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Early CO_2 emission estimates for 2013 based on monthly energy data

Annual Report

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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.

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List of Abbreviations

CHP	Combined Heating and Power
CO_2	Carbon dioxide
CRF	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.
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 = 1kt (kiloton) = 1000 tons
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
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
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 four 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 monthly energy data. For this purpose, early estimates at T+4 months were calculated in April 2014 for the year 2013. This is about one year earlier than official submissions of inventory data by Member States to the UNFCCC. In addition, the early CO_2 estimates calculated in 2013 for the year 2012 will be compared with final inventory submissions for 2012.

The second objective of this project is to analyse the quality level of monthly Eurostat energy data compared to annual Eurostat data and to energy data used by Member States for the inventory estimation. Based on this comparison it will be concluded whether the quality of these data improved compared to data for the years 2008-2011 and in which areas substantial deviations continue to occur.

This report includes a description of the methodological approach used, the data evaluation of the monthly data for the years 2008 – 2012 and a detailed analysis for 2012, the calculation of early CO_2 emissions from fuel combustion for the year 2013 and a comparison of the early estimates calculated in 2013 (for 2012) with the final inventory data submitted recently to the UNFCCC (also for 2012).

2 Methodological approach for early CO_2 estimates

2.1 Methodological approach for calculating CO_2 reference approach emissions 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 data on fuel use.

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 monthly Eurostat data for the years 2009, 2010, 2011, 2012 and 2013. The trend changes of 2010/2009, 2011/2010, 2012/2011 and 2013/2012 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 monthly energy data.

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 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 8.5.

The calculations are conducted for each fossil fuel group, for each Member State, constructing early CO_2 estimates for the respective year. The sum of Member States' CO_2 emissions then represents the EU-27 and, since 2013, the EU-28 early CO_2 emission estimate for the energy sector.

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 three to four months after the previous year. This is due to missing 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

[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

national inventory report. An outline of the differences that can arise between the two approaches is included in Annex 8.5.

2.1.2 Allocation of fuels from monthly data

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

The following fuels are not provided in Eurostat monthly data at the level of disaggregation required by the IPCC reference approach:

- Orimulsion is not reported separately in the monthly Eurostat data, but included under 'Other hydrocarbons'.
- Shale oil is not reported separately in the monthly Eurostat data, but included under 'Other hydrocarbons'.
- Bitumen and lubricants are not reported individually, but are included under 'Other products'.
- Hard coal is reported as an aggregate category in monthly Eurostat data covering anthracite, coking coal, other bituminous coal and sub-bituminous coal.
- Oil shale and oil sands are reported under "Lignite".
- Monthly Eurostat data do not include fossil waste whereas the new Eurostat database for annual data will include the fossil waste as a separate category.

Equation 1

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

with

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

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

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

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

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

		IPCC fuel categories	Eurostat fuel nomenclature
Liquid	Primary	Crude Oil	Crude Oil
Fossil	Fuels	Orimulsion	Other hydrocarbons
		Natural Gas Liquids	Natural Gas Liquids
	Secondary	Gasoline (Motor Gasoline, Aviation Gasoline, Jet Gasoline)	Motor Gasoline - Biogasoline + Aviation Gasoline + Gasoline Jet Fuel
	Fuels	Jet Kerosene	Kerosene Jet Fuel
		Other Kerosene	Other Kerosene
		Shale Oil	Other hydrocarbons
		Gas / Diesel Oil	Transport Diesel - Biodiesel + Heating and Other Gasoil
		Residual Fuel Oil	Total fuel oil
		Liquefied Petroleum Gas (LPG)	Liquefied Petroleum Gas (LPG)
		Ethane	Ethane
		Naphtha	Naphtha
		Bitumen	Other products
		Lubricants	Other products
		Petroleum Coke	Petroleum Coke
		Refinery Feedstocks	Refinery Feedstocks
		Other Oil (Refinery Gas, Paraffin Waxes, White Spirit, Other)	Other products (Paraffin Waxes, White Spirit, Other)
Other Liquid Fossil			
Solid	Primary	Anthracite (if data for Anthracite are not available separately, include with Other Bituminous Coal)	Hard coal
Fossil	Fuels	Coking Coal	Hard coal
		Other Bituminous Coal	Hard coal
		Sub-bituminous Coal	Hard coal
		Lignite	Lignite
		Oil Shale	Lignite
		Peat	Peat
	Secondary	BKB (Brown coal/peat briquettes) and Patent Fuel	BKB, Patent fuels
	Fuels	Coke Oven/Gas Coke (Coke)	Coke
Other Solid Fuels			
Gaseous Fossil		Natural Gas (Dry)	Natural Gas (Dry)
Other Gaseous Fuels			

2.1.3 Conversion factors used in the calculation

Eurostat data provide liquid and solid fuel consumption in physical units while natural gas is reported in energy units. The data provided in the reference approach in the CRF table are partly available in physical units, but for 11 of 28 Member States only data in energy units (TJ) (Czech Republic, Germany, Denmark, Hungary, Italy, Lithuania, Latvia, Netherlands, Portugal, Romania, Sweden) were available in the CRF table 1.A(b). For these Member States, CRF data were converted to physical units to allow for the comparison with Eurostat monthly and annual fuel consumption data. The Net Calorific Values (NCVs) used for this purpose were taken from Member States' national inventory reports as submitted in 2014 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 GCVs, whereas the reference approach data are provided in TJ based on NCVs. For the comparison of Eurostat data with CRF 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 2013 and 2012 used to calculate early CO_2 estimates was calculated based on Eurostat monthly data in physical units. 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 CRF 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 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. 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 8-3. Therefore, the simpler approach based on Eurostat data in physical units was maintained for the final CO_2 estimates for the year 2013, because this approach requires fewer conversion steps that would introduce additional uncertainties.

2.1.5 Data sources

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

To calculate early CO_2 emissions, three different data sources are used:

1) Monthly Eurostat data 2012 (as available in April 2013)
2) Monthly Eurostat data 2013 (as available in April 2014)
3) CRF Inventory data for CO_2 emissions based on the reference approach (Table 1.A.b) as reported to UNFCCC for the year 2012 (as available on 15th April 2014).

To assess the quality of the early CO_2 estimates for the year 2012, the following data sources are compared.

1) Early CO_2 estimates for the year 2012 (estimated in April 2013 with monthly Eurostat data)
2) CRF Inventory data for CO_2 emissions based on the reference approach (Table 1.A.b) as reported to UNFCCC for the year 2012 (as available on 15th April 2014).

If the difference between the two approaches is less than +/- 2%, no further analysis is needed. Where differences of the early CO_2 estimates for the year 2012 calculated with monthly Eurostat data 2012 and 2011 and CRF inventory data 2012 exceed +/-2%, a more detailed analysis is carried out. Large differences can be due to:

1) Quality of monthly Eurostat data for 2011 (available in April 2012)

2) Quality of monthly Eurostat data for 2012 (available in April 2013) or changed reporting of monthly Eurostat data for 2012 in comparison to the reporting of 2011 data

3) Recalculations in the CRF inventory for CO_2 emissions based on the reference approach for the year 2011 (as available on 15th April 2014) (see Chapter 5.2).

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.

