Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

Early CO_2 emission estimates for 2014 based on Eurostat monthly energy data

Final Annual Report

Berlin, June 2016

Anke Herold

Margarethe Scheffler

Lukas Emele

Graham Anderson

Disclaimer

The views expressed in this study represent only the views of Öko-Institut and the authors and not those of Eurostat or any other organization.

Contents

List of Figures

List of Tables

List of Abbreviations

CHP	Combined Heat and Power
C	Carbon
CO_2	Carbon dioxide
CRF	Common Reporting Format
CV	Calorific value
DECC	Department of Energy and Climate Change (UK)
ETS	Emission Trading Scheme
EU	European Union
GCV	Gross calorific value
Gg	gigagram = 10^9 g = 1 kt (kiloton) = 1000 tons
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
kt	Kilotons (1 kt = 1000 tons)
LPG	Liquefied petroleum gas
MS	Member State
NCV	Net calorific value
NIR	National inventory report
QA/QC	Quality assurance and quality control
Pp	Percentage points
TJ	Terajoule
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction and background

In order to improve the timeliness of the EU carbon dioxide emissions data, Eurostat initiated an action five years ago called “Early Estimates of CO_2 Emissions”, which aims to provide first estimates of CO_2 emissions from energy use (combustion of fossil fuels) only four to five months after the reference year (instead of the current 16 months). These first estimates are based on a harmonised methodology and monthly energy statistics already available through the Energy Statistics Regulation. This information is particularly relevant because CO_2 emissions from fossil fuel combustion make up nearly 80% of the total emissions and, on average, around 80% of the annual change in EU greenhouse gas emissions.

The first objective of this project is to test whether the trend method developed to estimate early CO_2 emissions continues to produce valuable results based on the use of Eurostat monthly energy data. For this purpose, early estimates at t+4 months were calculated in May 2015 for the year 2014. This is about one year earlier than official GHG submissions of inventory data by Member States to the UNFCCC. In addition, the early CO_2 estimates calculated in 2014 for the year 2013 will be compared with final GHG inventory submissions for 2013 as provided to UNFCCC.

The second objective of this project is to analyse the quality level Eurostat monthly energy data compared to annual Eurostat data and to energy data used by Member States for the GHG inventory. Based on this comparison it will be concluded whether the quality of the Eurostat monthly energy data improved compared to data for the years 2008-2012 and in which areas substantial deviations continue to occur.

This report includes a description of the methodological approach used, a data evaluation of the Eurostat monthly energy data for the years 2008 – 2013 and a detailed analysis for 2013, the calculation of early CO_2 emissions from fuel combustion for the year 2014 and a comparison of the early estimates calculated in 2014 (for reference year 2013) with the final GHG inventory data submitted recently to the UNFCCC (also for reference year 2013).

2 Methodological approach for early CO_2 estimates

2.1 Methodological approach for calculating CO_2 emissions from fossil fuel combustion based on Eurostat monthly data

2.1.1 Method to calculate early CO_2 emission estimates

The method used to calculate early CO_2 estimates is based on the reported IPCC reference approach for the emissions of EU Member States and uses up-to-date Eurostat monthly energy data on fuel consumption. The reference approach is integral part of the GHG-inventory and presented in CRF table 1.A.(b).

The approach used is based on the trend changes of the fuel consumption for aggregated fuel categories (liquid fuels, solid fuels and gaseous fuels) of Eurostat monthly energy data for the years 2013 and 2014. The trend changes of 2014/2013 are applied to the CO_2 emissions of the same aggregate fuel categories of the latest available reported year in Member States' Greenhouse Gas (GHG) inventories as reported in the Common Reporting Format (CRF)[1] reference approach table 1.A.(b) (Equation 1).[2]

The first step in this method calculates the percentage change in the consumption of fossil fuels over the last two years for solid, liquid and gaseous fuels for each Member State on the basis of Eurostat monthly energy data either in physical or in energy units.

According to the methodology for the IPCC reference approach, fossil fuel consumption is calculated differently for primary and for secondary fuels and also differs from the concept of calculating gross inland consumption calculated by Eurostat:

Apparent Consumption for primary fuels (IPCC): Production + imports – exports –stock change.

Apparent consumption for secondary fuels (IPCC): Imports – Exports – Stock changes – international marine and aviation bunkers.

This definition differs from the calculated gross inland consumption calculated by Eurostat under the flow code B_100900.

- Recovered products etc. are not taken into account under the IPCC definition.
- International aviation bunkers (Production code: 101931 for annual and Production code: 105121 for Eurostat monthly energy data) are subtracted from the apparent consumption following the IPCC definition.

[1] Common Reporting Format - a set of standardised spread sheet data tables containing mainly numerical information and submitted electronically. These form one component of annual inventory submissions to the EU and the UNFCCC.

[2] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php

Biofuels should not be included in the calculation of the apparent consumption for liquid fuels, as the emission factor for biofuels is zero[3].

In the second step the percentage changes are applied to the published CO_2 fuel combustion emissions for the most recent year available, as reported by Member States to the UNFCCC as part of their national GHG inventories in CRF table 1.A (b), which is the reference approach calculation of CO_2 emissions. A more detailed description of the IPCC reference approach method is included in Annex 8.3.

The CO_2 emission estimate calculations are conducted for each fossil fuel group (liquid, solid and gaseous fossil fuels), for each Member State to construct early CO_2 estimates for each year. The sum of Member States' CO_2 emissions then represents energy sector emissions for the EU-27 and the EU-28 from 2013.

In the national GHG inventories a second bottom-up approach – called the sectoral approach – is calculated for CO_2 emissions from fuel combustion; however no early statistics at EU level are available that can approximate this sectoral approach four to five months after the previous year. This is due to missing sectoral energy consumption data. In line with UNFCCC inventory reporting guidelines, differences between the reference approach and the sectoral approach to calculate CO_2 emissions from fuel combustion should be lower than 2 %; if differences are larger, they need to be explained in the national inventory report. An outline of the differences that can arise between the two approaches is included in Annex 8.3.

2.1.2 Allocation of fuels from Eurostat monthly energy data

The approach requires an accurate correspondence of fuel categories between Eurostat monthly energy data, Eurostat annual energy data and the GHG inventory data reported in the CRF table 1.A.(b). Table 2-1 shows the allocation of fuels included in Eurostat monthly energy data to the fuel types in the reference approach (table 1.A(b) as required in the inventory submission under the UNFCCC.

The following fuels are not provided in Eurostat monthly energy data at the level of disaggregation required by the IPCC reference approach, but are reported under other fuel categories:

- Orimulsion is not reported separately in the Eurostat monthly energy data, but included under 'Other hydrocarbons'.
- Shale oil is not reported separately in the Eurostat monthly energy data, but included under 'Other hydrocarbons'.
- Bitumen and lubricants are not reported individually, but are included under 'Other products'.

[3] Due to inconsistencies in reporting in all Member States it has not been possible to subtract biofuels in the calculation of the years 2012 and 2013.

- Hard coal is reported as an aggregate category in Eurostat monthly energy data covering anthracite, coking coal, other bituminous coal and sub-bituminous coal.
- Oil shale and oil sands are reported under “Lignite”.
- According to 2006 IPCC Guidelines peat is no longer reported under Solid Fuels but as a separate category.
- Eurostat monthly energy data do not include fossil waste whereas the new Eurostat database for annual data and the new reporting under the 2006 IPCC Guidelines CRF table (1.A(b)) will include the fossil waste as a separate category.
- Monthly and Annual Eurostat energy data do not include the category “Other fossil fuels” whereas the new reporting under the IPCC 2006 Guidelines includes this category in the CRF table (1.A(b)).

Equation 1

$$E_{CO2}^{Y} = \frac{C_{solid}^{Y}}{C_{solid}^{Y-1}} \cdot E_{solid,CO2}^{Y-1} + \frac{C_{peat}^{Y}}{C_{peat}^{Y-1}} \cdot E_{peat,CO2}^{Y-1} + \frac{C_{liquid}^{Y}}{C_{liquid}^{Y-1}} \cdot E_{liquid,CO2}^{Y-1} + \frac{C_{gaseous}^{Y}}{C_{gaseous}^{Y-1}} \cdot E_{gaseous,CO2}^{Y-1}$$

with

E_{CO2}^{Y} *CO_2 emissions in reference approach table 1A(b)*

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

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

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

Table 2-1 Fuel categories in IPCC Reference Approach and Eurostat monthly energy data

FUEL TYPES		IPCC fuel categories	Eurostat monthly fuel nomenclature
Liquid fossil	Primary fuels	Crude oil	Crude oil
		Orimulsion	Other hydrocarbons
		Natural gas liquids	Natural gas liquids
	Secondary fuels	Gasoline	Motor Gasoline - Biogasoline + Aviation Gasoline + Gasoline Jet Fuel
		Jet kerosene	Jet kerosene
		Other kerosene	Other kerosene
		Shale oil	Other hydrocarbons
		Gas/diesel oil	Total Gas Diesel Oil - Biodiesel
		Residual fuel oil	Residual fuel oil
		Liquefied petroleum gases (LPG)	Liquefied petroleum gases (LPG)
		Ethane	Ethane
		Naphtha	Naphtha
		Bitumen	Other products
		Lubricants	Other products
		Petroleum coke	Petroleum coke
		Refinery feedstocks	Refinery feedstocks
		Other oil	Other products (Parafffin waxes, White spirit, Other)
Other liquid fossil			-
Solid fossil	Primary fuels	Anthracite[3]	Hard Coal
		Coking coal	Hard Coal
		Other bituminous coal	Hard Coal
		Sub-bituminous coal	Hard Coal
		Lignite	Lignite
		Oil shale and tar sand	Lignite
	Secondary fuels	BKB[4] and patent fuel	BKB[4] and patent fuel
		Coke oven/gas coke	Coke oven/gas coke
		Coal tar	-
Other solid fossil			-
Gaseous fossil		Natural gas (dry)	Natural gas (dry)
Other gaseous fossil			-
Waste (non-biomass fraction)			-
Other fossil fuels			-
Peat[5,6]			Peat

2.1.3 Conversion factors used in the calculation

Eurostat data provides liquid and solid fuel consumption in physical units while natural gas is reported in energy units. The data provided in the GHG inventory in the CRF table 1.A(b) are partly available in physical units, but for 13 out of 28 Member States data were available only in in energy units (TJ) (Czech Republic, Germany, Denmark, Greece, Hungary, Italy, Lithuania, Latvia, Netherlands, Poland, Portugal, Romania, United Kingdom) in the CRF table 1.A(b). For these Member States, GHG inventory

data were (back) converted to physical units to allow for the comparison with Eurostat monthly and annual energy data. The Net Calorific Values (NCVs) used for this purpose were taken from Member States' national inventory reports as submitted in 2014[4] under the UNFCCC. The values used are documented in Table 8-2 in Annex 8.1.

Data for natural gas are provided in Eurostat data in TJ based on Gross calorific values (GCVs), whereas the reference approach data are provided in TJ based on NCVs. For the comparison of Eurostat data with GHG inventory data, therefore, Eurostat data was multiplied with the factor 0.9 to convert to TJ NCV.

2.1.4 Use of energy units for aggregate fuel categories

The annual trend change between 2014 and 2013 used to calculate early CO_2 estimates was calculated based on Eurostat monthly energy data in physical units (kt). For some Member States that do not report consumption data in physical units, a conversion step from energy units to physical units is necessary for the comparison of GHG inventory data with Eurostat data in this approach.

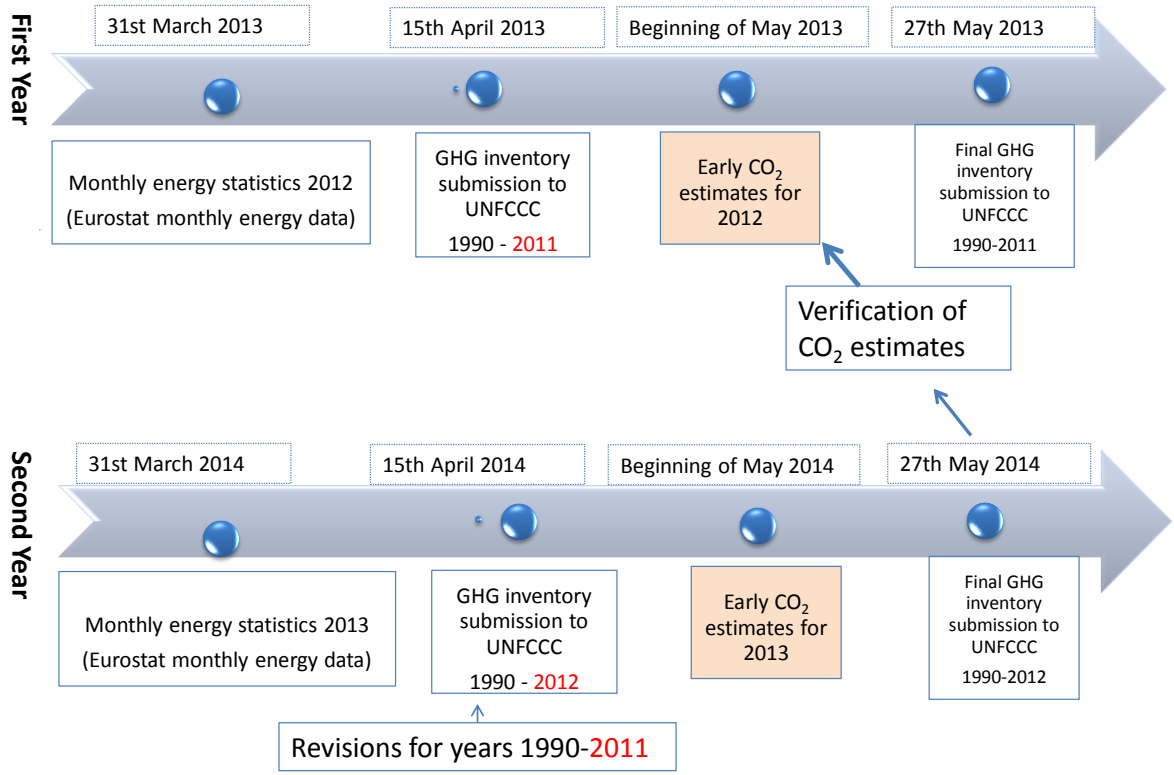
A modified approach was also tested in which, as a first step, Eurostat fuel consumption data were converted from physical units (kt) into energy units (TJ) for all Member States. In a second step, the trend changes relative to the previous year were calculated based on the fuel consumption in energy units (TJ). However, for most countries the results for the CO_2 emissions were very similar. The results of this test are documented in Annex 8.1, Table 8-4. Therefore, the simpler approach based on Eurostat data in physical units was maintained for the final CO_2 estimates for the year 2014, because this approach requires fewer conversion steps that would introduce additional uncertainties. Only for a few selected countries the calculation of solid fuels is based on trend changes in energy units (see 4.1.1)

2.1.5 Data sources

The estimation of early CO_2 emissions and the verification of results is based on a specific timeline depending on the availability of data sources used (see Figure 2-1).

[4] Due to the delay of the inventory submission in 2015, no inventory reports were provided at the time the analysis takes place

Figure 2-1: Availability of data sources, example CO_2 estimate for reference year 2013 and verification of results of the CO_2 estimate for reference year 2012



Source: Own compilation

To test whether reliable early CO_2 estimates can be calculated with Eurostat monthly energy data as available 4 months after the reference year, different data sources are needed.

To calculate early CO_2 emissions for the year 2014, three different data sources are used:

1) Eurostat monthly energy data 2013 (as available in April 2014)
2) Eurostat monthly energy data 2014 (as available in April 2015)
3) Preliminary GHG inventory data for CO_2 emissions based on the reference approach (Table 1.A.b) as provided by the countries to Oeko-Institute in May 2015.

Usually official GHG inventory data is available on the 15th of April from the UNFCCC website[5]. Due to problems with the reporting software the official inventory submission has been delayed to the beginning of November 2015. To calculate early CO_2 estimates all Member States provided preliminary inventory data to Oeko-Institute in May 2015. The data comparison for the consistency with Member States GHG inventory data and Eurostat monthly energy data and Eurostat annual energy data was conducted on the basis of final MS inventory submissions for the year 2013 as available in November 2015.

To assess the quality of the early CO_2 estimates for the year 2013, the following data sources are compared:

1) Early CO_2 estimates for the year 2013 (estimated in April 2014 with Eurostat monthly energy data)
2) GHG Inventory data for CO_2 emissions based on the reference approach (Table 1.A(b)) as reported to the EU for the year 2013 (as available by October 2015 and updated by mid-November 2015 for the official UNFCCC submission).

At the time of the preparation of the report the Member States' submissions had not been made under UNFCCC, but the inventory data available to the project team by mid-November were the same data as subsequently submitted to the UNFCCC[6].

If the difference between the two approaches is less than +/- 4 %, no further analysis is needed. Where differences of the early CO_2 estimates for the year 2013 calculated with Eurostat monthly energy data 2013 and 2012 and GHG inventory data 2013 (submitted in November 2015) exceed +/-4 %, a more detailed analysis is carried out. Large differences can be due to:

1) Quality of Eurostat monthly energy data for 2013 (available in April 2014)
2) Quality of Eurostat monthly energy data for 2014 (available in April 2015) or changed reporting of Eurostat monthly energy data for 2014 in comparison to the reporting of 2013 data

For calculating early CO_2 estimates using the trend changes, the reporting of the two years needs to be consistent. Changes such as improvements in reporting will of course affect the time series trends. Thus, any changes in the reporting between the years lead to differences in the trend changes and affect the results of the early CO_2 estimates.

[5] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8812.php

[6] To prepare the EU inventory Member States have to submit their inventories to the EU earlier than to UNFCCC. For Denmark, France and the United Kingdom EU data has been used, as data uploaded to UNFCCC has a different scope and does not cover only the EU-Territory. Member States inventories are uploaded to the Eionet - European Environment Information and Observation Network and were used for comparison.

Nevertheless, revisions of earlier years than the last one can be substantial. Therefore, data shown in earlier reports of this project might show different figures for the same fuel and the same point in time.

As there are only few data sources available that provide data as soon as 4 months after the reference year, the quality of the 2014 Eurostat monthly energy data is analysed in terms of completeness, outliers and gaps.

Quality of Eurostat monthly energy data

To assess the quality of the Eurostat monthly energy data for the year 2013 (as available in April 2014) it is analysed by comparing the Eurostat monthly energy data 2013 with:

1) Annual Eurostat energy data 2013 (as available in April 2015)
2) GHG Inventory data on fuel consumption (CRF table 1.A(b)) as reported to UNFCCC for the year 2013 (as available by mid of November 2015).

This is done on the level of aggregated fuel consumption in physical units for liquid and solid fuels and in energy units for gaseous fuels. If differences exceed +/- 4 % a detailed comparison is carried out (see 3.2 and 3.4).

To analyse if other data sources that confirm the trend change calculated with Eurostat monthly energy data, an internet research on early national energy statistics is carried out. The comparison of Eurostat monthly energy data and early national energy statistics is based on trend changes (see Chapter 3.5) Eurostat monthly energy data and early national energy statistics for the year 2014/2013 (as available in May 2015).

3 Data evaluation

3.1 Evaluation of Eurostat monthly energy data

3.1.1 Data tool, quality assurance and quality control

For consistency and comparability the project this year builds on work from previous years and makes use of the same data 'tool' - a set of Excel spreadsheets that hold and calculate Eurostat monthly and annual energy and emissions data. The data used is drawn from the CRF table 1.A(b) on the IPCC reference approach for emissions from fuel combustion as reported in the 2015 GHG inventory submissions (for reference year 2013) to the UNFCCC and on Eurostat monthly energy data on fuel consumption from the Eurostat database as of April 2015 (for reference year 2014).

Eurostat monthly energy data are imported from the raw data files (as extracted from Eurostat's production database) and analysed with standard Excel features and functions such as Pivot tables, conditional formatting, filters and formula. Pivot tables are used to view and analyse the data in a convenient monthly table with rows for Member States and fuel activity.

The spreadsheet tool is subject to quality control practices whereby each member of our team independently reviews the work of others and verifies data flows, calculations and results.

3.1.2 Completeness of Eurostat monthly energy data for the year 2014

The analysis of data gaps was based on a pivot table with formulas and conditional formatting configured to identify possible gaps. These results were then assessed for plausibility based on our own expert opinion. The first part of the analysis on the Eurostat monthly data set was to identify missing data (no values). The analysis was conducted on the Eurostat monthly data of the 28 Member States for six flows (primary production, total imports, stock change, total exports, international marine bunkers and deliveries to international aviation) and 33 fuels. While not all the fuel categories are directly relevant for the calculation of CO_2 early estimates, it was however assumed useful to apply the search for data gaps to the complete fuel list provided, independently of the use in the early CO_2 emissions calculations.

The resulting list of data gaps, included as Table 8-6 (see annex 8.2), was further examined by Eurostat, with the consensus that only few data gaps were filled. Most gaps could be identified in the reporting of international bunkers (see Table 3-1). After feed back to the Member States most Member States provided revised estimates on international bunkers, which could be used for the calculation of early CO_2 emissions 2014.

Table 3-1 Outliers and gaps in Eurostat monthly data reporting of international aviation bunkers from Kerosene Type Jet Fuel for the reporting year 2014

Member State	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Comment
Denmark								8			15		23	New data submitted
Spain	239	225	265	309		311	394	368	328	354	267	275	3335	New data submitted
Malta	6	5		9	10	11	12	13	11	11	7	7	102	New data submitted
United Kingdom										991	796	842	2629	New data submitted

For Ireland, peat consumption data (beyond the consumption in power plants) was not reported in the Eurostat monthly database for the years 2011, 2012, 2013 and 2014 for confidentiality reasons. This led to highly improbable early CO_2 estimates for Ireland due to the absence of this important fuel in the Irish energy balance (underreporting). Therefore, for Ireland the reported peat deliveries to main activity producer power plants were used for the estimation and it was assumed that this consumption is about 72 % of the total peat consumption in 2014. This ratio was derived from past years (2011-2013) for which peat consumption is available from annual data.

3.1.3 Completeness: Reporting of international bunkers (for marine and aviation)

Consumption of international bunker fuels is one area for which several Member States report much lower quantities or no consumption at all in Eurostat monthly energy data. The non-reporting of international bunker fuels in a country's monthly data has the effect that the combined monthly total fuel consumption in the reference approach calculation is higher than in the annual total. This is because international bunker fuels are subtracted from each country's total fuel consumption for internal consumption.

The following comparison is based on monthly and annual Eurostat energy data. As annual Eurostat energy data is available for the year t-2 the comparison is performed retrospectively for the year 2013. An analysis of the reporting of international bunkers in the Eurostat monthly energy data 2014 can only be carried out if annual data becomes available in April 2016. However, in 2014 Austria and the United Kingdom improved the reporting of international bunkers. Both countries provided monthly data on international bunkers from *Jet Kerosene* for the first time.

In 2013 international bunker fuels are consistently not reported for single fuel categories in the monthly data by Austria, Finland, the United Kingdom and Slovakia, as indicated in Table 3-2 below.

The importance of international bunker fuels varies across Member States. For the United Kingdom, international bunker fuels account for 19 % of the total liquid fuel consumption and the missing bunker fuels account for 99 % of the difference between annual and monthly liquid fuel consumption (see also Table 3-6).

For Finland the difference between annual and monthly international bunker fuel data for *Gas/Diesel Oil* and *Residual Fuel Oil* has varied over the years. As there seem to be problems in the reporting of other liquid fuels, the difference between monthly and annual energy data on liquid fuel consumption is not only related to the reporting of international bunker fuels. International bunker fuels are not that important in Finland and the missing share of liquid fuels due to the lack of international bunkers for *Gas/Diesel Oil* and *Residual Fuel Oil* in monthly data is low (2 %).

For Austria the gaps in the monthly data for international bunker fuels is higher than the total differences between monthly and annual liquid fuel consumption. Thus, in the countries listed in the table below, the difference can be explained to a substantial part by the non-reporting of international bunker fuels in monthly data (see also Table 3-6). However, international bunker fuels only represent a share of 5 % of annual consumption of liquid fuels in Austria. For Slovakia, the gaps in international bunker fuels are less relevant in relation to the total consumption of liquid fuels.

For Slovakia the missing data on monthly consumption of international aviation bunkers has only a very limited effect as these fuels only contribute 1% of the total liquid fuel consumption in 2013. The differences between monthly and annual fuel consumption of liquid fuels are related to the reporting of other liquid fuels and not based on the reporting of international bunker fuels.

Table 3-2 International bunker fuels missing in the 2013 Eurostat monthly energy data

Member States	**Fuel types**	Intern. bunkers quantities in annual data 2013	Intern. bunkers quantities in monthly data 2013	Total difference between annual and monthly data for intern. bunkers	Total difference between annual and monthly data for total liquid fuels	Share of difference for bunker fuels relative to total difference	Share of intern. bunkers in total liquid fuels
		kt			kt	%	%
Austria	Kerosenes - Jet fuels	627	-	627	582	108%	5%
Slovakia	Kerosenes - Jet fuels	40	-	40	-209	-19%	1%
Finland	**Total**	**132**	**-**	**132**	**9**	**1467%**	**2%**
	Gas / Diesel Oil	47	-	47		-	
	Residual Fuel Oil	85	-	85		-	
United Kingdom	Kerosenes - Jet fuels	10,418	-	10,418	10,541	99%	19%

Note: Differences between monthly and annual Eurostat energy data on liquid fuel consumption are calculated by subtracting monthly energy data from annual energy data. If no international bunker fuels are reported under monthly energy data, the difference between monthly and annual energy data is positive (see Austria, Finland and the United Kingdom) because international bunker fuels could not be subtracted from total consumption of liquid fuels. (See explanation on methodology under 2.1.1)

Besides the complete omission of international bunker fuels, considerable underestimation of international bunker fuels also occurs in monthly data compared to annual data, which is presented in Table 3-3.

Significantly lower consumption of international bunker fuels in monthly data compared to annual data occurs for Denmark, Estonia, France, Hungary and Portugal. In comparison to 2012 Luxembourg and Malta improved its reporting of international bunkers.

Estonia provided data on international bunkers in 2013, but only from September 2013 to December 2013 for gas/diesel oil. For residual fuel oil the month of May and June 2013 are not reported. Thus, the reported consumption of *Gas/Diesel Oil* and *Residual Fuel Oil* in monthly data was lower than in the annual data. For international bunkers from Jet kerosene all months are reported, but the reported quantities under monthly Eurostat data differ from the annual quantities. The total quantities of international bunker fuels missing in the monthly data for Estonia represent large quantities in relation to the total liquid fuel consumption (above 100%). But differences in the reporting of other flows for liquid fuels do also contribute to the differences between monthly and annual Eurostat energy data on liquid fuel consumption.

Table 3-3 Underreporting of international bunker fuels in the 2013 Eurostat monthly energy data

Member States	**Fuel types**	Intern. bunkers quantities in annual data 2013	Intern. bunkers quantities in monthly data 2013	Total difference between annual and monthly data for intern. bunkers	Total difference between annual and monthly data for total liquid fuels	Share of difference for bunker fuels relative to total difference	Share of intern. bunkers in total liquid fuels
		kt			kt	%	%
Denmark	Kerosenes - Jet fuels	806	338	468	537	87%	14%
Estonia	**Total**	**460**	**298**	**162**	-110	-147%	110%
	Kerosenes - Jet fuels	28	50	-22			
	Gas / Diesel Oil	40	12	40			
	Residual Fuel Oil	392	236	156			
France	Kerosenes - Jet fuels	5,436	4,200	1,236	1,421	87%	8%
Hungary	Kerosenes - Jet fuels	163	20	143	267	54%	3%
Portugal	Kerosenes - Jet fuels	909	326	583	479	122%	10%

Note: Differences between monthly and annual Eurostat energy data on liquid fuel consumption are calculated by subtracting monthly energy data from annual energy data. If no international bunker fuels are reported under monthly energy data, the difference between monthly and annual energy data is positive (see Austria, Finland and the United Kingdom) because international bunker fuels could not be subtracted from total consumption of liquid fuels. (See explanation on methodology under 2.1.1)

For France the underreporting of international aviation bunker fuels is equal to the total difference between monthly and annual liquid fuel consumption. The share of international aviation bunkers from Kerosene - Jet Fuels in total liquid fuel consumption only amounts to 8 %. In comparison to the reporting in the last years the absolute differences between monthly and annual reporting of international bunkers decreased.

For Portugal the reporting of international aviation bunkers contributes a large part of the difference between monthly and annual Eurostat data for total liquid fuels. International aviation bunkers (*Kerosene - Jet Fuels)* make up a share of 10% in total liquid fuel consumption. For Portugal, the amounts of *Kerosene - Jet Fuels* are consistently underreported in the monthly data for all the years analysed.

For Hungary the underreporting of international aviation bunkers has only a very limited effect as these fuels only contribute 3% of the total liquid fuel consumption in 2013.

3.1.4 Outliers in Eurostat monthly energy data for the year 2014

Outliers were initially identified as monthly values of more than 3 standard deviations from the median over the year. Records with months with more than two missing values or zero values were ignored as these cases were already evaluated in the gap analysis.

This method of outlier detection showed many outliers for stock change flows. These have also been treated as outliers as stock changes typically fluctuate to a larger extent than other flows. Even without considering stock change flows, this approach still returned many records that may actually represent expected or normal variation. The second column from the right of Table 3-4 shows the outliers as a fraction of the total of the other months in the year. This list only shows those records where the outlier was greater than 10 % of the annual total (excluding the outlier).

Of course, outliers could be valid data and for this reason the results were also inspected visually, with plausible flow patterns identified and excluded. From a quantitative perspective the outliers as documented in Table 3-4 should be further considered as they may represent more significant issues.

Table 3-4 Outliers in the Eurostat monthly energy data for the reporting year 2014

Member State	Product	Flow	Outlier Value (kt)	Month	Range of other months	% of total	Comment
Belgium	Heating and other Gasoil	Stock change	348	Jun	-68 - 98	103 %	Outlier confirmed
Denmark	Heating and other Gasoil	Total exports	89	Dec	2 - 36	35%	Outlier confirmed
Denmark	Transport Diesel (alltogether including biofuels)	Stock change	265	Dec	-89 - 51	96%	Outlier confirmed
Ireland	Transport Diesel (alltogether including biofuels)	Total imports	260	Dec	104 - 163	15%	Outlier confirmed
Ireland	Residual Fuel Oil (alltogether including biofuels)	Total imports	29	Jun	4 - 10	27%	Outlier confirmed
Spain	Petroleum Coke	Stock change	304	Dec	-50 - 70	76%	Outlier confirmed
Spain	Other Petroleum Products	Total imports	218	Dec	33 - 127	24%	Outlier confirmed
Croatia	Motor Gasoline (alltogether including biofuels)	Total imports	41	Jun	5 - 16	28%	Outlier confirmed
Portugal	Motor Gasoline (alltogether including biofuels)	Total imports	48	Dec	4 - 31	32%	Outlier confirmed
Romania	Natural gas in TJ (gross calorific value)	Primary production	46583	Dec	33723 - 37550	11%	New data submitted

The ‘comments’ column is a summary of the further assessment by Eurostat in May 2015 based on the initial outlier analysis. For the more significant outliers, it was confirmed with the reporting Member States or with the original questionnaires that the identified values were correct. If the outlier analysis revealed outliers that concern only low amounts, these were not followed up as it is unlikely that they have a strong impact on the consistency between annual and monthly Eurostat energy data.

3.1.5 Reporting of biofuels

In the data evaluation, the reporting of biofuels in the annual and monthly oil questionnaires by Member States was further assessed. In the annual oil questionnaires Member States are expected to report petroleum products blended with biofuels (Blended = an addition of biofuel portions to fossil fuels).

In 2012 the annual oil questionnaire was amended related to the reporting of biofuels and these amendments were introduced in the monthly oil questionnaire one year later in 2013:

- For *Motor Gasoline* and *Gas/Diesel Oil*, the fossil and the bio proportion of the fuel have to be reported. This makes it easier for reporting countries to add together the fossil and bio proportion of the respective fuel resulting in the total fuel consumption.
- For *Kerosene type Jet Fuel* the bio component was introduced from 2012 onwards. So far, *Kerosene type Jet Fuel* has not been blended with the bio component. Therefore, the *Kerosene Total* is the same as the fossil proportion of *Kerosene*.

In 2011 and 2012, the new reporting requirements related to monthly reporting of biofuels was not consistently implemented throughout the Member States, and the fuels reported under bio and fossil categories did not always add up to the correct total. This inconsistency has improved for the 2013 and 2014 data submissions.

