calculated with a special top-down method, see chapter 6.2.1.7.

6.2.1.3 1.A.2 Manufacturing Industries and Construction

The main source for the estimation of CO_2 emissions from source category 1.A.2 (Manufacturing Industries and Construction) are the verified emissions data from the EUTL. To calculate CO_2 emissions from 1.A.2 several aggregates of ETS emissions used:

1. Aggregate of fuel combustion activities, including the following ETS main activity codes:
    - 20 Combustion of fuels excluding all power plants identified by Öko Institute except those that were identified to use waste gas from the iron and steel industry
    - 22 Production of coke
    - 23 Metal ore roasting or sintering
    - 24 Production of pig iron or steel
    - 25 Production or processing of ferrous metals
    - 29 Production of cement clinker
    - 30 Production of lime, or calcination of dolomite/magnesite
    - 31 Production of glass
    - 32 Production of ceramics
    - 34 Production or processing of gypsum or plasterboard
    - 35 Production of pulp
    - 36 Production of paper or cardboard
2. Aggregate of fuel combustion activities without cement production and related activities, including the following ETS main activity codes:

- 20 Combustion of fuels excluding all power plants identified by Öko Institute except those that were identified to use waste gas from the iron and steel industry
- 22 Production of coke
- 23 Metal ore roasting or sintering
- 24 Production of pig iron or steel
- 25 Production or processing of ferrous metals
- 31 Production of glass
- 32 Production of ceramics
- 35 Production of pulp
- 36 Production of paper or cardboard

3. Aggregate of iron and steel production related activities, including the following ETS main activity codes:
    - 20 Combustion of fuels, only those power plants identified by Öko Institute that were identified to use waste gas from the iron and steel industry
    - 22 Production of coke
    - 23 Metal ore roasting or sintering
    - 24 Production of pig iron or steel
    - 25 Production or processing of ferrous metals
4. Aggregate of fuel combustion activities without iron and steel production related activities, including the following ETS main activity codes:
    - 29 Production of cement clinker
    - 30 Production of lime, or calcination of dolomite/magnesite
    - 31 Production of glass
    - 32 Production of ceramics
    - 34 Production or processing of gypsum or plasterboard
    - 35 Production of pulp
    - 36 Production of paper or cardboard
5. Aggregate of glass/ceramics and paper related activities, including the following ETS main activity codes:
    - 20 Combustion of fuels excluding all power plants identified by Öko Institute
    - 31 Production of glass
    - 32 Production of ceramics
    - 35 Production of pulp
    - 36 Production of paper or cardboard
6. Other activities, in the following ETS main activity code:
    - 99 Other

Based on these EUTL emission data aggregates two different approaches for the 1.A.2 CO_2 emissions were used:

1. For the Member States with no strong correlation between CO_2 emissions and any of the six EUTL data aggregates in the previous years the average 2013–2015 of the CO_2 emission data from the last inventory submissions were used.

2. For the Member States with a significant correlation between CO_2 emissions and any of the six EUTL data aggregates in the previous years, the projection of CO_2 emissions is based on the following equation:

Equation 11

$$E^{Y}_{1A2,CO2} = \frac{E^{Y}_{CITL(...)}}{E^{Y-1}_{CITL(...)}} \cdot E^{Y-1}_{1A2,CO2}$$

with

$E^{Y}_{1A2,CO2}$	*CO_2 emissions for source category 1A2*
$E^{Y-1}_{1A2,CO2}$	*CO_2 emissions for source category 1A2 from previous year*
$E^{Y}_{CITL(...)}$	*EUTL emissions for installations reported under different main activities*
$E^{Y-1}_{CITL(...)}$	*EUTL emissions for installations reported under different main activities from previous year*

The first option (trend changes of ETS main activity codes 20 [without power plants except waste gas], 22–25, 29–32, 34–36) was used for Belgium, Croatia, Denmark, France, Germany, Greece, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

The fourth option (trend changes of ETS main activity codes 20 [without power plants except waste gas], 29–32, and 34–36) was used for Bulgaria, Finland, Luxembourg and the Netherlands.

The fifth option (trend changes of ETS main activity codes 20 [without power plants], 31–32 and 34–36) was used for Austria, Hungary, Ireland and Italy.

The sixth option (trend changes of ETS main activity code 99) was used for the Czech Republic.

The second option (trend changes of ETS main activity codes 20 [without power plants except waste gas], 22–25 and 34–36) and the third option (trend changes of ETS main activity codes 20 [without power plants], 22–25) were analysed but finally not used.

For Cyprus, Estonia, Latvia, Lithuania and Malta the average 2013–2015 of the CO_2 emission data from the last inventory submission were used.

For CH_4 emissions from source category 1.A.2 two different approaches were used

1. For the Member States with no strong correlation between CO_2 and CH_4 emissions in the previous years, the average 201–2015 of the CH_4 emission data from the last inventory submission were used.
2. For the Member States with a significant correlation for the trends of CO_2 and CH_4 emissions in the previous years, the projection of CH_4 emissions is based on the following formula:

Equation 12

$$E^{Y}_{1A2,CH4} = \frac{E^{Y}_{1A2,CO2}}{E^{Y-1}_{1A2,CO2}} \cdot E^{Y-1}_{1A2,CH4}$$

with

$E^{Y}_{1A2,CH4}$ *CH_4 emissions for source category 1A2*

$E^{Y-1}_{1A2,CH4}$ *CH_4 emissions for source category 1A2 from previous year*

$E^{Y}_{1A2,CO2}$ *CO_2 emissions for source category 1A2 (see above)*

$E^{Y-1}_{1A2,CO2}$ *CO_2 emissions for source category 1A2 from previous year*

The first option (average of 2013–2015) was used for Belgium, Bulgaria, Cyprus, Croatia, Czech Republic, Denmark, Estonia, Greece, Hungary, Ireland, Latvia, Italy, Slovakia, Slovenia, Spain and United Kingdom. The second option (estimates on the basis of trend dynamics) was chosen for Austria, Finland, France, Germany, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, and Sweden.

Two different approaches were used for N_2O emissions from source category 1.A.2:

1. For the Member States with no strong correlation between CO_2 and N_2O emissions in the previous years the average 2013–2015 of the N_2O emission data from the last inventory submission were used.
2. For the Member States with a significant correlation for the trends of CO_2 and N_2O emissions in the previous years, the projection of N_2O emissions is based on the following formula.

Equation 13

$$E^{Y}_{1A2,N2O} = \frac{E^{Y}_{1A2,CO2}}{E^{Y-1}_{1A2,CO2}} \cdot E^{Y-1}_{1A2,N2O}$$

with

$E^{Y}_{1A2,N2O}$ *N_2O emissions for source category 1A2*

$E^{Y-1}_{1A2,N2O}$ *N_2O emissions for source category 1A2 from previous year*

$E^{Y}_{1A2,CO2}$ *CO_2 emissions for source category 1A2 (see above)*

$E^{Y-1}_{1A2,CO2}$ *CO_2 emissions for source category 1A2 from previous year*

The first option (average of 2013–2015) was used for Austria, Belgium, Croatia, Cyprus, Estonia, Greece, Hungary, Ireland, Latvia, Slovakia, Slovenia and the United Kingdom. The second option (estimates on the basis of trend dynamics) was chosen for Austria, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Spain and Sweden.

CO_2, CH_4 and N_2O emissions from 1.A.2 Manufacturing industries and construction in Iceland were calculated with a special top-down method, see chapter 6.2.1.7

6.2.1.4 1.A.3 Transport

The main sources for the estimation of CO_2 emissions from source category 1.A.3 (Transport) are the following Eurostat data, extracted from Eurostat's database:

- Monthly data for the observed gross inland deliveries of motor gasoline, transport diesel and aviation fuels;

Based on these data sources three slightly different options to calculate the CO_2 emissions were developed. Out of these, the most suitable approach was chosen for each Member State taking into account the performance of the respective approximation approaches to reproduce the reported emissions of previous years.