As the 2012 monthly Eurostat data (available in April 2013) are relevant for the calculation of the 2013 early CO_2 estimates, the quality of the monthly Eurostat data for the year 2012 is analysed by comparing the monthly Eurostat data 2012 with:

1) Annual Eurostat data 2012 (as available in April 2014)

2) CRF Inventory data on fuel consumption as reported to UNFCCC for the year 2012 (as available on 15th April 2014).

If this comparison shows large inconsistencies for single fuel categories in some countries, these errors in the monthly Eurostat data 2012 (as available in April 2013) can be corrected to achieve more reliable results for the early CO_2 estimates 2013. This can be carried out by using:

1) Revised monthly Eurostat data 2012 (as available in April 2014 for those countries that provided new monthly data) or

2) Annual Eurostat data 2012 (available in April 2014) if no revised monthly Eurostat data for the year 2012 are available.

As there are only few data sources available that provide data as soon as 4 months after the reference year, the quality of the 2013 monthly data is analysed in terms of completeness, outliers and gaps as well as by comparing the trend changes of monthly Eurostat data and early national statistics for the year 2013/2012:

- Early national statistics 2013/2012 (as available in April 2014).

In cases where there are large inconsistencies between the trend changes of monthly Eurostat data and early national statistics, corrections can be applied to obtain better results for 2013 CO_2 estimates (see Chapter 4.1).

3 Data evaluation

3.1 Evaluation of monthly Eurostat fuel consumption 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 manipulate monthly and annual energy and emissions data. The data used is drawn from CRF table 1.A(b) on the IPCC reference approach for emissions from fuel combustion as reported in the 2014 GHG inventory submissions (for reference year 2012) to the UNFCCC and on Eurostat monthly data on fuel consumption from the Eurostat database as of April 2014 (for reference year 2013).

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 monthly Eurostat energy data for the year 2013

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 monthly data set was to identify missing data (no values). The analysis was conducted on the 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 emissions calculations.

The resulting list of data gaps, included as Table 8-6, was further examined by Eurostat, with the consensus that only few data gaps were filled. The data gaps for natural gas exports in January 2013 identified for Slovakia and Slovenia, and missing data on natural gas in November and December for the Czech Republic were filled with updated Eurostat data.

For Ireland, peat consumption data (beyond the consumption in power plants) was not reported in the Eurostat monthly database for the years 2011, 2012 and 2013 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

70 % of the total peat consumption in 2013. This ratio was derived from past years (2008-2012) for which peat consumption is available from annual data. Thus, the assumption used to gap fill the Irish peat consumption data is fully consistent with the final annual data. The peat consumption in power plants represents 70 % of the total inland peat consumption. We continue to use this ratio also for 2014 monthly data.

A second part of the completeness analysis was carried out to identify possible incongruous zero (0) values. "Zero" values in single months were identified where the annual total was not zero and exceeded a threshold of 100 tonnes. This analysis step aims at identifying potential missing values in single months.

The results from this analysis were inspected so that instances of plausible zero values could manually be excluded. For example, in Denmark and Ireland there are some "zero" values for gas imports over the summer months due to low demand for heating purposes in these months. The same pattern can be observed in preceding years. There are similar seasonal patterns for peat production, imports and exports in Estonia, Finland, Latvia and Lithuania where production does not occur over winter months. Such regular intermittency in fuel consumption was not identified as a data gap in the analysis. A certain degree of intermittency can be expected for some fuel flows and means that the verification of energy data will always involve some expert opinion. For completeness, Table 8-7 in the Annex includes the results that were not manually excluded by the procedures outlined above. According to this analysis no further issues have been identified. All zeros appeared for fuel categories with very small amounts in production, imports and exports, so that a zero seems plausible in all cases.

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 monthly Eurostat 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.

In 2012 international bunker fuels are consistently not reported for single fuel categories in the monthly data by Austria, Estonia, Finland, the United Kingdom and Slovakia, as indicated in Table 3-1 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 accounts for 96 % of the difference between annual and monthly liquid fuel consumption.

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. The missing quantities in 2012 amount to 31 % of the differences in total liquid fuel consumption. However, 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 account for 52 % of 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. However, international bunker fuels only represent a share of 6 % of annual consumption of liquid fuels. For Slovakia, the gaps in international bunker fuels are less relevant in relation to the total consumption of liquid fuels.

Table 3-1 International bunker fuels missing in the 2012 monthly data

Member States	Fuel types	International bunkers quantities in annual data 2012	International bunkers quantities in monthly data 2012	Total difference between annual and monthly data for international bunkers	Total difference between annual and monthly data for total liquid fuels	Share of difference for bunker fuels relative to total difference	Share of international bunkers in total liquid fuels
		Kt			kt	%	%
Austria	Kerosene - Jet fuels	659	-	659	1,263	52%	6%
Slovakia	Kerosene - Jet fuels	36	-	36	-209	-17%	1%
Finland	Total	**124**	-	124	406	31%	2%
	Gas / Diesel Oil	42	-	42		-	
	Residual Fuel Oil	82	-	82		-	
United Kingdom	Kerosene - Jet fuels	10,547	-	10,547	11,003	96%	19%

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 3-2.

Significantly lower consumption of international bunker fuels in monthly data compared to annual data occurs for Denmark, Estonia, France, Luxembourg, Malta and Portugal.

Estonia provided data on international bunkers in 2012, but only in the revised monthly report for the month December 2012. International bunkers are not reported for the other months of the year 2012. Thus, the reported consumption of *Kerosene - Jet Fuels*, *Gas/Diesel Oil*, and *Residual Fuel Oil* in monthly data was much lower than in the annual data. 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 (96 %). This leads to large differences of 73 % between total liquid fuel consumption in monthly and annual data.

For Malta the total quantities of international bunker fuels missing in the monthly data are also large in relation to the total liquid fuel consumption. For Malta, the reporting of

international bunkers from *Kerosene - Jet Fuels*, *Gas/Diesel Oil*, and *Residual Fuel Oil* has not been consistent over the years. In 2012 the difference in reporting of international bunker fuels amounts to 67 % of the differences for total liquid fuel consumption between annual and monthly data.

Table 3-2 Underreporting of international bunker fuels in the 2012 monthly data

Member States	Fuel types	International bunkers quantities in annual data 2012	International bunkers quantities in monthly data 2012	Total difference between annual and monthly data for international bunkers	Total difference between annual and monthly data for total liquid fuels	Share of difference for bunker fuels relative to total difference	Share of international bunkers in total liquid fuels
		Kt			kt	%	%
Denmark	Kerosenes - Jet fuels	814	395	419	346	121%	13%
Estonia	**Total**	**447**	**32**	**415**	341	122%	96%
	Kerosenes - Jet fuels	36	4	32			
	Gas / Diesel Oil	86	-	86			
	Residual Fuel Oil	325	28	297			
France	Kerosenes - Jet fuels	5,491	1,300	4,191	4,097	102%	7%
Luxembourg	Kerosene - Jet Fuels	361	263	98	-29	-338%	15%
Malta	Total	**1,330**	**1,108**	**222**	198	112%	179%
	Kerosenes - Jet fuels	98	20	78			
	Gas / Diesel Oil	229	197	32			
	Residual Fuel Oil	1,003	891*	112			
Portugal	Kerosenes - Jet fuels	899	327	572	479	119%	10%

Note: For further calculations International bunkers for residual fuel oil have been gap filled for Malta accounting to 981 kt

For France the underreporting of international aviation bunker fuels is equal to the total difference between annual and monthly liquid fuel consumption. The share of international aviation bunkers from Kerosene - Jet Fuels in total liquid fuel consumption only amounts to 7 %. For the calculation of the early CO_2 estimates this has not been relevant so far, as the reporting has been consistent throughout the years. Nevertheless the reporting of international bunkers by France in 2013 seemed to have improved compared to previous years. This might produce higher differences for the actual year for the early CO_2 estimates (see chapter 4.3).