Apart from Sweden in 2013 and 2014 all Member States reported consistent biofuel consumption in their monthly oil questionnaires (see Table 3-5). Only Sweden did not provide the figures necessary to calculate the Gross Inland Deliveries (calculated) or Gross Inland Consumption of biofuels as part of the monthly data submission. In the annual oil questionnaire Sweden provides these figures. The differences for Sweden in Table 3-5 between *Gasoline* without bio components and Total *Motor Gasoline* as well as for *Gas/Diesel Oil* without and with bio components are based on the incomplete reporting of *Gasoline* and *Gas/Diesel Oil* without bio components, where not all months were reported for exports and stock changes.

Table 3-5 Consumption of gasoline and gas/diesel oil including biofuels in Eurostat monthly energy data for the reporting year 2014*

Product	3234	5546O	3234A	3260	5547O	3260A
Product Name	Gasoline (without bio components)	Biogasoline	Total motor gasoline (blended with bio components)	Gas/diesel oil (without bio components)	Biodiesels	Total gas/diesel oil (blended with bio components)
Flow	Gross Inland Consumption			Gross Inland Consumption		
Unit	1000T			1000T		
Belgium	-3,294	0	-3,294	-2,556	0	-2,556
Bulgaria	-1,128	0	-1,128	-27	4	-23
Czech Republic	41	-18	23	824	-13	811
Denmark	-548	-8	-556	353	19	372
Germany	-2,873	-19	-2,892	9,159	-52	9,107
Estonia	254	0	254	643	0	643
Ireland	617	0	617	2,166	0	2,166
Greece	-2,194	0	-2,194	-5,602	-1	-5,603
Spain	-3,375	0	-3,375	-3,276	0	-3,276
France	-3,608	0	-3,608	20,601	-2	20,599
Croatia	-256	0	-256	552	0	552
Italy	-6,677	1	-6,676	-2,375	36	-2,339
Cyprus	338	0	338	457	14	471
Latvia	202	0	202	801	0	801
Lithuania	-1,966	0	-1,966	-1,988	0	-1,988
Luxembourg	310	0	310	1,875	78	1,953
Hungary	4	13	17	-264	-19	-283
Malta	73	0	73	185	0	185
Netherlands	-9,889	0	-9,889	-13,711	0	-13,711
Austria	-158	-9	-167	3,321	213	3,534
Poland	-249	0	-249	258	2	260
Portugal	-845	0	-845	-576	0	-576
Romania	-1,628	-28	-1,656	-617	-11	-628
Slovenia	442	0	442	1,566	0	1,566
Slovakia	-723	-23	-746	-1,080	-27	-1,107
Finland	-2,487	0	-2,487	-1,491	0	-1,491
Sweden	-1,531	0	-1,712	-1,783	0	-2,387
United Kingdom	-3,779	-13	-3,792	4,925	-39	4,887

Note:* According to the IPCC 2006 Guidelines apparent consumption for secondary fuels is calculated as: Apparent consumption for secondary fuels (IPCC): Imports – Exports – Stock changes – international marine and aviation bunkers.
Source: Eurostat

Correct reporting is prerequisite to being able to deduct the biofuel proportion from the total *Gasoline* and/or *Gas/Diesel Oil* consumption. For calculating CO_2 emissions for 2014 based on the trend change method, good data quality for the years of 2013 and 2014 is needed. As biofuels are reported consistently in the Eurostat monthly energy data (except for Sweden) for 2013 and 2014 they were subtracted for the calculation of early CO_2 estimates for 2014 in the Eurostat monthly energy data and do not influence the trend changes. This is consistent with the calculation of CO_2 emissions in the reference approach tables (1.A(b)) in the GHG inventory where emissions from biofuels

are excluded from the total. Nevertheless, the total amounts of biofuels currently reported as imports, exports and stock changes (which are relevant for the calculation of apparent consumption) are relatively small in most countries and would not affect the calculation of early CO_2 estimates in a strong way if they were included in the Eurostat monthly energy data.

3.2 Comparison of Eurostat monthly energy data with Eurostat annual energy data

This section provides comparisons of the differences between annual and cumulated Eurostat monthly energy data on fuel consumption of liquid, solid and gaseous fuel types for the years 2008-2013. The datasets for the 28 Member States of the EU were provided by Eurostat in April 2015 and processed by Oeko-Institute.

The evaluation compares the differences between the combined monthly and annual Eurostat energy data on apparent liquid, solid and gaseous fuel consumption for the years 2008 to 2013. Table 8-1 in the Annex provides a detailed comparison of monthly and annual Eurostat data for the three aggregate fuel categories for all Member States.

3.2.1 Liquid fuels

In 2008, nine Member States showed differences of less than 2 % between Eurostat annual and cumulated monthly energy data on liquid fuel consumption. These nine Member States have a share of 43 % of the total EU-27 liquid fuel consumption. Differences greater than 5 % were identified for nine Member States (see Table 3-6). These nine Member States have a share of 24 % of EU-27 total liquid fuel consumption.

In 2013, the last reporting year for which Eurostat annual and cumulated monthly data are available, differences between annual and monthly data of less than 2 % were found for fourteen Member States. Liquid fuel consumption of these fourteen Member States amounts to 58 % of total EU-28 liquid fuel consumption. Six Member States were identified with differences of above 5 %. These six Member States have a share of 17 % in the total EU-28 liquid fuel consumption.

In most countries the consumption of liquid fuels constitutes a large share of the total CO_2 emissions from energy consumption. Cyprus and Malta use almost 100 % liquid fuels in their energy sector and in Luxembourg and Sweden the share of liquid fuels in total emissions from energy consumption is above 70 % (see Table 3-6). Thus a high data quality for liquid fuels is required to provide good CO_2 estimates.

Table 8-1 in the Annex provides a detailed comparison of monthly and annual Eurostat data.

Table 3-6 Difference between Eurostat monthly and annual liquid fuel consumption data, 2008-2013

Member States	2008	2009	2010	2011	2012	2013	Share of emissions from liquid fuels in total energy CO2 emissions (%) in 2013
Belgium	-6%	-4%	-10%	-1%	6%	2%	48%
Bulgaria	7%	7%	-14%	-8%	-4%	1%	25%
Czech Republic	0%	0%	-4%	-2%	-1%	0%	19%
Denmark	-5%	-4%	21%	2%	5%	9%	45%
Germany	-1%	-1%	-1%	0%	-1%	-1%	33%
Estonia	64%	107%	117%	114%	63%	-26%	5%
Ireland	-6%	0%	5%	7%	-2%	-1%	49%
Greece	2%	3%	5%	1%	-4%	5%	42%
Spain	2%	2%	0%	0%	1%	0%	55%
France	3%	2%	2%	6%	6%	2%	58%
Croatia	NE	NE	NE	0%	0%	2%	57%
Italy	-3%	-1%	-2%	-3%	1%	0%	43%
Cyprus	-6%	0%	1%	1%	-2%	-1%	99%
Latvia	-4%	0%	-1%	4%	-9%	-12%	52%
Lithuania	4%	1%	2%	1%	-1%	1%	60%
Luxembourg	8%	8%	13%	-1%	-2%	1%	76%
Hungary	1%	-2%	-6%	2%	-1%	5%	32%
Malta	NE	-47%	1%	-28%	34%	-3%	100%
Netherlands	-1%	0%	2%	0%	-2%	-1%	32%
Austria	5%	8%	11%	12%	11%	5%	58%
Poland	-15%	-1%	-1%	1%	-2%	1%	19%
Portugal	5%	3%	5%	3%	6%	15%	56%
Romania	1%	-4%	-5%	2%	0%	1%	34%
Slovenia	-2%	-2%	1%	-1%	-2%	-10%	49%
Slovakia	0%	5%	1%	0%	-2%	-2%	29%
Finland	4%	2%	11%	-3%	2%	0%	44%
Sweden	-2%	0%	2%	-2%	-1%	1%	70%
United Kingdom	15%	25%	21%	18%	21%	19%	36%
EU 27 /28	**1%**	**3%**	**2%**	**3%**	**3%**	**3%**	39%
<+/- 2%	9 MS	13 MS	12 MS	13 MS	14 MS	14 MS	
+/-2-5%	8 MS	8 MS	4 MS	8 MS	6 MS	8 MS	
> +/- 5%	9 MS	6 MS	11 MS	7 MS	8 MS	6 MS	

Note: Percentages calculated by dividing original cumulated monthly Eurostat by annual Eurostat data.
Data for Croatia is included from 2011 onwards.
NE is used for countries for which cumulated monthly data could not be estimated, as they were not available or are incomplete.
Annual Eurostat data = 100 %, a positive value indicates that monthly data is higher than annual data; a negative value indicates that monthly data is lower than annual data.
Source: Extraction from Eurostat database in the specific year

Table 3-6 shows that there is not an overall systematic quality increase over the years. While some Member States improved the consistency of Eurostat monthly and annual energy data over the 2008-2013 period (LU, BG, CY, CZ, EE, LT, RO), the consistency deteriorated in other Member States (DK, EL, HU, LV, PT, SI). Germany, the Netherlands and Spain are the only countries that provide good monthly data for liquid fuel consumption for all years. Nevertheless, the share of these three countries in the

EU-28 total liquid fuel consumption amounts to 34 % in 2013. Some countries like Sweden, Cyprus and Lithuania show small differences of below 5 % for only one year in the time series, while all other countries show differences between annual and monthly liquid fuel consumption data in at least two years.

Systematic differences for the whole time series are found for Austria and the United Kingdom. This is due to the non-reporting of international bunkers in the Eurostat monthly data and does not strongly influence the trend changes that are used for calculating CO_2 emissions. Nevertheless from 2014 onwards Austria and the United Kingdom improved the reporting of monthly data and provided monthly data on international aviation bunkers for the first time.

Large differences between annual and monthly liquid fuel consumption are found for Malta for many reporting years. The differences occur due the differences in the reporting of international bunkers in annual and Eurostat monthly energy data, and have improved considerably from 2013 onwards.

Also for Denmark and Portugal the large differences between monthly and annual Eurostat data are due to the inconsistent reporting of international bunkers in the monthly data. The reporting of international aviation bunkers is not mandatory under the Energy Statistics regulation for monthly data. Thus, many countries do not or only partly report international bunkers in their monthly data. For the calculation of the fuel consumption based on the IPCC reference approach the reporting of international bunkers is relevant.

The largest differences in all years are observed in the case of Estonia. These differences are due to the reporting of shale oil, which differs in the monthly reporting from the annual reporting. Nevertheless this difference has decreased over the years and monthly reporting has improved. As the share of liquid fuels in total CO_2 emissions from energy consumption only amounts to 5 % in 2013, these large differences do not strongly influence the results of the early CO_2 estimates.

The differences of almost 3 % in all years at the EU level can be explained by the non-reporting of international bunkers from the United Kingdom. In 2013 the international bunkers from jet kerosene in the United Kingdom accounted for 10,418 kt, which is 2 % of the EU-28 total liquid fuel consumption.

Constant deviations (over- or underreporting) in the course of time indicate that there might be a systematic problem. This seems to hold true for France and Portugal. Member States should further analyse the data submitted and draw the conclusions for the next cycle of monthly data collections.

Table 3-7 provides details on the discrepancies identified in Table 3-6 for the year 2013 at the level of liquid fuels for individual Member States. The table includes only those countries where discrepancies between Eurostat monthly and annual reporting of liquid fuels are above 4%. Besides the differences on the level of total liquid fuel consumption sub-rows are included for the major fuel types contributing most to the differences in total fuel consumption.

Table 3-7 Detailed differences for liquid fuel consumption between Eurostat monthly and annual data for 2013

COUNTRY	FUEL TYPES	Annual	Monthly	Difference		Systematic issue	Explanations and comments
		kt		abs	%		
Denmark	**Total liquids**	**5,950**	**6,487**	**537**	**9.0%**	Yes	Ongoing differences due to monthly reporting of bunker fuel see Table 3-3
	Jet kerosene + Other Kerosene	-87	478	565			
Estonia	**Total liquid**	**420**	**310**	**-110**	**-26.2%**	Yes	There is no monthly reporting of other oil
	Other Oil + Bitumen and Lubricants	85	0	-85			
Greece	**Total liquid**	**10,664**	**11,181**	**517**	**4.8%**		
	Gas/diesel oil	-4,805	-4,594	211		No	Differences in exports
	Residual fuel oil	-3,476	-3,289	187		Yes	Differences in imports
	Refinery feedstocks	3,623	3,395	-228		Yes	Differences in imports
Latvia	**Total liquid**	**1,254**	**1,101**	**-153**	**-12.2%**	No	
	Gas/diesel oil	852	710	-142			Differences in imports
Hungary	**Total liquid**	**5,520**	**5,787**	**267**	**4.8%**		
	Ormiulsion	**8**	**197**	189		No	Differences in production
	Jet kerosene + Other Kerosene	-178	-33	145		Yes	Ongoing differences due to monthly reporting of bunker fuel see Table 3-3
Austria	**Total liquid**	**11,680**	**12,262**	**582**	**5.0%**	Yes	Missing monthly bunker fuel data.
	Jet kerosene + Other Kerosene	-621	4	625			
Portugal	**Total liquid**	**9,224**	**10,569**	**1,345**	**14.6%**		
	Gasoline	-1,256	-1,023	233		No	Differences in exports and stock changes
	Jet kerosene + Other Kerosene	-985	-233	752		Yes	Lower monthly reporting of bunker fuel
	Other Oil + Bitumen and Lubricants	-220	-33	187		No	Differences in exports
Slovenia	**Total liquid**	**2,398**	**2,169**	**-229**	**-9.5%**		
	Gas/diesel oil	1,676	1,548	-128		No	Differences in imports
	Petroleum coke	77	0	-77		Yes	There is no monthly reporting of petroleum coke
United Kingdom	**Total liquid**	**55,371**	**65,912**	**10,541**	**19.0%**		
	Jet kerosene + Other Kerosene	-3,042	7,163	10,205		Yes	Missing monthly bunker fuel data.

3.2.2 Solid fuels

In 2008 twelve Member States showed differences of less than 2 % between annual and cumulated monthly solid fuel consumption. These twelve Member States have a share of 56 % of the total EU-27 solid fuel consumption. Differences greater than 5 %

were identified for seven Member States (see Table 3-8). These seven Member States have a share of only 5 % of EU-27 total solid fuel consumption.

In 2013, the last reporting year for which annual and cumulated monthly data are available, differences between annual and monthly data of less than 2 % were found for fourteen Member States. Solid fuel consumption of these fourteen Member States accounts for 51 % of the total EU-28 solid fuel consumption. The number of Member States that have differences of more than 5 % decreased to five Member States in 2013. These five Member States have a share of 5 % of the total EU-28 solid fuel consumption.

Table 3-8 Difference between Eurostat monthly and annual solid fuel consumption data, 2008-2013

Member States	2008	2009	2010	2011	2012	2013	Share of emissions from solid fuels in total energy CO2 emissions (%) in 2013
Belgium	-6%	-20%	-75%	-42%	-12%	-20%	13%
Bulgaria	2%	0%	0%	0%	1%	-1%	63%
Czech Republic	0%	0%	-4%	1%	0%	1%	63%
Denmark	0%	1%	0%	0%	1%	2%	32%
Germany	-1%	-1%	-3%	-2%	-3%	-4%	43%
Estonia	2%	10%	0%	1%	7%	-1%	88%
Ireland	-20%	-17%	-45%	1%	7%	2%	25%
Greece	-3%	-5%	-14%	-6%	-2%	-3%	49%
Spain	-2%	10%	7%	3%	4%	-1%	18%
France	0%	-2%	4%	4%	8%	7%	15%
Croatia	NE	NE	NE	-1%	-1%	1%	17%
Italy	4%	-5%	-6%	1%	-2%	1%	16%
Cyprus	2%	-5%	-4%	-15%	NO	NO	-
Latvia	-1%	7%	1%	-1%	30%	1%	4%
Lithuania	0%	-3%	8%	-12%	-1%	0%	10%
Luxembourg	-13%	-12%	-14%	-2%	-2%	-5%	2%
Hungary	0%	-1%	1%	0%	0%	1%	24%
Malta	NO	NO	NO	NO	NO	NO	-
Netherlands	-2%	-1%	-1%	38%	22%	-1%	20%
Austria	-15%	-10%	-2%	-7%	-17%	-9%	9%
Poland	4%	2%	-3%	3%	1%	0%	71%
Portugal	1%	1%	-10%	0%	0%	0%	23%
Romania	-4%	-9%	1%	-2%	0%	-3%	33%
Slovenia	-7%	-4%	-1%	-2%	-2%	-10%	39%
Slovakia	6%	1%	-10%	2%	1%	-3%	35%
Finland	-9%	-4%	-3%	-3%	2%	-1%	42%
Sweden	-1%	-17%	9%	-3%	-14%	-11%	20%
United Kingdom	0%	1%	0%	1%	0%	0%	28%
EU 27 /28	**0%**	**-1%**	**-4%**	**0%**	**0%**	**-2%**	33%
<+/- 2%	12 MS	10 MS	10 MS	14 MS	11 MS	14 MS	
+/-2-5%	7 MS	6 MS	6 MS	7 MS	7 MS	7 MS	
> +/- 5%	7 MS	10 MS	10 MS	6 MS	8 MS	5 MS	

Note: Percentages calculated by dividing original cumulated monthly Eurostat by annual Eurostat data.
Data for Croatia is included from 2011 onwards.
NE is used for countries for which cumulated monthly data could not be estimated, as they were not available or are incomplete.
NO is reported if there is no solid fuel consumption in the country.
Annual Eurostat data = 100 %, a positive value indicates that monthly data is higher than annual data; a

negative value indicates that monthly data is lower than annual data.
For IE the data for solid fuels has been corrected from 2011 onwards, as the reporting is confidential (see Chapter 3.1.4).
Source: Extraction from Eurostat database in the specific year

Table 8-1 in the Annex provides a detailed comparison of monthly and annual Eurostat data.

Countries with emissions from solid fuel consumption of above 50% of the total CO_2 emissions from energy consumption in 2013 are Bulgaria, the Czech Republic, Estonia and Poland.

Similar to liquid fuel consumption, Table 3-8 shows that there is no systematic quality increase over the years for solid fuels. In comparison to liquid fuel consumption there are four countries (Bulgaria, Croatia, Hungary and the United Kingdom) that provide good monthly data for solid fuel consumption for all reported years. The share of these four countries in total solid fuel consumption accounts for 14% in 2013. Denmark, Portugal and the Czech Republic show larger differences for only one year in the time series, while all other countries have larger differences in at least two years. Croatia only started reporting in 2011 with EU accession and the data show very small differences.

Large differences in almost all years can be found for Ireland. For Ireland hard coal and peat consumption data in the Eurostat monthly database are incomplete and much lower for 2008-2010 than annual Eurostat data. Therefore, for peat and hard coal consumption approximations were used based on reported monthly deliveries to main activity producer power plants instead of the reported monthly hard coal consumption data. It was assumed that hard coal deliveries to main activity producer power plants represent about 78 % of the total hard coal consumption. This ratio was derived from past years (2011-2013) for which hard coal consumption is available in annual data. For peat it was assumed that peat consumption in main activity producer power plants is equivalent to 72% of the total consumed peat at main activity producer power plants. This method of estimation gives acceptable results in most years and is used from 2011 onwards for all hard coal and peat consumption data for Ireland shown in this report.

Belgium consistently underreported hard coal consumption, but improved the reporting of BKB and in coke oven coke between monthly and annual Eurostat data in 2013.

Besides Belgium differences above 10 % for solid fuel consumption in the reporting between monthly and annual Eurostat data for the year 2013 can be found for Slovenia and Sweden. For these countries the differences are due to inconsistencies in the reporting of hard coal consumption which are shown in more detail in Table 3-9.

Furthermore, tendencies of consistent underreporting of solid fuel consumption in monthly data occur for some Member States (AT, DE). For DE one reason could be that because of legal issues monthly consumption of coke oven coke does not have to be reported by the industry anymore.

For other Member States the differences fluctuate from under-reporting to over-reporting and vice versa. For France, Slovenia and Sweden, the differences between

monthly and annual data increased in the two recent years compared to earlier years of the time series. It is the responsibility of Member States to carefully analyse the reasons for the shown differences between their monthly and annual data for solid fuels.

The difference for total solid fuel consumption on EU 28 level increased to -2% in 2013. This amounts to an absolute difference of -12,824 kt and is due to large differences in solid fuel consumption in France (1,228 kt), Greece (-1,495 kt) and Germany (-9,680 kt). The high difference of -4 % in 2010 amounted to an absolute difference of 25,009 kt between annual and monthly Eurostat data in the EU-28. This was due to large differences in solid fuel consumption in Greece (-8,211 kt), Germany (-7,789 kt), Poland (-4,224 kt) and other countries.

Table 3-9 provides a more detailed analysis of the differences identified in Table 3-8 for the year 2013 for solid fuel consumption for individual Member States. The table includes only those countries where discrepancies between monthly and annual amounts of solid fuels are above 4%. Besides the differences on the level of total solid fuel consumption sub-rows are included for the major fuel types contributing most to the differences in total fuel consumption.

Table 3-9 Detailed differences for solid fuel consumption between Eurostat monthly and annual data for 2013

COUNTRY	FUEL TYPES	*Annual*	*Monthly*	*Difference*		Systematic issue	*Explanations and comments*
		Kt		*abs*	*%*		
Belgium	**Total solid**	**4,970**	**3,994**	**-976-**	**-19.6%**	**Yes**	Differences in imports
	Hard Coal	4,997	4,092	-905	**-**		
France	**Total solid**	**18,824**	**20,052**	**1,228**	**6.5%**	**Yes**	Differences in imports
	Hard Coal	18,016	19,563	1,547			
	Coke oven coke	592	216	-376			
Austria	**Total solid**	**4,911**	**4,449**	**-462**	**-9.4%**	**Yes**	Differences in imports
	Hard Coal	3,565	3,229	-336			
Slovenia	**Total solid**	**4,487**	**4,045**	**-442**	**-9.9%**	**Yes**	Hard coal is missing in monthly Eurostat data
	Hard Coal	420	0	-420			
Sweden	**Total solid**	**3,669**	**3,252**	**-417**	**-11.4%**		
	Hard Coal	2,832	2,528	-304		**Yes**	Differences in stock changes
	Peat	768	639	-129		**No**	Differences in production

3.2.3 Gaseous fuels

In 2008 twelve Member States showed differences below 2% between annual and cumulated monthly natural gas consumption. These twelve Member States are responsible for 56 % of the total EU-27 gaseous fuel consumption. Differences above 5% were identified for four Member States (see Table 3-10). These four Member

States only consumed 5% of the total EU-27 natural gas consumption. Due to different concepts being used since the reference year 2012 for import and export data for the annual (import from country of ultimate origin) and the monthly (import from country of last consignment) data collections, the comparability of import and export data is no longer provided. As a consequence, a country which does not produce natural gas itself cannot report natural gas exports in annual data, while it has to report exports of natural gas in transit in monthly statistics.

In 2013, the last reporting year for which annual and cumulated monthly data are available, differences between annual and monthly data below 2 % were found for twenty Member States. These twenty Member States account for 84 % of the total EU-28 natural gas consumption. The number of Member States that have differences of above 5% decreased to two Member States in 2013. These two Member States share 3% of the EU-28 total natural gas consumption. Table 8-1 in the Annex provides a detailed comparison of monthly and annual Eurostat data.

Table 3-10 Difference between Eurostat monthly and annual gaseous fuel consumption data, 2008-2013

Member States	2008	2009	2010	2011	2012	2013	Share of emissions from natural gas in total energy CO2 emissions (%) in 2013
Belgium	-18%	-10%	-18%	-25%	-45%	-1%	35%
Bulgaria	0%	-3%	3%	-4%	-10%	-3%	12%
Czech Republic	0%	0%	-4%	0%	-2%	0%	17%
Denmark	-1%	0%	-1%	-3%	-5%	0%	20%
Germany	1%	0%	10%	1%	-4%	1%	22%
Estonia	-5%	-12%	-12%	-3%	0%	0%	5%
Ireland	-21%	0%	1%	3%	3%	4%	26%
Greece	0%	0%	0%	0%	0%	0%	9%
Spain	0%	0%	0%	0%	0%	0%	27%
France	-1%	-8%	-3%	1%	-5%	-4%	26%
Croatia	NE	NE	NE	-6%	-9%	-9%	26%
Italy	0%	0%	0%	0%	0%	0%	40%
Cyprus	NO	NO	NO	NO	NO	NO	-
Latvia	0%	0%	0%	0%	0%	0%	42%
Lithuania	0%	0%	0%	0%	0%	0%	28%
Luxembourg	-3%	0%	0%	0%	0%	0%	22%
Hungary	2%	-1%	-13%	-2%	3%	-1%	43%
Malta	NO	NO	NO	NO	NO	NO	-
Netherlands	4%	-1%	-1%	3%	0%	1%	47%
Austria	-3%	-1%	-5%	-5%	-1%	-1%	29%
Poland	3%	2%	0%	0%	0%	0%	9%
Portugal	0%	-1%	-26%	0%	2%	3%	20%
Romania	-3%	-2%	2%	3%	3%	5%	33%
Slovenia	-5%	-3%	-4%	-7%	-9%	0%	11%
Slovakia	-10%	21%	1%	22%	23%	1%	35%
Finland	3%	0%	-7%	0%	0%	-1%	13%
Sweden	0%	-9%	93%	0%	0%	0%	5%
United Kingdom	3%	-2%	-1%	0%	0%	0%	35%
EU 15	**0%**	**-2%**	**0%**	**-1%**	**-3%**	0%	
EU 27 /28	**0%**	**-1%**	**0%**	**0%**	**-3%**	0%	
<+/- 2%	12 MS	17 MS	12 MS	14 MS	13 MS	20 MS	
+/-2-5%	9 MS	3 MS	6 MS	7 MS	7 MS	4 MS	
> +/- 5%	4 MS	5 MS	7 MS	5 MS	6 MS	2 MS	

Note: Percentages calculated by dividing original cumulated monthly Eurostat by annual Eurostat data.
Data for Croatia is included from 2011 onwards. NE is used for countries where cumulated monthly data could not be estimated, as they were not available or are incomplete. NO is reported if there is no gaseous fuel consumption in the country
Annual Eurostat data = 100 %, a positive value indicates that monthly data is higher than annual data; a negative value indicates that monthly data is lower than annual data.
Source: Extraction from Eurostat database in the specific year

The reporting quality of data on natural gas improved considerably from 2012 to 2013.

There is no country within the EU-28 for which the share of emissions from natural gas in total energy CO_2 emissions is above 50 %. In Greece, Sweden, Estonia and Poland the share is even below 10 %. In Malta and Cyprus natural gas is not consumed at all. Of the three fuel consumption categories (liquid, solid and natural gas) monthly data on natural gas consumption is the most consistent with the annual data. Five countries

(Spain, Greece, Italy, Lithuania and Latvia) provide good data quality with differences below 2 % for all reported years. These five Member States share 25 % of the total EU-28 natural gas consumption. Luxembourg and the United Kingdom show differences above 2 % for only one year in the time series, while all other countries have larger differences in at least two years.

Large differences in almost all years can be found for Belgium and Slovakia in earlier years. Belgium authorities have since 2013 changed their data collection system which led to the improvements. Also Slovakia improved its reporting in 2013 and provided good monthly data for natural gas consumption. While most other countries improved their reporting in 2013, the quality of monthly reporting of natural gas from Croatia is still inadequate. Croatia should investigate the origin of the differences. For Romania the differences in the reporting of natural gas between monthly and annual Eurostat data increased in 2013. Thus Romania should review their reporting of natural gas.

The difference for total natural gas consumption on EU level is below 2 % in all years, except in 2012. The difference of -3 % in 2012 amounts to an absolute difference of 427,617 TJ between annual and monthly Eurostat data in the EU-28. This is due to large differences in natural gas consumption in Belgium (-271,706 TJ) and Germany (-108,248 TJ).

3.3 Comparison of Eurostat monthly energy data with GHG inventory data

This section provides comparisons of the monthly Eurostat data and inventory GHG inventory data from the reference approach table 1.A(b) from UNFCCC submissions for fuel consumption data of liquid, solid and gas fuel types for the years 2008-2013[7]. The comparison is based on physical units (kt) which are reported by Eurostat data and in the CRF table 1.A(b). As some Member States provide table 1.A(b) only in TJ, GHG inventory data for these Member States was converted to physical units for the comparison with Eurostat monthly energy data on fuel consumption data using net calorific values from Member States national inventory reports.

The following sub-chapters summarize large differences between annual Eurostat and GHG inventory data for aggregate fuel categories liquid, solid and gaseous fuels. Table 8-5 in the Annex provides a comparison of GHG inventory data and annual Eurostat data for the three aggregate fuel categories for all Member States.

3.3.1 Liquid fuels

In 2008, ten Member States showed differences below 2 % between Eurostat monthly energy data and GHG inventory data for liquid fuel consumption. These ten Member States have a share of 39 % of the total EU-27 liquid fuel consumption. Differences

[7] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php

above 5 % could be identified for ten Member States (see Table 3-11), adding up to a share of 38 % of the EU-27 total liquid fuel consumption.

In 2013, the last reporting year for which Eurostat monthly energy data and GHG inventory data are available, data differences between annual and GHG inventory data of less than 2 % were found for ten Member States. Liquid fuel consumption of these ten Member States accounts for 56 % of the total EU-28 liquid fuel consumption. Eleven Member States have differences greater than 5 %. These eleven Member States have a share of 20 % of the EU-28 total liquid fuel consumption.

So far, there has not been a systematic improvement of the consistency between Eurostat monthly energy data on fuel consumption and the energy data on fuel consumption reported in the GHG inventory data across all Member States. While the consistency improved in Belgium, Bulgaria, Ireland, Croatia, Italy, Austria and Poland, it deteriorated especially in the year 2013 in the case of Denmark, Portugal, Slovenia, Slovakia, Finland and Sweden.

Table 3-11 Difference in liquid fuel consumption between GHG inventory data (CRF table 1.A(b)) and Eurostat monthly energy data, 2008-2013

Member States	2008	2009	2010	2011	2012	2013	Share of emissions from liquid fuels in total energy CO2 emissions (%) in 2013
Belgium	-8%	-2%	-8%	-2%	6%	0%	48%
Bulgaria	8%	7%	-14%	-8%	-3%	1%	25%
Czech Republic	2%	1%	-3%	1%	-1%	1%	19%
Denmark	-4%	2%	6%	-1%	8%	9%	45%
Germany	2%	2%	-1%	0%	-2%	-2%	33%
Estonia	805%	117%	104%	112%	76%	-25%	5%
Ireland	-14%	-18%	7%	4%	5%	2%	49%
Greece	2%	-2%	3%	-6%	2%	5%	42%
Spain	2%	2%	2%	2%	2%	2%	55%
France	0%	4%	-2%	2%	1%	-1%	56%
Croatia	NE	NE	NE	-4%	0%	0%	57%
Italy	-7%	-7%	-7%	-6%	-5%	-4%	43%
Cyprus	0%	5%	2%	1%	0%	-1%	99%
Latvia	-4%	0%	-4%	6%	-6%	-8%	52%
Lithuania	3%	-5%	-6%	-8%	-8%	-8%	60%
Luxembourg	6%	6%	13%	0%	1%	4%	76%
Hungary	1%	-1%	-7%	-4%	-1%	2%	32%
Malta	NE	-51%	5%	-3%	19%	-8%	100%
Netherlands	1%	3%	3%	3%	-3%	-3%	32%
Austria	4%	7%	7%	11%	11%	5%	58%
Poland	-17%	-2%	-3%	1%	-2%	1%	19%
Portugal	3%	1%	6%	6%	3%	13%	56%
Romania	-14%	-13%	3%	5%	-1%	-1%	34%
Slovenia	2%	-3%	2%	2%	0%	-7%	49%
Slovakia	-2%	3%	0%	-1%	-4%	-5%	29%
Finland	8%	6%	5%	-2%	4%	-6%	44%
Sweden	-1%	-7%	5%	4%	3%	-5%	70%
United Kingdom	15%	27%	21%	17%	19%	18%	36%
EU 27 /28	**0%**	**3%**	**1%**	**2%**	**2%**	**1%**	39%
<+/- 2%	10 MS	13 MS	4 MS	12 MS	9 MS	10 MS	
+/-2-5%	6 MS	8 MS	11 MS	6 MS	10 MS	7 MS	
> +/- 5%	10 MS	8 MS	12 MS	10 MS	9 MS	11 MS	

Note: Data for Croatia is included from 2011 onwards.
NE is used for countries where cumulated monthly data could not be estimated, as they were not available or are incomplete.
GHG inventory data = 100 %, a positive value indicates that monthly Eurostat data is higher than GHG inventory data, a negative value indicates that monthly Eurostat data is lower than GHG inventory data.
Source: Extraction from Eurostat database in the specific year

Table 3-12 provides details on the discrepancies identified in Table 3-6 Table 3-11 for the year 2013 for liquid fuels for individual Member States. The table includes only those countries where discrepancies between monthly Eurostat data and GHG inventory reporting of liquid fuels are above 4 %. Besides the differences on the level of total liquid fuel consumption sub-rows are included for the major fuel types contributing most to the differences in total fuel consumption.