Option 1 for calculating CO_2 emissions (Equation 14) was chosen for Austria, Bulgaria, Czech Republic, Germany, Spain, France, Greece, Hungary, Ireland, Latvia, the Netherlands, Poland, Portugal, Romania, Slovenia and Slovakia:

Equation 14

$$E^{Y}_{1A3,CO2} = \left(\frac{E^{Y}_{MS,CO2} + E^{Y}_{AD,CO2}}{E^{Y-1}_{MS,CO2} + E^{Y-1}_{AD,CO2}}\right) \cdot E^{Y-1}_{1A3b,c,d,e,CO2} + \frac{E^{Y}_{K,CO2}}{E^{Y-1}_{K,CO2}} \cdot E^{Y-1}_{1A3a,CO2}$$

with

$E^{Y}_{1A3,CO2}$ *CO_2 emissions for source category 1A3*

$E^{Y}_{MS,CO2}$ *CO_2 emissions motor spirit (monthly total of internal market deliveries) x CO_2 factor*

$E^{Y}_{AD,CO2}$ *CO_2 emissions automotive diesel (monthly total of internal market deliveries) x CO_2 factor*

$E^{Y-1}_{MS,CO2}$ *CO_2 emissions motor spirit (monthly total of internal market deliveries) x CO_2 factor*

$E^{Y-1}_{AD,CO2}$ *CO_2 emissions automotive diesel (monthly total of internal market deliveries) x CO_2 factor*

$E^{Y-1}_{1A3b,c,d,e,CO2}$ *CO_2 emissions for source category 1A3 b,c,d,e from previous year*

$E^{Y}_{K,CO2}$ *CO_2 emissions kerosene (monthly total of internal market deliveries) x CO_2 factor*

$E^{Y-1}_{K,CO2}$ *CO_2 emissions kerosene (monthly total of internal market deliveries) x CO_2 factor*

$E^{Y-1}_{1A3a,CO2}$ *CO_2 emissions for source category 1A3a from previous year (civil aviation)*

Country - specific CO_2 factors are calculated using net calorific values and implied emission factors based on the CRF submissions of the previous year

Option 2 (Equation 15) was chosen for Cyprus, Denmark, Estonia, Finland, Croatia, Italy, Luxembourg, Malta and the United Kingdom:

Equation 15

$$E^{Y}_{1A3,CO2} = Fw_{t} \cdot E^{Y-1}_{1A3,CO2}$$

with

$E^{Y}_{1A3,CO2}$ CO_2 *emissions for source category 1A3*

Fw_{t} *Weighted Factor*

$E^{Y-1}_{1A3,CO2}$ CO_2 *emissions for source category 1A3 from previous year*

$$Fw_{t} = \frac{C^{Y}_{motorspirit}}{C^{Y-1}_{motorspirit}} \cdot S^{Y}_{t,motorspirit} + \frac{C^{Y}_{automotivediesel}}{C^{Y-1}_{automotivediesel}} \cdot S^{Y}_{t,automotivediesel} + \frac{C^{Y}_{kerosene}}{C^{Y-1}_{kerosene}} \cdot S^{Y}_{t,kerosene}$$

with

$C^{Y}_{motorspirit}$ *Consumption of motor spirit (monthly total of internal market deliveries)*

$C^{Y-1}_{motorspirit}$ *Consumption of motor spirit (monthly total of internal market deliveries) previous year*

$S^{Y}_{t,motorspirit}$ *Share (mass) of motor spirit in total consumption of regarded fuels*

$C^{Y}_{automotivediesel}$ *Consumption of automotive diesel (monthly total of internal market deliveries)*

$C^{Y-1}_{automotivediesel}$ *Consumption of automotive diesel (monthly total of internal market deliveries) previous year*

$S^{Y}_{t,automotivediesel}$ *Share (mass) of automotive diesel in total consumption of regarded fuels*

$C^{Y}_{kerosene}$ *Consumption of kerosene (monthly total of internal market deliveries)*

$C^{Y-1}_{kerosene}$ *Consumption of kerosene (monthly total of internal market deliveries) previous year*

$S^{Y}_{t,kerosene}$ *Share (mass) of kerosene in total consumption of regarded fuels*

Option 3 for calculating CO_2 emissions (Equation 16) was chosen for Belgium, Lithuania and Sweden:

Equation 16

$$E^{Y}_{1A3,CO2} = Fw_{m} \cdot E^{Y-1}_{1A3b,c,d,e,CO2} + \frac{C^{Y}_{kerosene}}{C^{Y-1}_{kerosene}} \cdot E^{Y-1}_{1A3a,CO2}$$

with

$E^{Y}_{1A3,CO2}$ CO_2 *emissions for source category 1A3*

Fw_{m} *Weighted Factor*

$E^{Y-1}_{1A3b,c,d,e,CO2}$ CO_2 *emissions for source category 1A3 b,c,d,e from previous year*

$C^{Y}_{kerosene}$ *Consumption of kerosene (monthly total of internal market deliveries)*

$C^{Y-1}_{kerosene}$ *Consumption of kerosene (monthly total of internal market deliveries) previous year*

$E^{Y-1}_{1A3a,CO2}$ CO_2 *emissions for source category 1A3a from previous year (civil aviation)*

$$Fw_{m} = \frac{C^{Y}_{motorspirit}}{C^{Y-1}_{motorspirit}} \cdot S^{Y}_{m,motorspirit} + \frac{C^{Y}_{automotivediesel}}{C^{Y-1}_{automotivediesel}} \cdot S^{Y}_{m,automotivediesel}$$

with

$C^{Y}_{motorspirit}$ *Consumption of motor spirit (monthly total of internal market deliveries)*

$C^{Y-1}_{motorspirit}$ *Consumption of motor spirit (monthly total of internal market deliveries) previous year*

$S^{Y}_{m,motorspirit}$ *Share (mass) of motor spirit in total consumption of motor spirit and automotive diesel*

$C^{Y}_{automotivediesel}$ *Consumption of automotive diesel (monthly total of internal market deliveries)*

$C^{Y-1}_{automotivediesel}$ *Consumption of automotive diesel (monthly total of internal market deliveries) previous year*

$S^{Y}_{m,automotivediesel}$ *Share (mass) of automotive diesel in total consumption of motor spirit and automotive diesel*

The estimation for CH_4 emissions from source category 1.A.3 (Transport) is based on the approximated trend of CO_2 emissions and depicted in Equation 17:

Equation 17

$$E^{Y}_{1A3,CH4} = \left(\frac{E^{Y}_{1A3,CO2}}{E^{Y-1}_{1A3,CO2}}\right) \cdot E^{Y-1}_{1A3,CH4}$$

with

$E^{Y}_{1A3,CH4}$ CH_4 *emissions for source category 1A3*

$E^{Y}_{1A3,CO2}$ CO_2 *emissions for source category 1A3 as approximated using* CO_2 *options* $1-3$ *respectively*

$E^{Y-1}_{1A3,CO2}$ CO_2 *emissions for source category 1A3 from previous year*

$E^{Y-1}_{1A3,CH4}$ CH_4 *emissions for source category 1A3 from previous year*

The estimation for N_2O emissions from source category 1.A.3 (Transport) is similar to CH_4 (Equation 18):

Equation 18

$$E^{Y}_{1A3,N2O} = \left(\frac{E^{Y}_{1A3,CO2}}{E^{Y-1}_{1A3,CO2}}\right) \cdot E^{Y-1}_{1A3,N2O}$$

with

$E^{Y}_{1A3,N2O}$ N_2O *emissions for source category 1A3*

$E^{Y}_{1A3,CO2}$ CO_2 *emissions for source category 1A3 as approximated using* CO_2 *options* $1-3$ *respectively*

$E^{Y-1}_{1A3,CO2}$ CO_2 *emissions for source category 1A3 from previous year*

$E^{Y-1}_{1A3,N2O}$ N_2O *emissions for source category 1A3 from previous year*

CO_2, CH_4 and N_2O emissions from 1.A.3 Transport in Iceland were calculated with a special top-down method, see chapter 6.2.1.7.