For Denmark, Portugal and Luxembourg, international bunker fuels account for about 10-15 % of the total liquid fuel consumption. For all countries the missing quantities in monthly data are large compared to the total differences between monthly and annual consumption of liquid fuels.

For Luxembourg international bunkers for *Kerosene - Jet Fuels* are consistently underreported in the monthly data.

For Portugal the reporting of international aviation bunkers contributes a large part to the difference between annual and monthly 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 so far.

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 2012.

3.1.4 Outliers in monthly Eurostat energy data for the year 2013

Outliers were initially identified as monthly values deviating 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 the stock change flows. These have also been ignored 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 represent to some extent expected or normal variation of data. The right hand column of Table 3-3 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 3-3 should be further considered as they may represent more significant issues.

Table 3-3 Outliers in the monthly fuel data for the reporting year 2013

Member States	Fuel category	Flows	Month	Outlier Value (kt)[1]	Range in other months (kt)[1]	% of total [2]	Results of follow-up
Belgium	Coke Oven Coke	Imports	August	19	0 - 11	50%	Correct value confirmed with MS
Belgium	Coke Oven Coke	Exports	February	76	17 - 34	27%	Correct value confirmed with MS C
Belgium	Natural gas	Exports	March	131935	69015 - 98874	15%	Correct value confirmed with MS
Czech Republic	Lignite/Brown Coal	Imports	June	112	4 - 48	58%	No follow-up due to low amounts
Denmark	Gas/Diesel oil	Bunkers	August	31	19 - 24	13%	No follow-up due to low amounts

Member States	Fuel category	Flows	Month	Outlier Value (kt)[1]	Range in other months (kt)[1]	% of total [2]	Results of follow-up
Ireland	Motor Gasoline	Imports	February	178	48 - 86	29%	Correct value confirmed with MS
Greece	Fuel Oil - Low Sulphur	Exports	March	43	3 - 15	41%	No follow-up due to low amounts
Spain	Naphta	Exports	January	217	12 - 48	68%	Correct value confirmed with MS
Spain	Fuel Oil - Low Sulphur	Exports	August	118	1 - 61	70%	Correct value confirmed with MS
Spain	Other Petroleum Products	Imports	July	242	21 - 127	42%	Correct value confirmed with MS
France	Other Kerosene	Exports	October	18	2 - 9	38%	No follow-up due to low amounts
France	Crude, NGLs, feedstocks, additives/oxygenates & hydrocarbons (blended bio components)	Exports	April	62	3 - 28	53%	No follow-up due to low amounts
Italy	Coke Oven Coke	Exports	November	51	14 - 23	27%	Correct value confirmed with original questionnaire
Hungary	Lignite/Brown Coal	Exports	October	91	0 - 51	64%	No follow-up due to low amounts
Hungary	Fuel Oil - Low Sulphur	Exports	February	20	1 - 7	67%	No follow-up due to low amounts
Netherlands	Other Kerosene	Imports	April	68	4 - 28	43%	No follow-up due to low amounts
Slovakia	Natural gas	Primary production	March	867	194 - 395	26%	Correct value confirmed with MS
United Kingdom	Petroleum Coke	Imports	February	244	9 - 100	48%	Correct value confirmed with original questionnaire

1 Natural gas: TJ, gross calorific value Data for natural gas is provided in Eurostat data in TJ based on GCVs.
2 % of the annual total, for that fuel flow, excluding the outlier.

The column “results of follow-up” is a summary of the further assessment by Eurostat in April 2014 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 data.

3.1.5 Reporting of biofuels

One area of further consideration in the data evaluation is the reporting of biofuels in the annual and monthly oil questionnaires by Member States. In the annual oil questionnaires Member States are expected to report petroleum products blended with biofuels (Blended = mix of bio and fossil components).

In 2012 the annual oil questionnaire was amended and the reporting of annual data is more complete than before. These amendments were introduced in the monthly oil questionnaire one year later in 2013:

- For motor gasoline and gas/diesel oil the fossil proportion of the fuel also has 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.
- For kerosene type jet fuel the bio component was introduced in 2012 and 2013 respectively. So far, kerosene type jet fuel has not been blended with the bio component. Therefore, the total kerosene total is the same as the fossil proportion of kerosene.

In 2011 and 2012 the monthly reporting of biofuels was not consistent throughout the Member States, as many countries reported biofuels under the correct subcategory but did not add up to the correct total.

Apart from Sweden in 2013 all Member States reported consistent biofuel consumption in their monthly oil questionnaires (see Table 3-4). Only SE did not provide the figures which would enable us to calculate the Gross Inland Deliveries (calculated) or Gross Inland Consumption of biofuels. In the annual oil questionnaire SE provides these figures.

Table 3-4 Consumption of gasoline and gas/diesel oil including biofuels in monthly Eurostat data for the reporting year 2013

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	-2,993	0	-2,993	348	0	348
Bulgaria	-1,353	0	-1,353	-287	0	-287
Czech Republic	225	-4	221	1,033	21	1,054
Denmark	-713	65	-648	216	117	335
Germany	-3,406	-14	-3,420	9,700	-103	9,597
Estonia	234	0	234	589	0	589
Ireland	623	43	666	1,940	56	1,996
Greece	-1,732	0	-1,732	-4,595	1	-4,594
Spain	-3,305	0	-3,305	-1,520	0	-1,520
France	-3,259	-5	-3,264	21,187	-3	21,176
Croatia	-307	0	-307	485	0	485
Italy	-7,171	-10	-7,181	-6,021	25	-5,996
Cyprus	345	0	345	437	16	577
Latvia	206	0	206	714	-4	710
Lithuania	-2,409	0	-2,409	-2,713	0	-2,713
Luxembourg	318	0	318	1,984	81	2,065
Hungary	80	11	91	-37	-8	-45
Malta	73	0	73	171	4	175
Netherlands	-8,095	0	-8,095	-12,377	0	-12,377
Austria	74	8	82	3,510	222	3,732
Poland	-362	0	-362	220	0	220
Portugal	-1,024	0	-1,024	-1,072	0	-1,072
Romania	-1,571	1	-1,570	400	-2	398
Slovenia	450	0	450	1,542	6	1,548
Slovakia	-835	-24	-859	-1,415	-41	-1,456
Finland	-2,540	0	-2,540	-1,450	0	-1,450
Sweden	-14	0	-678	168	0	-1,544
United Kingdom	-5,971	12	-5,959	2,649	-26	2,624

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 based on the trend change method, good data quality for the years of 2012 and 2013 is needed. As in 2012, monthly biofuel data has not been reported consistently and it had not been possible to subtract the amount of biofuels from total gasoline and gas/diesel oil consumption. Thus, for calculating the 2013 CO_2 emissions the totals for gasoline and gas/diesel oil were used without subtracting the biofuels. Subtracting the biofuels for the monthly 2013 data only (where the reporting was consistent) and not for the monthly 2012 data (as available in April 2013) would affect the consistency and could influence the trend change.