Table 3-12 Detailed differences for liquid fuel consumption between GHG inventory data and Eurostat monthly data for 2013

COUNTRY	FUEL TYPES	CRF table 1.A(b)	Monthly	Difference		Systematic issue	Explanations and comments
		kt		abs	%		
Denmark	**Total liquids**	**5,930**	**6,487**	**557**	**9.4%**		Ongoing differences due to lower monthly reporting of bunker fuel
	Jet kerosene + Other Kerosene	-58	478	536		**Yes**	
Estonia	**Total liquid**	**413**	**310**	**-103**	**-24.9%**		There is no monthly reporting of other oil
	Other Oil + Bitumen and Lubricants	85	0	-85		**Yes**	
Greece	**Total liquid**	**10,687**	**11,181**	**494**	**4.6%**		Due to reporting issues in the CRF table 1.A(b) a comparison on the basis of single flows is not possible
	Gas/diesel oil	-4,800	-4,594	206			
	Residual fuel oil	-3,476	-3,289	187			
	Petroleum coke	669	778	109			
	Refinery feedstocks	3,623	3,395	-228			
Latvia	**Total liquid**	**1,192**	**1,101**	**-91**	**-7.7%**		
	Gas/Diesel Oil	800	710	-90		**Yes**	Differences in all flows
Lithuania	**Total liquid**	**2,372**	**2,193**	**-179**	**-7.6%**		
	Refinery Feedstocks	562	380	-182		**Yes**	Differences in imports
Malta	**Total liquid**	**773**	**713**	**-60**	**-7.7%**		
	Residual fuel oil	488	448	-40		**Yes**	Differences in stock changes
Austria	**Total liquid**	**11,680**	**12,262**	**582**	**5.0%**		
	Jet kerosene + Other Kerosene	-621	4	625		**Yes**	Missing monthly bunker fuel data.
Portugal	**Total liquid**	**9,341**	**10,569**	**1,228**	**13.1%**		
	Gasoline	-1,258	-1,023	235		**No**	Differences in exports and stock changes
	Jet kerosene + Other Kerosene	-967	-233	734		**Yes**	Lower monthly reporting of bunker fuel
	Other Oil + Bitumen and Lubricants	-166	-33	133		**No**	Differences in imports
Slovenia	**Total liquid**	**2,330**	**2,169**	**-161**	**-6.9%**		
	Gas/diesel oil	1,619	1,548	-71		**No**	Differences in imports
	Petroleum coke	77	0	-77		**Yes**	There is no monthly reporting of petroleum coke
Slovakia	**Total liquid**	**3,134**	**2,977**	**-157**	**-5.0%**		
	Other Oil + Bitumen and Lubricants	-62	-205	-143		**Yes**	Differences in exports and imports
Finland	**Total liquid**	**7,647**	**7,196**	**-451**	**-5.9%**		
	Gas/diesel oil	-1,234	-1,450	-216		**No**	Differences in imports and stock changes

	Refinery feedstocks	63	-84	-147		**No**	Differences in imports and stock changes
Sweden	**Total liquid**	**12,178**	**11,558**	**-620**	**-5.1%**		
	Jet kerosene + Other Kerosene	458	-223	-681		**No**	International bunkers are not reported in CRF table 1.A(b)
United Kingdom	**Total liquid**	**56,009**	**65,912**	**9,903**	**17.7%**		
	Jet kerosene + Other Kerosene	-2,671	7,163	9,834		**Yes**	Missing monthly bunker fuel data.

3.3.2 Solid fuels

In 2008 seven Member States showed less than 2 % difference between Eurostat monthly energy data and GHG inventory data for solid fuel consumption. These seven Member States have a share of 41 % of the total EU-27 solid fuel consumption.

Differences greater than 5 % could be identified for eleven Member States (see Table 3-13). These eleven Member States have a share of 14 % of the EU-27 total solid fuel consumption.

In 2013, the last reporting year for which GHG inventory data are available, data differences between monthly and GHG inventory data of less than 2 % could be found for twelve Member States. Nevertheless, the solid fuel consumption of these twelve Member States account only for 45 % of the total EU-28 solid fuel consumption. The reason for this relatively low share of only 45 % in the total solid fuel consumption is the fact that Germany (the Member State with the largest solid fuel consumption) is not amongst these twelve Member States. For Germany the difference in reporting between monthly Eurostat and GHG inventory data amounts to -4 %. The solid fuel consumption of Germany accounts for 32 % of the total solid fuel consumption of the EU-28. The number of Member States that have differences greater than 5 % increased to eight Member States in 2013. These eight Member States share 7 % of EU-28 total solid fuel consumption.

Thus, in terms of the number of Member States with low differences between Eurostat monthly energy data and GHG inventory data the situation has improved.

Table 3-13 Difference in solid fuel consumption between GHG inventory data (CRF table 1.A(b) and Eurostat monthly energy data, 2008-2013

Member States	2008	2009	2010	2011	2012	2013	Share of emissions from solid fuels in total energy CO2 emissions (%) in 2013
Belgium	-6%	-22%	-75%	-41%	-11%	-19%	13%
Bulgaria	3%	6%	0%	0%	1%	-1%	63%
Czech Republic	1%	1%	-3%	0%	-3%	-1%	63%
Denmark	0%	1%	1%	1%	1%	0%	32%
Germany	-1%	-1%	-4%	-2%	-3%	-4%	43%
Estonia	2%	10%	0%	1%	7%	-1%	88%
Ireland	-12%	-17%	-46%	1%	15%	0%	25%
Greece	-3%	-5%	-14%	-6%	-2%	-3%	49%
Spain	-2%	11%	7%	3%	4%	-1%	18%
France	-11%	-6%	-5%	-6%	-3%	-6%	15%
Croatia	NE	NE	NE	-1%	-1%	1%	17%
Italy	6%	-3%	-5%	2%	-1%	2%	16%
Cyprus	1%	-1%	0%	-8%	NO	NO	-
Latvia	-1%	10%	7%	7%	30%	1%	4%
Lithuania	9%	5%	17%	-10%	3%	20%	10%
Luxembourg	3%	-12%	-14%	-2%	-2%	-6%	2%
Hungary	-10%	-6%	-7%	-6%	1%	1%	24%
Malta	NO	NO	NO	NO	NO	NO	-
Netherlands	-3%	-2%	-2%	37%	15%	-6%	20%
Austria	-13%	-10%	-2%	-7%	-17%	-9%	9%
Poland	3%	1%	0%	2%	1%	0%	71%
Portugal	1%	2%	-10%	2%	1%	1%	23%
Romania	3%	0%	1%	-2%	0%	-3%	33%
Slovenia	-7%	-4%	-1%	-2%	-2%	-10%	39%
Slovakia	5%	0%	-6%	1%	0%	-3%	35%
Finland	-13%	-6%	-4%	-3%	3%	-3%	42%
Sweden	12%	-12%	15%	8%	-18%	-11%	20%
United Kingdom	5%	15%	-1%	-1%	-1%	0%	28%
EU 27 /28	**0%**	**0%**	**-4%**	**-1%**	**-1%**	**-2%**	33%
<+/- 2%	7 MS	9 MS	8 MS	11 MS	11 MS	12 MS	
+/-2-5%	8 MS	2 MS	6 MS	6 MS	8 MS	6 MS	
> +/- 5%	11 MS	15 MS	12 MS	10 MS	7 MS	8 MS	

Note: Data for Croatia is included from 2011 onwards.
NE is used for countries where cumulated monthly data could not be estimated, as they were not available or are incomplete. Cyprus did not report solid fuel consumption under monthly Eurostat data in 2012 and 2013.
NO is reported if there is no solid fuel consumption in the country.
GHG inventory data = 100 %, a positive value indicates that monthly Eurostat data is higher than GHG inventory data, a negative value indicates that monthly Eurostat data is lower than GHG inventory data.
Luxembourg reported municipal solid waste under the GHG inventory table 1.A(b) in 2008 and 2009. This amount is not taken into account here. Denmark reports municipal solid waste under solid fossils under GHG inventory table 1.A(b) for the whole time series. This amount is not taken into account here.
Source: Extraction from Eurostat database in the specific year

The countries that still show large differences between monthly data and GHG inventory data for solid fuels are mostly small countries that have a very small share of solid fuels in their total fuel consumption.

Table 3-14 provides details on the discrepancies identified in Table 3-13 for the year 2013 at the level of solid fuels for individual Member States. The table includes only those countries where discrepancies between monthly and GHG inventory table 1.A(b) reporting of solid fuels are above 4 %. Besides the differences on the level of total solid

fuel consumption sub-rows are included for the major fuel types contributing most to the differences in total fuel consumption.

Table 3-14 Detailed differences for solid fuel consumption between GHG inventory data and Eurostat monthly data for 2013

COUNTRY	FUEL TYPES	*CRF table 1.A(b)*	*Monthly*	*Difference*		Systematic issue	*Explanations and comments*
			kt	*abs*	*%*		
Belgium	**Total solid**	**4,917**	**3,994**	**-923**	**-18.8%**	**Yes**	Differences in imports
	Hard Coal	4,997	4,092	-905			
France	**Total solid**	**21,317**	**20,052**	**-1,265**	**-5.9%**	**Yes**	Table 1.A(b) only include consumption data
	Hard Coal	20,566	19,563	-1,003			
Lithuania	**Total solids**	**427**	**513**	**86**	**20.0%**	**No**	BKB is reported under monthly Eurostat data, but not in Table 1.A(b)
Luxembourg	**Total solid**	**81**	**76**	**-5**	**-6.4%**	**Yes**	Very small amount
Netherlands	**Total solid**	**13,846**	**12,890**	**-956**	**-6.9%**	**Yes**	Differences in all flows, export most relevant
	Hard Coal	13,770	12,891	-879			
Austria	**Total solid**	**4,877**	**4,449**	**-428**	**-8.8%**	**Yes**	Differences in imports
	Hard Coal	3,565	3,229	-336			
Slovenia	**Total solid**	**4,487**	**4,045**	**-442**	**-9.9%**	**Yes**	Hard coal is missing in monthly
	Hard Coal	420	0	-420			
Sweden	**Total solid**	**3,669**	**3,252**	**-417**	**-11.4%**		
	Hard Coal	2,832	2,528	-304		**Yes**	Differences in stock change
	Peat	768	639	-129		**Yes**	Differences in production

3.3.3 Gaseous fuels

In 2008 ten Member States showed differences of less than 2% between monthly Eurostat and GHG inventory data for natural gas consumption. These ten Member States are responsible for 38 % of EU-27 total natural gas consumption. Differences greater than 5% could be identified for four Member States (see Table 3-15). These four Member States only account for 6 % of EU-27 total natural gas consumption.

In 2013, the last reporting year for which GHG inventory data is available, data differences between monthly Eurostat and GHG inventory data below 2% were found for nineteen Member States. The natural gas consumption of these nineteen Member States accounts for 65% of the total EU-28 natural gas consumption. For 2013 there

are differences above 5% in two Member States, which account for only 3% of EU-28 total natural gas consumption.

Hence, the consistency between monthly Eurostat data and the fuel consumption reported in the GHG inventory table 1.A(b) improved in the case of natural gas.

Table 3-15 Difference between natural gas consumption in GHG inventory (CRF table 1.A(b)) and monthly Eurostat data, 2008-2013

Member States	2008	2009	2010	2011	2012	2013	Share of emissions from natural gas in total energy CO2 emissions (%) in 2013
Belgium	-19%	-11%	-18%	-26%	-45%	-1%	35%
Bulgaria	1%	-3%	0%	-4%	-10%	-3%	12%
Czech Republic	0%	0%	-4%	0%	-2%	-1%	17%
Denmark	-1%	0%	-1%	-3%	-5%	0%	20%
Germany	5%	9%	10%	0%	-5%	-3%	22%
Estonia	11%	-10%	-12%	-3%	3%	1%	5%
Ireland	-21%	-1%	1%	3%	3%	4%	26%
Greece	3%	2%	1%	2%	2%	0%	9%
Spain	0%	0%	0%	0%	0%	0%	27%
France	-1%	-7%	-3%	6%	-5%	-4%	26%
Croatia	NE	NE	NE	5%	-10%	-9%	26%
Italy	0%	0%	0%	0%	0%	0%	40%
Cyprus	NO	NO	NO	NO	NO	NO	-
Latvia	0%	0%	0%	0%	0%	-1%	42%
Lithuania	0%	0%	27%	0%	0%	0%	28%
Luxembourg	-3%	0%	0%	0%	0%	0%	22%
Hungary	2%	-1%	-13%	-2%	3%	-1%	43%
Malta	NO	NO	NO	NO	NO	NO	-
Netherlands	4%	-1%	-1%	3%	0%	0%	47%
Austria	-4%	-6%	-5%	-6%	-1%	-1%	29%
Poland	3%	0%	0%	0%	0%	0%	9%
Portugal	-1%	-1%	-26%	-1%	2%	3%	20%
Romania	-4%	-2%	2%	3%	3%	5%	33%
Slovenia	-5%	-3%	-4%	-7%	-9%	0%	11%
Slovakia	-10%	20%	1%	22%	23%	1%	35%
Finland	3%	0%	-7%	0%	0%	-1%	13%
Sweden	1%	2%	73%	-1%	-1%	0%	5%
United Kingdom	3%	-2%	0%	0%	0%	0%	35%
<+/- 2%	10 MS	14 MS	12 MS	13 MS	12 MS	19 MS	
+/-2-5%	11 MS	5 MS	4 MS	8 MS	6 MS	5 MS	
> +/- 5%	4 MS	6 MS	9 MS	5 MS	8 MS	2 MS	

Note: Data for Croatia is included from 2011 onwards.
NE is used for countries where cumulated monthly data could not be estimated, as they were been available or are incomplete
NO is reported if there is no natural gas consumption in the country.
GHG inventory data = 100%, a positive value indicates that monthly Eurostat data is higher than GHG inventory data, a negative value indicates that monthly Eurostat data is lower than GHG inventory data.
Source: Extraction from Eurostat database in the specific year

3.4 Comparison of Eurostat annual energy data with GHG inventory data

This section provides comparisons of the annual Eurostat data and GHG inventory data from the reference approach table 1.A(b) from UNFCCC submissions for fuel consumption data of liquid, solid and gas fuel types for the years 2008-2013[8]. The comparison is based on physical units (kt) which are reported by Eurostat data and in the CRF table (1.A(b). As some Member States provide Table 1.A(b) only in TJ, GHG inventory data for these Member States was converted to physical units for the comparison with Eurostat annual fuel consumption data using net calorific values from Member States national inventory reports.

The following sub-chapters summarize large differences between annual Eurostat and GHG inventory data for aggregate fuel categories liquid, solid and gaseous fuels. Table 8-5 in the Annex provides a comparison of GHG inventory data and annual Eurostat data for the three aggregate fuel categories for all Member States.

The comparison of energy data on fuel consumption reported as annual data to Eurostat and the energy data used in the GHG inventory table 1.A(b) reveals that many Member States use different data sources for the inventory and for reporting to Eurostat as annual data. The following sub-chapters provide an overview of the differences for the reporting of liquid, solid and gaseous fuel consumption. A detailed analysis based on individual fuels is not provided, as this is not relevant for the improvement of Eurostat monthly energy data and the calculation of the early CO_2 estimates.

3.4.1 Liquid fuels

In 2008, sixteen Member States showed differences of less than 2 % between annual Eurostat data and GHG inventory data for liquid fuel consumption. These sixteen Member States were responsible for 46 % of total EU-27 liquid fuel consumption. Differences greater than 5 % could be identified for four Member States (see Table 3-16). These four Member States accounted for only 4 % of EU-27 total liquid fuel consumption.

In 2013, the last reporting year for which annual Eurostat and GHG inventory data are available, the number of Member States with differences between annual and GHG inventory data of less than 2 % decreased to fourteen. Liquid fuel consumption of these fourteen Member States accounts for 56 % of the total EU-28 liquid fuel consumption. The number of Member States that have larger differences of above 5 % increased to five Member States in 2013, making up a share of 5 % of the EU-28 total liquid fuel consumption. In comparison to 2012 the differences between annual Eurostat and annual GHG inventory data increased for five Member States from < 2 % to > 2 %

8 http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php

(Belgium, Hungary, Netherlands and Slovenia), while for three Member States it increased from < 5 % to > 5 % (Latvia, Finland, Sweden).

So far, there has not been a systematic improvement of the consistency between annual Eurostat energy data on liquid fuel consumption and the liquid fuel consumption data reported in the GHG inventory table 1.A(b) across all Member States.

Table 3-16 Difference in liquid fuel consumption between GHG inventory data (table 1.A(b) and annual Eurostat data, 2008-2013

Member States	2008	2009	2010	2011	2012	2013	Share of emissions from liquid fuels in total energy CO2 emissions (%) in 2013
Belgium	-1%	1%	2%	-1%	0%	-2%	48%
Bulgaria	1%	0%	-1%	0%	1%	0%	25%
Czech Republic	2%	1%	1%	3%	0%	1%	19%
Denmark	1%	6%	-13%	-3%	2%	0%	45%
Germany	3%	3%	1%	0%	-1%	-1%	33%
Estonia	452%	5%	-6%	-1%	8%	2%	5%
Ireland	-9%	-18%	2%	-2%	7%	3%	49%
Greece	0%	-4%	-2%	-7%	7%	0%	42%
Spain	0%	0%	2%	2%	1%	2%	55%
France	-3%	2%	-4%	-4%	-5%	-3%	58%
Croatia	NE	NE	NE	-3%	0%	-2%	57%
Italy	-5%	-7%	-5%	-4%	-5%	-4%	43%
Cyprus	7%	5%	1%	0%	2%	0%	99%
Latvia	0%	0%	-3%	1%	3%	5%	52%
Lithuania	-1%	-5%	-8%	-8%	-7%	-8%	60%
Luxembourg	-2%	-2%	0%	1%	4%	3%	76%
Hungary	-1%	1%	-1%	-6%	-1%	-3%	32%
Malta	NE	-7%	3%	34%	-11%	-5%	100%
Netherlands	2%	3%	1%	3%	-1%	-2%	32%
Austria	-1%	-1%	-4%	-1%	0%	0%	58%
Poland	-2%	-1%	-2%	0%	0%	0%	19%
Portugal	-2%	-2%	1%	3%	-3%	-1%	56%
Romania	-15%	-9%	8%	3%	-1%	-2%	34%
Slovenia	4%	-1%	1%	2%	1%	3%	49%
Slovakia	-2%	-1%	-1%	-1%	-2%	-3%	29%
Finland	4%	4%	-5%	2%	2%	-6%	44%
Sweden	1%	-7%	3%	6%	4%	-6%	70%
United Kingdom	0%	1%	0%	-1%	-2%	-1%	36%
EU 27 /28	**1%**	**0%**	**1%**	**1%**	**-1%**	**-2%**	39%
<+/- 2%	16 MS	14 MS	14 MS	13 MS	14 MS	14 MS	
+/-2-5%	6 MS	5 MS	8 MS	10 MS	7 MS	9 MS	
> +/- 5%	4 MS	8 MS	5 MS	5 MS	7 MS	5 MS	

Note: Data for Croatia is included from 2011 onwards.
NE is used for countries where data could not be estimated, as they were available or are incomplete.
GHG inventory data = 100 %, a positive value indicates that annual Eurostat data is higher than GHG inventory data, a negative value indicates that annual Eurostat data is lower than GHG inventory data.
Source: Extraction from Eurostat database and GHG inventory submission to UNFCCC in the specific year

3.4.2 Solid fuels

In 2008 fifteen Member States showed differences of less than 2 % between annual Eurostat data and GHG inventory data for solid fuel consumption. These fifteen Member States are responsible for 77 % of total EU-27 solid fuel consumption.

Differences above 5 % could be identified for eight Member States (see Table 3-17), which account for 17 % of the EU-27 total solid fuel consumption.

In 2013, the last reporting year for which annual Eurostat and GHG inventory data are available, data differences between annual Eurostat data and GHG inventory data of less than 2 % could be found for 21 Member States. These 21 Member States account for 94 % of the total EU-28 solid fuel consumption. One Member States show differences greater than 5 %. This Member State consumes 3 % of EU-28 total solid fuels.

Compared to 2008 the reporting of solid fuels improved in many countries. Thus, in terms of the number of Member States with lower differences between annual Eurostat data and GHG inventory data the situation improved.

The situation of solid fuel consumption in Cyprus is a specific one: from 2008 to 2010 small volumes of bituminous coal were imported (max. 41 kt per year). In addition since 2008 1 kt of lignite import was reported every year. From 2012 onwards only 1 kt of lignite is reported under annual Eurostat data and GHG inventory data. These are amounts which can be neglected.

Table 3-17 Difference in solid fuel consumption between GHG inventory (Table 1.A(b) and annual Eurostat data, 2008-2013

Member States	2008	2009	2010	2011	2012	2013	Share of emissions from solid fuels in total energy CO2 emissions (%) in 2013
Belgium	0%	-3%	-1%	0%	1%	1%	13%
Bulgaria	1%	6%	0%	0%	0%	0%	63%
Czech Republic	1%	1%	1%	-1%	-3%	-2%	63%
Denmark	0%	0%	1%	1%	0%	-2%	32%
Germany	0%	0%	-1%	0%	0%	0%	43%
Estonia	0%	1%	0%	0%	0%	0%	88%
Ireland	10%	0%	-1%	0%	7%	-3%	25%
Greece	0%	0%	1%	0%	0%	0%	49%
Spain	0%	0%	0%	0%	0%	0%	18%
France	-11%	-4%	-9%	-10%	-11%	-12%	15%
Croatia	NE	NE	NE	0%	0%	0%	17%
Italy	2%	1%	1%	1%	2%	2%	16%
Cyprus	-1%	4%	4%	8%	NO	NO	-
Latvia	0%	2%	6%	8%	0%	0%	4%
Lithuania	10%	9%	8%	2%	4%	4%	10%
Luxembourg	18%	0%	0%	0%	0%	-1%	2%
Hungary	-10%	-5%	-8%	-6%	0%	0%	24%
Malta	NO	NO	NO	NO	NO	NO	-
Netherlands	-1%	-1%	-1%	-1%	-5%	-4%	20%
Austria	3%	0%	0%	0%	0%	1%	9%
Poland	-1%	-1%	3%	-1%	-1%	0%	71%
Portugal	0%	0%	0%	2%	1%	1%	23%
Romania	8%	10%	0%	0%	0%	0%	33%
Slovenia	0%	0%	0%	0%	0%	0%	39%
Slovakia	-1%	-1%	4%	-1%	-1%	0%	35%
Finland	-5%	-2%	0%	-1%	1%	-2%	42%
Sweden	13%	6%	5%	10%	-4%	0%	20%
United Kingdom	5%	14%	-1%	-1%	-1%	-1%	28%
EU 27 /28	**0%**	**1%**	**0%**	**-1%**	**-1%**	**-1%**	33%
<+/- 2%	15 MS	16 MS	18 MS	22 MS	20 MS	21 MS	
+/-2-5%	3 MS	5 MS	4 MS	0 MS	3 MS	4 MS	
> +/- 5%	8 MS	5 MS	4 MS	5 MS	3 MS	1 MS	

Note: Data for Croatia is included from 2011 onwards.
NE is used for countries where data could not be estimated, as they were not available or are incomplete.
NO is reported if there is no solid fuel consumption in the country.
GHG inventory data = 100 %, a positive value indicates that annual Eurostat data is higher than GHG inventory data, a negative value indicates that annual Eurostat data is lower than GHG inventory data.
Luxembourg reported municipal solid waste under the GHG inventory table 1.A(b) in 2008 and 2009. This amount is not taken into account here. Denmark reports municipal solid waste under solid fossils under GHG inventory table 1.A(b) for the whole time series. This amount is not taken into account here.

Source: Extraction from Eurostat database and GHG inventory submission to UNFCCC in the specific year

3.4.3 Gaseous fuels

In 2008 twenty-two Member States showed differences of less than 2% between annual Eurostat and GHG inventory data for monthly natural gas consumption. These twenty-two Member States are responsible for 82% of EU-27 total natural gas consumption. Differences greater than 5% were identified for Estonia (see Table 3-18), which consumes only 0.2% of EU-27 total natural gas.

In 2013, the last reporting year for which annual Eurostat and GHG inventory data are available, differences between annual Eurostat and GHG inventory data of less than 2% were found for 25 Member States. The natural gas consumption of these 25 Member States accounts for 81% of total EU-28 natural gas consumption. Germany's natural gas consumption amounts to the remaining 19% of the EU 28 and shows a difference of above 2 % between annual Eurostat and GHG inventory data. For 2013 no Member State shows differences above 5% between annual Eurostat data and GHG inventory data.

In the year 2013 all Member States except Germany, Estonia and the Netherlands seem to use the same data sources for the reporting of natural gas consumption for inventory compilation and reporting to Eurostat.

Hence, the consistency between annual Eurostat data and the energy data reported in the GHG inventory table 1.A(b) improved in the case of natural gas.

Table 3-18 Difference between natural gas consumption in GHG inventory (table 1.A(b) and annual Eurostat data, 2008-2013

Member States	2008	2009	2010	2011	2012	2013	Share of emissions from natural gas in total energy CO2 emissions (%) in 2013
Belgium	0%	0%	0%	-1%	0%	0%	35%
Bulgaria	1%	0%	-3%	0%	0%	0%	12%
Czech Republic	0%	0%	0%	0%	0%	0%	17%
Denmark	0%	0%	0%	0%	0%	0%	20%
Germany	4%	9%	0%	-1%	-1%	-4%	22%
Estonia	18%	3%	0%	-1%	3%	1%	5%
Ireland	0%	-1%	0%	0%	0%	0%	26%
Greece	3%	2%	1%	2%	2%	0%	9%
Spain	0%	0%	0%	0%	0%	0%	27%
France	0%	0%	-1%	5%	0%	0%	26%
Croatia	NA	NA	NA	11%	-1%	0%	26%
Italy	0%	0%	0%	0%	0%	0%	40%
Cyprus	NO	NO	NO	NO	NO	NO	-
Latvia	0%	0%	0%	0%	0%	0%	42%
Lithuania	0%	0%	27%	0%	0%	0%	28%
Luxembourg	0%	0%	0%	0%	0%	0%	22%
Hungary	0%	0%	0%	0%	0%	0%	43%
Malta	NO	NO	NO	NO	NO	NO	-
Netherlands	0%	0%	0%	0%	0%	-1%	47%
Austria	-1%	-5%	-1%	-1%	0%	0%	29%
Poland	0%	-2%	0%	0%	0%	0%	9%
Portugal	0%	0%	0%	-1%	0%	0%	20%
Romania	0%	0%	0%	0%	0%	0%	33%
Slovenia	0%	0%	0%	0%	0%	0%	11%
Slovakia	0%	0%	0%	0%	0%	0%	35%
Finland	0%	0%	0%	0%	0%	0%	13%
Sweden	1%	12%	-10%	0%	0%	0%	5%
United Kingdom	0%	0%	0%	0%	0%	0%	35%
EU 15	**1%**	**2%**	**0%**	**0%**	**0%**	**-1%**	
EU 27 /28	**-1%**	**-1%**	**0%**	**0%**	**0%**	**-1%**	
<+/- 2%	22 MS	19 MS	22 MS	24 MS	24 MS	25 MS	
+/-2-5%	2 MS	3 MS	1 MS	1 MS	2 MS	1 MS	
> +/- 5%	1 MS	3 MS	2 MS	1 MS	0 MS	0 MS	

Note: Data for Croatia is included from 2011 onwards.
NE is used for countries where data could not be estimated, as they were been available or are incomplete.
NO is reported if there is no natural gas consumption in the country.
GHG inventory data = 100%, a positive value indicates that annual Eurostat data is higher than GHG inventory data, a negative value indicates that annual Eurostat data is lower than GHG inventory data.
Source: Extraction from Eurostat database and GHG inventory submission to UNFCCC in the specific year

3.5 Comparison of Eurostat monthly energy data with early national statistics

For calculating reliable early CO_2 emissions for 2014 the quality of the 2013 and the 2014 Eurostat monthly energy data is essential. 2013 monthly data could already be analysed by comparing Eurostat monthly data with annual Eurostat data and GHG inventory data for the year 2013, but the quality of the 2014 Eurostat monthly energy

data has only been analysed in terms of completeness, gaps and outliers (see chapter 3.1). There are only a few data sources available that provide data 4 months after the reference year that can be used to check the quality of the Eurostat monthly data for 2014. In this case early national statistics can be used to cross-check the quality of Eurostat monthly data 2014.

This chapter provides a comparison of the trend changes from energy data on fuel consumption reported under early national statistics and cumulated monthly fuel consumption data of liquid, solid and gaseous fuel types provided by Eurostat. Some Member States make their early national energy statistics available on national websites (the references to these websites are documented in section 7 References). These statistics are published in different ways. Some Member States provide detailed information on individual fuel types and flows, while on other websites only the gross inland consumption for aggregated fuel categories is available. Therefore, the comparison of the different data sources is based on the trend changes compared to the previous year.

For the trend change of the year 2014/2013 early national statistics could be found for nineteen Member States. For most of these Member States there is a good correlation for the trend change of Eurostat monthly energy data and early national energy statistics below +/-2%.

The results of the detailed comparisons are presented in Table 3-19.

Table 3-19 Comparison of trend changes for fuel categories between Eurostat aggregated monthly energy data and early national statistics for the years 2014/2013 for individual Member States

Member States	Trend changes 2014/2013 Liquid fuels			Trend changes 2014/2013 Solid fuels			Trend changes 2014/2013 Gaseous fuels		
	Eurostat monthly data	Early national statistics	Difference	Eurostat monthly data	Early national statistics	Difference	Eurostat monthly data	Early national statistics	Difference
Bulgaria	105%	105%	0%	109%	108%	1%	99%	97%	2%
Denmark	98%	99%	-1%	81%	83%	-2%	84%	86%	-3%
Germany	99%	99%	0%	100%	94%	6%	89%	87%	2%
Estonia	87%	85%	2%	100%	104%	-4%	78%	78%	0%
Ireland	99%	102%	-3%	104%	100%	4%	97%	93%	4%
Spain	98%	99%	-1%	108%	105%	2%	91%	91%	0%
France	99%	97%	2%	74%	75%	-2%	87%	84%	4%
Latvia	108%	107%	1%	76%	77%	-1%	90%	90%	0%
Lithuania	109%	108%	1%	83%	84%	-1%	95%	95%	0%
Luxembourg	93%	91%	2%	103%	111%	-7%	95%	95%	0%
Netherlands	95%	97%	-1%	102%	110%	-7%	87%	86%	1%
Austria	98%	98%	0%	103%	90%	14%	92%	91%	1%
Portugal	92%	92%	0%	102%	101%	1%	92%	92%	0%
Romania	102%	101%	1%	100%	99%	2%	94%	96%	-2%
Slovenia	101%	97%	4%	78%	78%	0%	91%	91%	0%
Finland	114%	98%	16%	82%	89%	-8%	88%	86%	2%
Sweden	99%	100%	-1%	104%	101%	3%	83%	86%	-4%
United Kingdom	100%	99%	1%	80%	81%	-1%	91%	91%	1%

Note : Difference = Eurostat trend minus national trends
Source : National Statistics and Eurostat database

For some countries the comparison between Eurostat monthly energy data and early national statistics shows large differences between the trend changes of the aggregated fuel categories.

For liquid fuels a difference of 16% occurs for the trend changes for Finland. Finland provides early national statistics on total energy consumption for oil, coal, natural gas and for other categories[9]. The data is available in TJ or in annual trend change %. However, no detailed data is provided on single oil or coal products. Peat is reported separately and is not included in the trend change for Eurostat monthly energy data and in early national statistics for Finland in Table 3-19. For the year 2013 differences for liquid fuel consumption between Eurostat monthly energy data and GHG inventory data have also been identified in Table 3-11. A comparison of annual trend changes calculated from different data sources (Table 3-20) shows that the trend changes

[9] Finland early national statistics available under: http://193.166.171.75/Dialog/varval.asp?ma=010_ehk_tau_101_en&ti=Total+Energy+Consumption+by+Source+and+CO2+Emissions&path=../Database/StatFin/ene/ehk/&lang=1&multilang=en ist dieser link noch aktiv?