6.2.1.5 1.A.4 Other sectors

The CO_2 emissions from source category 1.A.4 (Other sectors) were estimated based on the following approaches:

1. Trend change of heating degree days (HDD)
2. Trend change of gross domestic product (GDP)
3. Trend change of gas consumption
4. Trend change of heating oil consumption
5. Average of 2013–2015
6. Subtraction from bottom-up calculation for sector 1.A

The first four approaches are applied individually for the subsectors for each of the 1.A.4 subsectors which are 1.A.4.a (Commercial and institutional), 1.A.4.b (Residential) and 1.A.4.c (Agriculture, forestry and fishing):

Equation 19

$$E^{Y}_{1A4x,CO2} = \frac{AR^{Y}_{\text{HDD or GDP or gas or oil}}}{AR^{Y-1}_{\text{HDD or GDP or gas or oil}}} \cdot E^{Y-1}_{1A4x,CO2}$$

with

$E^{Y}_{1A4x,CO2}$ *CO2 emissions for source category 1A4a,1A4b or 1A4c*

$E^{Y-1}_{1A4x,CO2}$ *CO2 emissions for source category 1A4a,1A4b or 1A4c from previous year*

$AR^{Y}_{HDD\,or\,GDP\,or\,gas\,or\,oil}$ *HDD or GDP or consumption of gas or oil*

$AR^{Y\text{-}1}_{HDD\,or\,GDP\,or\,gas\,or\,oil}$ *HDD or GDP or consumption of gas or oil previous year*

The fifth option is a simple average of 2012–2014 emissions and is also applied to each of the subsectors individually.

In the sixth option: approximated emissions of source category 1.A.4 are estimated by a subtraction approach: Based on the real-time projection for the source categories 1.A, 1.A.1, 1.A.2 and 1.A.3 and constant emissions for 1.A.5, the emissions for the source categories 1.A.4 were calculated based on the following formula:

Equation 20

$$E^{Y}_{1A4} = E^{Y}_{1A} - E^{Y}_{1A1} - E^{Y}_{1A2} - E^{Y}_{1A3} - E^{Y}_{1A5}$$

with

E^{Y}_{i} *Emissions for source category i*

This subtraction method was used for all Member States, where total 1.A emissions were estimated using another approach than approach III (bottom-up approach). As a consequence subsectoral emissions for 1.A.4.a/1.A.4.b/1.A.4.c are not used in that approach.

The following Table 17 shows which approach was used for which Member State.

Table 17 Methods used to estimate CO_2 emissions from 1.A.4 Other sectors

Member State	1.A.4	1.A.4.a	1.A.4.b	1.A.4.c
AT	Sum	Average 2013–2015	HDD trend	GDP trend
BE	Subtraction	Not used		
BG	Subtraction	Not used		
CY	Subtraction	Not used		

Member State	1.A.4	1.A.4.a	1.A.4.b	1.A.4.c
CZ	Sum	HDD trend	HDD trend	Average 2013–2015
DE	Subtraction	Not used		
DK	Sum	Average 2013–2015	Average 2013–2015	Average 2013–2015
EE	Sum	Average 2013–2015	Average 2013–2015	Average 2013–2015
ES	Subtraction	Not used		
FI	Subtraction	Not used		
FR	Subtraction	Not used		
GR	Subtraction	Not used		
HR	Subtraction	Not used		
HU	Subtraction	Not used		
IE	Subtraction	Not used		
IT	Subtraction	Not used		
LT	Subtraction	Not used		
LU	Subtraction	Not used		
LV	Sum	Average 2013–2015	Average 2013–2015	Average 2013–2015
MT	Sum	Average 2013–2015	Average 2013–2015	Average 2013–2015
NL	Subtraction	Not used		
PL	Subtraction	Not used		
PT	Sum	Average 2013–2015	Average 2013–2015	Average 2013–2015
RO	Sum	Average 2013–2015	Average 2013–2015	Average 2013–2015
SE	Sum	Average 2013–2015	Average 2013–2015	Average 2013–2015
SI	Sum	Average 2013–2015	HDD trend	Average 2013–2015
SK	Subtraction	Not used		
UK	Subtraction	Not used		
IS	1.A Trend change	Not used		

Source: EEA's ETC/ACMAs a result, the emissions from 1.A.4 have higher uncertainties than the other source categories in the energy sector.

For CH_4 and N_2O emissions from source category 1.A.4, the calculation is based on the following formula:

Equation 21

$$E^{Y}_{1A4,CH4orN2O} = \frac{E^{Y}_{1A4,CO2}}{E^{Y-1}_{1A4,CO2}} \cdot E^{Y-1}_{1A4,CH4orN2O}$$

with

$E^{Y}_{1A4,CH4orN2O}$ CH_4 *or* N_2O *emissions for source category 1A4*

$E^{Y-1}_{1A4,CH4orN2O}$ CH_4 *or* N_2O *emissions for source category 1A4 from previous year*

$E^{Y}_{1A4,CO2}$ CO_2 *emissions for source category 1A4 (see above)*

$E^{Y-1}_{1A4,CO2}$ CO_2 *emissions for source category 1A4 from previous year*

CO_2, CH_4 and N_2O emissions from 1.A.4 Other sectors in Iceland were calculated with a special top-down method, see chapter 6.2.1.7.

6.2.1.6 1.A.5 Other Fuel Combustion

For all Member States except Iceland and all three gases (CO_2, CH_4 and N_2O), inventory data from previous year was used as emission estimate for source category 1.A.5 (Other Fuel Combustion). As a result, the emissions from 1.A.5 have higher uncertainties than the other source categories in the energy sector.

CO_2, CH_4 and N_2O emissions from 1.A.5 Other in Iceland were calculated with a special top-down method, see chapter 6.2.1.7.

6.2.1.7 Special top-down method for Iceland

Iceland does not report full energy data to Eurostat and fuel combustion sector contributes to only approximately 37 % to total emissions of Iceland (excluding LULUCF). According to Iceland's latest GHG inventory in the energy sector only liquid fossil fuels (except for a vanishingly small 0.02 % share of solid fuels) are consumed. Therefore a much simpler approach for calculating fuel combustion emissions of Iceland was used:

Equation 22

$$E^{Y}_{1Ax,Gas} = \frac{AR^{Y}_{liquid}}{AR^{Y-1}_{liquid}} \cdot E^{Y-1}_{1Ax,Gas}$$

with

$E^{Y}_{1Ax,Gas}$ CO_2, CH_4 *or* N_2O *emissions for source category 1A, 1A1, 1A2, 1A3, 1A4 or 1A5*

$E^{Y-1}_{1Ax,Gas}$ CO_2, CH_4 *or* N_2O *emissions for source category 1A, 1A1, 1A2, 1A3, 1A4 or 1A5 from previous year*

AR^{Y}_{liquid} *Activity data of liquid fuel consumption*

AR^{Y}_{liquid} *Activity data of liquid fuel consumption from previous year*

So the change of liquid fossil fuel consumption in Iceland was applied to the source category 1.A (Fuel Combustion), all subcategories (1.A.1 to 1.A.5) and all relevant greenhouse gases (CO_2, CH_4 and N_2O). As this method applies one fossil liquid fuel consumption trend to all subsectors and all gases, this can be named as a form of top-down approach.

6.2.1.8 1.B Fugitive Emissions

The CO_2 and CH_4 emissions for source category 1.B (Fugitive Emissions from Fuels) were estimated on the basis of a separate analysis of the following source categories:

- Solid Fuels (1.B.1);
- Oil (1.B.2.a);
- Natural Gas (1.B.2.b);
- Venting (1.B.2.c.1);
- Flaring (1.B.2.c.2);
- Other (1.B.2.d).