However, for the calculation of CO_2 emissions as in GHG inventories, CO_2 from biofuels should be excluded. For the calculation of early CO_2 estimates for 2014 (calculated in 2015) the reporting of biofuels in the monthly Eurostat data for 2014 will be analysed and, if reported correctly, the consumption of biofuels can be subtracted in the 2013 and 2014 monthly Eurostat data for the calculation of CO_2 emissions to assess whether the results of the CO_2 emission estimation improve when biofuels are consistently subtracted from the fuel consumption. Nevertheless, the relatively low total amounts of biofuels currently reported do not strongly affect the results of the early CO_2 estimates.

3.2 Comparison of monthly Eurostat energy data with annual data

This section provides comparisons of the differences between annual and cumulated monthly fuel consumption data of liquid, solid and gas fuel types for the years 2008-2012. The datasets for the 28 Member States of the EU were kindly provided by Eurostat in April 2014 and processed by Öko-Institut.

The evaluation compares the differences between the combined monthly and annual apparent liquid, solid and gas fuel consumption data for the years 2008 to 2012. 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, 9 Member States showed differences below 2 % between annual and cumulated monthly liquid fuel consumption, making up a share of 43 % of the total EU-27 liquid fuel consumption. Differences above 5 % could be identified for 9 Member States (see Table 3-5), adding up to a share of 24 % of EU-27 total liquid fuel consumption.

In 2012, the last reporting year for which annual Eurostat and cumulated monthly Eurostat data are available, data differences between annual and monthly data below 2 % could be found for 14 Member States. Liquid fuel consumption of these 14 Member States account for 57 % of the total EU-28 liquid fuel consumption. The number of Member States that have larger differences of above 5 % increased to 8 Member States in 2012, constituting 36 % of 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 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 3-5). 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 3-5 Difference between monthly and annual liquid fuel data, 2008-2012

Member States	2008	2009	2010	2011	2012	Share of emissions from liquid fuels in total energy CO2 emissions (%) in 2012
Belgium	-6%	-4%	-10%	-1%	6%	49%
Bulgaria	7%	7%	-14%	-8%	-4%	24%
Czech Republic	0%	0%	-4%	-2%	-1%	21%
Denmark	-5%	-4%	21%	2%	5%	49%
Germany	-1%	-1%	-1%	0%	-1%	35%
Estonia	64%	107%	117%	114%	63%	7%
Ireland	-6%	0%	5%	7%	-2%	46%
Greece	2%	3%	5%	1%	-4%	41%
Spain	2%	2%	0%	0%	1%	51%
France	3%	2%	2%	6%	6%	60%
Croatia	NE	NE	NE	0%	0%	57%
Italy	-3%	-1%	-2%	-3%	1%	43%
Cyprus	-6%	0%	1%	1%	-2%	100%
Latvia	-4%	0%	-1%	4%	-9%	53%
Lithuania	4%	1%	2%	1%	-1%	60%
Luxembourg	8%	8%	13%	-1%	-2%	73%
Hungary	1%	-2%	-6%	2%	-1%	30%
Malta	NE	-47%	1%	-28%	34%	100%
Netherlands	-1%	0%	2%	0%	-2%	33%
Austria	5%	8%	11%	12%	11%	51%
Poland	-15%	-1%	-1%	1%	-2%	22%
Portugal	5%	3%	5%	3%	6%	55%
Romania	1%	-4%	-5%	2%	0%	29%
Slovenia	-2%	-2%	1%	-1%	-2%	49%
Slovakia	0%	5%	1%	0%	-2%	27%
Finland	4%	2%	11%	-3%	2%	47%
Sweden	-2%	0%	2%	-2%	-1%	79%
United Kingdom	15%	25%	21%	18%	21%	35%
EU 15	2%	4%	3%	3%	4%	
EU 27 /28	1%	3%	2%	3%	3%	
<+/- 2%	9 MS	13 MS	12 MS	13 MS	14 MS	
+/-2-5%	8 MS	8 MS	4 MS	8 MS	6 MS	
> +/- 5%	9 MS	6 MS	11 MS	7 MS	8 MS	

Percentages calculated by dividing original cumulated monthly Eurostat by annual Eurostat data.

Note: 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.

Table 3-5 shows that there is not an overall systematic quality increase over the years. While some Member States improved the consistency of monthly and annual data over the 2008-2012 period (LU, BG, CY, CZ, LT, RO, SI), the consistency deteriorated in

other Member States (AT, FR, EL, HU, LV, SK). 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 2012. 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.

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. As the share of liquid fuels in total CO_2 emissions from energy consumption only amounts to 7 % in 2012, these large differences do not strongly influence the results of the CO_2 estimates.

Additionally, strong differences between annual and monthly liquid fuel consumption are found for Malta for all reporting years. The differences occur due the differences in the reporting of international bunkers in annual and monthly Eurostat data (see chapter 3.1.3).

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

The differences of almost 3 % in all years at the EU level can be explained by the non-reporting of international bunkers from the UK. In 2012 the international bunkers from jet kerosene in the UK accounted for 10,547 kt, which is 2 % of the EU-28 total liquid fuel consumption.

3.2.2 Solid fuels

In 2008 12 Member States showed differences below 2 % between annual and cumulated monthly solid fuel consumption, making up a share of 56 % of the total EU-27 solid fuel consumption. Differences above 5 % could be identified for 7 Member States (see Table 3-6), adding up to a share of only 5 % of EU-27 total solid fuel consumption.

In 2012, the last reporting year for which annual Eurostat and cumulated monthly Eurostat data are available, data differences between annual and monthly data below 2 % were found for 11 Member States. Solid fuel consumption of these 11 Member States account for 44 % of the total EU-28 solid fuel consumption. The number of Member States that have larger differences of more than 5 % increased to 8 Member States in 2012 with a share of 9 % of the total EU-28 solid fuel consumption.

Table 3-6 Difference between monthly and annual solid fuel data, 2008-2012

Member States	2008	2009	2010	2011	2012	Share of emissions from solid fuels in total energy CO2 emissions (%) in 2012
Belgium	-6%	-20%	-75%	-42%	-12%	13%
Bulgaria	2%	0%	0%	0%	1%	65%
Czech Republic	0%	0%	-4%	1%	0%	63%
Denmark	0%	1%	0%	0%	1%	30%
Germany	-1%	-1%	-3%	-2%	-3%	43%
Estonia	2%	10%	0%	1%	7%	86%
Ireland	-20%	-17%	-45%	1%	7%	27%
Greece	-3%	-5%	-14%	-6%	-2%	49%
Spain	-2%	10%	7%	3%	4%	23%
France	0%	-2%	4%	4%	8%	14%
Croatia	NE	NE	NE	-1%	-1%	15%
Italy	4%	-5%	-6%	1%	-2%	17%
Cyprus	2%	-5%	-4%	-15%	NE	
Latvia	-1%	7%	1%	-1%	30%	5%
Lithuania	0%	-3%	8%	-12%	-1%	8%
Luxembourg	-13%	-12%	-14%	-2%	-2%	2%
Hungary	0%	-1%	1%	0%	0%	26%
Malta	NO	NO	NO	NO	NO	
Netherlands	-2%	-1%	-1%	38%	22%	20%
Austria	-15%	-10%	-2%	-7%	-17%	21%
Poland	4%	2%	-3%	3%	1%	69%
Portugal	1%	1%	-10%	0%	0%	24%
Romania	-4%	-9%	1%	-2%	0%	38%
Slovenia	-7%	-4%	-1%	-2%	-2%	40%
Slovakia	6%	1%	-10%	2%	1%	37%
Finland	-9%	-4%	-3%	-3%	2%	38%
Sweden	-1%	-17%	9%	-3%	-14%	15%
United Kingdom	0%	1%	0%	1%	0%	32%
EU 15	-2%	-2%	-5%	-1%	-1%	
EU 27 /28	0%	-1%	-4%	0%	0%	
<+/- 2%	12 MS	10 MS	10 MS	14 MS	11 MS	
+/-2-5%	7 MS	6 MS	6 MS	7 MS	7 MS	
> +/- 5%	7 MS	10 MS	10 MS	6 MS	8 MS	

Percentages calculated by dividing original cumulated monthly Eurostat by annual Eurostat data.