2013/2012 based on early national statistics almost match with trend changes calculated with GHG inventory data. However, trend changes calculated for 2012/2011 do not match very well for liquid and solid fuel consumption between early national statistics and annual Eurostat as well as GHG inventory data.

Table 3-20 Annual trend changes for consumption of aggregate fuel categories for Finland for the years 2008–2013 based on Eurostat monthly energy data, annual Eurostat data, early national statistics and GHG inventory data

		Liquid fuels				Solid fuels				Gaseous fuels			
Member States		Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF
Finland	2009/2008	93%		95%	95%	103%		98%	102%	88%		90%	90%
	2010/2009	101%		92%	102%	132%		131%	129%	103%		110%	110%
	2011/2010	94%		107%	100%	86%		85%	85%	94%		88%	88%
	2012/2011	92%	98%	87%	87%	84%	85%	80%	78%	89%	89%	89%	90%
	2013/2012	89%	96%	91%	99%	98%	106%	102%	104%	95%	93%	95%	95%
	2014/2013	114%	98%			95%	89%			88%	86%		

As it seems that different data sources were used for monthly reporting to Eurostat and for early national statistics, Finland should investigate if there are any possibilities to improve the reporting of monthly data on liquid and solid fuels to Eurostat.

In Germany, Luxembourg, the Netherlands, Austria and Finland larger differences in the trend changes for solid fuels occur when early national statistics are compared with Eurostat monthly data.

Germany published early national statistics in March 2015 under AGEB[10] (AG Energiebilanzen e.V). This statistic contains data on primary energy consumption for oil, hard coal, lignite, natural gas and other sources for the years 2013 and 2014 in PJ. The differences for Germany are related to the reporting of hard coal consumption (Table 3-21). While the calculated trend change with Eurostat monthly data shows an increase of 3% (=103%), the calculated trend change with early national statistics shows a decrease of 8% (=92%) between 2014 and 2013. Hard Coal consumption has been systematically underreported under Eurostat monthly data (Table 3-21, see also differences between annual and monthly Eurostat data Table 3-8 and Eurostat monthly data and GHG inventory data Table 3-13). A deeper analysis revealed that mainly the import figures for coking coal and figures for the transformation output from coking plants are far too low in the monthly reporting to Eurostat. Germany should therefore investigate the possibility to submit better monthly data on hard coal consumption to Eurostat. These seem to be available, as early national statistics use other data.

[10] http://www.ag-energiebilanzen.de/6-0-Primaerenergieverbrauch.html

Table 3-21 Hard coal and lignite consumption in Germany for the year 2013 and 2014 based on different data sources

Germany	2013	2014	Trend change 2014/2013
	TJ		%
Total solid fuel (national statistics)	3,418,000	3,219,000	94%
Total solid fuel (monthly Eurostat)	3,106,286	3,093,728	100%
Hard Coal (national statistics)	1,788,000	1,647,000	92%
Hard Coal (monthly Eurostat)*	1,450,830	1,487,957	103%
Lignite (national statistics)	1,630,000	1,572,000	96%
Lignite (monthly Eurostat)**	1,655,456	1,605,771	97%
*Conversion factor 27.4 TJ/kt NCV for hard coal **Conversion factor 9.07 TJ/kt NCV for lignite			

Austria publishes early national statistics on gross inland consumption in TJ[11] for single fuel categories. The differences for Austria shown in Table 3-19 are related to hard coal consumption, where the calculated trend change with Eurostat monthly data is 97 % in comparison to the calculated trend change with early national statistics which is 89 % between 2014 and 2013. The reporting of monthly Eurostat solid fuels show large differences for Austria compared to annual Eurostat data and compared to the fuel consumption used for the GHG inventory data table 1.A(b) for most years (Table 3-8 and Table 3-13). The comparison of annual trend changes from different data sources in Table 3-22 shows that trend changes calculated with data from early national statistics match very well with trend changes calculated with Eurostat annual and GHG inventory data. Austria should investigate potential improvements of its monthly data for hard coal submitted to Eurostat. Better monthly data seem to be available, as early national statistics use other data which are more consistent with inventory data.

Table 3-22 Annual trend changes for consumption of aggregate fuel categories for Austria for the years 2008–2013 based on Eurostat monthly energy data, annual Eurostat data, early national statistics and GHG inventory data

		Liquid fuels				Solid fuels				Gaseous fuels			
Member States		Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF
Austria	2009/2008	98%		95%	96%	83%		78%	78%	98%		96%	98%
	2010/2009	103%		101%	104%	128%		117%	119%	111%		115%	110%
	2011/2010	97%		96%	93%	97%		103%	102%	94%		94%	94%
	2012/2011	98%		99%	98%	84%		93%	94%	100%		96%	95%
	2013/2012	97%	102%	102%	102%	111%	101%	102%	101%	95%	94%	95%	95%
	2014/2013	93%	98%			103%	90%			92%	91%		

Note: The dismatch of the trend change for liquid fuel consumption 2014/2013 between Table 3-22 and Table 3-19 is due to the gap filling of international bunkers in the monthly data used for calculating CO_2 emissions for 2014. The table above shows the trend change based on original data submitted to Eurostat.

11 http://www.statistik.at/web_de/statistiken/energie_umwelt_innovation_mobilitaet/energie_und_umwelt/energie/energiebilanzen/index.html

Solid fuel consumption accounts for a very small share in Luxembourg's total fuel consumption. According to GHG inventory data 2013 solid fuel consumption in Luxembourg is only 84 kt. Thus the differences in the trend changes can be neglected.

The Netherlands publishes early national statistics that include energy consumption for aggregated fuel categories crude and petroleum products, hard coal and coal products in PJ[12]. According to Table 3-13 there are differences in solid fuel consumption between monthly Eurostat and GHG inventory data in the last three years. According to Table 3-23 calculated trend changes based on early national statistics show a good match with trend changes based on GHG inventory data. If other data sources such as early national statistics are available the country should investigate if the data sources used for early national statistics are more appropriate for reporting to Eurostat as monthly statistics.

Table 3-23 Annual trend changes for consumption of aggregate fuel categories for Netherlands for the years 2008–2013 based on Eurostat monthly energy data, annual Eurostat data, early national statistics and GHG inventory data

		Liquid fuels				Solid fuels				Gaseous fuels			
Member States	**Trend changes**	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF
Nether-lands	2009/2008	99%		98%	97%	94%		93%	93%	96%		101%	101%
	2010/2009	104%		102%	105%	101%		101%	101%	112%		112%	112%
	2011/2010	95%		97%	95%	137%		99%	98%	91%		87%	87%
	2012/2011	101%	103%	103%	108%	97%	110%	110%	115%	93%	96%	96%	96%
	2013/2012	96%	98%	95%	96%	81%	99%	100%	98%	102%	102%	101%	102%
	2014/2013	95%	97%			102%	110%			87%	86%		

Trend changes for natural gas consumption do not show discrepancies greater than 5 % for all countries.

[12] http://statline.cbs.nl/StatWeb/dome/?LA=EN

4 Early CO_2 estimates for the year 2014

4.1 Data improvements to correct trend changes of Eurostat monthly energy data

For calculating early CO_2 estimates for the year 2014 Eurostat monthly energy data for the year 2013 (as available in April 2014) and Eurostat monthly energy data for the year 2014 (as available in April 2015) have been used. Due to improvements in the reporting quality and the absence of obvious large outliers in monthly 2013 and 2014 Eurostat data, only small adaptations to the adopted method as explained in section 2.1 were made.

For improving the trend changes that were used to calculate 2014 CO_2 emissions the following two options for adaptations were used:

1. Austria and the United Kingdom improved their reporting of international bunkers and reported international bunkers of jet kerosene in the 2014 monthly data for the first time. To ensure a correct trend change between 2013/2014, the 2013 monthly data (as available in 2014) have been gap filled with data on international bunkers for jet kerosene with annual Eurostat data for international bunkers in 2013.
2. The trend changes were calculated on the basis of physical units and energy units. For most countries the results are very similar. However for Germany, Hungary and Poland, the two approaches resulted in small differences for the trend changes for solid fuels. For these countries, trend changes for solid fuels calculated with energy units have been used for the 2014 calculation of early CO_2 estimates for Germany, Hungary and Poland (see 4.1.2).

4.1.1 Gap filling of international bunkers for jet kerosene

Austria reported international bunkers from Jet Kerosene in the monthly 2014 Eurostat data for the first time. In the calculation of the IPCC reference approach, bunkers used for international transport (shipping or aviation) are subtracted from the total fuel consumption, as they are not counted as emissions from national territories. Thus, if international bunkers are reported they can be subtracted and total liquid fuel consumption in 2014 is lower than in 2013. The trend change for 2014/2013 is calculated with 92.6 % when no correction is made. If international bunkers for the year 2013 in the monthly Eurostat data for jet kerosene are gap filled the 2013 monthly total liquid fuel consumption also decreases (as international bunkers where subtracted from consumption) and the trend change for 2014/2013 of total liquid fuel consumption arrives at 98.1 %, which is more realistic(see Table 4-1). This trend change has been used to calculate CO_2 emissions for Austria.

Table 4-1 Total liquid fuel consumption in Austria including international bunkers for 2013

Austria	2013	2014	Trend change 2014/2013
	kt		%
Total liquid fuel consumption	12,262	11,353	92.6%
International bunkers from Jet Kerosene	0	624	
International bunkers gap filled*	688		
Total liquid fuel consumption incl. bunkers 2013	11,574	11,353	98.1%

Note: * Figures provided by Eurostat have been used to gap fill international bunkers in monthly 2013 data

Also the United Kingdom started the reporting of international bunkers in monthly Eurostat data in 2014. Without including international bunkers in the monthly data 2013 the calculated trend change 2014/2013 for total liquid fuel consumption is 84.1 %. If international bunkers for jet kerosene are gap filled in the monthly 2013 Eurostat data by using annual Eurostat data for international bunkers the trend change arrives at 99.9 % for total liquid fuel consumption (see Table 4-2). This trend change has been used to calculate CO_2 emissions for the United Kingdom.

Table 4-2 Total liquid fuel consumption in the United Kingdom including international bunkers for 2013

United Kingdom	2013	2014	Trend change 2014/2013
	kt		%
Total liquid fuel consumption	65,912	55,419	84.1%
International bunkers from Jet Kerosene	0	10,824	
International bunkers gap filled*	10,418		
Total liquid fuel consumption incl. bunkers 2013	55,494	55,419	99.9%

Note: * Annual figures 2013 for international bunkers from Jet Kerosene have been used to gap fill monthly 2013 data

4.1.2 Calculation in physical units or energy units

The annual trend change between 2014 and 2013 used to calculate early CO_2 estimates was calculated based on Eurostat monthly data in physical units. Uncertainties arise from this approach due to the fact that different individual fuels in this fuel category are related to different NCVs and carbon contents and therefore the impact on emissions is not the same for all fuel types. Some fuel types with high carbon contents have a stronger impact on CO_2 emissions than other fuels which is not correctly weighted when the physical quantities of the fuels are used in the calculation. A modified approach (as described in 2.1.4) was used in which, as a first step, Eurostat fuel consumption data were converted from physical units into energy units (TJ) for all Member States based on Member States NCVs used in 2013 GHG inventories (i.e.

NCV reported by the Member States themselves) and, in a second step, the trend change relative to the previous year was calculated based on the fuel consumption in energy units. For most countries the results for the CO_2 emissions were very similar (see Table 8-4 in the Annex).

Only for Germany, Hungary and Poland differences in total CO_2 emissions with estimated trend changes in kt and in TJ are above 0.5 %. Emission estimates based on trend changes in TJ seem to be more reliable in the case of these three countries. Thus, for calculating CO_2 emissions for 2014 the trend changes of solid fuels are calculated in TJ for Germany, Hungary and Poland.

The difference at the level of trend changes calculated in kt and in TJ for DE is 1.4 percentage points. According to the data submitted to Eurostat hard coal consumption increases in 2014, while lignite consumption decreases (see Table 4-3). This results in a higher trend in the aggregation of total solid fuel consumption when energy units are used, which influences the total CO_2 emissions.

Table 4-3 Solid fuel consumption for 2013 and 2014 in kt and TJ for Germany

Fuel	Eurostat monthly data		Trend change	Eurostat monthly data		Trend change
	2013	2014	2014/2013	2013	2014	2014/2013
	kt		%	**TJ**		%
Total solid fuel	**237,599**	**233,670**	**98.3%**	**3,178,297**	**3,169,992**	**99.7%**
Hard Coal*	52,950	54,305		1,450,830	1,487,957	
Lignite**	182,520	177,042		1,655,456	1,605,771	
BKB and Patent fuels***	-1,288	-1,143		-25,374	-22,517	
Coke oven coke****	3,417	3,466		97,385	98,781	
*conversion factor of 27.4 TJ/kt is used for Hard Coal **conversion factor of 9.07 TJ/kt is used for Lignite ***conversion factor of 19.7 TJ/kt is used for BKB and patent fuels ****conversion factor of 28.5 TJ/kt is use for coke oven coke						

For Hungary there is a difference of 3.9 percentage points between trend changes for solid fuel consumption calculated in kt or in TJ (see Table 4-4). This affects the total CO_2 emissions.

Table 4-4 Solid fuel consumption for 2013 and 2014 in kt and TJ for Hungary

Fuel	Eurostat monthly data		Trend change	Eurostat monthly data		Trend change
	2013	2014	2014/2013	2013	2014	2014/2013
	kt		%	**TJ**		%
Total solid fuel	**10,796**	**10,359**	**96.0%**	**90,195**	**90,093**	**99.9%**
Hard Coal*	1,330	1,367		33,117	34,038	
Lignite**	9,985	9,399		71,892	67,673	
BKB***	6	5		148	124	
Coke Oven/Gas Coke****	-525	-412		-14,963	-11,742	
*conversion factor of 24.9 TJ/kt is used for Hard Coal **conversion factor of 7.2 TJ/kt is used for Lignite ***conversion factor of is used 24.7 TJ/kt for BKB ****conversion factor of is used 28.5 TJ/kt for Coke Oven/Gas Coke						

Total solid fuel consumption has a very large effect on Poland's CO_2 emissions. Thus even if the differences between trends in kt and TJ are only 1.2 percentage points, this change affects the CO_2 estimates (see Table 4-5). Thus, trend changes in TJ have been used for calculating 2014 CO_2 emissions for Poland.

Table 4-5 Solid fuel consumption for 2013 and 2014 in kt and TJ for Poland

Fuel	Eurostat monthly data		Trend change	Eurostat monthly data		Trend change
	2013	2014	2014/2013	2013	2014	2014/2013
	kt		%	**TJ**		%
Total solid fuel	**137,563**	**129,964**	**94.5%**	**2,120,592**	**1,979,527**	**93.3%**
Hard Coal*	77,968	72,493		1,746,483	1,623,843	
Lignite**	65,888	63,793		553,459	535,861	
Coke Oven/Gas Coke****	-6,293	-6,322		-179,351	-180,177	
*conversion factor of 22.4 TJ/kt is used for Hard Coal **conversion factor of 8.4 TJ/kt is used for Lignite ****conversion factor of is used 28.5 TJ/kt for Coke Oven/Gas Coke						

4.1.3 Corrections applied to Eurostat monthly energy data 2013 and 2014

For **Ireland** some **peat consumption** data are missing in the Eurostat monthly database for the year 2014 for confidentiality reasons. However, peat deliveries to main activity producer power plants are reported on a monthly basis. This figure is used to estimate the peat consumption, assuming that peat delivered to power plants represents about 72 % of the total peat consumption. This ratio was derived from

annual data of past years (2011-2013) for which a complete set of annual data for peat consumption is available.

For Ireland **hard coal consumption** data in the Eurostat monthly database are much lower than annual Eurostat data also for confidentiality reasons. This resulted in improbably low CO_2 estimates for Ireland. Similar to the approximation of peat consumption, the reported deliveries to main activity producer power plants were used to estimate monthly hard coal consumption data. It was assumed that this consumption represents about 78 % of the total hard coal consumption. This ratio was derived from previous data (2011-2013) for which hard coal consumption is available in annual data.

4.2 Results for 2014

The following steps were taken to calculate early CO_2 emissions for 2014:

1. Calculation of trend changes of the fuel consumption for the aggregated fuel categories (liquid, solid and natural gas) from Eurostat monthly energy data 2013 and 2014;
2. Calculation of CO_2 emissions for the three aggregate fuel categories by multiplying the trend changes with the CO_2 emissions of the GHG inventory data on CO_2 emissions of the Reference Approach table 1.A(b) for the year 2013 (as available in May 2015).

Table 4-6 and Table 4-7 show the calculation of the early CO_2 emissions according to the different steps.

Table 4-6 Calculation of trend changes for the aggregated fuel categories, 2014/2013

Member States	Monthly Eurostat data for liquid fuel consumption		Trend change liquids	Monthly Eurostat data for solid fuels without peat consumption		Trend change solids w.o.peat	Monthly Eurostat data for peat consumption		Trend change peat	Monthly Eurostat data for natural gas fuel consumption		Trend change natural gas
	2013	2014	2014/2013	2013	2014	2014/2013	2013	2014	2014/2013	2013	2014	2014/2013
	kt		%	kt		%	kt		%	TJ NCV		%
Belgium	21,984	22,469	102%	3,994	4,678	117%	NO	NO	-	594,578	520,738	88%
Bulgaria	3,509	3,680	105%	30,409	33,281	109%	NO	NO	-	96,513	95,599	99%
Czech Republic	7,996	8,490	106%	46,801	45,718	98%	NO	NO	-	289,558	258,585	89%
Denmark	6,303	6,152	98%	5,485	4,447	81%	NO	NO	-	139,353	116,431	84%
Germany	98,991	97,508	99%	237,599	233,670	98%	NO	NO	-	3,075,491	2,738,165	89%
Estonia	310	269	87%	20,246	20,336	100%	403	220	55%	23,233	18,236	78%
Ireland	5,792	5,733	99%	2,080	2,031	98%	3,941	4,239	108%	168,227	162,531	97%
Greece	11,180	10,993	98%	53,193	49,200	92%	NO	NO	-	135,392	103,783	77%
Spain	46,235	45,406	98%	20,420	21,961	108%	NO	NO	-	1,092,011	990,950	91%
France	72,138	71,208	99%	20,052	14,774	74%	NO	NO	-	1,570,531	1,364,721	87%
Croatia	3,083	2,903	94%	1,146	1,099	96%	NO	NO	-	87,207	79,616	91%
Italy	53,495	51,314	96%	21,783	20,975	96%	NO	NO	-	2,402,257	2,122,967	88%
Cyprus	1,800	1,864	104%	NE	NE	NE	NO	NO	-	NO	NO	-
Latvia	1,105	1,197	108%	129	97	75%	3	3	100%	50,200	45,274	90%
Lithuania	2,193	2,384	109%	447	387	87%	66	41	62%	90,554	86,157	95%
Luxembourg	2,365	2,209	93%	76	78	103%	NO	NO	-	37,259	35,302	95%
Hungary	5,784	6,044	104%	10,796	10,359	96%	NO	NO	-	320,365	292,156	91%
Malta	712	730	103%	NO	NO	NO	NO	NO	-	NO	NO	-
Netherlands	27,926	26,657	95%	12,890	13,183	102%	NO	NO	-	1,394,339	1,217,665	87%
Austria"	11,344	11,149	98%	4,449	4,455	100%	NE	108	-	290,772	267,122	92%
Poland	21,781	21,375	98%	137,563	129,964	94%	NO	NO	-	574,372	562,338	98%
Portugal	10,569	9,725	92%	4,450	4,519	102%	NO	NO	-	162,206	149,900	92%
Romania	8,095	8,227	102%	25,754	25,840	100%	NO	NO	-	430,846	404,690	94%
Slovenia	2,163	2,188	101%	4,045	3,163	78%	NO	NO	-	28,954	26,241	91%
Slovakia	3,042	2,919	96%	6,657	6,522	98%	NO	NO	-	203,223	133,253	66%
Finland	7,196	8,196	114%	6,023	4,955	82%	5,314	5,800	109%	118,526	104,086	88%
Sweden	11,559	11,471	99%	2,613	2,927	112%	639	471	74%	40,068	33,245	83%
United Kingdom	55,507	55,470	100%	61,027	48,781	80%	NO	NO	-	2,747,482	2,511,757	91%

Note: " International bunkers for jet kerosene have been gap filled in 2013 monthly Eurostat data , NO is used if there is no consumption, NE is used if the cumulated monthly data is incomplete.

Source: Extraction from Eurostat database in the specific year

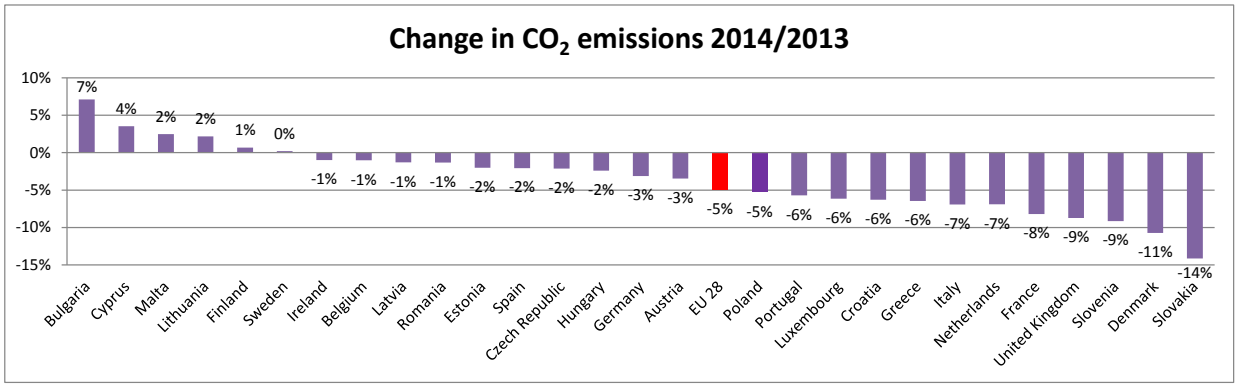
Table 4-7 Calculation of early CO_2 emissions for the year 2014

Member States	GHG Inventory data CO2 emissions from liquid fuels (provisional, inofficial submission 2015)	Trend change liquids without biofuels	CO2 emissions liquid fuels calculated with monthly Eurostat data	GHG Inventory data CO2 emissions from solid fuels without peat (provisional, inofficial submission 2015)	Trend change solids without peat	CO2 emissions solid fuels calculated with monthly Eurostat data	GHG Inventory data CO2 emissions from peat (provisional, inofficial submission 2015)	Trend change peat	CO2 emissions of peat consumption calculated with monthly Eurostat data	GHG Inventory data CO2 emissions from natural gas (provisional, inofficial submission 2015)	Trend change natural gas	CO_2 emissions natural gas calculated with monthly Eurostat data	**CO_2 emissions without waste and other fossils**
	2013	2014/2013	2014	2013	2014/2013	2014	2013	2014/2013	2014	2013	2014/2013	2014	**2014**
	kt CO_2	%	kt CO_2	kt CO_2	%	kt CO_2	kt CO_2	%	kt CO_2	kt CO_2	%	kt CO_2	**kt CO_2**
Belgium	45,254	102%	46,253	12,502	117%	14,643	NO	-	NO	32,751	88%	28,684	**89,580**
Bulgaria	10,141	105%	10,635	25,846	109%	28,287	NO	-	NO	4,733	99%	4,688	**43,610**
Czech Republic	18,019	106%	19,132	58,921	98%	57,557	NO	-	NO	16,117	89%	14,393	**91,083**
Denmark	17,755	98%	17,330	12,527	81%	10,156	NO	-	NO	7,884	84%	6,587	**34,073**
Germany*	255,163	99%	251,340	340,252	100%	339,060	NO	-	NO	172,994	89%	154,019	**744,419**
Estonia	1,083	87%	940	17,314	100%	17,391	272	55%	148	965	78%	758	**19,237**
Ireland	17,153	99%	16,978	5,254	98%	5,130	3,436	108%	3,695	9,245	97%	8,932	**34,736**
Greece	32,693	98%	32,147	36,332	92%	33,605	NO	-	NO	6,983	77%	5,353	**71,104**
Spain	126,496	98%	124,228	42,052	108%	45,225	NO	-	NO	61,118	91%	55,462	**224,915**
France	197,289	99%	194,746	50,880	74%	37,489	NO	-	NO	89,618	87%	77,874	**310,109**
Croatia	9,131	94%	8,598	2,684	96%	2,574	NO	-	NO	4,190	91%	3,825	**14,996**
Italy	163,154	96%	156,502	54,641	96%	52,615	NO	-	NO	135,848	88%	120,054	**329,171**
Cyprus	5,202	104%	5,387	-	-	NO	NO	-	NO				**5,387**
Latvia	3,086	108%	3,343	270	75%	203	9	100%	9	2,742	90%	2,473	**6,028**
Lithuania	6,572	109%	7,145	913	87%	790	177	62%	110	3,076	95%	2,926	**10,971**
Luxembourg	7,314	93%	6,832	156	103%	160	NO	-	NO	2,112	95%	2,001	**8,992**
Hungary*	12,751	104%	13,324	9,372	100%	9,361	NO	-	NO	17,050	91%	15,549	**38,233**
Malta	2,418	103%	2,479	NO	-	NO	NO	-	NO	1			**2,479**
Netherlands	41,879	95%	39,976	36,019	102%	36,838	NO	-	NO	74,525	87%	65,082	**141,896**
Austria"	31,192	98%	30,656	5,078	100%	5,085	0.47	-	0.47	15,495	92%	14,235	**49,976**
Poland*	55,696	98%	54,658	215,725	93%	201,366	2,489	-	2,489	27,683	98%	27,103	**285,616**
Portugal	25,565	92%	23,524	10,297	102%	10,457	NO	-	NO	8,808	92%	8,140	**42,121**
Romania	21,556	102%	21,908	21,159	100%	21,230	35	-	35	20,994	94%	19,720	**62,893**
Slovenia	6,931	101%	7,011	5,606	78%	4,384	NO	-	NO	1,592	91%	1,443	**12,837**
Slovakia	8,045	96%	7,719	9,715	98%	9,518	NO	-	NO	9,804	66%	6,428	**23,666**
Finland	20,275	114%	23,092	13,179	82%	10,842	6,011	109%	6,561	5,972	88%	5,244	**45,739**
Sweden	30,311	99%	30,081	7,759	112%	8,691	1,037	74%	764	2,048	83%	1,700	**41,236**
United Kingdom"	158,486	100%	158,381	123,082	80%	98,384	47	-	47	154,973	91%	141,677	**398,489**
EU 15	**1,169,981**	98%	**1,152,064**	**750,010**	94%	**708,379**	**10,531**	107%	**11,068**	**780,375**	89%	**695,044**	**2,566,555**
EU 13	**160,632**	101%	**162,280**	**367,527**	97%	**352,661**	**2,982**	56%	**2,792**	**108,947**	91%	**99,305**	**617,038**
EU 28	**1,330,613**	99%	**1,314,344**	**1,117,537**	96%	**1,061,040**	**13,513**	105%	**13,859**	**889,322**	89%	**794,350**	**3,183,593**

Note: * Trend changes of solid fuels were calculated in TJ; "International bunkers for jet kerosene have been gap filled in 2013 monthly Eurostat data , NO is used if there is no consumption, NE is used if the cumulated monthly data is incomplete.
Source: Eurostat database and Member States' inventory submissions UNFCCC 2014

Table 4-7 shows the results for early CO_2 estimates for the year 2014 based on the methodological approach described in section 2.1 and 4.1. These early estimates suggest that the CO_2 emissions from fuel combustion decreased for 22 Member States and increased for only 6 Member States in 2014 (see Figure 4-1). The calculations do not include CO_2 emissions from the new categories Waste and other fossil fuels that have been introduced in the reference approach calculation for the year 2014 in the GHG inventories, as there are no Eurostat monthly energy data available that could indicate the trend changes for these new fuel categories.

Figure 4-1 Relative changes in total fossil fuel consumption for all 28 EU-Member states for 2014/2013



The early estimates indicate that CO_2 emissions from the energy sector decreased by 5.0 % for the EU-28 between 2013 and 2014.

A short explanation for decreases or increases in emissions in 2014 for certain countries is provided below:

- Bulgaria: +7.1%, solid fuel consumption increased to 109% of 2013 consumption, liquid fuel consumption is 105% of 2013 consumption
    - Because of a strong increase of electricity exports, electricity generation increased while electricity consumption decreased resulting in higher solid fuel consumption in power plants (hard coal +21%, lignite +7%).[13]
- France: -8.2%, solid fuel consumption only 74% of 2013
    - Electricity heating was used less because of warm winter temperatures which led to a reduction of electricity production in fossil (mainly coal-fired) thermal power plants by 40%.[14]

[13] NSI: Production and deliveries of electricity, http://www.nsi.bg/sites/default/files/files/data/timeseries/Energy-1.4.Electricity_en.xls

[14] RTE: 2014 Annual Electricity Report, http://www.rte-france.com/sites/default/files/bilan_electrique_2014_en.pdf

- Germany: -3.1%, Natural gas consumption only 89% of 2013 gas consumption
    - Main driver of energy consumption were higher temperatures which led to lower consumption of heating oil and gas. Lower consumption of solid fuels was driven by both lower electricity consumption and higher renewable energy production.[15]
- Denmark: -10.7%, solid fuel consumption 81% of 2013 consumption, natural gas consumption 84% of 2013 consumption
    - Fossil energy consumption (solid, liquid, gaseous) decreased because of high temperatures, more renewable energy generation and higher electricity imports.[16]
- Italy: -6.9%, liquid and solid fuel consumption 96% of 2013 consumption, natural gas consumption 88% of 2013 consumption
    - Lower electricity generation and higher renewable generation led to a reduction of electricity generation in thermal power plants and lower fossil fuel consumption.[17]
- Netherlands: -6.9%, Natural gas consumption 87% of 2013 consumption
    - Consumption of liquid and gaseous fuels mainly decreased in final energy consumption.[18]
- Slovenia: -9.1%, solid fuel consumption only 74% of 2013 consumption.
    - Record-high hydro electricity production and strongly increased nuclear production[19]
- Slovakia: -14.1%, Natural gas consumption only 66% of 2013 consumption
- United Kingdom: -8.7%, solid fuel consumption only 80% of 2013 consumption, natural gas consumption only 91% of 2013 consumption

[15] AG Energiebilanzen: Energieverbrauch im Jahr 2014, http://www.ag-energiebilanzen.de/index.php?article_id=29&fileName=ageb_jahresbericht2014.pdf

[16] ENS: Lowest Danish energy consumption in 32 years, http://www.ens.dk/en/info/news-danish-energy-agency/lowest-danish-energy-consumption-32-years

[17] Terna: Rapporto Mensile sul Sistema elettrico consuntivo dicembre 2014, http://www.terna.it/LinkClick.aspx?fileticket=xlb5XQtu648%3d&tabid=379&mid=3013 link inaktiv?