The estimates for CO_2 and CH_4 emissions for source category 1.B.1 (Solid Fuels) are based on the monthly production data for hard coal and lignite (nrg_101m, indicator code 100100, Eurostat product codes 2111 and 2210) from Eurostat. Two different approaches were used for CO_2 and CH_4 emissions from source category 1.B.1 (Solid Fuels):

1. For the Member States with no strong correlation between CO_2 respectively CH_4 emissions and monthly production data for hard coal or lignite from Eurostat in the previous years the average 2013–2015 of the CO_2 respectively CH_4 emission data from the last inventory submissions were used.
2. For the Member States with a significant correlation for the trends of CO_2 respectively CH_4 emissions in the previous years, the projection of CO_2 respectively CH_4 emissions is based on the following equation:

Equation 23

$$E^{Y}_{1B1,CO2\,or\,CH4} = \frac{AR^{Y}_{coal-prod}}{AR^{Y-1}_{coal-prod}} \cdot E^{Y-1}_{1B1,CO2\,or\,CH4}$$

with

$E^{Y}_{1B1,CO2\,or\,CH4}$ *CO2 or CH4 emissions for source category 1B1*

$E^{Y-1}_{1B1,CO2\,or\,CH4}$ *CO2 or CH4 emissions for source category 1B1 from previous year*

$AR^{Y}_{coal-prod}$ *Hard coal or lignite production*

$AR^{Y-1}_{coal-prod}$ *Hard coal or lignite productionfor previous year*

For Czech Republic where hard coal production is the main determinant for CO_2 emissions from source category 1.B.1, the primary hard coal production (Eurostat nrg_101m, indicator code 100100, Eurostat product code 2111) was used for the projection of CO_2 emissions arising from this source category. For all other Member states that report CO_2 emissions from 1.B.1, the inventory data, average 2013-2015, from the last available submission were used.

For Bulgaria, Greece, Hungary, Poland, Slovakia and Slovenia where lignite production is the main source for CH_4 emissions from source category 1.B.1, the primary production data for lignite (Eurostat nrg_101m, indicator code 100100 and Eurostat product code 2210) were used. For Czech Republic where hard coal production is the main determinant for CH_4 emissions from source category 1.B.1, the primary hard coal production (Eurostat nrg_101m, indicator code 100100, Eurostat product code 2111) was used. For all other Member states that report CH_4 emissions from 1.B.1, the inventory data, average 2013-2015, from the last available submission were used.

For calculating CO_2 and CH_4 emissions from 1.B.2.a, 1.B.2.b, 1.B.2.c.1 and 1.B.2.c.2 the correlation of several trends has been reviewed.

- Eurostat crude oil production (nrg_102m, indicator code 100100, product code 3100);[28]
- Eurostat gas consumption (nrg_102m, indicator code 100900, product code 4100);
- Eurostat gas production (nrg_102m, indicator code 100100, product code 4100);
- EUTL main activity code 21 (refineries).

The estimates for CO_2 and CH_4 emissions for source category 1.B.2.a, 1.B.2.b, 1.B.2.c.1 and 1.B.2.c.2 are based on these data sources. Two different approaches were used for CO_2 and CH_4 emissions from source categories 1.B.2.a, 1.B.2.b, 1.B.2.c.1 and 1.B.2.c.2:

1. For the Member States with no strong correlation between CO_2 respectively CH_4 emissions and any of the reviewed data sources in the previous years the average 2012–2014 of the CO_2 respectively CH_4 emission data from the last inventory submissions were used.

[28] As Eurostat crude oil production data showed (different than in previous years) implausible decreases for almost all Member States these data were not used in this year's calculations.

2. For the Member States with a significant correlation for the trends of CO_2 respectively CH_4 emissions in the previous years, the projection of CO_2 respectively CH_4 emissions is based on the following equation:

Equation 24

$$E^{Y}_{1B2\,a,b,c\;CO2\,or\,CH4} = \frac{E^{Y}_{EUTL}\ or\ AR^{Y}_{Eurostat}}{E^{Y\text{-}1}_{EUTL}\ or\ AR^{Y-1}_{Eurostat}} \cdot E^{Y-1}_{1B2\,a,b,c\;CO2\,or\,CH4}$$

with

$E^{Y}_{1B2\,a,b,c\;CO2\,or\,CH4}$ CO_2 *or* CH_4 *emissions for source category 1B2a,b,c*

$E^{Y-1}_{1B2\,a,b,c\;CO2\,or\,CH4}$ CO_2 *or* CH_4 *emissions for source category 1B2a,b,c from previous year*

$AR^{Y}_{Eurostat}$ *Crude oil production, Gas production or Gas consumption*

$AR^{Y-1}_{Eurostat}$ *Crude oil production, Gas production or Gas consumption for previous year*

E^{Y}_{EUTL} *Emissions of refineries from EUTL*

E^{Y-1}_{EUTL} *Emissions of refineries from EUTL for previous year*

The following table displays the selected methods.

Table 18 Methods used to estimate fugitive emissions from Oil, Gas or Venting and Flaring

Approach	1B2a CO2	1B2a CH4	1B2b CO2	1B2b CH4	1B2c1 CO2	1B2c1 CH4	1B2c2 CO2	1B2c2 CH4
Crude Oil Production								
Gas Production		PL, RO	AT, PL	RO	ES, IT, RO	RO	IT, RO	PL, RO
Gas Consumption		LT	GR, LU, NL, PT, RO, SI	EE, FR, GR, HR, LU, PL, PT, SI, UK	PL, SI	GR, PL, SI	PL	
EUTL Refineries	AT, BE, ES, FR	AT, BE, ES, IE, NL, SE,	BE	BE, DE, ES	SK	SK		

Approach	1B2a CO2	1B2a CH4	1B2b CO2	1B2b CH4	1B2c1 CO2	1B2c1 CH4	1B2c2 CO2	1B2c2 CH4
		SK						
Average (2013–2015)	BG, CZ, DE, DK, GR, HR, HU, IT, LT, NL, PL, PT, RO, SE, SI, SK, UK	BG, CZ, DE, DK, FI, FR, GR, HR, HU, IT, PT, UK, IS	BG, CZ, DE, DK, EE, ES, FR, HR, HU, IE, IT, LT, LV, SE, SK, UK	AT, BG, CZ, DK, FI, HU, IE, IT, LT, LV, NL, SE, SK	BG, CZ, DK, FR, GR, HR, HU, LT, LV, NL, SE, UK	BE, BG, DK, ES, FR, HR, HU, IT, LT, LV, NL, SE, UK	BE, BG, CZ, DE, DK, ES, FI, FR, GR, HU, IE, LT, NL, PT, SE, SI, SK, UK	BG, CZ, DE, DK, ES, FI, FR, GR, HU, IT, LT, NL, PT, SE, SI, SK, UK

Source: EEA's ETC/ACM

Two different approaches were used to estimate CO_2 and CH_4 emissions from 1.B.2.d (Other fugitive emissions):

1. For the Member States where no corresponding national CO_2 resp. CH_4 emissions data were found the average 2013–2015 of the CO_2 resp. CH_4 emission data from the last inventory submissions were used.
2. For the Member States with a significant correlation between CO_2 emissions and EUTL data Main activity code 29 in the previous years, the projection of CO_2 emissions is based on the following equation:

Equation 25

$$E^{Y}_{1B2d,CO2\ or\ CH4} = \frac{E^{Y}_{national,CO2\ or\ CH4}}{E^{Y-1}_{national,CO2\ or\ CH4}} \cdot E^{Y-1}_{1B2d,CO2\ or\ CH4}$$

with

$E^{Y}_{1B2d,CO2\ or\ CH4}$ *CO2 or CH4 emissions for source category 1B2d*

$E^{Y-1}_{1B2d,CO2\ or\ CH4}$ *CO2 or CH4 emissions for source category 1B2d from previous year*

$E^{Y}_{national,CO2\ or\ CH4}$ *CO2 or CH4 emissions of from relevant national statistics*

$E^{Y-1}_{national,CO2\ or\ CH4}$ *CO2 or CH4 emissions of from relevant national statistics from previous year*

Average of 2013–2015 CO_2 emissions was used as estimate for 1.B.2.d CO_2 emissions for Greece,

Hungary, Italy, Poland and Portugal. Average of 2013–2015 CH_4 emissions was used as estimate for 1.B.2.d CH_4 emissions for Hungary, Italy and Romania. For Iceland trend change of national data on CO_2 resp. CH_4 emissions from geothermal power plants[29] was used to calculate 1.B2.d CO_2 and CH_4 estimates. All other EU-28 Member States did not report 1.B.2.d CO_2 or CH_4 emissions therefore no emissions were estimated.