Note: 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 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).

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 2012 are Bulgaria, the Czech Republic, Estonia and Poland. Table 3-6 provides an overview of the data quality based a comparison of monthly and annual Eurostat data.

Similar to liquid fuel consumption, Table 3-6 shows that there is no systematic quality increase over the years for solid fuels. In comparison to liquid fuel consumption there are five countries (Denmark, the United Kingdom, Bulgaria and Hungary) that provide good monthly data for solid fuel consumption for all years. The share of these four countries in total solid fuel consumption accounts for 14% in 2012. 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 than annual Eurostat data. Therefore, for peat and hard coal consumption approximations were used based on reported 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 80 % of the total hard coal consumption. This ratio was derived from past years (2008-2012) 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 66% of the total consumed peat.

Belgium consistently underreported hard coal consumption and shows large inconsistencies in the reporting of BKB and patent fuels and in coke oven/gas coke between monthly and annual Eurostat data.

Besides Belgium differences above 10 % for solid fuel consumption in the reporting between monthly and annual Eurostat data for the year 2012 can be found for Latvia, the Netherlands, Austria and Sweden. For all these countries the differences are due to inconsistencies in the reporting of hard coal consumption.

Furthermore, tendencies of continued underreporting of solid fuel consumption in monthly Eurostat data are visible for some Member States in the case of solid fuels (AT, DE); while for others it varies from under- to overreporting and vice versa. Some developments are certainly not acceptable like the clear deterioration of data quality as is visible for Lithuania and the Netherlands for the last years. 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 level is quite low in 2011 and 2012. The high difference of -4 % in 2010 amounts 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.

3.2.3 Gaseous fuels

In 2008 12 Member States showed differences below 2% between annual and cumulated monthly natural gas consumption, making up a share of 56 % of the total EU-27 gaseous fuel consumption. Differences above 5% were identified for 4 Member States (see Table 3-7), adding up to a share of only 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 2012, the last reporting year for which annual Eurostat and cumulated monthly Eurostat data are available, data differences between annual and monthly data below 2 % were found for 13 Member States. The natural gas consumption of these 13 Member States accounts for 58 % of the total EU-28 natural gas consumption. Table 8-1 in the Annex provides a detailed comparison of monthly and annual Eurostat data.

Table 3-7 Difference between monthly and annual natural gas data, 2008-2012

Member States	2008	2009	2010	2011	2012	Share of emissions from natural gas in total energy CO2 emissions (%) in 2012
Belgium	-18%	-10%	-18%	-25%	-45%	38%
Bulgaria	0%	-3%	3%	-4%	-10%	11%
Czech Republic	0%	0%	-4%	0%	-2%	16%
Denmark	-1%	0%	-1%	-3%	-5%	22%
Germany	1%	0%	10%	1%	-4%	22%
Estonia	-5%	-12%	-12%	-3%	0%	7%
Ireland	-21%	0%	1%	3%	3%	27%
Greece	0%	0%	0%	0%	0%	9%
Spain	0%	0%	0%	0%	0%	26%
France	-1%	-8%	-3%	1%	-5%	26%
Croatia	NE	NE	NE	-6%	-9%	28%
Italy	0%	0%	0%	0%	0%	40%
Cyprus	NO	NO	NO	NO	NO	
Latvia	0%	0%	0%	0%	0%	42%
Lithuania	0%	0%	0%	0%	0%	32%
Luxembourg	-3%	0%	0%	0%	0%	25%
Hungary	2%	-1%	-13%	-2%	3%	44%
Malta	NO	NO	NO	NO	NO	
Netherlands	4%	-1%	-1%	3%	0%	47%
Austria	-3%	-1%	-5%	-5%	-1%	28%
Poland	3%	2%	0%	0%	0%	9%
Portugal	0%	-1%	-26%	0%	2%	20%
Romania	-3%	-2%	2%	3%	3%	33%
Slovenia	-5%	-3%	-4%	-7%	-9%	11%
Slovakia	-10%	21%	1%	22%	23%	35%
Finland	3%	0%	-7%	0%	0%	14%
Sweden	0%	-9%	93%	0%	0%	6%
United Kingdom	3%	-2%	-1%	0%	0%	33%
EU 15	0%	-2%	0%	-1%	-3%	
EU 27 /28	0%	-1%	0%	0%	-3%	
<+/- 2%	12 MS	17 MS	12 MS	14 MS	13 MS	
+/-2-5%	9 MS	3 MS	6 MS	7 MS	7 MS	
> +/- 5%	4 MS	5 MS	7 MS	5 MS	6 MS	

Percentages calculated by dividing original cumulated monthly Eurostat by annual Eurostat data.

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.
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.

The number of Member States that have larger differences of above 5% increased to 6 Member States in 2012, making up a share of 6% of the EU-28 total natural gas consumption.

Thus, similar to liquid and solid fuel consumption, there is no systematic quality increase over the years.

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 mostly consistent with the annual Eurostat data. Five countries (Spain, Greece, Italy, Lithuania and Latvia) provide good data quality with differences below 2 % for all reported years, making up a share of 25 % of the total EU-28 natural gas consumption. Luxembourg and the United Kingdom show differences 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. For Belgium this can be considered as an outlier. Belgium authorities have reacted in the meantime and changed their collection system. The large differences shown by Slovakian data are no longer acceptable and the Slovakian authorities are asked to analyse the problem and initiate corrective action. Slovenia, Croatia and Bulgaria should also investigate the origin of the differences. German figures also need to be improved.

The difference for total natural gas consumption on EU level is below 2 % in all years, except in 2012. The high 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).

3.2.4 Detailed differences for individual Member States in the comparison of monthly and annual Eurostat data

Table 3-8 provides details on the discrepancies identified in the previous sections at the level of individual fuels for individual Member States. The table includes three heading rows (Total Liquids, Solid Fuels and Natural Gas) for each Member State. Sub-rows are included for the major fuel types where the difference between the cumulated monthly and annual data was greater than 5% and larger than 100kt.

The column ‘cumulated monthly’ in Table 3-8 intends to provide additional explanations related to the discrepancies and where exactly they occur. Six Member States (AT, BE, DE, MT, PL, PT) provided revised monthly data for the year 2012 during the year 2013, which has been included in the column “Cumulated monthly” (revised). Large differences between revised monthly data occur for natural gas consumption in Belgium. Nevertheless, the revised 2012 monthly data are the same as the annual data for 2012 and are no longer related to any monthly statistics, but are more an adaptation of annual figures. Other countries provided revised monthly data without adapting

annual figures. This data has been included to analyse whether the revised monthly data had improved.