[18] CBS: Energy balance sheet key figures, http://statline.cbs.nl/Statweb/publication/?DM=SLEN&PA=37281ENG&D1=11-15&D2=a&D3=127%2cl&LA=EN&VW=T

[19] SURS: Energy dependency of Slovenia in 2014 at 44%, the lowest ever http://www.stat.si/StatWeb/en/show-news?id=5190&title=Energetika-Slovenija-2014

- Electricity production from coal was reduced by more than 25%. High winter temperatures led to less gas consumption.[20]

[20] DECC: UK Energy Statistics, 2014 & Q4 2014, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416310/PN_March_15.pdf

5 Comparison of previous early CO_2 estimates with final CO_2 emissions in Member States' GHG inventories

5.1 Changes due to implementation of 2006 IPCC Guidelines

For the reporting year 2013 the implementation of the 2006 IPCC Guidelines became mandatory for each Member State. The calculations of the early CO_2 estimates for the year 2013 (published in May 2014) were based on the UNFCCC inventory submission 2014 (reporting year 2012). Reporting of this submission was based on the 1996 IPCC Guidelines and IPCC Good Practice Guidance (2000). In 2015 the calculation for the inventory year 2013 became available which is based on the 2006 IPCC Guidelines. Comparison of the 2013 early estimates (calculated in 2014 based on 1996 IPCC Guidelines) and Inventory 2013 estimates (calculated in 2015 based on 2006 IPCC Guidelines) is therefore difficult as the estimates are based on different methodological guidance. The following differences in the reference approach between 2006 IPCC Guidelines and 1996 IPCC Guidelines exist:

- According to the 2006 IPCC Guidelines two new emission categories (Waste (non-biomass fraction) and Other fossil fuels) have been included (see Table 2-1). Under Eurostat monthly energy data no data on waste or other fossils is available. By comparing the total CO_2 emissions for 2013 calculated as early estimates and the inventory calculations it is unclear, if countries already reported emissions of the new categories in their old submissions under other categories (i.e. under solid fuels).
- Different default IPCC NCVs for fuels and default IPCC carbon emission factors (IPCC 2006 GL, Volume 2, table 2.2-2.5 and 3.2.1)
- Changes in carbon stored and excluded
    - Reductants in iron & steel industry (coke and petroleum coke): quantities of coke delivered for the iron and steel and non-ferrous metals industries should be excluded from total carbon in the reference approach
    - Non-energy fuel use: all delivery of lubricants should be excluded from the reference approach (even if combusted in 2-stroke engines)
    - Feedstocks (Naphtha, LPG, refinery gas etc.): all deliveries to petrochemical feedstocks should be excluded, not subtracting products that later go into combustion
- New default values for fractions of carbon stored
- Changes in fraction of carbon oxidized (changed from 0.99 to 1)

Thus there are various changes related to the implementation of the 2006 IPCC Guidelines. Not all Member States calculations are affected by the changes of the IPCC methodology. Where Member States have been using country-specific values for NCVs, fractions of carbon stored, fractions of carbon oxidized etc., and not the previous IPCC default values, then there will not be large changes compared to the

previous submission. Changes will only be related to the reporting of emissions of the two new categories and the implementation of differences in carbon stored. The changes in the 2006 IPCC Guidelines increase the differences between early estimates and inventory calculations for the year 2013 if comparing absolute CO_2 emissions in kilotons (kt). The differences on country level are in most cases related to changes in the methodology and reflected in the recalculations. Only for few Member States the differences are based on the differences in the activity data reported under monthly data to Eurostat and activity data used in the GHG inventory.

5.2 Comparison of results of early CO_2 estimates with final GHG inventory data

Each year, Member States perform recalculations of GHG inventory data reported to the UNFCCC in previous years for different reasons such as the improvement of emission factors, improvement of methodologies or updated activity data. Such methodological changes at Member State level cannot be captured by any methodological approach for the calculation of early CO_2 estimates and will always result in differences between the early CO_2 estimates and the GHG inventory data in absolute CO_2 emissions in kt in particular if the recalculations arise from changes in emission factors or methodologies used in the inventories. Thus, inventory recalculations are a general source of uncertainty for early CO_2 estimates at EU level which cannot be reduced through refinement of the methodological approach.

Due to the changes in the inventory data a comparison on the basis of total CO_2 emissions in kt is not possible. However the relevant information is the change in emissions compared to last year. Besides all the changes related to the implementation of the IPCC 2006 Guidelines, the comparison of the results based on trend changes shows rather good results for the year 2013 (see Table 5-1). Only for Belgium, Estonia, Portugal, Slovenia and Slovakia the differences are above +/-4 %, while differences above +/-2 % are found for Germany, Greece, Spain and Malta. In addition to the height of the deviation also deviations in the signs are relevant. For the Member States it will be important if the trend change of the calculated CO_2 estimates shows an increase or a decrease in CO_2 emissions. For the calculation of the year 2013 different signs are found for the estimates of CO_2 emissions in Belgium, France and Portugal.

Table 5-1 Comparison of early CO_2 emission estimates with final GHG inventory CO_2 emissions (CRF table 1A(b)) for 2013 – Changes in CO_2 emissions from fossil fuel combustion

Member States	Eurostat early CO_2 estimates	Member States GHG inventory emission data (CRF table 1.A(b))	Difference trend changes Monhtly-CRF
Total	Change 2013/2012		%
Belgium	-0.3%	3.8%	-4.1%
Bulgaria	-10.2%	-12.1%	1.9%
Czech Republic	-2.9%	-2.4%	-0.5%
Denmark	6.8%	5.3%	1.5%
Germany	2.0%	4.0%	-2.0%
Estonia	4.4%	13.3%	**-8.9%**
Ireland	-3.8%	-4.0%	0.3%
Greece	-10.2%	-12.4%	2.2%
Spain	-12.6%	-10.4%	-2.2%
France	0.6%	-0.9%	1.5%
Croatia	-1.7%	-1.1%	-0.6%
Italy	-6.6%	-7.6%	1.0%
Cyprus	-14.7%	-14.1%	-0.6%
Latvia	-4.2%	-2.4%	-1.8%
Lithuania	-5.8%	-4.7%	-1.0%
Luxembourg	-3.7%	-5.3%	1.5%
Hungary	-6.9%	-6.5%	-0.3%
Malta	-6.8%	-10.4%	3.6%
Netherlands	-0.3%	-0.5%	0.3%
Austria	-2.1%	-1.1%	-1.0%
Poland	0.3%	1.6%	-1.3%
Portugal	3.6%	-4.4%	**8.0%**
Romania	-14.6%	-12.7%	-1.9%
Slovenia	-12.0%	-4.0%	**-8.0%**
Slovakia	-6.2%	-1.6%	-4.6%
Finland	-2.8%	-2.0%	-0.8%
Sweden	-4.2%	-6.2%	2.0%
United Kingdom	-2.4%	-3.2%	0.8%
EU 15	-2.2%	-2.0%	**-0.2%**
EU 13	-3.9%	-2.4%	**-1.5%**
EU 28	-2.5%	-2.1%	**-0.4%**

Source: Eurostat early CO_2 estimates, MS GHG inventory submissions to UNFCCC

The following tables (Table 5-2) show the differences of changes in emissions for the CO_2 emissions of the aggregated categories liquid fossils, solid fossils and gaseous fossils. The countries with high deviations of trend changes for total CO_2 emissions show high deviations in most of the aggregated categories:

- Belgium for trend changes in liquid and solid fuel consumption,
- Estonia and Slovenia for trend changes in liquid, solid and gaseous fuel consumption,
- Portugal only for trend changes in liquid fuel consumption,
- Slovakia for trend changes in liquid and gaseous fuel consumption.

A detailed comparison for countries with deviations of changes in total CO_2 emissions of above +/- 4 % is provided in Chapter 5.4.

Table 5-2 Comparison of early CO_2 emission estimates for liquid, solid and gaseous CO_2 emissions between Eurostat early estimates and Member States inventory emission data (Table 1.A(b)) for the year 2013

Member States	Eurostat early CO_2 estimates	Member States GHG inventory emission data (CRF table 1.A(b))	Difference trend changes Monhtly-CRF	Eurostat early CO_2 estimates	Member States GHG inventory emission data (CRF table 1.A(b))	Difference trend changes Monhtly-CRF	Eurostat early CO_2 estimates	Member States GHG inventory emission data (CRF table 1.A(b))	Difference trend changes Monhtly-CRF
	Liquid fuels			Solid fuels			Gaseous fuels		
Total	Change 2013/2012		%	Change 2013/2012		%	Change 2013/2012		%
Belgium	0.5%	7.9%	-7.4%	-0.9%	6.2%	-7.2%	-1.1%	0.1%	-1.2%
Bulgaria	-4.5%	-8.4%	3.9%	-14.8%	-14.9%	0.1%	4.3%	-3.6%	7.8%
Czech Republic	-2.6%	-2.5%	-0.1%	-4.5%	-3.4%	-1.1%	3.0%	1.5%	1.5%
Denmark	-0.3%	-1.8%	1.5%	26.6%	28.2%	-1.5%	-4.4%	-5.2%	0.9%
Germany	1.4%	4.8%	-3.4%	-0.8%	2.3%	-3.1%	8.3%	8.9%	-0.5%
Estonia	-33.5%	-15.7%	-17.8%	7.9%	17.0%	-9.2%	1.7%	-20.8%	22.6%
Ireland	2.5%	-1.0%	3.4%	-15.1%	-10.6%	-4.5%	-3.0%	-3.7%	0.7%
Greece	-6.7%	-10.4%	3.7%	-12.8%	-14.0%	1.2%	-11.8%	-12.6%	0.8%
Spain	-6.6%	-3.8%	-2.8%	-31.7%	-28.6%	-3.0%	-7.7%	-7.4%	-0.3%
France	-1.8%	-4.1%	2.3%	6.7%	9.9%	-3.2%	3.1%	1.6%	1.5%
Italy	-5.1%	-6.4%	1.3%	-10.5%	-12.8%	2.3%	-6.5%	-6.9%	0.4%
Cyprus	-14.7%	-14.2%	-0.5%	NO	NO	-	NO	NO	-
Latvia	-4.0%	-0.8%	-3.2%	-31.3%	-20.9%	-10.3%	-1.0%	-2.1%	1.1%
Lithuania	-2.2%	-3.5%	1.3%	17.4%	15.0%	2.4%	-18.5%	-15.2%	-3.3%
Luxembourg	0.4%	-1.7%	2.1%	-15.6%	-12.9%	-2.7%	-15.0%	-15.5%	0.5%
Hungary	1.4%	-3.0%	4.4%	-10.0%	-9.7%	-0.2%	-10.7%	-7.1%	-3.7%
Malta	-6.8%	-10.5%	3.7%	NO	NO	-	NO	NO	-
Netherlands	-3.6%	-4.6%	1.0%	0.2%	0.2%	0.0%	1.9%	1.8%	0.1%
Austria	1.9%	2.2%	-0.4%	-7.4%	0.0%	-7.4%	-5.4%	-6.2%	0.8%
Poland	-6.6%	-7.7%	1.1%	2.4%	4.3%	-1.9%	0.9%	1.0%	-0.1%
Portugal	11.8%	2.0%	9.8%	-8.7%	-9.0%	0.3%	-3.8%	-11.8%	8.0%
Romania	-5.0%	-3.9%	-1.1%	-28.0%	-23.6%	-4.4%	-7.5%	-8.5%	1.0%
Slovenia	-12.0%	-4.2%	-7.8%	-17.1%	-4.3%	-12.8%	6.9%	-2.6%	9.5%
Slovakia	-2.8%	-8.1%	5.3%	-5.3%	-6.5%	1.2%	-9.9%	9.8%	-19.6%
Finland	-10.6%	-12.2%	1.7%	7.8%	13.0%	-5.3%	-5.5%	-7.0%	1.5%
Sweden	-5.7%	-8.9%	3.2%	3.9%	1.0%	2.9%	-4.8%	-5.6%	0.8%
United Kingdom	-2.3%	-2.1%	-0.2%	-4.0%	-7.7%	3.7%	-0.9%	-0.5%	-0.5%
EU 15	-2.1%	-2.0%	**-0.1%**	-4.4%	-3.3%	**-1.1%**	-0.3%	-0.5%	**0.2%**
EU 13	-5.3%	-6.0%	**0.7%**	-3.2%	-0.9%	**-2.3%**	-4.0%	-2.7%	**-1.4%**
EU 28	-2.5%	-2.5%	**0.0%**	-4.0%	-2.5%	**-1.5%**	-0.7%	-0.7%	**0.0%**

Source: Eurostat early CO_2 estimates, MS GHG inventory submissions to UNFCCC

5.3 Results of comparisons between early CO_2 estimates for the years 2011 to 2013 with final inventory data

Table 5-4 provides a comparison of early CO_2 emission estimates based on Eurostat monthly energy data calculated for the years 2011, 2012 and 2013 with the final[21] inventory data (CRF table 1.A.(b)) for the same year. This is a comparison of the early CO_2 estimates against the published authoritative CO_2 emissions reports under the UNFCCC based on trend changes of CO_2 emissions in comparison to the previous year and not on absolute CO_2 emissions in kilotons.

The results for the year 2011 that have been calculated in the previous project are based on the original Eurostat monthly data without applying any corrections and revised monthly data. For the calculation of the 2012 CO_2 emissions, some corrections are applied to the Eurostat monthly energy data in order to produce reliable early CO_2 estimates.

This comparison shows that the closeness of the early CO_2 estimates to final GHG inventory is constantly improving. In 2011 the closeness of the early CO_2 emission estimates to the final GHG inventory data on CO_2 emissions from CRF table 1.A(b) is very low, in particular for the new Member States (see Table 5-4). For EU-27, the early CO_2 emission estimates were 2.6% higher than the final CO_2 emissions; for EU-15, the trend changes from early CO_2 estimates were 1.9% higher; and for EU-12, the early estimates were 5.4 % higher. In 2013 the differences in trend changes at EU-27 level make up only -0.5 %, and in 2013 the differences were the lowest in the time series with only -0.4 % for EU 28.

[21] The inventory submission that becomes available on 27th of May will be referred to as the final GHG inventory (see Figure 2-1)

Table 5-3 Closeness of early CO2 emission estimates with final GHG inventory CO2 emissions (CRF table 1A(b))

	2011	2012	2013
Number of MS with a difference to final inventory of ≤ ±2%	10 MS	15 MS	19 MS
Contribution of those MS' to total EU-27/28 emissions	61%	44%	62%
Number of MS with a difference to final inventory of ± >2 and ≤ 5%,	5 MS	9 MS	6 MS
Contribution of those MS' to total EU-27/28 emissions	15%	50%	36%
Number of MS with a difference to final inventory of > ± 5%	12 MS	3 MS	3 MS
Contribution of those MS' to total EU-27/28 emissions	23%	6%	2%
Closeness at EU27/28 level[22]	**2.6%**	**-0.5%**	**-0.4%**

Source: Authors' own compilation, Years 2011 to 2012 present total EU-27 data without Croatia which joined the EU in 2013. Croatia not included, because only data for the year 2013 could be calculated and not for the earlier years of the time series.

Table 5-3 shows that the closeness of the early CO_2 estimates to the final inventory data on CO_2 emissions from fuel consumption considerably improved over the years. In 2013 differences of less or equal to 2% could be found for 19 Member states (10 MS in 2011, 15 MS in 2012), for six MS the differences were between 2 % and 5 % (5 MS in 2011, 6 MS in 2012) and for 3 MS the difference was larger than 5 % (12 MS in 2011, 3 MS in 2012). The contribution of the Member States with differences lower than 2 % of the total EU-28 increased to 62 % in 2013, as the differences for countries with high emissions like France, Italy, Poland and the United Kingdom were below 2 % (see Table 5-4). On the other hand, the differences greater than 5 % represent only 2 % of the total EU-28 emissions in 2013. It should be noted that the countries with large differences between early CO_2 estimates and final inventory data change almost every year. There is no country that shows large deviations between early CO_2 estimates and final GHG inventory data for CO_2 emissions for all three years.

[22] Until 2012 the European Union had 27 Member States. On 1 July 2013 Croatia joined the EU as its 28th Member State.

Table 5-4 Comparison of early CO_2 emission estimates with final GHG inventory CO_2 emissions (CRF table 1A(b)) for 2011, 2012 and 2013 – Changes in CO_2 emissions from fossil fuel combustion

Member States	Eurostat early CO_2 estimates	Member States GHG inventory emission data (CRF table 1.A(b))	Difference trend changes Monhtly-CRF	Eurostat early CO_2 estimates	Member States GHG inventory emission data (CRF table 1.A(b))	Difference trend changes Monhtly-CRF	Eurostat early CO_2 estimates	Member States GHG inventory emission data (CRF table 1.A(b))	Difference trend changes Monhtly-CRF
Total	Change 2011/2010		%	Change 2012/2011		%	Change 2013/2012		%
Belgium	6.3%	-10.5%	**16.8%**	-11.8%	-6.3%	**-5.5%**	-0.3%	3.8%	-4.1%
Bulgaria	16.6%	11.5%	**5.1%**	-6.9%	-9.0%	2.2%	-10.2%	-12.1%	1.9%
Czech Republic	1.2%	-1.5%	2.7%	-5.2%	-5.5%	0.3%	-2.9%	-2.4%	-0.5%
Denmark	-13.3%	-11.3%	-2.0%	-9.4%	-10.7%	1.3%	6.8%	5.3%	1.5%
Germany	-3.1%	-3.2%	0.1%	0.9%	2.9%	-2.0%	2.0%	4.0%	-2.0%
Estonia	3.9%	2.2%	1.7%	-0.5%	-6.3%	**5.8%**	4.4%	13.3%	**-8.9%**
Ireland	9.0%	-8.0%	**17.0%**	-1.3%	-3.2%	1.9%	-3.8%	-4.0%	0.3%
Greece	0.6%	0.3%	0.3%	-0.2%	-5.2%	**5.0%**	-10.2%	-12.4%	2.2%
Spain	1.6%	1.1%	0.4%	-1.4%	-1.7%	0.3%	-12.6%	-10.4%	-2.2%
France	-2.5%	-7.2%	4.6%	-0.8%	1.5%	-2.3%	0.6%	-0.9%	1.5%
Croatia	-	-	-	-	-	-	-1.7%	-1.1%	-0.6%
Italy	-1.6%	-2.6%	1.0%	-5.1%	-5.2%	0.1%	-6.6%	-7.6%	1.0%
Cyprus	-4.4%	-3.4%	-1.0%	-8.5%	-6.0%	-2.4%	-14.7%	-14.1%	-0.6%
Latvia	-1.8%	-8.6%	**6.7%**	-2.8%	-4.5%	1.7%	-4.2%	-2.4%	-1.8%
Lithuania	-0.2%	-7.7%	**7.5%**	1.7%	0.3%	1.4%	-5.8%	-4.7%	-1.0%
Luxembourg	-8.9%	-1.0%	**-7.9%**	-1.7%	-2.0%	0.3%	-3.7%	-5.3%	1.5%
Hungary	4.8%	-2.8%	**7.6%**	-3.8%	-7.2%	3.4%	-6.9%	-6.5%	-0.3%
Malta	-7.4%	0.0%	**-7.4%**	6.3%	5.6%	0.7%	-6.8%	-10.4%	3.6%
Netherlands	0.0%	-7.1%	**7.2%**	-3.5%	-0.2%	-3.3%	-0.3%	-0.5%	0.3%
Austria	-3.8%	-4.6%	0.9%	-4.6%	-4.3%	-0.4%	-2.1%	-1.1%	-1.0%
Poland	7.8%	0.4%	**7.4%**	-5.0%	-7.4%	2.4%	0.3%	1.6%	-1.3%
Portugal	9.6%	-1.1%	**10.7%**	-4.0%	-1.5%	-2.5%	3.6%	-4.4%	**8.0%**
Romania	9.0%	9.3%	-0.3%	-4.5%	-3.3%	-1.2%	-14.6%	-12.7%	-1.9%
Slovenia	-1.7%	1.2%	-2.9%	-2.5%	-3.2%	0.7%	-12.0%	-4.0%	**-8.0%**
Slovakia	7.5%	-5.0%	**12.5%**	-6.5%	-7.4%	0.9%	-6.2%	-1.6%	-4.6%
Finland	-10.1%	-10.1%	0.0%	-11.8%	-16.4%	4.6%	-2.8%	-2.0%	-0.8%
Sweden	-7.8%	-4.2%	-3.6%	-10.1%	-9.6%	-0.5%	-4.2%	-6.2%	2.0%
United Kingdom	-9.0%	-7.6%	-1.4%	3.9%	4.6%	-0.7%	-2.4%	-3.2%	0.8%
EU 15	-2.8%	-4.7%	**1.9%**	-1.4%	-0.4%	**-1.0%**	-2.2%	-2.0%	**-0.2%**
EU 13	6.5%	1.1%	**5.4%**	-4.8%	-6.4%	**1.6%**	-3.9%	-2.4%	**-1.5%**
EU 28	-1.0%	-3.6%	**2.6%**	-2.1%	-1.6%	**-0.5%**	-2.5%	-2.1%	**-0.4%**

Note: Green: difference ≤ ± 2%, Yellow: difference ± >2 and ≤ 5%, Red: difference > ± 5% .
For calculating 2011 no corrections have been applied, for the data presented here.
For calculating 2012, revised monthly data 2011 has been used as available in April 2014. Additionally for the year 2012 solid fuel consumption for Belgium for the year 2011 has been corrected and for Malta data on international bunkers for Jet kerosene has been corrected for 2012 monthly data.
For calculating 2013 for Estonia annual data was used for 2013. For France, Netherlands and Austria trend changes for solid fuels have been corrected by using annual data for 2013. For Finland and Hungary trend changes for solid fuels has been calculated in TJ
Source: Eurostat early CO_2 estimates, MS GHG inventory submissions to UNFCCC

5.4 Analysis of large differences at Member States level

This section provides additional explanations of the reasons for differences between early CO_2 emission estimates and Member State GHG inventory data for the year 2013 for those Member States for which the comparison with inventory data showed differences exceeding ± 4%.

In 2013 only Belgium, Estonia, Portugal, Slovakia and Slovenia show differences between early CO_2 emission estimates and Member States' GHG inventory data of more than 4 %.

5.4.1 Belgium

For Belgium the trend change calculated for the early CO_2 estimate for 2013 was 4.1 % lower than the final inventory CO_2 emissions (see Table 5-4).

Table 5-5 Differences between cumulated fuel consumption in Eurostat monthly data energy data and GHG inventory data for Belgium for the years 2008–2013

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Belgium	2008	21,726	23,551	-1,825	-8%	6,395	6,812	-417	-6%	507,678	622,938	-115,260	-19%
	2009	22,489	23,033	-544	-2%	3,783	4,869	-1,086	-22%	566,504	634,426	-67,923	-11%
	2010	22,071	24,049	-1,978	-8%	1,245	5,059	-3,814	-75%	580,711	712,012	-131,302	-18%
	2011	21,580	21,975	-395	-2%	2,692	4,589	-1,897	-41%	474,624	640,285	-165,661	-26%
	2012	21,866	20,548	1,318	6%	4,032	4,542	-510	-11%	329,770	601,475	-271,706	-45%
	2013	21,984	21,965	19	0%	3,994	4,917	-923	-19%	594,578	602,704	-8,126	-1%
	2014	22,469				4,678				520,738			

Table 5-5 shows that there were large differences between Eurostat monthly energy data and GHG inventory data for liquid fuels in 2012, for solid fuels in all years and for natural gas for all years apart from the year 2013. For natural gas data for 2012 has been revised by Belgium, thus this resubmitted data has been used for calculating 2013 CO_2 emissions. The differences in liquid fuel and solid fuel consumption resulted in a significantly different trend change 2013/2012 between Eurostat monthly data and GHG inventory data for solid fuels (-6 % difference for liquid fuels and -9 % for solid fuels) (Table 5-6).

Table 5-6 Annual trend changes for consumption of aggregate fuel categories for Belgium for the years 2008–2013 based on Eurostat monthly energy data, annual Eurostat data and GHG inventory data

Member States			Liquid fuels			Solid fuels			Gaseous fuels		
			Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF
BE	Belgium	2009/2008	104%	100%	100%	59%	69%	71%	112%	102%	102%
		2010/2009	98%	106%	111%	33%	106%	81%	103%	112%	112%
		2011/2010	98%	88%	91%	216%	92%	91%	82%	90%	90%
		2012/2011	101%	94%	94%	150%	100%	99%	69%	95%	94%
		2013/2012	101%	105%	107%	99%	108%	108%	180%	100%	100%
		2014/2013	102%			117%			88%		

5.4.2 Estonia

For Estonia the trend change calculated for the early CO_2 estimate for 2013 was 8.9 % lower than the final inventory CO_2 (Table 1.A(b)) emissions (see Table 5-4).

Table 5-7 Differences between cumulated fuel consumption in Eurostat monthly energy data and GHG inventory data for Estonia for the years 2008–2013

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Estonia	2008	1,011	112	899	805%	16,294	15,997	297	2%	30,491	27,438	3,053	11%
	2009	936	431	505	117%	15,454	13,996	1,458	10%	19,335	21,398	-2,063	-10%
	2010	996	489	507	104%	18,258	18,207	51	0%	20,730	23,547	-2,817	-12%
	2011	989	467	522	112%	19,124	19,026	98	1%	20,508	21,235	-727	-3%
	2012	807	460	347	76%	19,146	17,835	1,311	7%	22,835	22,109	726	3%
	2013	310	413	-103	-25%	20,649	20,770	-121	-1%	23,233	23,083	149	1%
	2014	269				20,556				18,236			

Table 5-7 shows that there were large differences between Eurostat monthly energy data and GHG inventory data for liquid fuels for all 6 years, but they are considerably decreasing over time. Large differences for solid fuels appear in particular in the years 2012 and 2009. The differences for natural gas consumption in the last two years were below 5%. The differences in solid fuels consumption resulted in a significantly different trend change 2013/2012 between Eurostat monthly data and GHG inventory data for solid fuels (9 % difference) (Table 5-8). Annual and monthly total liquid fuel consumption shows the largest discrepancies in the past years, but total liquid fuel consumption is low compared to solid fuel consumption and is only responsible for 5 % of the total CO_2 emissions in the year 2013. Thus, the influence of liquid fuel consumption in general is very small and the differences in the reported quantities of solid fuels and gas in the past had a stronger effect on the early CO_2 estimates. The impacts were large as the quality of the monthly data varied considerably in each year. For solid fuels in some years the data quality was very good and in some years there were relatively large differences between monthly and annual Eurostat data (2009 and 2012 for solid fuels and 2008-2010 for natural gas).

Table 5-8 Annual trend changes for consumption of aggregate fuel categories for Estonia for the years 2008–2013 based on Eurostat monthly energy data, annual Eurostat data and GHG inventory data

Member States			Liquid fuels			Solid fuels			Gaseous fuels		
			Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF
EE	Estonia	2009/2008	93%	73%	92%	95%	88%	87%	63%	68%	78%
		2010/2009	106%	102%	113%	118%	129%	129%	107%	107%	107%
		2011/2010	99%	100%	97%	105%	104%	105%	99%	89%	90%
		2012/2011	82%	107%	99%	100%	94%	94%	111%	108%	104%
		2013/2012	38%	85%	90%	108%	117%	116%	102%	102%	104%
		2014/2013	87%			100%			78%		

5.4.3 Portugal

For Portugal the trend change calculated for the early CO_2 estimate for 2013 was 8.0 % higher than the final inventory CO_2 emissions (see Table 5-4).

Table 5-9 Differences between cumulated fuel consumption in Eurostat monthly energy data and GHG inventory data for Portugal for the years 2008–2013

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Portugal	2008	12,942	12,552	390	3%	4,200	4,164	36	1%	172,983	174,055	-1,072	-1%
	2009	11,854	11,688	166	1%	4,747	4,674	73	2%	175,348	177,241	-1,893	-1%
	2010	11,740	11,088	652	6%	2,442	2,710	-268	-10%	139,263	188,691	-49,428	-26%
	2011	10,840	10,184	656	6%	3,700	3,635	65	2%	186,444	188,080	-1,636	-1%
	2012	9,457	9,158	299	3%	4,874	4,846	28	1%	168,567	165,391	3,176	2%
	2013	10,569	9,595	974	10%	4,450	4,410	40	1%	162,206	157,799	4,407	3%
	2014	9,725				4,519				149,900			

Table 5-9 shows that in 2013 the data quality decreased in the case of liquid fuel and natural gas consumption. As for the calculation of early CO_2 emissions the data quality of the last two years is important, the monthly trend changes for 2013/2012 (Table 5-10) are inconsistent with the GHG inventory trend changes for liquid fuels (difference 7 %). Liquid fuel consumption contributes 56 % to Portugal's total CO_2 emissions.

Table 5-10 Annual trend changes for consumption of aggregate fuel categories for Portugal for the years 2008–2013 based on Eurostat monthly energy data, annual Eurostat data and GHG inventory data

		Liquid fuels				Solid fuels				Gaseous fuels			
Member States	Trend changes	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF
Portugal	2009/2008	92%		93%	93%	113%		113%	113%	101%		102%	102%
	2010/2009	99%		97%	95%	51%		58%	58%	79%		106%	106%
	2011/2010	92%		94%	93%	152%		137%	134%	134%		99%	100%
	2012/2011	87%	90%	85%	90%	132%	132%	132%	133%	90%	90%	88%	88%
	2013/2012	112%	98%	104%	102%	91%	93%	91%	91%	96%	96%	96%	95%
	2014/2013	92%	92%			102%	101%			92%	92%		

5.4.4 Slovenia

For Slovenia the trend change calculated for the early CO_2 estimate for 2013 was 8.0 % lower than the final inventory CO_2 emissions (see Table 5-4).

Table 5-11 Differences between cumulated fuel consumption in Eurostat monthly energy data and GHG inventory data for Slovenia for the years 2008–2013

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Slovenia	2008	2,857	2,801	56	2%	4,887	5,236	-349	-7%	34,962	36,771	-1,809	-5%
	2009	2,472	2,548	-76	-3%	4,755	4,960	-205	-4%	33,599	34,748	-1,149	-3%
	2010	2,529	2,491	38	2%	4,928	4,955	-27	-1%	34,594	36,146	-1,552	-4%
	2011	2,533	2,492	41	2%	4,952	5,057	-105	-2%	28,765	30,907	-2,142	-7%
	2012	2,465	2,469	-4	0%	4,882	4,985	-103	-2%	27,091	29,742	-2,651	-9%
	2013	2,169	2,330	-161	-7%	4,045	4,487	-442	-10%	28,954	28,967	-13	0%
	2014	2,188				3,163				26,241			

Table 5-11 shows that in 2013 the data quality of Eurostat monthly energy data decreased again in the case of liquid and solid fuel consumption while it improved for natural gas consumption. As for the calculation of early CO_2 emissions the data quality of the last two years is important, the monthly trend changes for 2013/2012 (Table 5-12) are inconsistent with the trend changes of the GHG inventory data for liquid fuels (difference -6 %), solid fuel (difference -16 %) and natural gas consumption (difference 9 %).

Table 5-12 Annual trend changes for consumption of aggregate fuel categories for Slovenia for the years 2008–2013 based on Eurostat monthly energy data, annual Eurostat data and GHG inventory data

			Liquid fuels			Solid fuels			Gaseous fuels		
Member States			Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF
SI	**Slovenia**	2009/2008	87%	87%	87%	97%	95%	95%	96%	95%	95%
		2010/2009	102%	99%	98%	104%	100%	100%	103%	104%	104%
		2011/2010	100%	102%	100%	100%	102%	102%	83%	85%	86%
		2012/2011	97%	98%	99%	99%	98%	99%	94%	96%	96%
		2013/2012	88%	96%	94%	83%	90%		107%	97%	97%
		2014/2013	101%			78%			91%		

5.4.5 Slovakia

For Slovakia the trend change calculated for the early CO_2 estimate for 2013 was 4.6 % lower than the final inventory CO_2 emissions (see Table 5-4).

Table 5-13 Differences between cumulated fuel consumption in Eurostat monthly energy data and GHG inventory data for Slovakia for the years 2008–2013

		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
Member States		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Slovakia	2008	3,490	3,555	-65	-2%	8,613	8,170	443	5%	195,151	216,238	-21,087	-10%
	2009	3,342	3,236	106	3%	7,806	7,781	25	0%	223,225	185,657	37,568	20%
	2010	3,410	3,411	-1	0%	6,871	7,286	-415	-6%	212,203	209,806	2,398	1%
	2011	3,311	3,337	-26	-1%	7,557	7,487	70	1%	237,008	193,672	43,336	22%
	2012	3,062	3,203	-141	-4%	7,029	7,042	-13	0%	225,478	182,788	42,690	23%
	2013	2,977	3,134	-157	-5%	6,657	6,847	-190	-3%	203,223	201,628	1,595	1%
	2014	2,869				6,522				133,253			

Table 5-13 shows that in 2013 the data quality of Eurostat monthly data decreased in the case of liquid and solid fuel consumption, while for natural gas consumption the comparability improved considerably in 2013. As for the calculation of early CO_2 emissions the data quality of the last two years is important, the monthly trend changes for 2013/2012 (Table 5-14) are inconsistent with the trend changes of the GHG inventory data for liquid fuels (difference -1 %), solid fuel (difference -2 %) and especially natural gas consumption (difference -20 %).

Table 5-14 Annual trend changes for consumption of aggregate fuel categories for Slovakia for the years 2008–2013 based on Eurostat monthly data, annual Eurostat data and GHG inventory data

			Liquid fuels			Solid fuels			Gaseous fuels		
Member States			Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF
SK	**Slovakia**	2009/2008	96%	91%	91%	91%	95%	95%	114%	86%	86%
		2010/2009	102%	106%	105%	88%	99%	94%	95%	113%	113%
		2011/2010	97%	98%	98%	110%	97%	103%	112%	93%	92%
		2012/2011	92%	95%	96%	93%	94%	94%	95%	94%	94%
		2013/2012	97%	97%	98%	95%	98%	97%	90%	110%	110%
		2014/2013	96%			98%			66%		

6 Conclusions and recommendations

6.1 Approach to calculate early CO_2 estimates

A methodological approach was developed that calculates early CO_2 emissions for the EU and its Member States based on Eurostat monthly energy data 4 to 5 months after the reference year, which is about one year earlier than final CO_2 emissions reported in national GHG inventories.