For all N_2O emissions from source category 1.B (Fugitive Emissions from Fuels) the emissions data from the last inventory submissions were used.

6.2.2 Industrial Processes and Product Use

6.2.2.1 2.A Mineral products

The emissions from 2.A Mineral products are based on CO_2 emission data for Cement (2.A.1) Lime (2.A.2) and Glass Production (2.A.3) from the EUTL data which were used as an index of the evolution of the emissions from the production of cement clinker, lime or glass production.

Two different approaches were used to estimate CO_2 emissions from 2.A.1 (Cement production):

1. For the Member States with no strong correlation between CO_2 emissions and EUTL data Main activity code 29 (Cement production) in the previous years the average 2013–2015 of the CO_2 emission data from the last inventory submissions were used.
2. For the Member States with a significant correlation between CO_2 emissions and EUTL data Main activity code 29 in the previous years, the projection of CO_2 emissions is based on the following equation:

Equation 26

$$E_{2A3}^{Y} = \frac{E_{EUTL}^{Y}}{E_{EUTL}^{Y-1}} \cdot E_{2A1}^{Y-1}$$

with

E_{2A7}^{Y} *Emissions for source category 2A1*

E_{2A3}^{Y-1} *Emissions for source category 2A1 from previous year*

E_{EUTL}^{Y} *EUTL emissions for the production of glass production*

E_{EUTL}^{Y-1} *EUTL emissions for the production of glass production from previous year*

[29] Talnaefni Orkustofnunar / Orkustofnun Data Repository: OS-2016-T007-01 Gaslosun jarðvarmavirkjana og hitaveitna 1969-2016 / Gas Emissions of Geothermal Power Plants and Utilities 1969-2016, http://www.nea.is/media/talnaefni/OS-2017-T012-01.xlsx, 17 May 2017 (accessed 17 July 2017).

Average of 2013–2015 emissions was used as estimate for Cyprus, Finland and Latvia. Malta and Iceland did not report 2.A.1 emissions for cement production therefore no emissions were estimated. For all other EU-28 Member States, emissions were estimated based on EUTL data Main activity code 29.

Two different approaches were used to estimate CO_2 emissions from 2.A.2 (Lime production):

1. For the Member States with no strong correlation between CO_2 emissions and EUTL data Main activity code 30 (Lime production) in the previous years the average 2013–2015 of the CO_2 emission data from the last inventory submissions were used.
2. For the Member States with a significant correlation between CO_2 emissions and EUTL data Main activity code 30 in the previous years, the projection of CO_2 emissions is based on the following equation:

Equation 27

$$E_{2A2}^{Y} = \frac{E_{EUTL}^{Y}}{E_{EUTL}^{Y-1}} \cdot E_{2A2}^{Y-1}$$

with

E_{2A7}^{Y} *Emissions for source category 2A3*

E_{2A3}^{Y-1} *Emissions for source category 2A3 from previous year*

E_{EUTL}^{Y} *EUTL emissions for the production of glass production*

E_{EUTL}^{Y-1} *EUTL emissions for the production of glass production from previous year*

Average of 2013–2015 emissions was used as estimate for Cyprus, Denmark, Latvia and Portugal. Luxembourg, Malta, the Netherlands and Iceland did not report 2.A.2 emissions for lime production therefore no emissions were estimated. For all other EU-28 Member States, emissions were estimated based on EUTL data Main activity code 30.

Two different approaches were used to estimate CO_2 emissions from 2.A.3 (Glass production):

1. For the Member States with no strong correlation between CO_2 emissions and EUTL data Main activity code 31 (Manufacture of glass) in the previous years the average 2013–2015 of the CO_2 emission data from the last inventory submissions were used.
2. For the Member States with a significant correlation between CO_2 emissions and EUTL data Main activity code 31 in the previous years, the projection of CO_2 emissions is based on the following equation:

Equation 28

$$E_{2A3}^{Y} = \frac{E_{EUTL}^{Y}}{E_{EUTL}^{Y-1}} \cdot E_{2A3}^{Y-1}$$

with

E_{2A7}^{Y} *Emissions for source category 2A3*

E_{2A3}^{Y-1} *Emissions for source category 2A3 from previous year*

E_{EUTL}^{Y} *EUTL emissions for the production of glass production*

E_{EUTL}^{Y-1} *EUTL emissions for the production of glass production from previous year*

Average of 2013–2015 emissions was used as estimate for Finland and Latvia. Cyprus, Ireland, Malta and Iceland did not report 2.A.3 emissions for glass production therefore no emissions were estimated. For all other EU-28 Member States, emissions were estimated based on EUTL data Main activity code 30.

Estimates for CO_2 emissions in source category 2.A.4 (Other use of carbonates) are described in chapter 6.2.2.4.

6.2.2.2 2.B Chemical industry

The estimates for GHG emissions for source category 2.B (Chemical industry) are based on detailed estimates for the following gases and source categories: CO_2 emissions from 2.B.1 (Ammonia production), N_2O emissions from 2.B.2 (Nitric acid production), CO_2 and N_2O emissions from 2.B.3 (Adipic acid production) and CO_2 emissions from 2.B.7 (Soda ash production). The remaining sub-categories and gases of 2.B are estimated using trend extrapolations.

Three different approaches were analysed to estimate CO_2 emissions from 2.B.1 (Ammonia production):

1. For the Member States with no strong correlation between CO_2 emissions and EUTL data Main activity code 41 (Production of ammonia) in the previous years the average 2013–2015 of the CO_2 emission data from the last inventory submissions were used.
2. For the Member States with no strong correlation between CO_2 emissions and EUTL data Main activity code 41 (Production of ammonia) in the previous years but strong emission decreases between 2014 and 2015 the CO_2 emission data of the year 2015 from the last inventory submissions were used.
3. For the Member States with a significant correlation between CO_2 emissions and EUTL data Main activity code 41 in the previous years, the projection of CO_2 emissions is based on the following equation:

Equation 29

$$E_{2B1}^{Y} = \frac{E_{EUTL}^{Y}}{E_{EUTL}^{Y-1}} \cdot E_{2B1}^{Y-1}$$

with

E_{2B1}^{Y} *Emissions for source category 2B1*

E_{2B1}^{Y-1} *Emissions for source category 2B1 from previous year*

E_{EUTL}^{Y} *EUTL emissions for the production of ammonia*

E_{EUTL}^{Y-1} *EUTL emissions for the production of ammonia from previous year*

Average of 2013–2015 emissions was used as 2.B.1 CO_2 emission estimate for Belgium, Czech Republic, Greece, and Italy, as in none of these Member States 2.B.1 CO_2 emissions showed good correlation to EUTL data Main activity code 41. For Germany and Romania 2015 emissions were used as there were strong emission declines between 2014 and 2015. For Austria, Bulgaria, Croatia, France, Hungary, Lithuania, the Netherlands, Poland, Slovakia, Spain and United Kingdom trend change of EUTL data Main activity code 41 was used to estimate 2.B.1 CO_2 emissions. Cyprus, Denmark, Estonia, Finland, Ireland, Latvia, Luxembourg, Malta, Portugal, Slovenia, Sweden and Iceland did not report 2.B.1 emissions for ammonia production therefore no emissions were estimated.