Table 3-8 Differences for Member States in the comparison of monthly and annual Eurostat 2012 data (gross inland consumption)

Member States	Fuel type	Annual (kt, natural gas TJ NCV)	Cumulated monthly (kt natural gas TJ NCV)	Difference (%)	Cumulated monthly (revised)	Systematic issue	Explanations and comments
Belgium	**Total Liquids**	20,532	21,866	6%	-		Largely due to differences for motor spirit and LPG
Belgium	Motor spirit	-3,406	-2,078	-39%	-	No	Largely due to differences in stock change data.
Belgium	LPG	869	638	-27%	-	No	Largely due to differences in reported import amounts.
Belgium	**Solid Fuels**	**4,586**	**4,032**	**-12%**	**-**		
Belgium	Hard Coal	4,812	4,107	-15%	-	Yes	Differences in imports
Belgium	Lignite	0	265		-	No	Annual data missing.
Belgium	**Natural Gas**	**601,475**	**329,770**	**-45%**	**601,476**		Largely due to differences in reported import amounts and to a lesser extent to stock change data.
Bulgaria	**Total Liquids**	**3,838**	**3,673**	**-4%**	**-**		
Bulgaria	**Solid Fuels**	**35,273**	**35,683**	**1%**	**-**		
Bulgaria	**Natural Gas**	**102,625**	**92,539**	**-10%**	**-**	Yes	Incomplete monthly production data.
Czech Republic	**Total Liquids**	**8,289**	**8,227**	**-1%**	**-**		
Czech Republic	**Solid Fuels**	**49,222**	**49,001**	**0%**	**-**		
Czech Republic	**Natural Gas**	**287,051**	**281,038**	**-2%**	**-**		
Denmark	**Total Liquids**	**6,182**	**6,490**	**5%**	**6,507**		.
Denmark	Kerosenes - Jet fuels	-175	272	-255%	238	Yes	Ongoing differences due to lower monthly reporting of bunker fuel.
Denmark	**Solid Fuels**	**4,271**	**4,331**	**1%**	**-**		
Denmark	**Natural Gas**	**145,886**	**138,151**	**-5%**	**145,709**	No	Missing monthly import data and small mismatch in annual vs monthly production data
Germany	**Total Liquids**	**98,105**	**96,976**	**-1%**	**97,499**		
Germany	Kerosenes - Jet fuels	-4,464	-4,091	-8%	-4,442	No	Missing monthly bunker fuel data.
Germany	Gas / Diesel Oil	7,374	6,201	-16%	7,291	No	Stock change and bunker fuels.
Germany	Residual Fuel Oil	-1,981	-1,473	-26%	-1,979	No	Missing monthly bunker fuel data.
Germany	**Solid Fuels**	**247,526**	**239,616**	**-3%**	**-**		

Member States	Fuel type	Annual (kt, natural gas TJ NCV)	Cumulated monthly (kt natural gas TJ NCV)	Difference (%)	Cumulated monthly (revised)	Systematic issue	Explanations and comments
Germany	Hard Coal	60,400	52,455	-13%	-	Yes	Consistent mismatch on import data
Germany	**Natural Gas**	**2,923,196**	**2,814,948**	**-4%**	**2,838,489**		
Estonia	**Total Liquids**	**495**	**807**	**63%**	**-**		Marine bunkering and stock changes are included separately, not for individual fuels. Mismatches in all flows, especially in Residual Fuel Oil.
Estonia	Residual Fuel Oil	-1	-343	34200%	-	Yes	Mismatch in all flows, imports exports and especially bunker fuels.
Estonia	**Solid Fuels**	**17,822**	**19,146**	**7%**	**-**		
Estonia	Lignite	0	18,896		-	No	Annual data missing.
Estonia	**Natural Gas**	**22,835**	**22,835**	**0%**	**-**		
Ireland	**Total Liquids**	**5,847**	**5,750**	**-2%**	**-**		Only for aggregated fuel categories.
Ireland	**Solid Fuels**	**6,618**	**7,104**	**7%**	**-**		
Ireland	Hard Coal	2,422	2,616	8%	-	Yes	Differences in imports and stock changes.
Ireland	Peat	4,168	4,467	7%	-	No	Due to confidentiality peat data not reported in monthly data. The aggregate monthly value for peat is 66% of deliveries to main activity producer power plant.
Ireland	**Natural Gas**	**168,076**	**173,475**	**3%**	**-**		
Greece	**Total Liquids**	**12,501**	**11,978**	**-4%**	**-**		Difference largely due to missing monthly Residual Fuel Oil imports.
Greece	Residual Fuel Oil	-2,676	-3,288	23%	-	No	Difference largely due to missing monthly imports.
Greece	**Solid Fuels**	**62,261**	**60,978**	**-2%**	**-**		
Greece	Hard Coal	351	120	-66%	-	Yes	Consistently low reporting of imports.
Greece	**Natural Gas**	**153,325**	**153,502**	**0%**	**-**		
Spain	**Total Liquids**	49,044	49,504	1%	-		
Spain	Residual Fuel Oil	-5,470	-5,094	-7%	-	No	Relatively small difference in bunkers.
Spain	**Solid Fuels**	**28,693**	**29,881**	**4%**	**-**		
Spain	Lignite	0	2,183		-	Yes	Annual data missing.
Spain	**Natural Gas**	**1,180,239**	**1,182,644**	**0%**	**-**		

Member States	Fuel type	Annual (kt, natural gas TJ NCV)	Cumulated monthly (kt natural gas TJ NCV)	Difference (%)	Cumulated monthly (revised)	Systematic issue	Explanations and comments
France	**Total Liquids**	**73,169**	**77,623**	**6%**	**-**		Monthly energy data online, only for aggregated fuel categories. Differences largely due to low monthly reporting of bunker fuels.
France	Kerosenes - Jet fuels	-1,771	2,294	-230%	-	Yes	Missing monthly bunker fuel data.
France	Naphta	647	537	-17%	-	No	Low monthly import data.
France	Residual Fuel Oil	-2,654	-1,877	-29%	-	No	Differences in imports and to a lesser extent stock change.
France	**Solid Fuels**	**17,342**	**18,795**	**8%**	**-**		
France	Hard Coal	16,533	18,265	10%	-	Yes	High monthly imports data.
France	**Natural Gas**	**1,600,211**	**1,523,371**	**-5%**	**-**	No	Differences in imports.
Croatia	**Total Liquids**	**3,172**	**3,158**	**0%**	**-**		
Croatia	Refinery feedstocks	438	279	-36%	-	No	Low monthly import data.
Croatia	**Solid Fuels**	**1,080**	**1,073**	**-1%**	**-**		
Croatia	**Natural Gas**	**101,038**	**91,488**	**-9%**	**-**	No	Differences in imports and production.
Italy	**Total Liquids**	**55,959**	**56,387**	**1%**	**-**		.
Italy	Kerosenes - Jet fuels	-1,725	-1,591	-8%	-	No	Stock change and bunker fuels.
Italy	Petroleum Coke	1,891	1,395	-26%	-	Yes	Low monthly import data.
Italy	Residual Fuel Oil	-5,517	-4,144	-25%	-	No	Stock change and bunker fuels.
Italy	**Solid Fuels**	**24,950**	**24,345**	**-2%**	**-**		
Italy	**Natural Gas**	**2,568,837**	**2,569,179**	**0%**	**-**		
Cyprus	**Total Liquids**	**2,169**	**2,128**	**-2%**	**-**		
Cyprus	**Solid Fuels**	**1**	**0**	**-100%**	**-**		Diminishing amounts of solid fuel imports reported. Stock changes mismatches.
Cyprus	**Natural Gas**	**0**	**0**		**-**		
Latvia	**Total Liquids**	**1,258**	**1,147**	**-9%**	**-**		Difference due to small mismatches across many flows.
Latvia	**Solid Fuels**	**148**	**192**	**30%**	**-**		
Latvia	**Natural Gas**	**50,709**	**50,716**	**0%**			