The approach used is based on the trend changes of the fuel consumption for aggregated fuel categories (liquid fuels, solid fuels and gaseous fuels) of Eurostat monthly energy data for the years 2011, 2012, 2013 and 2014. The trend changes of 2012/2011, 2013/2012 and 2014/2013 are applied to the CO_2 emissions of the same aggregate fuel categories of the latest available reported year in Member States' GHG inventories as reported in the CRF reference approach table 1.A.(b).

In practical terms, for example, monthly cumulated data for liquid fuels, solid fuels and gaseous fuels for 2013 and 2014 for a given Member State are compared and a trend change is calculated for each fuel type. The 2014 value is simply divided by the 2013 value. The result is the trend change expressed as a percentage. Then the GHG inventory CO_2 emission data from CRF table 1.A.(b) (CO_2 emissions in Gg) for the different fuel types of the year 2013 are multiplied with the respective trend change from the comparison of the monthly data. The result is the estimated CO_2 emission by country and fuel type for 2014 in Gg CO_2. A year later the estimate can be checked for its closeness to reality by comparing it with the respective GHG inventory data from the CRF table 1.A (b) for the reference year 2014.

The methodological approach has been applied consecutively for the six years of 2009 – 2014, while this report only includes the results for the years 2011-2013. Table 5-4 provides a comparison of early CO_2 emission estimates based on Eurostat monthly energy data calculated for the years of 2011, 2012 and 2013 with the final inventory data (CRF table 1.A.(b)) for the same year.

Table 6-1 indicates that the closeness of the early CO_2 estimates to the final GHG inventory data on CO_2 emissions from fossil fuel combustion for EU aggregates was quite good for the years 2012 and 2013. The contribution of the Member States with differences lower than 2 % of the total EU-28 increased again to 62 % of total EU-28 emissions in 2013, as the differences for countries with high emissions like France and Poland were below 2 %. Additionally the differences greater than 5 % represented only 2 % of the total EU-28 emissions in 2013, as besides Portugal, Estonia and Slovenia are rather small countries with low CO_2 emissions.

It should be noted that in particular Member States with large differences between early CO_2 estimates and final GHG inventory CO_2 emission data change almost every year.

Table 6-1 Closeness of early CO2 emission estimates with final GHG inventory CO_2 emissions (CRF table 1A(b))

	2011	2012	2013
Number of MS with a difference to final inventory of ≤ ±2%	10 MS	15 MS	19 MS
Contribution of those MS' to total EU-27/28 emissions	61%	44%	62%
Number of MS with a difference to final inventory of ± >2 and ≤ 5%,	5 MS	9 MS	6 MS
Contribution of those MS' to total EU-27/28 emissions	15%	50%	36%
Number of MS with a difference to final inventory of > ± 5%	12 MS	3 MS	3 MS
Contribution of those MS' to total EU-27/28 emissions	23%	6%	2%
Closeness at EU27/28 level[23]	**2.6%**	**-0.5%**	**-0.4%**

Source: Authors own compilation based on Eurostat early CO_2 estimates and MS GHG inventory submissions to UNFCCC

The detailed analysis of the discrepancies for individual Member States shows that the differences between the early CO_2 estimates can be explained. There are some Member States for which significant differences between monthly and annual Eurostat energy data and Eurostat monthly energy data and GHG inventory data still occur and a further improvement of the quality of monthly fuel consumption data is necessary.

An analysis of the data quality by comparing annual and monthly Eurostat energy data for the years 2008–2013 shows that the data quality varies throughout the years for all countries but improved in the year 2013 (see analysis in Chapter 3.2).

The analysis of this report shows that from the year 2013 onwards there seems to be some improvement in the quality of the reported monthly data (e.g. related to the reporting of bunker fuels and the consumption of natural gas). Thus, for calculating 2014 CO_2 early estimates only small adaptations of Eurostat monthly energy data were necessary. This includes the gap filling for international bunkers for Austria and the United Kingdom (see Chapter 4.1.1) and the calculation of trend changes from solid fuel consumption in TJ for countries like Germany, Hungary and Poland (see Chapter 4.1.2). The improvements in the monthly reporting in 2013 and 2014 are a further step towards a harmonised method without further individual corrections. In order to apply a harmonised method to all EU Member States without correcting or updating any monthly data a sufficient quality of monthly data is needed for all years.

The reporting of the 2014 monthly data could be further improved through the completeness and outlier checks. Most Member States that received feedback from

[23] Until 2012 the European Union had 27 Member States. On 1 July 2013 Croatia joined the EU as its 28th Member State.

Eurostat on outliers or data gaps in their 2014 monthly data provided recalculated data or checked again their monthly data and confirmed that data identified as outliers were actual fluctuations in the fuel consumption data.

6.2 Priorities by Member State

The three summary tables below list the most significant problems related to completeness and consistency between annual and monthly Eurostat energy data, and consistency between GHG inventory data and Eurostat data and list actions that should be taken by Member States in case of large differences. These tables analyse the data quality of the year 2013. The columns provide the information of whether there is a difference in monthly and annual Eurostat energy data for the year 2013 and Eurostat monthly energy data and GHG inventory data for the year 2013 of above 5 %. This gives an overview of the problems related to the data quality of the Eurostat monthly energy data for the year 2013. The last two columns provide an explanation and the required action that would be necessary to solve the problems in the data quality.

Table 6-2 Priority list of liquid fuel data quality issues by Member State

Member States	Relevant	Monthly vs. Annual Eurostat data 2013	Relevant	Monthly Eurostat vs. GHG inventory data 2013	Explanation	Action
Belgium	-	2%	-	0%	-	No action required.
Bulgaria	-	1%	-	1%	-	No action required.
Czech Republic	-	0%	-	1%	-	No action required.
Denmark	x	9%	x	9%	Ongoing differences due to monthly reporting of international bunkers.	Check whether reporting of international bunkers can be improved.
Germany	-	-1%	-	-2%	-	No action required.
Estonia	x	-26%	x	-25%	Lack of reporting of other oil in monthly data	Check if reporting can be improved.
Ireland	-	-1%	-	2%	-	No action required.
Greece	-	5%	-	5%	Differences in the reporting of gas/diesel soil, residual fuel oil and refinery feedstock	Check if reporting can be improved.
Spain	-	0%	-	2%	-	No action required.
France	-	2%	-	-1%	-	No action required.
Croatia	-	2%	-	0%	-	No action required.
Italy	-	0%	-	-4%	-	No action required.
Cyprus	-	-1%	-	-1%	-	No action required.

Member States	Relevant	Monthly vs. Annual Eurostat data 2013	Relevant	Monthly Eurostat vs. GHG inventory data 2013	Explanation	Action
Latvia	x	-12%	-	-8%	Differences due to reporting of Gas/Diesel Oil imports.	Check reporting of Gas/Diesel Oil under monthly data carefully next year.
Lithuania	-	1%	x	-8%	Large differences due to reporting of refinery feedstock imports.	The difference is due to additives/oxygenates which are disregarded in the project file because we assume that it might lead to double counting.
Luxembourg	-	1%	-	4%	-	No action required.
Hungary	-	5%	-	2%	Reporting of Orimulsion under monthly data and reporting of international bunker fuels from jet kerosene	Check if reporting can be improved.
Malta	-	-3%	x	-8%	Large differences due to reporting of residual fuel oil	Check whether reporting of residual fuel oil can be improved.
Netherlands	-	-1%	-	-3%	-	No action required.
Austria	-	5%	-	5%	Lack of reporting of international bunker from jet kerosene under monthly data	Improved in the 2014 Eurostat monthly data.
Poland	-	1%	-	1%	-	No action required.
Portugal	x	15%	x	13%	Large differences due to reporting of international bunkers.	Check whether reporting of international bunkers can be improved.
Romania	-	1%	-	-1%	-	No action required.
Slovenia	x	-10%	x	-7%	Large differences due to reporting of Gas/Diesel oil and Petroleum coke.	Check whether reporting of gas/diesel oil can be improved and data on petroleum coke is available and can be included next year.
Slovakia	-	-2%	x	-5%	Differences in the reporting of other oil, bitumen and lubricants.	Check whether reporting of other oil, bitumen and lubricants can be improved.
Finland	x	0%	x	-6%	Differences in the reporting of Gas/Diesel Oil.	Check whether reporting of Gas/Diesel Oil can be improved.

Member States	Relevant	Monthly vs. Annual Eurostat data 2013	Relevant	Monthly Eurostat vs. GHG inventory data 2013	Explanation	Action
Sweden	-	1%	x	-5%	Large differences due to reporting of international bunkers.	There seem to be an error in the CRF table 1.A(b), as international bunkers are not included.
United Kingdom	x	19%	x	18%	Large differences due to reporting of international bunkers.	International bunkers have been included in 2014 monthly data for the first time. Gap filling in 2013 was required for calculation early estimates for 2014.

Note: X is used for differences above 5% for the data that is compared, - is used if the differences are below 5%.

Table 6-3 Priority list of solid fuel data quality issues by Member State

Member States	Relevant	Monthly vs. Annual Eurostat data 2013	Relevant	Monthly Eurostat vs. GHG inventory data 2013	Explanation	Action
Belgium	**x**	-20%	x	-19%	Large differences due to reporting of hard coal imports.	Check whether reporting of hard coal can be improved.
Bulgaria	**-**	-1%	**-**	-1%	-	No action required.
Czech Republic	**-**	1%	**-**	-1%	-	No action required.
Denmark	**-**	2%	**-**	0%	-	No action required.
Germany	**-**	-4%	**-**	-4%	Differences in the reporting of hard coal	Check if monthly reporting of hard coal to Eurostat can be improved, as there are other data on hard coal available under early national statistics.
Estonia	**-**	-1%	**-**	-1%	-	No action required.
Ireland	**-**	2%	**-**	0%	-	No action required.
Greece	**-**	-3%	**-**	-3%	Differences due to reporting of lignite production.	Check if reporting on lignite production can be improved.
Spain	**-**	-1%	**-**	-1%	-	No action required.
France	**x**	7%	**x**	-6%	Large differences due to reporting of hard coal imports.	Check whether reporting of hard coal can be improved.
Croatia	**-**	1%	**-**	1%	-	No action required.
Italy	**-**	1%	**-**	2%	-	No action required.
Cyprus	**-**	NO	**-**	NO	-	No action required.
Latvia	**-**	1%	**x**	1%	-	No action required.

Lithuania	-	0%	x	-3%	-	No action required.
Luxembourg	-	-5%	x	-6%	Differences very small. Only 5 kt in total.	No action required.
Hungary	-	1%	-	1%	-	No action required.
Malta	-	NO	-	NO	-	No action required.
Netherlands	-	-1%	x	-6%	Large differences due to reporting of hard coal.	Check whether reporting of hard coal can be improved.
Austria	x	-9%	x	-9%	Large differences due to reporting of hard coal imports.	Check whether reporting of hard coal can be improved.
Poland	-	0%	-	0%	-	No action required.
Portugal	-	0%	-	1%	-	No action required.
Romania	-	-3%	-	-3%	Differences due to reporting of stock changes for lignite.	Check if reporting of stock changes for lignite can be improved.
Slovenia	x	-10%	x	-10%	Hard coal not reported under Eurostat monthly data.	Check if data on hard coal consumption is available and can be inlcuded next year.
Slovakia	-	-3%	-	-3%	Differences due to reporting of stock changes for hard coal	Check if reporting of stock changes for lignite can be improved.
Finland	-	-1%	-	-3%	-	No action required.
Sweden	x	-11%	x	-11%	Large differences due to reporting of hard coal and peat.	Check whether reporting of hard coal and peat can be improved.
United Kingdom	-	0%	-	0%	-	No action required.

Note: X is used for differences above 5% for the data that is compared, - is used if the differences are below 5%.

Table 6-4 Priority list of natural gas fuel data quality issues by Member State

Member States	Relevant	Monthly vs. Annual Eurostat data 2013	Relevant	Monthly Eurostat vs. GHG inventory data 2013	Explanation	Action
Belgium	-	-1%	-	-1%	-	No action required.
Bulgaria	-	-3%	-	-3%	-	Check if reporting can be improved.
Czech Republic	-	0%	-	-1%	-	No action required.
Denmark	-	0%	-	0%	-	No action required.
Germany	-	1%	-	-3%	-	No action required.
Estonia	-	0%	-	1%	-	No action required.
Ireland	-	4%	-	4%	-	Check if reporting can be improved.
Greece	-	0%	-	0%	-	No action required.
Spain	-	0%	-	0%	-	No action required.

France	**-**	-4%	**-**	-4%	-	Check if reporting can be improved.
Croatia	**x**	-9%	**x**	-9%	Large differences in all flows, especially imports.	Check if reporting can be improved.
Italy	**-**	0%	**-**	0%	-	No action required.
Cyprus	**NO**	NO	**NO**	NO	-	No action required.
Latvia	**-**	0%	**-**	-1%	-	No action required.
Lithuania	**-**	0%	**-**	0%	-	No action required.
Luxembourg	**-**	0%	**-**	0%	-	No action required.
Hungary	**-**	-1%	**-**	-1%	-	No action required.
Malta	**NO**	NO	**NO**	NO	-	No action required.
Netherlands	**-**	1%	**-**	0%	-	No action required.
Austria	**-**	-1%	**-**	-1%	-	No action required.
Poland	**-**	0%	**-**	0%	-	No action required.
Portugal	**-**	3%	**-**	3%	-	Check if reporting can be improved.
Romania	**x**	5%	**x**	5%	Large differences due to reporting of natural gas imports.	Check if reporting can be improved.
Slovenia	**-**	0%	**-**	0%	-	No action required.
Slovakia	**-**	1%	**-**	1%	-	No action required.
Finland	**-**	-1%	**-**	-1%	-	No action required.
Sweden	**-**	0%	**-**	0%	-	No action required.
United Kingdom	**-**	0%	**-**	0%	-	No action required.

Note: X is used for differences above 5% for the data that is compared, - is used if the differences are below 5%

7 References

Eurostat data:

- Eurostat Monthly Oil and Gas Questionnaires (2008, 2009 and 2010, 2011, 2012, 2013, 2014 submissions)
- Eurostat Monthly Coal Questionnaire (2008, 2009, 2010, 2011, 2012, 2013, 2014 submissions)
- Data from Eurostat database for monthly and annual fuel consumption for the years 2008 - 2013

Inventory data: Data as reported by Member States to the UNFCCC in CRF table 1.A.(b).Submissions 2010-2014 for the years 2008 -2012: http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8812.php

Inventory data: Data submitted to Eurostat by Member States CO_2 emissions for liquid, solid and gaseous fuel consumption for the year 2013. Not published.

Inventory data: Data as reported by Member States to EU Circa in CRF table 1.A.(b). Submissions 2015 for the year 2013.

IPCC/UNEP/OECD/IEA 1997, *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, Paris. Volume 2.

IPCC 2006, *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). IGES, Japan.

Early national statistics:

Austria:
www.statistik.at/web_de/statistiken/energie_und_umwelt/energie/energiebilanzen/

Bulgaria:
www.nsi.bg/en/content/5019/production-and-deliveries-energy-products

Denmark:
www.ens.dk/en/info/facts-figures/energy-statistics-indicators-energy-efficiency/monthly-statistics

Germany:
http://www.ag-energiebilanzen.de/6-0-Primaerenergieverbrauch.html

Estonia:
pub.stat.ee/px-web.2001/I_Databas/Economy/07Energy/02Energy_consumption_and_production/01Annual_statistics/01Annual_statistics.asp

Finland:
http://193.166.171.75/Dialog/varval.asp?ma=010_ehk_tau_101_en&ti=Total+Ene

rgy+Consumption+by+Source+and+CO2+Emissions&path=../Database/StatFin/ene/ehk/&lang=1&multilang=en

France:
developpement-durable.bsocom.fr/statistiques/ReportFolders/reportFolders.aspx

Ireland:
www.seai.ie/Publications/Statistics_Publications/Energy_Balance/

Latvia:
data.csb.gov.lv/Menu.aspx?selection=vide__%C4%AAstermi%C5%86a%20statistikas%20dati__Ener%C4%A3%C4%93tika&tablelist=true&px_language=en&px_db=vide&rxid=80666b16-4296-4d44-aa1c-ab806e990f07

Lithuania:
db1.stat.gov.lt/statbank/default.asp?w=1280

Luxembourg:
www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=4087&IF_Language=eng&MainTheme=1&FldrName=4&RFPath=50

Netherlands:
statline.cbs.nl/StatWeb/dome/?LA=EN

Portugal:
http://www.dgeg.pt/

Romania:
www.insse.ro/cms/en/content/statistical-bulletins

Slovenia:
pxweb.stat.si/pxweb/Database/Environment/18_energy/01_18179_balance_indicators/01_18179_balance_indicators.asp

Spain:
www.ine.es/jaxi/tabla.do?path=/t38/bme2/t04/a082/l1/&file=1202002.px&type=pcaxis&L=1

Sweden:
www.scb.se/Pages/Product____24905.aspx?Produktkod=EN0201&displaypublications=true

United Kingdom:
www.decc.gov.uk/en/content/cms/statistics/energy_stats/source/source.aspx

8 Annex

8.1 Data tables

In the tables in this annex the following colour code is used to indicate differences between datasets:
Green: difference ≤ ± 2%, Yellow: difference ± >2 and ≤ 5%, Red: difference > ± 5%

Table 8-1 Differences between annual and monthly Eurostat data for fuel consumption

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%
Belgium	2008	23,216	21,726	-1,490	-6%	6,813	6,395	-418	-6%	621,244	507,678	-113,566	-18%
	2009	23,329	22,489	-840	-4%	4,716	3,783	-933	-20%	632,699	566,504	-66,196	-10%
	2010	24,632	22,071	-2,561	-10%	5,005	1,245	-3,760	-75%	710,075	580,711	-129,364	-18%
	2011	21,750	21,580	-170	-1%	4,603	2,692	-1,911	-42%	636,087	474,624	-161,463	-25%
	2012	20,532	21,866	1,334	6%	4,586	4,032	-554	-12%	601,475	329,770	-271,706	-45%
	2013	21,502	21,984	482	2%	4,970	3,994	-976	-20%	602,704	594,578	-8,126	-1%
	2014		22,469				4,678				520,738		
Bulgaria	2008	4,606	4,928	322	7%	32,927	33,494	567	2%	122,012	122,106	94	0%
	2009	4,152	4,450	298	7%	30,147	30,291	144	0%	90,465	87,312	-3,154	-3%
	2010	3,789	3,263	-526	-14%	32,691	32,554	-137	0%	93,838	96,202	2,364	3%
	2011	3,592	3,306	-286	-8%	40,208	40,241	33	0%	110,124	105,458	-4,666	-4%
	2012	3,840	3,673	-167	-4%	35,273	35,683	410	1%	102,625	92,539	-10,086	-10%
	2013	3,486	3,509	23	1%	30,585	30,409	-176	-1%	99,977	96,513	-3,464	-3%
	2014		3,684				33,281				95,599		
Czech Republic	2008	9,266	9,276	10	0%	54,532	54,284	-248	0%	298,119	297,920	-199	0%
	2009	8,920	8,932	12	0%	51,136	51,331	195	0%	281,624	280,985	-639	0%
	2010	8,841	8,470	-371	-4%	51,949	50,010	-1,939	-4%	335,723	322,084	-13,639	-4%
	2011	8,445	8,276	-169	-2%	52,657	53,061	404	1%	283,607	283,617	10	0%
	2012	8,288	8,227	-61	-1%	49,222	49,001	-221	0%	287,051	281,038	-6,014	-2%
	2013	8,010	8,013	3	0%	46,243	46,801	558	1%	290,832	289,558	-1,274	0%
	2014		8,459				45,718				258,585		
Denmark	2008	7,208	6,865	-343	-5%	6,872	6,867	-5	0%	170,741	168,637	-2,104	-1%
	2009	6,950	6,690	-260	-4%	6,808	6,858	50	1%	163,437	163,416	-22	0%
	2010	5,977	7,247	1,270	21%	6,521	6,532	11	0%	185,203	183,258	-1,945	-1%
	2011	6,422	6,561	139	2%	5,546	5,538	-8	0%	155,640	150,786	-4,854	-3%
	2012	6,182	6,490	308	5%	4,271	4,331	60	1%	145,886	138,151	-7,736	-5%
	2013	5,950	6,487	537	9%	5,364	5,485	121	2%	138,833	139,353	520	0%
	2014		6,163				4,447				116,431		
Germany	2008	107,391	106,410	-981	-1%	242,011	239,652	-2,359	-1%	3,205,279	3,222,446	17,167	1%
	2009	101,487	100,356	-1,131	-1%	224,048	222,166	-1,882	-1%	3,206,219	3,199,675	-6,544	0%
	2010	102,206	100,721	-1,485	-1%	231,059	223,270	-7,789	-3%	3,073,352	3,390,003	316,651	10%
	2011	98,928	98,546	-382	0%	236,753	232,287	-4,466	-2%	2,756,188	2,797,036	40,848	1%
	2012	98,215	96,976	-1,239	-1%	247,526	239,616	-7,910	-3%	2,923,196	2,814,948	-108,248	-4%
	2013	99,737	98,874	-863	-1%	247,279	237,599	-9,680	-4%	3,051,546	3,075,491	23,944	1%
	2014		97,437				233,670				2,738,165		

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%
Estonia	2008	617	1,011	394	64%	16,046	16,294	248	2%	32,260	30,491	-1,769	-5%
	2009	453	936	483	107%	14,066	15,454	1,388	10%	21,986	19,335	-2,651	-12%
	2010	460	996	536	117%	18,207	18,258	51	0%	23,551	20,730	-2,822	-12%
	2011	462	989	527	114%	19,023	19,124	101	1%	21,072	20,508	-563	-3%
	2012	495	807	312	63%	17,822	19,146	1,324	7%	22,835	22,835	0	0%
	2013	420	310	-110	-26%	20,770	20,649	-121	-1%	23,233	23,233	0	0%
	2014		269				20,556				18,236		
Ireland	2008	7,406	6,995	-411	-6%	6,470	5,164	-1,306	-20%	187,666	148,332	-39,335	-21%
	2009	7,018	7,005	-13	0%	6,177	5,103	-1,074	-17%	179,356	179,431	76	0%
	2010	6,831	7,171	340	5%	5,965	3,251	-2,714	-45%	196,608	198,245	1,637	1%
	2011	6,019	6,412	393	7%	5,837	5,917	80	1%	172,361	177,456	5,095	3%
	2012	5,859	5,750	-109	-2%	6,618	7,104	486	7%	168,076	173,475	5,399	3%
	2013	5,946	5,891	-55	-1%	5,890	6,032	142	2%	161,940	168,227	6,287	4%
	2014		5,733				6,270				162,531		
Greece	2008	16,667	16,981	314	2%	65,156	63,171	-1,985	-3%	146,795	146,842	47	0%
	2009	15,942	16,363	421	3%	65,551	62,025	-3,526	-5%	124,388	124,326	-62	0%
	2010	14,226	14,977	751	5%	58,319	50,108	-8,211	-14%	135,398	135,398	0	0%
	2011	12,571	12,718	147	1%	60,358	57,015	-3,343	-6%	166,310	166,218	-92	0%
	2012	12,501	11,978	-523	-4%	62,261	60,978	-1,283	-2%	153,325	153,502	177	0%
	2013	10,664	11,181	517	5%	54,688	53,193	-1,495	-3%	135,497	135,392	-104	0%
	2014		10,992				49,200				103,783		
Spain	2008	64,388	65,638	1,250	2%	25,903	25,373	-530	-2%	1,461,599	1,456,392	-5,207	0%
	2009	59,786	60,953	1,167	2%	19,571	21,589	2,018	10%	1,309,163	1,307,858	-1,306	0%
	2010	57,309	57,490	181	0%	14,451	15,426	975	7%	1,305,770	1,303,618	-2,153	0%
	2011	54,007	54,060	53	0%	23,926	24,695	769	3%	1,213,828	1,211,493	-2,335	0%
	2012	49,043	49,504	461	1%	28,693	29,881	1,188	4%	1,180,239	1,182,644	2,405	0%
	2013	46,305	46,235	-70	0%	20,633	20,420	-213	-1%	1,092,028	1,092,011	-16	0%
	2014		45,406				21,961				990,950		
France	2008	83,231	85,477	2,246	3%	19,315	19,308	-7	0%	1,669,912	1,660,017	-9,896	-1%
	2009	81,024	82,444	1,420	2%	17,287	16,918	-369	-2%	1,610,319	1,487,191	-123,128	-8%
	2010	76,266	77,522	1,256	2%	18,162	18,912	750	4%	1,781,056	1,735,830	-45,225	-3%
	2011	75,648	80,064	4,416	6%	15,596	16,345	749	5%	1,550,868	1,572,071	21,202	1%
	2012	73,110	77,623	4,513	6%	17,342	18,795	1,453	8%	1,600,211	1,523,371	-76,840	-5%
	2013	70,701	72,122	1,421	2%	18,824	20,052	1,228	7%	1,633,145	1,570,531	-62,614	-4%
	2014		71,206				14,774				1,364,721		

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%
Croatia	2008												
	2009												
	2010												
	2011	3,403	3,390	-13	0%	1,225	1,213	-12	-1%	119,567	112,505	-7,062	-6%
	2012	3,178	3,158	-20	-1%	1,080	1,073	-7	-1%	101,038	91,488	-9,550	-9%
	2013	3,017	3,083	66	2%	1,139	1,146	7	1%	95,537	87,207	-8,330	-9%
	2014		2,903				1,099				79,616		
Italy	2008	72,769	70,685	-2,084	-3%	24,679	25,548	869	4%	2,910,639	2,906,557	-4,081	0%
	2009	67,598	67,028	-570	-1%	19,681	18,730	-951	-5%	2,675,445	2,678,942	3,497	0%
	2010	65,434	64,005	-1,429	-2%	21,595	20,209	-1,386	-6%	2,849,396	2,845,490	-3,906	0%
	2011	62,955	61,351	-1,604	-3%	24,172	24,337	165	1%	2,671,770	2,668,861	-2,909	0%
	2012	55,917	56,387	470	1%	24,950	24,345	-605	-2%	2,568,837	2,569,179	342	0%
	2013	53,455	53,510	55	0%	21,632	21,783	151	1%	2,402,667	2,402,257	-410	0%
	2014		51,351				20,975				2,122,967		
Cyprus	2008	2,520	2,371	-149	-6%	41	42	1	2%				
	2009	2,457	2,464	7	0%	22	21	-1	-5%				
	2010	2,395	2,407	12	1%	27	26	-1	-4%				
	2011	2,294	2,314	20	1%	13	11	-2	-15%				
	2012	2,169	2,128	-41	-2%	1	0	-1	-100%				
	2013	1,837	1,816	-21	-1%	1	0	-1	-100%				
	2014		1,878				4						
Latvia	2008	1,414	1,364	-50	-4%	176	174	-2	-1%	55,814	55,814	1	0%
	2009	1,172	1,170	-2	0%	138	148	10	7%	51,380	51,329	-51	0%
	2010	1,080	1,070	-10	-1%	180	182	2	1%	61,206	61,210	4	0%
	2011	1,103	1,149	46	4%	194	193	-1	-1%	53,943	53,943	0	0%
	2012	1,265	1,147	-118	-9%	148	192	44	30%	50,709	50,716	7	0%
	2013	1,254	1,101	-153	-12%	131	132	1	1%	50,438	50,200	-238	0%
	2014		1,197				100				45,274		
Lithuania	2008	2,774	2,880	106	4%	385	384	-1	0%	108,674	108,607	-68	0%
	2009	2,301	2,316	15	1%	291	281	-10	-3%	91,327	91,327	0	0%
	2010	2,297	2,338	41	2%	358	386	28	8%	104,321	104,386	65	0%
	2011	2,171	2,183	12	1%	447	395	-52	-12%	113,799	113,765	-34	0%
	2012	2,261	2,242	-19	-1%	442	437	-5	-1%	111,119	111,118	-2	0%
	2013	2,180	2,193	13	1%	513	513	0	0%	90,624	90,554	-69	0%
	2014		2,384				428				86,157		

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%
Luxembourg	2008	2,443	2,627	184	8%	124	108	-16	-13%	45,771	44,215	-1,556	-3%
	2009	2,267	2,443	176	8%	113	99	-14	-12%	46,577	46,579	2	0%
	2010	2,384	2,698	314	13%	113	97	-16	-14%	50,099	50,144	45	0%
	2011	2,536	2,502	-34	-1%	99	97	-2	-2%	43,219	43,217	-2	0%
	2012	2,495	2,437	-58	-2%	92	90	-2	-2%	44,006	43,857	-149	0%
	2013	2,433	2,446	13	1%	80	76	-4	-5%	37,258	37,259	1	0%
	2014		2,287				78				35,302		
Hungary	2008	6,938	7,027	89	1%	11,521	11,560	39	0%	442,161	452,598	10,437	2%
	2009	6,847	6,699	-148	-2%	10,542	10,442	-100	-1%	383,171	381,139	-2,032	-1%
	2010	6,410	6,016	-394	-6%	10,676	10,764	88	1%	410,955	359,447	-51,508	-13%
	2011	6,056	6,156	100	2%	11,263	11,281	18	0%	391,631	382,581	-9,050	-2%
	2012	5,726	5,708	-18	0%	11,057	11,100	43	0%	347,753	358,854	11,102	3%
	2013	5,520	5,787	267	5%	10,683	10,796	113	1%	322,601	320,365	-2,237	-1%
	2014		6,038				10,359				292,156		
Malta	2008	836	0	-836									
	2009	745	396	-349	-47%								
	2010	845	856	11	1%								
	2011	1,099	793	-306	-28%								
	2012	772	1,031	259	34%								
	2013	733	713	-20	-3%								
	2014		730										
Netherlands	2008	29,404	29,193	-211	-1%	12,888	12,575	-313	-2%	1,450,976	1,507,257	56,281	4%
	2009	28,771	28,785	14	0%	12,018	11,876	-142	-1%	1,464,133	1,453,700	-10,433	-1%
	2010	29,424	29,994	570	2%	12,117	11,988	-129	-1%	1,641,493	1,622,544	-18,949	-1%
	2011	28,518	28,600	82	0%	11,939	16,471	4,532	38%	1,432,013	1,470,612	38,599	3%
	2012	29,486	28,973	-513	-2%	13,143	15,997	2,854	22%	1,372,878	1,367,723	-5,155	0%
	2013	28,115	27,926	-189	-1%	13,080	12,890	-190	-1%	1,383,983	1,394,339	10,355	1%
	2014		26,657				13,183				1,217,665		
Austria	2008	12,549	13,162	613	5%	5,457	4,648	-809	-15%	312,835	302,307	-10,527	-3%
	2009	11,981	12,942	961	8%	4,273	3,844	-429	-10%	300,038	296,735	-3,303	-1%
	2010	12,068	13,378	1,310	11%	5,015	4,930	-85	-2%	343,922	328,372	-15,549	-5%
	2011	11,588	12,995	1,407	12%	5,165	4,786	-379	-7%	324,678	308,406	-16,272	-5%
	2012	11,483	12,706	1,223	11%	4,825	4,018	-807	-17%	310,433	307,210	-3,224	-1%
	2013	11,680	12,262	582	5%	4,911	4,449	-462	-9%	293,567	290,772	-2,795	-1%
	2014		11,353				4,563				267,122		