Two different approaches were analysed to estimate N_2O emissions from 2.B.2 (Nitric acid production):

1. For the Member States with no strong correlation between N_2O emissions and EUTL data Main activity code 38 (Production of nitric acid) in the previous year's the average 2013–2015 of the N_2O emission data from the last inventory submissions were used.
2. For the Member States with a significant correlation between N_2O emissions and EUTL data Main activity code 38 in the previous years, the projection of N_2O emissions is based on the following equation:

Equation 30

$$E_{2B2}^{Y} = \frac{E_{EUTL}^{Y}}{E_{EUTL}^{Y-1}} \cdot E_{2B2}^{Y-1}$$

with

E_{2B1}^{Y} *Emissions for source category 2B2*

E_{2B1}^{Y-1} *Emissions for source category 2B2 from previous year*

E_{EUTL}^{Y} *EUTL emissions for the production of nitric acid production*

E_{EUTL}^{Y-1} *EUTL emissions for the production of nitric acid production from previous year*

Average of 2013–2015 emissions was used as 2.B.2 N_2O emission estimate for Belgium, Croatia, Greece, Hungary, Italy, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovakia and United Kingdom, as in none of these Member States 2.B.2 N_2O emissions showed good correlation to EUTL data Main activity code 38. For Austria, Bulgaria, Czech Republic, Finland, France, Germany, Poland, Spain and Sweden trend change of EUTL data Main activity code 38 was used to estimate 2.B.2 N_2O emissions. Cyprus, Denmark, Estonia, Ireland, Latvia, Luxembourg, Malta, Slovenia and Iceland did not report 2.B.2 emissions for nitric acid production therefore no emissions were estimated.

Estimates for CO_2 emissions from 2.B.3 (Adipic acid production) for France and Italy where calculated as the average 2013–2015 of the CO_2 emission data from the last inventory submissions. Likewise estimates for N_2O emissions from 2.B.3 for France, Germany and Italy where calculated as the average 2013–2015 of the N_2O emission data from the last inventory submissions. All other EU-28 Member States and Iceland did not report 2.B.3 emissions for adipic acid production therefore no emissions where estimated.

Two different approaches were analysed to estimate CO_2 emissions from 2.B.7 (Soda ash production):

1. For the Member States with no strong correlation between CO_2 emissions and EUTL data Main activity code 44 (Production of soda ash and sodium bicarbonate) in the previous year's the average 2013–2015 of the CO_2 emission data from the last inventory submissions were used.
2. For the Member States with a significant correlation between CO_2 emissions and EUTL data Main activity code 44 in the previous years, the projection of CO_2 emissions is based on the following equation:

Equation 31

$$E_{2B7}^{Y} = \frac{E_{EUTL}^{Y}}{E_{EUTL}^{Y-1}} \cdot E_{2B7}^{Y-1}$$

with

E_{2B7}^{Y} *Emissions for source category 2B7*

E_{2B7}^{Y-1} *Emissions for source category 2B7 from previous year*

E_{EUTL}^{Y} *EUTL emissions for the production of soda ash and sodium bicarbonate*

E_{EUTL}^{Y-1} *EUTL emissions for the production of soda ash and sodium bicarbonate from previous year*

Average of 2013–2015 emissions was used as 2.B.7 CO_2 emission estimate for France, Italy and United Kingdom, as in none of these Member States 2.B.7 CO_2 emissions showed good correlation to EUTL data Main activity code 44. For Bulgaria, Germany, Romania and Spain trend change of EUTL data Main activity code 44 was used to estimate 2.B.7 CO_2 emissions. All other EU-28 Member States and Iceland did not report 2.B.7 emissions for soda ash production therefore no emissions were estimated.

Estimates for all other emissions in source category 2.B (Chemical industry) are described in chapter 6.2.2.4.

6.2.2.3 2.C Metal industry

The estimates for GHG emissions for source category 2.C (Metal Production) are based on detailed CO_2 estimates for source categories 2.C.1 (Iron and Steel Production), 2.C.2 (Ferroalloy production) and 2.C.3 (Aluminium production) and trend extrapolations remaining sub-categories of source category 2.C.

For calculating CO_2 emissions from 2.C.1 the correlation of several trends has been analysed. The estimates are based on monthly production data from the World Steel Association or on EUTL data. The following trends have been analysed:

1. Crude steel production data from the World Steel Association;
2. Blast furnace iron production data from the World Steel Association;
3. EUTL main activity code 24 (Production of pig iron or steel);
4. EUTL main activity code 24 (Production of pig iron or steel) and including those power plants in the EUTL that where identified to use waste gases from the iron and steel industry;
5. EUTL main activity code 24 (Production of pig iron or steel) and including those power plants in the EUTL that where identified to use waste gases from the iron and steel industry; EUTL main activity code 22 (Production of coke), 23 (Metal ore roasting or sintering) 24 (Production of pig iron or steel) and including those power plants in the EUTL that where identified to use waste gases from the iron and steel industry;

The estimates for CO_2 emissions for source category 2.C.1 (Iron and Steel Production) are based on the formula:

Equation 32

$$E^{Y}_{2C1\_CO2} = \frac{AR^{Y}_{steel}}{AR^{Y-1}_{steel}} \cdot E^{Y-1}_{2C1\_CO2}$$

with

$E^{Y}_{2C1\_CO2}$ — *CO_2 emissions for source category 2C1*

$E^{Y-1}_{2C1\_CO2}$ — *CO_2 emissions for source category 2C1 from previous year*

AR^{Y}_{steel} — *Crude steel or blast furnace iron production or EUTL data*

AR^{Y-1}_{steel} — *Crude steel or blast furnace iron production or EUTL data for previous year*

Data from World Steel Association was used as activity data to estimate 2.C.1 CO_2 emissions for the following Member States: For Finland and Italy crude steel production data (option 1) and for the Czech Republic, Poland and Slovakia blast furnace iron production data (option 2) was used for calculation.

EUTL data was used to calculate 2.C.1 CO_2 estimates for nine Member States: Option 3 was used for Belgium, Germany, Greece, Romania, Slovenia and Spain, option 4 for Austria and option 5 for France, Hungary and the United Kingdom.

For Member States with no strong correlation between one of the trends and CO_2 emissions in the previous years, the emission data average 2013–2015 from the last inventory submission were used. This includes Bulgaria, Croatia, Latvia, Lithuania, Luxembourg, the Netherlands and Iceland.

Cyprus, Denmark, Estonia, Ireland, Malta and Sweden did not report CO_2 emissions in 2.C.1 for 2015 and therefore no emissions were estimated for 2016.

Estimates for all other emissions in source category 2.C (Metal production) are described in chapter 6.2.2.4.

6.2.2.4 Other source categories

For all other source categories covering Industrial Processes and Product Use (CRF 2), 2016 activity data from alternative data sources are lacking. These categories were extrapolated from 2017 GHG inventories, either by linear trend extrapolation via minimum square deviation or by taking the constant values of the year 2015. Constant values were used when past trends were inconsistent and

strongly fluctuating. Trend extrapolations were used when the historic time series showed good correlations[30] with a linear trend. Time spans ranging from four years (2012-2014) to sixteen years (2000–2015) were analysed regarding linear trends and best fitting time span was chosen for linear trend extrapolation.

The following tables provide a detailed overview of methods and data sources used for each source category and Member State. For further split of F-gas emissions into individual subcategories see chapter 4.1.3.2.

Table 19 Methods used to estimate emissions from fluorinated gases in Industrial Processes and Product Use

Sector	2				
Gas	HFCs	PFCs	Unspecified Mix of HFCs and PFCs	SF6	NF3
AT	15	p	p	p	6
BE	p	p	p	p	p
BG	6	4	p	p	p
CY	p	p	p	p	p
CZ	4	5	p	p	p
DE	14	14	p	4	p
DK	6	7	p	p	p
EE	8	p	p	5	p
ES	p	15	p	p	p
FI	16	p	p	4	p
FR	p	4	p	15	p
GR	10	p	p	p	p
HR	p	p	p	11	p
HU	4	5	p	5	p
IE	16	p	p	p	9

[30] A "good correlation" in the context of this report is interpreted as an adjusted coefficient of determination (R^2) of the trend is greater than or equal to 0.80.