Member States	Fuel type	Annual (kt, natural gas TJ NCV)	Cumulated monthly (kt natural gas TJ NCV)	Difference (%)	Cumulated monthly (revised)	Systematic issue	Explanations and comments
Lithuania	**Total Liquids**	**2,255**	**2,242**	**-1%**	**-**		For main fuel categories and flows.
Lithuania	**Solid Fuels**	**442**	**437**	**-1%**	**-**		
Lithuania	**Natural Gas**	**111,119**	**111,118**	**0%**	**-**		
Luxembourg	**Total Liquids**	**2,495**	**2,437**	**-2%**	**-**		
Luxembourg	**Solid Fuels**	**92**	**90**	**-2%**	**-**		
Luxembourg	**Natural Gas**	**44,006**	**43,857**	**0%**	**-**		
Hungary	**Total Liquids**	**5,745**	**5,708**	**-1%**	**-**		Difference due to small mismatches across many flows.
Hungary	**Solid Fuels**	**11,057**	**11,100**	**0%**	**-**		
Hungary	Hard Coal	1,853	1,497	-19%	-	Yes	Largely due to differences in reported import amounts and to a lesser extent to stock change data.
Hungary	**Natural Gas**	**347,753**	**358,854**	**3%**	**-**		
Malta	**Total Liquids**	**772**	**1031**	**34%**	**765**		Difference due to small mismatches across many flows.
Netherlands	**Total Liquids**	**29,517**	**28,973**	**-2%**			
Netherlands	**Solid Fuels**	**13,143**	**15,997**	**22%**			
Netherlands	Hard Coal	12,790	15,926	25%	-	No	Largely due to stock changes and also import and export flows.
Netherlands	**Natural Gas**	**1,372,878**	**1,367,723**	**0%**	**-**		
Austria	**Total Liquids**	**11,483**	**12,706**	**11%**	**12,039**		Largely due to differences in bunker fuels and imports of refinery feedstocks.
Austria	Kerosenes - Jet fuels	-583	72	-112%	76	Yes	Missing monthly bunker fuel data.
Austria	Refinery feedstocks	84	759	804%	84	Yes	Largely due to differences in reported import amounts and to a lesser extent to stock change data.
Austria	**Solid Fuels**	**4,825**	**4,018**	**-17%**	**-**		Largely due to the differences shown for Hard Coal.
Austria	Hard Coal	3,564	2,779	-22%	-	No	Largely due to differences in reported import amounts and to a lesser extent to stock change data.
Austria	**Natural Gas**	**310,433**	**307,210**	**-1%**	**-**		
Poland	**Total Liquids**	**23,714**	**23,329**	**-2%**	**-**		
Poland	Gas / Diesel Oil	979	519	-47%	-	No	Low monthly import data.

Member States	Fuel type	Annual (kt, natural gas TJ NCV)	Cumulated monthly (kt natural gas TJ NCV)	Difference (%)	Cumulated monthly (revised)	Systematic issue	Explanations and comments
Poland	**Solid Fuels**	**132,657**	**134,291**	**1%**	**-**		
Poland	**Natural Gas**	**569,447**	**569,380**	**0%**	**-**		
Portugal	**Total Liquids**	**8,913**	**9,457**	**6%**	**-**		Difference largely due to missing bunker fuel data.
Portugal	Kerosenes - Jet fuels	-749	-185	-75%	-	Yes	Missing monthly bunker fuel data.
Portugal	Refinery feedstocks	276	176	-36%	-	Yes	Differences in imports
Portugal	**Solid Fuels**	**4,874**	**4,874**	**0%**	**-**		
Portugal	**Natural Gas**	**164,651**	**168,567**	**2%**	**168,559**		
Romania	**Total Liquids**	**8,486**	**8,519**	**0%**	**-**		
Romania	Gas / Diesel Oil	797	691	-13%	-	No	Stock changes.
Romania	**Solid Fuels**	**35,870**	**35,757**	**0%**	**-**		
Romania	**Natural Gas**	**452,715**	**465,882**	**3%**	**-**		
Slovenia	**Total Liquids**	**2,503**	**2,465**	**-2%**	**-**		
Slovenia	**Solid Fuels**	**4,985**	**4,882**	**-2%**	**-**		
Slovenia	Hard Coal	438	1	-100%	-	Yes	Low monthly import data.
Slovenia	Lignite	4,512	4,880	8%	-	Yes	High monthly imports data.
Slovenia	**Natural Gas**	**29,730**	**27,091**	**-9%**	**-**	Yes	Low monthly imports data.
Slovakia	**Total Liquids**	**3,132**	**3,062**	**-2%**	**-**		Difference largely due to missing monthly imports especially in Bitumen and Lubricants.
Slovakia	**Solid Fuels**	**6,982**	**7,029**	**1%**	**-**		
Slovakia	**Natural Gas**	**182,768**	**225,478**	**23%**	**-**	Yes	High monthly imports data.
Finland	**Total Liquids**	**7,884**	**8,046**	**2%**	**-**		Exclusion of bunker fuels contributes most or all of the difference between annual and monthly data for total liquid fuels.
Finland	**Solid Fuels**	**11,336**	**11,593**	**2%**	**-**		
Finland	**Natural Gas**	**125,819**	**125,385**	**0%**	**-**		
Sweden	**Total Liquids**	**12,341**	**12,262**	**2%**	**-**		Monthly energy data online.
Sweden	**Solid Fuels**	**3,659**	**3,131**	**-14%**	**-**		

Member States	Fuel type	Annual (kt, natural gas TJ NCV)	Cumulated monthly (kt natural gas TJ NCV)	Difference (%)	Cumulated monthly (revised)	Systematic issue	Explanations and comments
Sweden	Hard Coal	2,776	2,247	-19%	-	No	Stock changes.
Sweden	**Natural Gas**	**42,144**	**42,098**	**0%**	**-**		
United Kingdom	**Total Liquids**	**55,966**	**67,485**	**21%**	**-**		No aviation bunkers in monthly data. The exclusion of bunker fuels contributes most or all of the difference between annual and monthly data for total liquid fuels.
United Kingdom	Kerosenes - Jet fuels	-4,123	6,175	-250%	-	Yes	Monthly data do not include international bunkers
United Kingdom	Gas / Diesel Oil	1,433	2,221	55%	-	Yes	Monthly data do not include international bunkers
United Kingdom	Motor spirit	-4,266	-3,491	-18%	-	No	High monthly imports data.
United Kingdom	LPG	-845	-945	12%	-	No	Low monthly import data.
United Kingdom	NGL	2,641	2,331	-12%	-	No	Low monthly import data.
United Kingdom	Petroleum Coke	20	-124	-720%	-	No	Low monthly import data.
United Kingdom	**Solid Fuels**	**63,316**	**63,554**	**0%**	**-**		
United Kingdom	**Natural Gas**	**2,777,984**	**2,773,037**	**0%**	**-**		

3.3 Comparison of Eurostat data with CRF data

This section provides comparisons of the annual Eurostat data and inventory CRF 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 2008-2012[3]. The comparison is based on physical units (kt) which are reported by Eurostat data and in the CRF tables. As some Member States provide CRF tables only in TJ, CRF data for these Member States was converted to physical units for the comparison with Eurostat monthly and annual fuel consumption data using net calorific values from Member States national inventory reports.