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%
Poland	2008	23,894	20,328	-3,566	-15%	134,794	140,511	5,717	4%	525,307	541,589	16,282	3%
	2009	23,531	23,272	-259	-1%	127,528	129,570	2,042	2%	502,567	512,955	10,388	2%
	2010	24,715	24,351	-364	-1%	133,746	129,522	-4,224	-3%	536,108	535,396	-713	0%
	2011	24,876	25,177	301	1%	138,699	142,424	3,725	3%	537,434	535,915	-1,519	0%
	2012	23,762	23,329	-433	-2%	132,657	134,291	1,634	1%	569,447	569,380	-67	0%
	2013	21,548	21,781	233	1%	137,505	137,563	58	0%	574,674	574,372	-302	0%
	2014		21,377				129,964				562,338		
Portugal	2008	12,313	12,942	629	5%	4,160	4,200	40	1%	173,272	172,983	-289	0%
	2009	11,467	11,854	387	3%	4,680	4,747	67	1%	176,567	175,348	-1,219	-1%
	2010	11,170	11,740	570	5%	2,705	2,442	-263	-10%	187,935	139,263	-48,672	-26%
	2011	10,528	10,840	312	3%	3,700	3,700	0	0%	186,884	186,444	-440	0%
	2012	8,911	9,457	546	6%	4,874	4,874	0	0%	164,651	168,567	3,916	2%
	2013	9,224	10,569	1,345	15%	4,449	4,450	1	0%	157,251	162,206	4,955	3%
	2014		9,725				4,519				149,900		
Romania	2008	9,980	10,090	110	1%	40,384	38,719	-1,665	-4%	521,348	503,913	-17,435	-3%
	2009	8,463	8,141	-322	-4%	35,136	32,091	-3,045	-9%	443,775	436,497	-7,277	-2%
	2010	8,807	8,394	-413	-5%	32,649	32,815	166	1%	451,681	462,542	10,861	2%
	2011	8,675	8,871	196	2%	39,010	38,269	-741	-2%	464,946	477,898	12,952	3%
	2012	8,487	8,519	32	0%	35,870	35,757	-113	0%	452,715	465,882	13,167	3%
	2013	7,987	8,094	107	1%	26,669	25,754	-915	-3%	410,052	430,846	20,794	5%
	2014		8,188				25,840				404,690		
Slovenia	2008	2,916	2,857	-59	-2%	5,236	4,887	-349	-7%	36,789	34,962	-1,828	-5%
	2009	2,528	2,472	-56	-2%	4,972	4,755	-217	-4%	34,815	33,599	-1,216	-3%
	2010	2,514	2,529	15	1%	4,955	4,928	-27	-1%	36,125	34,594	-1,531	-4%
	2011	2,552	2,533	-19	-1%	5,064	4,952	-112	-2%	30,883	28,765	-2,118	-7%
	2012	2,503	2,465	-38	-2%	4,985	4,882	-103	-2%	29,730	27,091	-2,639	-9%
	2013	2,398	2,169	-229	-10%	4,487	4,045	-442	-10%	28,967	28,954	-13	0%
	2014		2,188				3,163				26,241		
Slovakia	2008	3,493	3,490	-3	0%	8,098	8,613	515	6%	216,303	195,151	-21,152	-10%
	2009	3,192	3,342	150	5%	7,715	7,806	91	1%	185,238	223,225	37,987	21%
	2010	3,372	3,410	38	1%	7,609	6,871	-738	-10%	209,609	212,203	2,594	1%
	2011	3,306	3,311	5	0%	7,415	7,557	142	2%	194,144	237,008	42,864	22%
	2012	3,135	3,062	-73	-2%	6,982	7,029	47	1%	182,768	225,478	42,710	23%
	2013	3,048	2,977	-71	-2%	6,847	6,657	-190	-3%	201,571	203,223	1,651	1%
	2014		2,869				6,522				133,253		

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%	Annual	Cumulated Monthly	Difference absolute	%
Finland	2008	9,576	9,987	411	4%	12,995	11,875	-1,120	-9%	161,316	166,348	5,032	3%
	2009	9,129	9,292	163	2%	12,761	12,239	-522	-4%	145,872	145,871	-1	0%
	2010	8,426	9,344	918	11%	16,750	16,186	-564	-3%	160,668	149,836	-10,832	-7%
	2011	9,054	8,755	-299	-3%	14,206	13,841	-365	-3%	140,674	140,148	-526	0%
	2012	7,887	8,046	159	2%	11,336	11,593	257	2%	125,819	125,385	-434	0%
	2013	7,187	7,196	9	0%	11,507	11,337	-170	-1%	119,611	118,526	-1,085	-1%
	2014		8,196				10,755				104,086		
Sweden	2008	13,205	13,006	-199	-2%	4,204	4,174	-30	-1%	34,605	34,564	-41	0%
	2009	11,546	11,595	49	0%	3,423	2,844	-579	-17%	50,938	46,529	-4,409	-9%
	2010	13,353	13,600	247	2%	4,248	4,637	389	9%	54,969	106,010	51,041	93%
	2011	13,541	13,204	-337	-2%	4,239	4,133	-106	-3%	48,287	48,214	-73	0%
	2012	12,341	12,262	-79	-1%	3,659	3,131	-528	-14%	42,144	42,098	-47	0%
	2013	11,404	11,558	154	1%	3,669	3,252	-417	-11%	39,996	40,068	72	0%
	2014		11,471				3,398				33,245		
United Kingdom	2008	64,707	74,353	9,646	15%	58,503	58,214	-289	0%	3,536,479	3,626,832	90,353	3%
	2009	61,626	77,320	15,694	25%	48,319	48,685	366	1%	3,270,733	3,215,405	-55,328	-2%
	2010	60,661	73,331	12,670	21%	50,230	50,285	55	0%	3,550,973	3,525,830	-25,143	-1%
	2011	58,510	69,116	10,606	18%	49,797	50,109	312	1%	2,939,218	2,934,731	-4,487	0%
	2012	55,995	67,485	11,490	21%	63,316	63,554	238	0%	2,777,984	2,773,037	-4,947	0%
	2013	55,371	65,912	10,541	19%	60,778	61,027	249	0%	2,750,037	2,747,482	-2,555	0%
	2014		55,419				48,781				2,511,757		
EU 15	2008	526,473	536,047	9,574	2%	495,550	487,272	-8,278	-2%	16,089,129	16,071,406	-17,723	0%
	2009	499,921	517,558	17,637	4%	449,426	441,506	-7,920	-2%	15,355,883	15,087,507	-268,376	-2%
	2010	490,367	505,289	14,922	3%	452,255	429,518	-22,737	-5%	16,226,916	16,294,551	67,635	0%
	2011	472,575	487,304	14,729	3%	465,936	461,965	-3,971	-1%	14,438,024	14,350,316	-87,708	-1%
	2012	449,957	467,941	17,984	4%	497,492	492,339	-5,153	-1%	14,179,161	13,712,916	-466,245	-3%
	2013	439,674	454,153	14,479	3%	477,754	466,038	-11,716	-2%	14,000,062	13,968,491	-31,570	0%
	2014		435,865				441,252				12,439,362		
EU 28	2008	595,727	601,670	5,943	1%	799,690	796,234	-3,456	0%	18,447,915	18,414,556	-33,359	0%
	2009	564,682	582,149	17,467	3%	731,119	723,696	-7,423	-1%	17,442,230	17,205,208	-237,022	-1%
	2010	555,892	569,390	13,498	2%	745,302	715,834	-29,468	-4%	18,490,035	18,503,345	13,311	0%
	2011	540,609	555,752	15,143	3%	781,154	780,686	-468	0%	16,759,174	16,702,279	-56,894	0%
	2012	515,838	533,437	17,599	3%	793,031	790,930	-2,101	0%	16,436,950	16,009,333	-427,617	-3%
	2013	501,112	515,699	14,587	3%	763,327	750,503	-12,824	-2%	16,188,567	16,163,517	-25,051	0%
	2014		498,029				718,286				14,441,507		

Table 8-2 Net Calorific Values used for the purposes of converting GHG inventory data in physical units and for calculating trend changes in TJ units

Member States			Belgium	Bulgaria	Cyprus	Czech Republic	Germany	Denmark	Estonia	Ireland	Greece	Spain	Finland	France
FUEL TYPES														
Liquid Fossil	Primary Fuels	Crude Oil	41.9	42.5	42.20	42.4	42.7	43.0		42.8	42.8	41.9	42.7	42.0
		Other hydrocarbons		41.9				27.7	39.2	41.9				27.5
		NGL	44.2				46.0			44.0	41.6		45.2	44.0
	Secondary Fuels	Motor spirit	44.0	44.0	44.8	43.4	43.5	43.8	44.0	44.6	44.0	44.8	43.0	44.0
		Kerosenes - Jet fuels	43.1	43.0	44.6	43.3	42.8	43.5	43.0	44.1	44.6	43.4	43.3	44.0
		Gas / Diesel Oil	42.7	42.3	43.3	42.6	43.0	42.7	42.3	43.3	43.0	43.1	42.8	42.0
		Residual Fuel Oil	40.6	40.0	40.2	39.5	40.4	40.7	40.2	41.2	40.2	40.5	40.8	40.0
		LPG	46.0	46.0	47.3	46.0	46.0	46.0	45.5	47.2	47.3	44.8	46.2	46.0
		Ethane		49.5										47.5
		Naphta	44.0	44.0		44.0	44.0	44.5		44.0	45.0	45.0	44.3	45.0
		Bitumen	37.7	37.7	40.2	40.2	40.2	39.8	40.2	37.7	40.2	40.2	40.2	40.0
		Lubricants	42.3	42.3	40.2	40.2	40.2	41.9	40.2	42.3	40.2	40.2	40.2	40.0
		Petroleum Coke	31.4	31.4	31.0	38.5	31.5	31.4		32.5	32.4	32.5	33.5	32.0
		Refinery Feedstocks	41.9	42.5		39.0	44.3	42.7		42.5	41.3	44.8	42.5	44.8
Other Liquid Fossil		Refinery gas + paraffin waxes + white spirit & SBP + other petroleum products+ Bitumen + Lubricants	40.0	40.4	40.2	40.4	39.5	43.5		40.0	40.2	40.2	42.0	40.0
Liquid Fossil Totals														
Solid	Primary	Hard Coal	26.3	25.7	25.5	22.7	27.4	24.2	27.2	25.2	25.0	22.5	25.5	26.0
		Lignite	21.6	7.0	11.9	12.2	9.1		9.0	19.8	5.3	10.0		17.0
		Peat							10.0	7.8			10.1	11.6
	Secondary Fuels	BKB (Brown coal / peat briquettes) and Pate	24.7	12.5		20.8	19.7	18.3		18.5				32.0
		Coke Oven Coke + Gas Coke	29.3	28.5		28.4	28.5	28.5	28.5		27.8	27.7	28.1	28.0

Member States			Croatia	Hungary	Italy	Lithuania	Luxem-bourg	Latvia	Malta	Nether-lands	Austria
FUEL TYPES											
Liquid Fossil	Primary Fuels	Crude Oil	42.7	40.8	42.6	42.8				42.2	42.5
		Other hydrocarbons		40.0							
		NGL	42.5	43.0		44.0				44.0	42.5
	Secondary Fuels	Motor spirit	44.6	42.0	44.0	44.8	43.0	44.0	44.8	44.0	41.3
		Kerosenes - Jet fuels	44.0	42.0	43.0	43.2	43.1	43.2	44.1	43.5	43.3
		Gas / Diesel Oil	42.7	42.0	42.6	43.1	42.5	42.5	43.3	42.7	42.1
		Residual Fuel Oil	40.2	40.0	40.0	40.1	40.0	40.6	40.2	40.0	40.4
		LPG	46.9	47.0	46.0	46.4	46.0	45.5	47.3	45.2	46.1
		Ethane	47.5								
		Naphta	44.6	42.0	44.0					44.0	45.0
		Bitumen	33.5	37.7	39.0	39.0	40.2	41.9		41.9	44.3
		Lubricants	33.5	39.8	42.0	42.0	40.2	41.9		41.4	41.8
		Petroleum Coke	31.0	29.4	32.0	32.0	31.5	33.0			35.2
		Refinery Feedstocks	42.6	41.8	41.9	44.0					42.6
Other Liquid Fossil		Refinery gas + paraffin waxes + white spirit & SBP + other petroleum products+ Bitumen + Lubricants	42.7	40.1	40.0	40.0	39.5	41.9	41.0	40.0	44.3
Liquid Fossil Totals											
Solid	Primary	Hard Coal	24.6	24.9	26.6	25.1	24.4	24.1		24.7	27.3
		Lignite	10.7	7.0	10.5	14.7	22.2			20.0	19.4
		Peat				11.7		10.1			8.8
	Secondary Fuels	BKB (Brown coal / peat briquettes) and Pate	16.7	24.7		24.7	22.2				19.3
		Coke Oven Coke + Gas Coke	29.3	28.5	28.5	29.3	28.5	26.8		28.5	29.0

Member States			Poland	Portugal	Romania	Sweden	Slovenia	Slovakia	United Kingdom
FUEL TYPES									
Liquid Fossil	Primary Fuels	Crude Oil	42.6	42.4	41.4	42.3		42.0	43.4
		Other hydrocarbons		28.0	38.9	42.5	42.5	27.5	28.2
		NGL			49.5	44.0		37.0	46.9
	Secondary Fuels	Motor spirit	44.0	44.0	43.5	44.0	43.6	43.7	44.8
		Kerosenes - Jet fuels	43.0	43.8	48.8	43.0	43.5	43.3	43.9
		Gas / Diesel Oil	42.6	42.6	42.4	42.6	42.6	42.2	43.3
		Residual Fuel Oil	40.0	40.0	39.4	40.0	41.4	40.4	41.2
		LPG	46.0	46.0	48.1	46.1	46.1	46.0	45.4
		Ethane	49.5			50.4		47.4	47.5
		Naphta	44.0	44.0	44.0	44.0		43.6	45.4
		Bitumen	39.0	39.0	35.2	41.9	40.2	40.2	40.2
		Lubricants	42.0	42.0	35.2	42.0	42.1	42.0	40.2
		Petroleum Coke	32.0	32.0	34.3	34.8	31.8	34.9	34.0
		Refinery Feedstocks	42.5	44.0	44.8	44.2		43.9	42.5
Other Liquid Fossil		Refinery gas + paraffin waxes + white spirit & SBP + other petroleum products+ Bitumen + Lubricants	40.0	40.0	40.0	40.0	40.2	30.0	40.9
Liquid Fossil Totals									
Solid	Primary	Hard Coal	22.4	25.2	22.0	27.2	25.5	25.5	24.7
		Lignite	8.4	16.4	7.9		10.7	10.6	
		Peat			8.8	11.5		9.8	12.8
	Secondary Fuels	BKB (Brown coal / peat briquettes) and Pate	24.7	24.7				25.6	31.0
		Coke Oven Coke + Gas Coke	28.5	17.6	26.4	28.1	29.9	28.0	28.3

Table 8-3 Differences between monthly Eurostat data and GHG inventory data (table 1.A(b) for fuel consumption

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Belgium	2008	21,726	23,551	-1,825	-8%	6,395	6,812	-417	-6%	507,678	622,938	-115,260	-19%
	2009	22,489	23,033	-544	-2%	3,783	4,869	-1,086	-22%	566,504	634,426	-67,923	-11%
	2010	22,071	24,049	-1,978	-8%	1,245	5,059	-3,814	-75%	580,711	712,012	-131,302	-18%
	2011	21,580	21,975	-395	-2%	2,692	4,589	-1,897	-41%	474,624	640,285	-165,661	-26%
	2012	21,866	20,548	1,318	6%	4,032	4,542	-510	-11%	329,770	601,475	-271,706	-45%
	2013	21,984	21,965	19	0%	3,994	4,917	-923	-19%	594,578	602,704	-8,126	-1%
	2014	22,469				4,678				520,738			
Bulgaria	2008	4,928	4,580	348	8%	33,494	32,666	828	3%	122,106	121,353	753	1%
	2009	4,450	4,161	289	7%	30,291	28,562	1,729	6%	87,312	90,465	-3,154	-3%
	2010	3,263	3,810	-547	-14%	32,554	32,691	-137	0%	96,202	96,312	-110	0%
	2011	3,306	3,580	-274	-8%	40,241	40,208	33	0%	105,458	110,172	-4,713	-4%
	2012	3,673	3,797	-124	-3%	35,683	35,273	410	1%	92,539	102,637	-10,098	-10%
	2013	3,509	3,473	36	1%	30,409	30,585	-176	-1%	96,513	99,977	-3,464	-3%
	2014	3,684				33,281				95,599			
Czech Republic	2008	9,276	9,105	171	2%	54,284	53,993	291	1%	297,920	298,119	-199	0%
	2009	8,932	8,821	111	1%	51,331	50,791	540	1%	280,985	281,624	-639	0%
	2010	8,470	8,714	-244	-3%	50,010	51,687	-1,677	-3%	322,084	336,360	-14,276	-4%
	2011	8,276	8,171	105	1%	53,061	53,042	19	0%	283,617	283,607	10	0%
	2012	8,227	8,269	-42	-1%	49,001	50,486	-1,485	-3%	281,038	287,051	-6,014	-2%
	2013	8,013	7,955	58	1%	46,801	47,051	-250	-1%	289,558	291,435	-1,877	-1%
	2014	8,459				45,718				258,585			
Denmark	2008	6,865	7,122	-257	-4%	6,867	6,875	-8	0%	168,637	170,740	-2,103	-1%
	2009	6,690	6,549	141	2%	6,858	6,810	48	1%	163,416	163,436	-21	0%
	2010	7,247	6,844	403	6%	6,532	6,467	65	1%	183,258	185,204	-1,946	-1%
	2011	6,561	6,601	-40	-1%	5,538	5,489	49	1%	150,786	155,640	-4,854	-3%
	2012	6,490	6,032	458	8%	4,331	4,271	60	1%	138,151	145,885	-7,734	-5%
	2013	6,487	5,930	557	9%	5,485	5,479	6	0%	139,353	138,833	520	0%
	2014	6,163				4,447				116,431			
Germany	2008	106,410	103,866	2,544	2%	239,652	241,561	-1,909	-1%	3,222,446	3,069,942	152,504	5%
	2009	100,356	98,819	1,537	2%	222,166	224,909	-2,743	-1%	3,199,675	2,944,253	255,422	9%
	2010	100,721	101,490	-769	-1%	223,270	233,063	-9,793	-4%	3,390,003	3,074,942	315,061	10%
	2011	98,546	98,460	86	0%	232,287	237,524	-5,237	-2%	2,797,036	2,784,786	12,250	0%
	2012	96,976	99,143	-2,167	-2%	239,616	247,727	-8,111	-3%	2,814,948	2,966,298	-151,350	-5%
	2013	98,874	100,479	-1,605	-2%	237,599	246,447	-8,848	-4%	3,075,491	3,178,642	-103,151	-3%
	2014	97,437				233,670				2,738,165			

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Estonia	2008	1,011	112	899	805%	16,294	15,997	297	2%	30,491	27,438	3,053	11%
	2009	936	431	505	117%	15,454	13,996	1,458	10%	19,335	21,398	-2,063	-10%
	2010	996	489	507	104%	18,258	18,207	51	0%	20,730	23,547	-2,817	-12%
	2011	989	467	522	112%	19,124	19,026	98	1%	20,508	21,235	-727	-3%
	2012	807	460	347	76%	19,146	17,835	1,311	7%	22,835	22,109	726	3%
	2013	310	413	-103	-25%	20,649	20,770	-121	-1%	23,233	23,083	149	1%
	2014	269				20,556				18,236			
Ireland	2008	6,995	8,119	-1,124	-14%	5,164	5,856	-692	-12%	148,332	188,044	-39,712	-21%
	2009	7,005	8,552	-1,547	-18%	5,103	6,168	-1,065	-17%	179,431	180,410	-979	-1%
	2010	7,171	6,723	448	7%	3,251	6,003	-2,752	-46%	198,245	197,170	1,074	1%
	2011	6,412	6,152	260	4%	5,917	5,837	80	1%	177,456	172,744	4,712	3%
	2012	5,750	5,462	288	5%	7,104	6,197	907	15%	173,475	168,449	5,026	3%
	2013	5,891	5,762	129	2%	6,032	6,043	-11	0%	168,227	162,109	6,118	4%
	2014	5,733				6,270				162,531			
Greece	2008	16,981	16,719	262	2%	63,171	65,157	-1,986	-3%	146,842	142,441	4,401	3%
	2009	16,363	16,678	-315	-2%	62,025	65,405	-3,380	-5%	124,326	121,786	2,540	2%
	2010	14,977	14,521	456	3%	50,108	57,961	-7,853	-14%	135,398	134,493	905	1%
	2011	12,718	13,559	-841	-6%	57,015	60,359	-3,344	-6%	166,218	163,053	3,165	2%
	2012	11,978	11,713	265	2%	60,978	62,263	-1,285	-2%	153,502	150,030	3,472	2%
	2013	11,181	10,687	494	5%	53,193	54,688	-1,495	-3%	135,392	135,497	-104	0%
	2014	10,992				49,200				103,783			
Spain	2008	65,638	64,388	1,250	2%	25,373	25,903	-530	-2%	1,456,392	1,461,599	-5,207	0%
	2009	60,953	59,786	1,167	2%	21,589	19,493	2,096	11%	1,307,858	1,312,073	-4,215	0%
	2010	57,490	56,306	1,184	2%	15,426	14,451	975	7%	1,303,618	1,305,770	-2,153	0%
	2011	54,060	53,042	1,018	2%	24,695	23,926	769	3%	1,211,493	1,213,828	-2,335	0%
	2012	49,504	48,435	1,069	2%	29,881	28,693	1,188	4%	1,182,644	1,181,551	1,093	0%
	2013	46,235	45,467	768	2%	20,420	20,633	-213	-1%	1,092,011	1,093,235	-1,223	0%
	2014	45,406				21,961				990,950			
France	2008	85,477	85,715	-238	0%	19,308	21,636	-2,328	-11%	1,660,017	1,674,708	-14,691	-1%
	2009	82,444	79,528	2,916	4%	16,918	18,049	-1,131	-6%	1,487,191	1,607,340	-120,149	-7%
	2010	77,522	79,203	-1,681	-2%	18,912	19,859	-947	-5%	1,735,830	1,798,429	-62,598	-3%
	2011	80,064	78,604	1,460	2%	16,345	17,375	-1,029	-6%	1,572,071	1,482,516	89,555	6%
	2012	77,623	77,070	553	1%	18,795	19,473	-678	-3%	1,523,371	1,605,645	-82,274	-5%
	2013	72,122	73,018	-896	-1%	20,052	21,317	-1,265	-6%	1,570,531	1,629,936	-59,405	-4%
	2014	71,206				14,774				1,364,721			

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Croatia	2008												
	2009												
	2010												
	2011	3,390	3,522	-132	-4%	1,213	1,224	-11	-1%	112,505	107,610	4,895	5%
	2012	3,158	3,167	-9	0%	1,073	1,081	-8	-1%	91,488	101,781	-10,293	-10%
	2013	3,083	3,073	10	0%	1,146	1,138	8	1%	87,207	95,537	-8,329	-9%
	2014	2,903				1,099				79,616			
Italy	2008	70,685	76,214	-5,529	-7%	25,548	24,083	1,465	6%	2,906,557	2,908,665	-2,108	0%
	2009	67,028	72,318	-5,290	-7%	18,730	19,398	-668	-3%	2,678,942	2,673,630	5,312	0%
	2010	64,005	68,672	-4,667	-7%	20,209	21,333	-1,124	-5%	2,845,490	2,847,466	-1,976	0%
	2011	61,351	65,270	-3,919	-6%	24,337	23,824	513	2%	2,668,861	2,669,961	-1,100	0%
	2012	56,387	59,176	-2,789	-5%	24,345	24,500	-155	-1%	2,569,179	2,567,407	1,771	0%
	2013	53,510	55,913	-2,403	-4%	21,783	21,292	491	2%	2,402,257	2,402,951	-694	0%
	2014	51,351				20,975				2,122,967			
Cyprus	2008	2,371	2,365	6	0%	42	42	0	1%				
	2009	2,464	2,349	115	5%	21	21	0	-1%				
	2010	2,407	2,370	37	2%	26	26	0	0%				
	2011	2,314	2,294	20	1%	11	12	-1	-8%				
	2012	2,128	2,135	-7	0%	0	1	-1	-100%				
	2013	1,816	1,830	-14	-1%	0	13	-13	-100%				
	2014	1,878				4							
Latvia	2008	1,364	1,420	-56	-4%	174	176	-2	-1%	55,814	55,894	-80	0%
	2009	1,170	1,174	-4	0%	148	135	13	10%	51,329	51,493	-164	0%
	2010	1,070	1,115	-45	-4%	182	170	12	7%	61,210	61,313	-103	0%
	2011	1,149	1,089	60	6%	193	180	13	7%	53,943	53,998	-55	0%
	2012	1,147	1,226	-79	-6%	192	148	44	30%	50,716	50,812	-96	0%
	2013	1,101	1,192	-91	-8%	132	131	1	1%	50,200	50,544	-344	-1%
	2014	1,197				100				45,274			
Lithuania	2008	2,880	2,809	71	3%	384	351	33	9%	108,607	108,673	-66	0%
	2009	2,316	2,429	-113	-5%	281	267	14	5%	91,327	91,329	-2	0%
	2010	2,338	2,494	-156	-6%	386	331	55	17%	104,386	82,007	22,379	27%
	2011	2,183	2,372	-189	-8%	395	440	-45	-10%	113,765	113,817	-53	0%
	2012	2,242	2,425	-183	-8%	437	426	11	3%	111,118	111,132	-14	0%
	2013	2,193	2,372	-179	-8%	513	427	86	20%	90,554	90,608	-54	0%
	2014	2,384				428				86,157			

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Luxembourg	2008	2,627	2,484	143	6%	108	105	3	3%	44,215	45,744	-1,529	-3%
	2009	2,443	2,310	133	6%	99	113	-14	-12%	46,579	46,577	2	0%
	2010	2,698	2,390	308	13%	97	113	-16	-14%	50,144	50,099	45	0%
	2011	2,502	2,506	-4	0%	97	99	-2	-2%	43,217	43,219	-2	0%
	2012	2,437	2,404	33	1%	90	92	-2	-2%	43,857	44,005	-148	0%
	2013	2,446	2,363	83	4%	76	81	-5	-6%	37,259	37,258	1	0%
	2014	2,287				78				35,302			
Hungary	2008	7,027	6,983	45	1%	11,560	12,789	-1,229	-10%	452,598	442,161	10,437	2%
	2009	6,699	6,789	-90	-1%	10,442	11,073	-631	-6%	381,139	383,171	-2,032	-1%
	2010	6,016	6,449	-433	-7%	10,764	11,592	-828	-7%	359,447	410,955	-51,508	-13%
	2011	6,156	6,413	-257	-4%	11,281	11,983	-702	-6%	382,581	391,506	-8,925	-2%
	2012	5,708	5,779	-71	-1%	11,100	11,034	66	1%	358,854	347,753	11,102	3%
	2013	5,787	5,662	125	2%	10,796	10,648	148	1%	320,365	322,601	-2,237	-1%
	2014	6,038				10,359				292,156			
Malta	2008												
	2009	396	802	-405	-51%								
	2010	856	817	39	5%								
	2011	793	817	-24	-3%								
	2012	1,031	864	167	19%								
	2013	713	773	-60	-8%								
	2014	730											
Netherlands	2008	29,193	28,845	348	1%	12,575	12,960	-385	-3%	1,507,257	1,454,108	53,149	4%
	2009	28,785	28,017	768	3%	11,876	12,086	-210	-2%	1,453,700	1,465,789	-12,089	-1%
	2010	29,994	29,149	846	3%	11,988	12,253	-265	-2%	1,622,544	1,642,667	-20,123	-1%
	2011	28,600	27,756	844	3%	16,471	12,065	4,406	37%	1,470,612	1,433,555	37,057	3%
	2012	28,973	29,887	-914	-3%	15,997	13,900	2,097	15%	1,367,723	1,372,754	-5,031	0%
	2013	27,926	28,739	-813	-3%	12,890	13,668	-778	-6%	1,394,339	1,396,200	-1,862	0%
	2014	26,657				13,183				1,217,665			
Austria	2008	13,162	12,660	502	4%	4,648	5,321	-673	-13%	302,307	315,995	-13,688	-4%
	2009	12,942	12,134	808	7%	3,844	4,284	-440	-10%	296,735	316,162	-19,428	-6%
	2010	13,378	12,534	844	7%	4,930	5,033	-103	-2%	328,372	347,395	-19,023	-5%
	2011	12,995	11,712	1,283	11%	4,786	5,157	-371	-7%	308,406	327,957	-19,551	-6%
	2012	12,706	11,442	1,264	11%	4,018	4,826	-808	-17%	307,210	310,433	-3,223	-1%
	2013	12,262	11,680	582	5%	4,449	4,877	-428	-9%	290,772	293,566	-2,794	-1%
	2014	11,353				4,563				267,122			

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Poland	2008	20,328	24,479	-4,151	-17%	140,511	136,174	4,337	3%	541,589	525,307	16,282	3%
	2009	23,272	23,715	-443	-2%	129,570	128,218	1,352	1%	512,955	513,992	-1,037	0%
	2010	24,351	25,212	-861	-3%	129,522	129,697	-175	0%	535,396	536,108	-713	0%
	2011	25,177	24,916	261	1%	142,424	140,280	2,144	2%	535,915	537,435	-1,520	0%
	2012	23,329	23,773	-444	-2%	134,291	133,593	698	1%	569,380	569,447	-67	0%
	2013	21,781	21,593	188	1%	137,563	137,827	-264	0%	574,372	574,674	-302	0%
	2014	21,377				129,964				562,338			
Portugal	2008	12,942	12,552	390	3%	4,200	4,164	36	1%	172,983	174,055	-1,072	-1%
	2009	11,854	11,688	166	1%	4,747	4,674	73	2%	175,348	177,241	-1,893	-1%
	2010	11,740	11,088	652	6%	2,442	2,710	-268	-10%	139,263	188,691	-49,428	-26%
	2011	10,840	10,184	656	6%	3,700	3,635	65	2%	186,444	188,080	-1,636	-1%
	2012	9,457	9,158	299	3%	4,874	4,846	28	1%	168,567	165,391	3,176	2%
	2013	10,569	9,341	1,228	13%	4,450	4,410	40	1%	162,206	157,799	4,407	3%
	2014	9,725				4,519				149,900			
Romania	2008	10,090	11,746	-1,656	-14%	38,719	37,491	1,228	3%	503,913	522,367	-18,455	-4%
	2009	8,141	9,340	-1,199	-13%	32,091	32,013	78	0%	436,497	445,570	-9,073	-2%
	2010	8,394	8,147	247	3%	32,815	32,569	246	1%	462,542	451,681	10,861	2%
	2011	8,871	8,433	438	5%	38,269	38,944	-675	-2%	477,898	464,946	12,952	3%
	2012	8,519	8,615	-96	-1%	35,757	35,866	-109	0%	465,882	452,715	13,167	3%
	2013	8,094	8,139	-45	-1%	25,754	26,663	-909	-3%	430,846	410,052	20,794	5%
	2014	8,188				25,840				404,690			
Slovenia	2008	2,857	2,801	56	2%	4,887	5,236	-349	-7%	34,962	36,771	-1,809	-5%
	2009	2,472	2,548	-76	-3%	4,755	4,960	-205	-4%	33,599	34,748	-1,149	-3%
	2010	2,529	2,491	38	2%	4,928	4,955	-27	-1%	34,594	36,146	-1,552	-4%
	2011	2,533	2,492	41	2%	4,952	5,057	-105	-2%	28,765	30,907	-2,142	-7%
	2012	2,465	2,469	-4	0%	4,882	4,985	-103	-2%	27,091	29,742	-2,651	-9%
	2013	2,169	2,330	-161	-7%	4,045	4,487	-442	-10%	28,954	28,967	-13	0%
	2014	2,188				3,163				26,241			
Slovakia	2008	3,490	3,555	-65	-2%	8,613	8,170	443	5%	195,151	216,238	-21,087	-10%
	2009	3,342	3,236	106	3%	7,806	7,781	25	0%	223,225	185,657	37,568	20%
	2010	3,410	3,411	-1	0%	6,871	7,286	-415	-6%	212,203	209,806	2,398	1%
	2011	3,311	3,337	-26	-1%	7,557	7,487	70	1%	237,008	193,672	43,336	22%
	2012	3,062	3,203	-141	-4%	7,029	7,042	-13	0%	225,478	182,788	42,690	23%
	2013	2,977	3,134	-157	-5%	6,657	6,847	-190	-3%	203,223	201,628	1,595	1%
	2014	2,869				6,522				133,253			