Sector Gas	2 HFCs	PFCs	Unspecified Mix of HFCs and PFCs	SF6	NF3
IT	9	p	p	p	4
LT	7	p	p	p	p
LU	11	p	p	11	p
LV	9	p	p	16	p
MT	4	p	p	p	p
NL	p	9	p	p	p
PL	16	4	p	4	p
PT	7	4	p	p	p
RO	15	p	p	p	p
SE	4	p	p	p	p
SI	4	p	p	4	p
SK	16	p	p	p	p
UK	16	p	p	6	4
IS	10	p	p	p	p

Note: p = previous year value; figures from 4 to 16 = number of years the interpolation took into account, e.g. 4 = 2012–2016 or 16 = 2000–2016. Sectors and gases with notations keys (IE, NA, NE and/or NO) in all mentioned sectors are not shown here.

Table 20 Methods used to estimate emissions from other source categories of Mineral products and Chemical industry

Sector Gas	2A4 CO2	2B1 CH4	2B1 N2O	2B4 CO2	2B4 N2O	2B5 CO2	2B5 CH4	2B6 CO2	2B8 CO2	2B8 CH4	2B10 CO2	2B10 CH4	2B10 N2O
AT	p	p	p	p	p	11	p	p	p	p	p	p	p
BE	p	p	p	p	4	p	p	p	4	p	7	p	p
BG	13	p	p	p	p	4	p	p	p	p	p	p	p
CY	6	p	p	p	p	p	p	p	p	p	p	p	p
CZ	p	p	p	p	p	p	p	p	p	p	p	p	p
DE	p	p	p	p	p	p	p	p	4	p	p	p	p
DK	16	p	p	p	p	p	p	p	p	p	7	p	p

Sector	2A4	2B1	2B1	2B4	2B4	2B5	2B5	2B6	2B8	2B8	2B10	2B10	2B10
Gas	CO2	CH4	N2O	CO2	N2O	CO2	CH4	CO2	CO2	CH4	CO2	CH4	N2O
EE	p	p	p	p	p	p	p	p	p	p	p	p	p
ES	p	p	p	p	p	5	p	p	p	p	p	p	p
FI	5	p	p	p	p	p	p	p	p	p	p	p	p
FR	p	p	p	p	p	p	p	p	p	p	p	p	4
GR	11	p	p	p	p	p	p	p	p	p	p	p	p
HR	16	p	4	p	p	p	p	p	p	p	p	p	p
HU	p	p	p	p	p	p	p	p	4	4	p	p	p
IE	p	p	p	p	p	p	p	p	p	p	p	p	p
IT	4	p	p	p	p	4	p	p	p	12	p	p	p
LT	p	p	p	p	p	p	p	p	p	p	p	p	p
LU	p	p	p	p	p	p	p	p	p	p	p	p	p
LV	p	p	p	p	p	p	p	p	p	p	p	p	p
MT	p	p	p	p	p	p	p	p	p	p	p	p	p
NL	p	p	p	p	p	p	p	p	p	p	p	p	p
PL	4	p	p	p	p	p	p	p	p	p	p	p	p
PT	p	p	p	p	p	p	p	p	4	p	p	p	p
RO	7	p	p	p	p	p	p	p	p	p	p	p	p
SE	p	p	p	p	p	p	p	p	p	p	15	p	p
SI	p	p	p	p	p	p	p	p	p	p	p	p	p
SK	6	p	p	p	p	4	p	p	p	p	p	p	p
UK	4	p	p	p	p	p	p	4	13	p	p	p	p
IS	p	p	p	p	p	p	p	p	p	p	p	p	p

Note: p = previous year value; figures from 4 to 16 = number of years the interpolation took into account, e.g. 4 = 2012–2016 or 16 = 2000–2016. Sectors and gases with notations keys (IE, NA, NE and/or NO) in all mentioned sectors are not shown here.

Table 21 Methods used to estimate emissions from other source categories of Industrial Processes and Product Use

Sector	2C	2C	2C4	2C5	2C6	2C7	2D	2D	2D	2G	2G	2G	2H
Gas	CH4	N2O	CO2	CO2	CO2	CO2	CO2	CH4	N2O	CO2	CH4	N2O	CO2
AT	p	p	p	p	p	p	16	p	p	11	p	p	p

Sector Gas	2C CH4	2C N2O	2C4 CO2	2C5 CO2	2C6 CO2	2C7 CO2	2D CO2	2D CH4	2D N2O	2G CO2	2G CH4	2G N2O	2H CO2
BE	p	p	p	p	p	p	p	p	p	p	p	p	p
BG	p	p	p	9	p	p	6	p	p	p	p	p	5
CY	p	p	p	p	p	p	p	p	p	p	p	16	p
CZ	7	p	p	14	p	p	p	p	p	p	p	p	p
DE	p	4	p	5	p	p	6	p	p	p	p	11	p
DK	p	p	p	4	p	p	p	p	p	p	p	4	p
EE	p	p	p	p	p	p	6	p	p	p	p	16	p
ES	4	p	p	13	p	p	11	p	p	p	p	8	p
FI	p	p	p	p	p	11	p	p	p	p	p	6	p
FR	p	p	p	p	p	p	p	4	6	p	p	8	p
GR	9	p	p	p	p	p	4	p	p	9	p	4	p
HR	p	p	p	p	p	p	7	p	p	p	p	p	p
HU	p	p	p	p	p	p	p	p	p	p	p	p	p
IE	p	p	p	p	p	p	4	p	p	p	p	7	p
IT	5	p	p	p	5	p	14	p	p	p	p	4	p
LT	p	p	p	p	p	p	p	p	p	p	p	p	p
LU	p	p	p	p	p	p	13	p	p	p	p	p	p
LV	p	p	p	p	p	p	p	p	p	p	p	4	p
MT	p	p	p	p	p	p	p	p	p	p	p	p	p
NL	p	p	p	p	p	p	4	5	p	p	p	p	p
PL	5	p	p	4	p	p	4	p	p	p	p	14	p
PT	p	p	p	p	p	p	16	11	p	p	p	p	p
RO	4	p	p	p	p	p	p	p	p	p	p	16	p
SE	p	p	p	p	p	p	p	p	p	p	p	12	4
SI	p	p	p	4	p	p	6	p	p	p	p	p	p
SK	6	p	p	4	p	p	p	p	p	p	p	p	p
UK	p	p	p	p	p	p	p	p	p	p	p	p	p
IS	p	p	p	p	p	p	p	p	p	p	p	5	p

Note: p = previous year value; figures from 4 to 16 = number of years the interpolation took into account, e.g. 4 = 2012–2016 or 16 = 2000–2016. Sectors and gases with notations keys (IE, NA, NE and/or NO) in all mentioned sectors are not shown here.

6.2.3 Agriculture

6.2.3.1 3.A Enteric fermentation

Enteric fermentation emissions were calculated using livestock data and previous year's emissions data. Livestock data were obtained from Eurostat and emissions data were from the annual inventory data in CRF format submitted by each Member State to the European Environment Agency.

Eurostat livestock data were used for dairy cattle, non-dairy cattle, sheep and swine. Livestock population is the main driver for these emissions, so the change in the number of livestock in each Member State was applied to the previous year's emissions level for each corresponding species/category of livestock. This methodology for CH_4 emissions from source category 3A cattle, sheep and swine is shown in the following equation:

Equation 33: 3A. Enteric fermentation emissions for dairy cattle, non-dairy cattle, sheep and swine

$$E^{Y}_{3A,T} = \frac{N^{Y}_{T}}{N^{Y-1}_{T}} \cdot E^{Y-1}_{3A,T}$$

with :

Y	*inventory year*
$3A$	*enteric fermentation*
T	*species / category of livestick*
N_T	*number of head of livestock species / category in country*
$E^{Y}_{3A,T}$	*enteric fermentation emissions for the year Y and livestock T*

3.A.4 Other livestock: Member State emissions inventories for enteric fermentation (and manure management) emissions from livestock other than cattle, sheep and swine typically include: goats, horses, buffalo, poultry, mules and asses. Horses, mules and asses are not covered by Eurostat animal production statistics and the data for poultry were for poultry meat production and not directly comparable to inventory categories. Data for buffalo are available but they constitute a small part of the bovine herd in all countries except Italy. Data on goats [apro_mt_lsgoat] is available but goats cause only a comparatively small amount of total agriculture emissions. Therefore, the emissions of the 3.A.4 Other livestock category (and the 3.B.4 Other livestock category) were updated using emissions data of previous five years and trend extrapolation. The Microsoft Excel TREND function returns values along a linear trend matching known data points, using the least squares method.