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%	Cumulated Monthly	CRF 1.A.(b)	Difference absolute	%
Finland	2008	9,987	9,244	743	8%	11,875	13,634	-1,759	-13%	166,348	161,670	4,678	3%
	2009	9,292	8,770	522	6%	12,239	12,984	-745	-6%	145,871	145,708	163	0%
	2010	9,344	8,900	444	5%	16,186	16,817	-631	-4%	149,836	160,342	-10,507	-7%
	2011	8,755	8,905	-150	-2%	13,841	14,331	-490	-3%	140,148	140,518	-370	0%
	2012	8,046	7,705	341	4%	11,593	11,241	352	3%	125,385	125,848	-462	0%
	2013	7,196	7,647	-451	-6%	11,337	11,719	-382	-3%	118,526	119,622	-1,096	-1%
	2014	8,196				10,755				104,086			
Sweden	2008	13,006	13,113	-107	-1%	4,174	3,719	455	12%	34,564	34,198	365	1%
	2009	11,595	12,445	-850	-7%	2,844	3,227	-383	-12%	46,529	45,616	913	2%
	2010	13,600	12,968	632	5%	4,637	4,047	590	15%	106,010	61,345	44,665	73%
	2011	13,204	12,751	453	4%	4,133	3,842	291	8%	48,214	48,523	-309	-1%
	2012	12,262	11,884	378	3%	3,131	3,815	-684	-18%	42,098	42,356	-258	-1%
	2013	11,558	12,178	-620	-5%	3,252	3,669	-417	-11%	40,068	39,996	72	0%
	2014	11,471				3,398				33,245			
United Kingdom	2008	74,353	64,886	9,467	15%	58,214	55,613	2,601	5%	3,626,832	3,536,725	90,108	3%
	2009	77,320	60,753	16,567	27%	48,685	42,257	6,428	15%	3,215,405	3,267,060	-51,655	-2%
	2010	73,331	60,727	12,604	21%	50,285	50,854	-569	-1%	3,525,830	3,542,785	-16,955	0%
	2011	69,116	58,829	10,287	17%	50,109	50,543	-433	-1%	2,934,731	2,931,555	3,176	0%
	2012	67,485	56,871	10,615	19%	63,554	63,965	-411	-1%	2,773,037	2,772,837	200	0%
	2013	65,912	56,009	9,903	18%	61,027	61,270	-244	0%	2,747,482	2,756,655	-9,173	0%
	2014	55,419				48,781				2,511,757			
EU 15	2008	536,047	529,480	6,567	1%	487,272	493,400	-6,128	-1%	16,071,406	15,961,572	109,834	1%
	2009	517,558	501,379	16,180	3%	441,506	444,727	-3,221	-1%	15,087,507	15,101,507	-13,999	0%
	2010	505,289	495,564	9,726	2%	429,518	456,023	-26,505	-6%	16,294,551	16,248,810	45,741	0%
	2011	487,304	476,306	10,998	2%	461,965	468,594	-6,629	-1%	14,350,316	14,396,219	-45,903	0%
	2012	467,941	456,929	11,012	2%	492,339	500,350	-8,011	-2%	13,712,916	14,220,365	-507,449	-4%
	2013	454,153	447,179	6,974	2%	466,038	480,510	-14,472	-3%	13,968,491	14,145,004	-176,512	-1%
	2014	435,865				441,252				12,439,362			
EU 28	2008	601,670	599,435	2,235	0%	796,234	796,484	-250	0%	18,414,556	18,315,892	98,664	1%
	2009	582,149	567,173	14,976	3%	723,696	722,544	1,152	0%	17,205,208	17,200,953	4,255	0%
	2010	569,390	561,083	8,306	1%	715,834	745,234	-29,400	-4%	18,503,345	18,493,044	10,301	0%
	2011	555,752	544,209	11,543	2%	780,686	786,479	-5,793	-1%	16,702,279	16,705,124	-2,845	0%
	2012	533,437	523,110	10,327	2%	790,930	798,121	-7,191	-1%	16,009,333	16,478,331	-468,998	-3%
	2013	515,699	509,118	6,581	1%	750,503	767,098	-16,595	-2%	16,163,517	16,334,109	-170,593	-1%
	2014	498,029				718,286				14,441,507			

Table 8-4 Comparison of calculation approaches of trend changes for CO_2 emissions with different ways of converting the units

Member States	Total CO_2 emissions without waste and other solids, Reference Approach [Gg CO2]		Difference relative 2014/2013 approach based on energy units	Difference relative 2014/2013 approach based on physical units
	Early estimates 2014 Eurostat (conversion to energy units)	Early estimates 2014 Eurostat (physical units)		
Belgium	89,622	89,580	-1.0%	-1.0%
Bulgaria	43,635	43,610	7.2%	7.1%
Czech Republic	90,894	91,083	-2.3%	-2.1%
Denmark	34,080	34,073	-10.7%	-10.7%
Germany	744,735	739,985	-3.1%	-3.7%
Estonia	19,319	19,237	-1.6%	-2.0%
Ireland	34,721	34,736	-1.0%	-1.0%
Greece	71,307	71,104	-6.2%	-6.5%
Spain	225,185	224,915	-2.0%	-2.1%
France	310,379	310,109	-8.1%	-8.2%
Croatia	14,982	14,996	-6.4%	-6.3%
Italy	329,352	329,171	-6.9%	-6.9%
Cyprus	5,329	5,387	2.4%	3.5%
Latvia	6,028	6,028	-1.3%	-1.3%
Lithuania	11,013	10,971	2.6%	2.2%
Luxembourg	9,001	8,992	-6.1%	-6.2%
Hungary	38,262	37,866	-2.3%	-3.3%
Malta	2,483	2,479	2.6%	2.5%
Netherlands	141,703	141,896	-7.0%	-6.9%
Austria	50,018	49,976	-3.4%	-3.5%
Poland	285,683	288,059	-5.3%	-4.5%
Portugal	42,190	42,121	-5.6%	-5.7%
Romania	62,592	62,893	-1.8%	-1.3%
Slovenia	12,833	12,837	-9.2%	-9.1%
Slovakia	23,732	23,666	-13.9%	-14.1%
Finland	45,656	45,739	0.5%	0.7%
Sweden	41,185	41,236	0.1%	0.2%
United Kingdom	398,626	398,489	-8.7%	-8.7%
EU 15	**2,567,761**	**2,562,121**	**-5.3%**	**-5.5%**
EU 13	**616,784**	**619,113**	**-3.6%**	**-3.3%**
EU 28	**3,184,545**	**3,181,235**	**-5.0%**	**-5.1%**

Note: The sum of EU 15, EU13 and EU 28 does not equal the sum in chapter 4.2; this is due to the use of the trend changes calculated in energy units only for solid fuels for Germany, Hungary and Poland. Results for DE, HU and PL are different from Table 4-7 as only the trend change for solid fuels was changed. The differences for Cyprus have not been considered this time, as the focus was on differences caused by solid fuels and there is no solid fuel consumption in Cyprus. Nevertheless next time differences caused by other fuels should also be considered.

Table 8-5 Comparison of Eurostat annual fuel consumption data with inventory GHG inventory data

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%
Belgium	2008	23,216	23,551	-335	-1%	6,813	6,812	1	0%	621,244	622,938	-1,695	0%
	2009	23,329	23,033	296	1%	4,716	4,869	-153	-3%	632,699	634,426	-1,727	0%
	2010	24,632	24,049	583	2%	5,005	5,059	-54	-1%	710,075	712,012	-1,937	0%
	2011	21,750	21,975	-225	-1%	4,603	4,589	14	0%	636,087	640,285	-4,198	-1%
	2012	20,532	20,548	-16	0%	4,586	4,542	44	1%	601,475	601,475	0	0%
	2013	21,502	21,965	-463	-2%	4,970	4,917	53	1%	602,704	602,704	0	0%
Bulgaria	2008	4,606	4,580	26	1%	32,927	32,666	261	1%	122,012	121,353	660	1%
	2009	4,152	4,161	-9	0%	30,147	28,562	1,585	6%	90,465	90,465	0	0%
	2010	3,789	3,810	-21	-1%	32,691	32,691	0	0%	93,838	96,312	-2,474	-3%
	2011	3,592	3,580	12	0%	40,208	40,208	0	0%	110,124	110,172	-48	0%
	2012	3,840	3,797	43	1%	35,273	35,273	0	0%	102,625	102,637	-12	0%
	2013	3,486	3,473	13	0%	30,585	30,585	0	0%	99,977	99,977	0	0%
Czech Republic	2008	9,266	9,105	161	2%	54,532	53,993	539	1%	298,119	298,119	0	0%
	2009	8,920	8,821	99	1%	51,136	50,791	345	1%	281,624	281,624	0	0%
	2010	8,841	8,714	127	1%	51,949	51,687	262	1%	335,723	336,360	-636	0%
	2011	8,445	8,171	274	3%	52,657	53,042	-385	-1%	283,607	283,607	0	0%
	2012	8,288	8,269	19	0%	49,222	50,486	-1,264	-3%	287,051	287,051	0	0%
	2013	8,010	7,955	55	1%	46,243	47,051	-808	-2%	290,832	291,435	-602	0%
Denmark	2008	7,208	7,122	86	1%	6,872	6,875	-3	0%	170,741	170,740	1	0%
	2009	6,950	6,549	401	6%	6,808	6,810	-2	0%	163,437	163,436	1	0%
	2010	5,977	6,844	-867	-13%	6,521	6,467	54	1%	185,203	185,204	-1	0%
	2011	6,422	6,601	-179	-3%	5,546	5,489	57	1%	155,640	155,640	0	0%
	2012	6,182	6,032	150	2%	4,271	4,271	0	0%	145,886	145,885	1	0%
	2013	5,950	5,930	20	0%	5,364	5,479	-115	-2%	138,833	138,833	0	0%
Germany	2008	107,391	103,866	3,525	3%	242,011	241,561	450	0%	3,205,279	3,069,942	135,337	4%
	2009	101,487	98,819	2,668	3%	224,048	224,909	-861	0%	3,206,219	2,944,253	261,966	9%
	2010	102,206	101,490	716	1%	231,059	233,063	-2,004	-1%	3,073,352	3,074,942	-1,589	0%
	2011	98,928	98,460	468	0%	236,753	237,524	-771	0%	2,756,188	2,784,786	-28,598	-1%
	2012	98,215	99,143	-928	-1%	247,526	247,727	-201	0%	2,923,196	2,966,298	-43,103	-1%
	2013	99,737	100,479	-742	-1%	247,279	246,447	832	0%	3,051,546	3,178,642	-127,096	-4%

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%
Estonia	2008	617	112	505	452%	16,046	15,997	49	0%	32,260	27,438	4,821	18%
	2009	453	431	22	5%	14,066	13,996	70	1%	21,986	21,398	588	3%
	2010	460	489	-29	-6%	18,207	18,207	0	0%	23,551	23,547	5	0%
	2011	462	467	-5	-1%	19,023	19,026	-3	0%	21,072	21,235	-164	-1%
	2012	495	460	35	8%	17,822	17,835	-13	0%	22,835	22,109	726	3%
	2013	420	413	7	2%	20,770	20,770	0	0%	23,233	23,083	149	1%
Ireland	2008	7,406	8,119	-713	-9%	6,470	5,856	614	10%	187,666	188,044	-378	0%
	2009	7,018	8,552	-1,534	-18%	6,177	6,168	9	0%	179,356	180,410	-1,054	-1%
	2010	6,831	6,723	108	2%	5,965	6,003	-38	-1%	196,608	197,170	-563	0%
	2011	6,019	6,152	-133	-2%	5,837	5,837	0	0%	172,361	172,744	-383	0%
	2012	5,859	5,462	397	7%	6,618	6,197	421	7%	168,076	168,449	-374	0%
	2013	5,946	5,762	184	3%	5,890	6,043	-153	-3%	161,940	162,109	-170	0%
Greece	2008	16,667	16,719	-52	0%	65,156	65,157	-1	0%	146,795	142,441	4,355	3%
	2009	15,942	16,678	-736	-4%	65,551	65,405	146	0%	124,388	121,786	2,603	2%
	2010	14,226	14,521	-295	-2%	58,319	57,961	358	1%	135,398	134,493	905	1%
	2011	12,571	13,559	-988	-7%	60,358	60,359	-1	0%	166,310	163,053	3,257	2%
	2012	12,501	11,713	788	7%	62,261	62,263	-2	0%	153,325	150,030	3,295	2%
	2013	10,664	10,687	-23	0%	54,688	54,688	0	0%	135,497	135,497	0	0%
Spain	2008	64,388	64,388	0	0%	25,903	25,903	0	0%	1,461,599	1,461,599	0	0%
	2009	59,786	59,786	0	0%	19,571	19,493	78	0%	1,309,163	1,312,073	-2,909	0%
	2010	57,309	56,306	1,003	2%	14,451	14,451	0	0%	1,305,770	1,305,770	0	0%
	2011	54,007	53,042	965	2%	23,926	23,926	0	0%	1,213,828	1,213,828	0	0%
	2012	49,043	48,435	608	1%	28,693	28,693	0	0%	1,180,239	1,181,551	-1,311	0%
	2013	46,305	45,467	838	2%	20,633	20,633	0	0%	1,092,028	1,093,235	-1,207	0%
France	2008	83,231	85,715	-2,484	-3%	19,315	21,636	-2,321	-11%	1,669,912	1,674,708	-4,796	0%
	2009	81,024	79,528	1,496	2%	17,287	18,049	-762	-4%	1,610,319	1,607,340	2,979	0%
	2010	76,266	79,203	-2,937	-4%	18,162	19,859	-1,697	-9%	1,781,056	1,798,429	-17,373	-1%
	2011	75,648	78,604	-2,956	-4%	15,596	17,375	-1,779	-10%	1,550,868	1,482,516	68,352	5%
	2012	73,110	77,070	-3,960	-5%	17,342	19,473	-2,131	-11%	1,600,211	1,605,645	-5,434	0%
	2013	70,701	73,018	-2,317	-3%	18,824	21,317	-2,493	-12%	1,633,145	1,629,936	3,209	0%

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%
Croatia	2008												
	2009												
	2010												
	2011	3,403	3,522	-119	-3%	1,225	1,224	1	0%	119,567	107,610	11,957	11%
	2012	3,178	3,167	11	0%	1,080	1,081	-1	0%	101,038	101,781	-743	-1%
	2013	3,017	3,073	-56	-2%	1,139	1,138	1	0%	95,537	95,537	0	0%
Italy	2008	72,769	76,214	-3,445	-5%	24,679	24,083	596	2%	2,910,639	2,908,665	1,973	0%
	2009	67,598	72,318	-4,720	-7%	19,681	19,398	283	1%	2,675,445	2,673,630	1,815	0%
	2010	65,434	68,672	-3,238	-5%	21,595	21,333	262	1%	2,849,396	2,847,466	1,930	0%
	2011	62,955	65,270	-2,315	-4%	24,172	23,824	348	1%	2,671,770	2,669,961	1,809	0%
	2012	55,917	59,176	-3,259	-6%	24,950	24,500	450	2%	2,568,837	2,567,407	1,429	0%
	2013	53,455	55,913	-2,458	-4%	21,632	21,292	340	2%	2,402,667	2,402,951	-284	0%
Cyprus	2008	2,520	2,365	155	7%	41	42	-1	-1%				
	2009	2,457	2,349	108	5%	22	21	1	4%				
	2010	2,395	2,370	25	1%	27	26	1	4%				
	2011	2,294	2,294	0	0%	13	12	1	8%				
	2012	2,169	2,135	34	2%	1	1	0	0%				
	2013	1,837	1,830	7	0%	1	13	-12	-92%				
Latvia	2008	1,414	1,420	-6	0%	176	176	0	0%	55,814	55,894	-81	0%
	2009	1,172	1,174	-2	0%	138	135	3	2%	51,380	51,493	-113	0%
	2010	1,080	1,115	-35	-3%	180	170	10	6%	61,206	61,313	-107	0%
	2011	1,103	1,089	14	1%	194	180	14	8%	53,943	53,998	-55	0%
	2012	1,265	1,226	39	3%	148	148	0	0%	50,709	50,812	-104	0%
	2013	1,254	1,192	62	5%	131	131	0	0%	50,438	50,544	-106	0%
Lithuania	2008	2,774	2,809	-35	-1%	385	351	34	10%	108,674	108,673	1	0%
	2009	2,301	2,429	-128	-5%	291	267	24	9%	91,327	91,329	-2	0%
	2010	2,297	2,494	-197	-8%	358	331	27	8%	104,321	82,007	22,314	27%
	2011	2,171	2,372	-201	-8%	447	440	7	2%	113,799	113,817	-18	0%
	2012	2,261	2,425	-164	-7%	442	426	16	4%	111,119	111,132	-13	0%
	2013	2,180	2,372	-192	-8%	444	427	17	4%	90,624	90,608	16	0%

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%
Luxembourg	2008	2,443	2,484	-41	-2%	124	105	19	18%	45,771	45,744	27	0%
	2009	2,267	2,310	-43	-2%	113	113	0	0%	46,577	46,577	0	0%
	2010	2,384	2,390	-6	0%	113	113	0	0%	50,099	50,099	0	0%
	2011	2,536	2,506	30	1%	99	99	0	0%	43,219	43,219	0	0%
	2012	2,495	2,404	91	4%	92	92	0	0%	44,006	44,005	0	0%
	2013	2,433	2,363	70	3%	80	81	-1	-1%	37,258	37,258	0	0%
Hungary	2008	6,938	6,983	-45	-1%	11,521	12,789	-1,268	-10%	442,161	442,161	0	0%
	2009	6,847	6,789	58	1%	10,542	11,073	-531	-5%	383,171	383,171	0	0%
	2010	6,410	6,449	-39	-1%	10,676	11,592	-916	-8%	410,955	410,955	0	0%
	2011	6,056	6,413	-357	-6%	11,263	11,983	-720	-6%	391,631	391,506	124	0%
	2012	5,726	5,779	-53	-1%	11,057	11,034	23	0%	347,753	347,753	0	0%
	2013	5,520	5,662	-142	-3%	10,683	10,648	35	0%	322,601	322,601	0	0%
Malta	2008	836	0	836									
	2009	745	802	-57	-7%								
	2010	845	817	28	3%								
	2011	1,099	817	282	34%								
	2012	772	864	-92	-11%								
	2013	733	773	-40	-5%								
Netherlands	2008	29,404	28,845	559	2%	12,888	12,960	-72	-1%	1,450,976	1,454,108	-3,132	0%
	2009	28,771	28,017	754	3%	12,018	12,086	-68	-1%	1,464,133	1,465,789	-1,656	0%
	2010	29,424	29,149	275	1%	12,117	12,253	-136	-1%	1,641,493	1,642,667	-1,174	0%
	2011	28,518	27,756	762	3%	11,939	12,065	-126	-1%	1,432,013	1,433,555	-1,542	0%
	2012	29,486	29,887	-401	-1%	13,143	13,900	-757	-5%	1,372,878	1,372,754	124	0%
	2013	28,115	28,739	-624	-2%	13,080	13,668	-588	-4%	1,383,983	1,396,200	-12,217	-1%
Austria	2008	12,549	12,660	-111	-1%	5,457	5,321	136	3%	312,835	315,995	-3,160	-1%
	2009	11,981	12,134	-153	-1%	4,273	4,284	-11	0%	300,038	316,162	-16,125	-5%
	2010	12,068	12,534	-466	-4%	5,015	5,033	-18	0%	343,922	347,395	-3,474	-1%
	2011	11,588	11,712	-124	-1%	5,165	5,157	8	0%	324,678	327,957	-3,279	-1%
	2012	11,483	11,442	41	0%	4,825	4,826	-1	0%	310,433	310,433	1	0%
	2013	11,680	11,680	0	0%	4,911	4,877	34	1%	293,567	293,566	1	0%

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%
Poland	2008	23,894	24,479	-585	-2%	134,794	136,174	-1,380	-1%	525,307	525,307	0	0%
	2009	23,531	23,715	-184	-1%	127,528	128,218	-690	-1%	502,567	513,992	-11,425	-2%
	2010	24,715	25,212	-497	-2%	133,746	129,697	4,049	3%	536,108	536,108	0	0%
	2011	24,876	24,916	-40	0%	138,699	140,280	-1,581	-1%	537,434	537,435	-1	0%
	2012	23,762	23,773	-11	0%	132,657	133,593	-936	-1%	569,447	569,447	0	0%
	2013	21,548	21,593	-45	0%	137,505	137,827	-322	0%	574,674	574,674	0	0%
Portugal	2008	12,313	12,552	-239	-2%	4,160	4,164	-4	0%	173,272	174,055	-783	0%
	2009	11,467	11,688	-221	-2%	4,680	4,674	6	0%	176,567	177,241	-675	0%
	2010	11,170	11,088	82	1%	2,705	2,710	-5	0%	187,935	188,691	-756	0%
	2011	10,528	10,184	344	3%	3,700	3,635	65	2%	186,884	188,080	-1,196	-1%
	2012	8,911	9,158	-247	-3%	4,874	4,846	28	1%	164,651	165,391	-740	0%
	2013	9,224	9,341	-117	-1%	4,449	4,410	39	1%	157,251	157,799	-549	0%
Romania	2008	9,980	11,746	-1,766	-15%	40,384	37,491	2,893	8%	521,348	522,367	-1,020	0%
	2009	8,463	9,340	-877	-9%	35,136	32,013	3,123	10%	443,775	445,570	-1,795	0%
	2010	8,807	8,147	660	8%	32,649	32,569	80	0%	451,681	451,681	0	0%
	2011	8,675	8,433	242	3%	39,010	38,944	66	0%	464,946	464,946	0	0%
	2012	8,487	8,615	-128	-1%	35,870	35,866	4	0%	452,715	452,715	0	0%
	2013	7,987	8,139	-152	-2%	26,669	26,663	6	0%	410,052	410,052	0	0%
Slovenia	2008	2,916	2,801	115	4%	5,236	5,236	0	0%	36,789	36,771	19	0%
	2009	2,528	2,548	-20	-1%	4,972	4,960	12	0%	34,815	34,748	67	0%
	2010	2,514	2,491	23	1%	4,955	4,955	0	0%	36,125	36,146	-21	0%
	2011	2,552	2,492	60	2%	5,064	5,057	7	0%	30,883	30,907	-24	0%
	2012	2,503	2,469	34	1%	4,985	4,985	0	0%	29,730	29,742	-12	0%
	2013	2,398	2,330	68	3%	4,487	4,487	0	0%	28,967	28,967	0	0%
Slovakia	2008	3,493	3,555	-62	-2%	8,098	8,170	-72	-1%	216,303	216,238	65	0%
	2009	3,192	3,236	-44	-1%	7,715	7,781	-66	-1%	185,238	185,657	-419	0%
	2010	3,372	3,411	-39	-1%	7,609	7,286	323	4%	209,609	209,806	-197	0%
	2011	3,306	3,337	-31	-1%	7,415	7,487	-72	-1%	194,144	193,672	472	0%
	2012	3,135	3,203	-68	-2%	6,982	7,042	-60	-1%	182,768	182,788	-20	0%
	2013	3,048	3,134	-86	-3%	6,847	6,847	0	0%	201,571	201,628	-57	0%

Member States		Liquid fuels (kt)				Solid fuels (kt)				Gaseous fuels (TJ)			
		Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%	Annual	CRF 1.A.(b)	Difference absolute	%
Finland	2008	9,576	9,244	332	4%	12,995	13,634	-639	-5%	161,316	161,670	-354	0%
	2009	9,129	8,770	359	4%	12,761	12,984	-223	-2%	145,872	145,708	164	0%
	2010	8,426	8,900	-474	-5%	16,750	16,817	-67	0%	160,668	160,342	326	0%
	2011	9,054	8,905	149	2%	14,206	14,331	-125	-1%	140,674	140,518	156	0%
	2012	7,887	7,705	182	2%	11,336	11,241	95	1%	125,819	125,848	-28	0%
	2013	7,187	7,647	-460	-6%	11,507	11,719	-212	-2%	119,611	119,622	-11	0%
Sweden	2008	13,205	13,113	92	1%	4,204	3,719	485	13%	34,605	34,198	407	1%
	2009	11,546	12,445	-899	-7%	3,423	3,227	196	6%	50,938	45,616	5,322	12%
	2010	13,353	12,968	385	3%	4,248	4,047	201	5%	54,969	61,345	-6,375	-10%
	2011	13,541	12,751	790	6%	4,239	3,842	397	10%	48,287	48,523	-236	0%
	2012	12,341	11,884	457	4%	3,659	3,815	-156	-4%	42,144	42,356	-212	0%
	2013	11,404	12,178	-774	-6%	3,669	3,669	0	0%	39,996	39,996	0	0%
United Kingdom	2008	64,707	64,886	-179	0%	58,503	55,613	2,890	5%	3,536,479	3,536,725	-246	0%
	2009	61,626	60,753	873	1%	48,319	42,257	6,062	14%	3,270,733	3,267,060	3,673	0%
	2010	60,661	60,727	-66	0%	50,230	50,854	-624	-1%	3,550,973	3,542,785	8,188	0%
	2011	58,510	58,829	-319	-1%	49,797	50,543	-746	-1%	2,939,218	2,931,555	7,663	0%
	2012	55,995	56,871	-876	-2%	63,316	63,965	-649	-1%	2,777,984	2,772,837	5,147	0%
	2013	55,371	56,009	-638	-1%	60,778	61,270	-492	-1%	2,750,037	2,756,655	-6,618	0%
EU 15	2008	526,473	529,480	-3,007	-1%	495,550	493,400	2,150	0%	16,089,129	15,961,572	127,557	1%
	2009	499,921	501,379	-1,458	0%	449,426	444,727	4,699	1%	15,355,883	15,101,507	254,376	2%
	2010	490,367	495,564	-5,197	-1%	452,255	456,023	-3,768	-1%	16,226,916	16,248,810	-21,894	0%
	2011	472,575	476,306	-3,731	-1%	465,936	468,594	-2,658	-1%	14,438,024	14,396,219	41,805	0%
	2012	449,957	456,929	-6,972	-2%	497,492	500,350	-2,858	-1%	14,179,161	14,220,365	-41,204	0%
	2013	439,674	447,179	-7,505	-2%	477,754	480,510	-2,756	-1%	14,000,062	14,145,004	-144,942	-1%
EU 28	2008	595,727	599,435	3,708	1%	799,690	796,484	-3,206	0%	18,447,915	18,315,892	-132,022	-1%
	2009	564,682	567,173	2,491	0%	731,119	722,544	-8,575	-1%	17,442,230	17,200,953	-241,277	-1%
	2010	555,892	561,083	5,191	1%	745,302	745,234	-68	0%	18,490,035	18,493,044	3,009	0%
	2011	540,609	544,209	3,600	1%	781,154	786,479	5,325	1%	16,759,174	16,705,124	-54,050	0%
	2012	515,838	523,110	7,272	1%	793,031	798,121	5,090	1%	16,436,950	16,478,331	41,381	0%
	2013	501,112	509,118	8,006	2%	763,258	767,098	3,840	1%	16,188,567	16,334,109	145,542	1%

8.2 Data gaps in 2014 monthly data

Table 8-6 List of gaps for individual months examined in the monthly fuel data for the year

Member State	Product	Flow	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Comment
									kt							
Belgium	Natural Gas Liquids	Total imports	38		38	13	39	8		38			50		224	MS confirmed that the data is correct.
Denmark	Refinery Feedstocks	Total imports	42	30	90	59	90		28	31	12	67	64		513	MS confirmed that the data is correct.
Denmark	Refinery Feedstocks	Total exports	66	181	109	30	79	54		12	35	17	138	94	815	MS confirmed that the data is correct.
Denmark	Petroleum Coke	Total imports	31	2	57		30	27		28	27	28	29	29	288	MS confirmed that the data is correct.
Denmark	Kerosene Type Jet Fuel (alltogether including biofuels)	Total imports	36		68	82	11	94	129	26	124	40	82	66	758	MS confirmed that the data is correct.
Ireland	Crude Oil	Total imports	166	253	307	247	308	167		293	240	248	252	218	2699	MS confirmed that the data is correct.
Ireland	Motor Gasoline (alltogether including biofuels)	Total exports		9	21	50	39	39		11	11	65	17	65	327	MS confirmed that the data is correct.
Ireland	Natural gas in TJ (gross calorific value)	Primary production	2646	2667	1813	532					185	541	2335	2763	13482	Data problems in reporting of natural gas. No other data available.
Croatia	Crude Oil	Total imports	237	79	11	312	243	259	332	68	83	234			1858	MS confirmed that the data is correct.
Latvia	Natural gas in TJ (gross calorific value)	Total imports					3498	18283	9002	19984	19382	13711		15	83875	MS confirmed that the data is correct.
Latvia	Natural gas in TJ (gross calorific value)	Total exports	8217	5865	4691	4548	2647	20	96			704	5359	6737	38884	MS confirmed that the data is correct.
Portugal	Kerosene Type Jet Fuel	Total imports		1	20	70	3	2	3	3	3	1	1	1	108	MS confirmed that the data is correct.
Portugal	Naphta	Total imports	57		48	16						36		16	173	MS confirmed that the data is correct.
Portugal	Gas/Diesel oil	Total exports	148		6		52	254	91	152	80	100	155	257	1295	MS confirmed that the data is correct.
Portugal	Natural gas in TJ (gross calorific value)	Total exports	1326		1575	4200	3153			154	3145	329			13882	MS confirmed that the data is correct.
Portugal	Motor Gasoline (alltogether including biofuels)	Total exports	48	85	1		65	38	105	109	105	110	154	156	976	MS confirmed that the data is correct.
Portugal	Kerosene Type Jet Fuel (alltogether including biofuels)	Total imports		1	20	70	3	2	3	3	3	1	1	1	108	MS confirmed that the data is correct.
Portugal	Gas/ Diesel Oil (alltogether including biofuels)	Total exports	148		6		52	254	91	152	80	100	155	257	1295	MS confirmed that the data is correct.
Finland	Residual Fuel Oil (alltogether including biofuels)	Total exports	69	57	61	85	70			77	77	78	59	139	772	June has been gap filled

8.3 The IPCC reference approach calculation

The IPCC reference approach calculates aggregate estimates of CO_2 emissions from fuel combustion by fuel type distinguishing between primary and secondary fuels in the following steps:

Step 1: Estimation of apparent fuel consumption in original units

Step 2: Convert to a common energy unit

Step 3: Conversion to carbon units (multiplication by carbon content of fuels)

Step 4: Estimation of excluded carbon or carbon stored (subtraction of the amount of carbon contained in long-lived materials manufactured from fuel carbon, i.e. "carbon stored" in the IPCC methodology)

Step 5: Correction for carbon un-oxidised

Step 6: Conversion to CO_2 emissions and summation of total CO_2 emissions across fuels

These steps are expressed in the following formula:

$$CO_2\ emissions = \sum_{allfuels} [(((AppCons)_{fuel} \bullet ConvFactor_{fuel} \bullet CC_{fuel}) \bullet 10^{-3} - Excl\ Carbon_{fuel}) \bullet COF_{fuel} \bullet 44/12]$$

Where

CO_2 Emissions = CO_2 emissions (Gg CO_2)

Apparent Consumption = production + imports – exports – international bunkers - stock change

Conv Factor (conversion factor) = conversion factor for the fuel to energy units (TJ) on a net calorific value basis

CC = carbon content (tonne C/TJ)

ExclCarbon $_{fuel}$ = Excluded Carbon or carbon stored = carbon in feedstocks and non-energy use excluded from fuel combustion emissions (Gg C)

COF_{fuel} = oxidation factor for incomplete combustion of C to CO_2

44/12 = factor to convert C into CO_2 using the molecular masses of C (12) and CO_2 (44)

In the annual GHG inventory submissions, the CO_2 emissions from fuel combustion based on the reference approach are reported in a separate table: CRF table 1.A.(b) CO2 from Fuel Combustion Activities – Reference Approach (IPCC Worksheet 1-1), in each reporting year for the year t-2.

Differences between the two approaches may inter alia arise from the following reasons:

- The sectoral approach only includes emissions from the non-energy use of fuel where they can be specifically identified and estimated such as with fertilizer production and iron and steel production. The IPCC reference approach implicitly treats the non-energy use of fuel as if it were combustion. A correction is then applied by deducting an estimate of carbon stored from non-energy fuel use. The carbon stored is estimated from an approximate procedure that does not identify specific processes. The result is that the IPCC reference approach is based on a higher estimate of non-energy use emissions.
- The sectoral approach only includes emissions from the non-energy use of fuel where they can be specifically identified and estimated such as with fertilizer production and iron and steel

production. The IPCC reference approach implicitly treats the non-energy use of fuel as if it were combustion. A correction is then applied by deducting an estimate of carbon stored from non-energy fuel use. The carbon stored is estimated from an approximate procedure that does not identify specific processes. The result is that the IPCC reference approach is based on a higher estimate of non-energy use emissions.

- Inclusion of some emissions from fossil parts of certain waste fuels that are not included in the fuel consumption statistics and the reference approach calculation.
- In the reference approach calculation kerosene consumption allocated to international bunkers is subtracted from the CO_2 emissions whereas the sectoral approach provides a detailed estimation of CO_2 emissions from domestic flights and international flights based on flight movement data and the domestic part of the kerosene consumption is estimated and allocated to the country in which the fuel was sold.