6.2.3.2 3.B Manure management

Manure management emissions calculations use the same approach as for Enteric Fermentation. Emissions are calculated using livestock data and previous year's emissions. Livestock data were obtained from Eurostat and emissions data were from the annual inventory data in CRF format submitted by each Member State to the European Environment Agency.

Eurostat livestock data were used for dairy cattle, non-dairy cattle, sheep and swine. Given that livestock population is the main driver for these emissions, the 2013 to 2014 change in the number of head of livestock species/category in each Member State was applied to the 2013 inventory emissions for corresponding species/category of livestock. The CH_4 emissions for source category 3B cattle, sheep and swine were calculated based on the following equation:

Equation 34: 3B. Manure management CH_4 emissions for dairy cattle, non-dairy cattle, sheep and swine

$$E^{Y}_{3B,T} = \frac{N^{Y}_{T}}{N^{Y-1}_{T}} \cdot E^{Y-1}_{3B,T}$$

with :

Y	*inventory year*
$3B$	*Manure managment*
T	*species / category of livestick*
N_T	*number of head of livestock species / category in country*
$E^{Y}_{3A,T}$	*Manure management emissions for the year Y and livestock T*

3.B.4 Other livestock: Member State emissions inventories for manure management emissions from livestock other than cattle, sheep and swine typically include: goats, horses, buffalo, poultry, mules and asses. Horses, mules and asses are not covered by Eurostat animal production statistics and the data for poultry are for poultry meat production and not easily comparable to inventory categories. Data for buffalo are available but they constitute a small part of the bovine herd in all countries except Italy. Data on goats [apro_mt_lsgoat] is available but goats cause only a comparatively small amount of total agriculture emissions. Therefore, the CH_4 emissions of the 3.B.4 Other livestock category were updated using emissions data of previous five years and trend extrapolation.

For 3.B Manure management N_2O emissions, an earlier EEA proxy methodology was also based on the sum of estimates using population by animal type sub-sectors where possible and otherwise either trend extrapolation or the previous year's value. Analysis of this detailed approach against subsequently reported emissions showed no appreciable gain in accuracy when compared to trend extrapolation. Therefore, 3.B Manure management N_2O emissions were updated using emissions data of previous five years and trend extrapolation.

6.2.3.3 3.D Agricultural Soils

Emissions from 3.D Agricultural Soils occur mainly as N_2O produced as a result of applying fertilizers, manure, and other agricultural practices. No Member States report CH_4 emissions from soils.

The EEA proxy for this sub-sector uses emissions data of previous five years and trend extrapolation.

An earlier EEA proxy methodology for N_2O emissions for 3.D Agricultural Soils[31], was based on the sum of trend estimates of most of the sub-sectors within the 3.D.1 Direct Soil Emissions category. That is from: 3.D.1.1 Synthetic Fertilizers, 3.D.1.2 Animal Manure applied to Soils, 3.D.1.3 N-fixing crops,

[31] Note that "4.D" is correct here as we are referring to previous proxy calculations aligned with reporting for Revised 1996 IPCC Guidelines.

3.D.1.4 Crop residue, 3.D.1.5 Cultivation of Histosols and 3.D.1.6 Other Direct Emissions. For each Member States and each subsector the estimates were based on either trend extrapolation or taking the previous year's value. Analysis of this detailed approach against subsequently reported emissions showed no appreciable gain in accuracy. This was also the case for the other categories: 3.D.2. Pasture, Range and Paddock Manure; 3.D.3. Indirect Emissions and 3.D.4. Other.

Emissions from Synthetic Fertilizers (3.D.a.1) typically contribute 25% of soil related emissions. There are Eurostat data (aei_fm_usefert) for fertiliser use up to t-2. Although these data could not be used for proxy calculations, the trend in artificial nitrogen fertiliser use closely matches the time series for emissions from synthetic fertilizers.

6.2.3.4 Other source categories in the agricultural sector

Simple approaches were chosen for all remaining agricultural source categories. Either a linear trend extrapolation was used if the past data showed a consistent linear trend. Where the past trend was fluctuating, the emissions from the latest year were kept constant.

6.2.4 Waste

For all source categories covering waste (CRF 5), activity data from alternative data sources are lacking. Therefore waste emissions were extrapolated from the most recently available GHG inventories, either by linear trend extrapolation via minimum square deviation or by taking the constant values of the last year. Constant values are used when past trends are inconsistent or fluctuating. Trend extrapolations are used when the historic time series showed good correlations[32] with a linear trend. Time spans ranging from three years to sixteen years are analysed for linear trends and the best fitting time span chosen for linear trend extrapolation.

Table 22 shows the approach used for each of the countries.

Table 22 Methods used to estimate emissions from Waste

Sector	5A	5A	5B	5B	5C	5C	5C	5D	5D	5E	5E	5E
Gas	CO2	CH4	CH4	N2O	CO2	CH4	N2O	CH4	N2O	CO2	CH4	N2O
AT	p	3	p	3	p	p	p	10	10	p	p	p
BE	p	4	p	p	9	p	p	14	3	p	p	p
BG	p	3	p	p	p	p	p	p	3	p	p	p
CY	p	3	3	3	p	p	p	3	4	p	p	p
CZ	p	16	3	4	3	3	3	3	3	p	p	p
DE	p	3	16	16	p	p	p	16	3	p	p	p
DK	p	10	3	12	p	p	p	8	3	p	p	p

[32] A "good correlation" in the context of this report is interpreted as an adjusted coefficient of determination (R^2) of the trend is greater than or equal to 0.80.

Sector	5A	5A	5B	5B	5C	5C	5C	5D	5D	5E	5E	5E
EE	p	14	p	p	p	3	3	3	4	p	p	p
ES	p	4	p	p	p	6	p	3	16	p	p	p
FI	p	10	p	p	p	p	p	16	6	p	p	p
FR	p	6	4	4	p	3	13	11	5	p	p	p
GR	p	4	4	4	p	p	p	p	3	p	p	p
HR	p	16	5	5	3	p	p	4	3	p	p	p
HU	p	3	10	12	9	p	p	3	3	p	p	p
IE	p	4	p	p	13	4	5	3	3	p	p	p
IT	p	15	15	15	p	p	p	3	5	p	p	p
LT	p	3	6	6	3	3	3	3	3	p	p	p
LU	p	15	5	5	p	p	p	4	9	p	p	p
LV	p	p	3	3	p	p	p	p	p	p	p	p
MT	p	3	4	p	p	3	3	10	3	p	p	p
NL	p	5	3	4	p	p	p	3	16	p	p	p
PL	p	3	5	5	3	p	8	3	p	p	p	p
PT	p	12	12	p	p	3	3	p	8	p	5	5
RO	p	3	3	3	6	5	p	3	3	p	p	p
SE	p	8	4	3	4	3	p	3	10	p	p	p
SI	p	14	3	3	4	4	4	3	3	p	p	p
SK	p	16	3	3	5	4	p	10	3	p	p	p
UK	p	14	14	16	3	14	6	3	6	p	p	p
IS	p	10	4	4	3	4	3	p	p	p	p	p

Note: p = previous year value; figures from 3 to 16 = number of years the interpolation took into account, e.g. 3 = 2012-2014 or 15 = 2000-2014. Sectors and gases with notations keys (IE, NA, NE and/or NO) in all mentioned sectors are not shown here.