The evaluation compares the CRF data and annual Eurostat liquid, solid and gas fuel consumption data for the years 2008 to 2012. The following sub-chapters summarize large differences between annual Eurostat and CRF data for aggregate fuel categories liquid, solid and gaseous fuels. A detailed analysis of the underlying differences for specific fuels and flows for these differences is provided in Table 3-12. Table 8-5 in the

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

Annex provides a comparison of CRF data and annual Eurostat data for the three aggregate fuel categories for all Member States.

3.3.1 Liquid fuels

In 2008, 17 Member States showed differences below 2 % between annual Eurostat data and CRF data for liquid fuel consumption, constituting a share of 46 % of the total EU-27 liquid fuel consumption. Differences above 5 % could be identified for 4 Member States (see Table 3-9), adding up to a share of only 3 % of the EU-27 total liquid fuel consumption.

In 2012, the last reporting year for which annual Eurostat and CRF data are available, data differences between annual and CRF data below 2 % were found for 14 Member States. Liquid fuel consumption of these 14 Member States accounts for 63 % of the total EU-28 liquid fuel consumption. The number of Member States that have larger differences of above 5 % increased to 7 Member States in 2012, making up a share of 29 % of the EU-28 total liquid fuel consumption.

So far, there has not been a systematic improvement of the consistency between annual Eurostat fuel consumption and the fuel consumption reported in the CRF reference approach table across all Member States. While the consistency improved in Germany, Finland, Czech Republic, Cyprus, Poland and Romania, it deteriorated in the case of Greece, France, Sweden, Hungary and Lithuania.

Table 3-9 Difference in liquid fuel consumption between CRF and annual Eurostat data, 2008-2012

Member States	2008	2009	2010	2011	2012	Share of emissions from liquid fuels in total energy CO2 emissions (%) in 2012
Belgium	-1%	1%	2%	-1%	0%	49%
Bulgaria	1%	0%	-1%	0%	1%	24%
Czech Republic	2%	1%	1%	3%	0%	21%
Denmark	1%	6%	-13%	-3%	2%	49%
Germany	3%	3%	1%	0%	-1%	35%
Estonia	452%	5%	-6%	-1%	8%	7%
Ireland	-9%	-18%	2%	-2%	7%	46%
Greece	0%	-4%	-2%	-7%	7%	41%
Spain	0%	0%	2%	2%	1%	51%
France	-3%	2%	-4%	-4%	-5%	60%
Croatia	NE	NE	NE	-3%	0%	57%
Italy	-5%	-7%	-5%	-4%	-5%	43%
Cyprus	7%	5%	1%	0%	2%	100%
Latvia	0%	0%	-3%	1%	3%	53%
Lithuania	-1%	-5%	-8%	-8%	-7%	60%
Luxembourg	-2%	-2%	0%	1%	4%	73%
Hungary	-1%	1%	-1%	-6%	-1%	30%
Malta	NE	-7%	3%	34%	-11%	100%
Netherlands	2%	3%	1%	3%	-1%	33%
Austria	-1%	-1%	-4%	-1%	0%	51%
Poland	-2%	-1%	-2%	0%	0%	22%
Portugal	-2%	-2%	1%	3%	-3%	55%
Romania	-15%	-9%	8%	3%	-1%	29%
Slovenia	4%	-1%	1%	2%	1%	49%
Slovakia	-2%	-1%	-1%	-1%	-2%	27%
Finland	4%	4%	-5%	2%	2%	47%
Sweden	1%	-7%	3%	6%	4%	79%
United Kingdom	0%	1%	0%	-1%	-2%	35%
EU 15	**-1%**	**0%**	**-1%**	**-1%**	**-2%**	
EU 27 /28	**1%**	**0%**	**1%**	**1%**	**-1%**	
<+/- 2%	17 MS	14 MS	14 MS	13 MS	14 MS	
+/-2-5%	6 MS	5 MS	8 MS	10 MS	7 MS	
> +/- 5%	4 MS	8 MS	5 MS	5 MS	7 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 available or are incomplete.
CRF inventory data = 100 %, a positive value indicates that annual Eurostat data is higher than CRF inventory data, a negative value indicates that annual Eurostat data is lower than CRF inventory data.

3.3.2 Solid fuels

In 2008 14 Member States showed differences below 2 % between annual Eurostat data and CRF data for solid fuel consumption, making up a share of 76 % of the total EU-27 solid fuel consumption.

Differences above 5 % could be identified for 10 Member States (see Table 3-10), which add up to a share of 18 % of the EU-27 total solid fuel consumption.

In 2012, the last reporting year for which annual Eurostat and CRF data are available, data differences between annual and CRF data below 2 % could be found for 21 Member States. Nevertheless, the solid fuel consumption of these 21 Member States account only for 57 % of the total EU-28 solid fuel consumption. The reason for this relatively low share in the total solid fuel consumption is the fact that Germany is not amongst these 19 Member States. For Germany the difference in reporting between annual Eurostat and CRF data amounts to 5 %. The solid fuel consumption of Germany accounts for 31 % of the total solid fuel consumption of the EU 28. The number of Member States that have larger differences of above 5 % decreased to 4 Member States in 2012 with a share of only 5 % of EU-28 total solid fuel consumption.

Thus, in terms of the number of Member States with lower differences between annual Eurostat data and CRF data the situation improved.

Table 3-10 Difference in solid fuel consumption between CRF and annual Eurostat data, 2008-2012

Member States	2008	2009	2010	2011	2012	Share of emissions from solid fuels in total energy CO2 emissions (%) in 2012
Belgium	0%	-3%	-1%	0%	1%	13%
Bulgaria	1%	6%	0%	0%	0%	65%
Czech Republic	1%	1%	1%	-1%	-3%	63%
Denmark	-7%	-7%	-8%	-8%	-11%	30%
Germany	0%	0%	-1%	0%	5%	43%
Estonia	0%	1%	0%	0%	0%	86%
Ireland	10%	0%	-1%	0%	7%	27%
Greece	0%	0%	1%	0%	0%	49%
Spain	0%	0%	0%	0%	0%	23%
France	-11%	-4%	-9%	-10%	-11%	14%
Croatia	NE	NE	NE	0%	0%	15%
Italy	2%	1%	1%	1%	2%	17%
Cyprus	60%	68%	4%	8%	0%	
Latvia	0%	2%	6%	8%	0%	5%
Lithuania	10%	9%	8%	2%	4%	8%
Luxembourg	18%	-49%	0%	0%	0%	2%
Hungary	-10%	-5%	-8%	-6%	0%	26%
Malta	NO	NO	NO	NO	NO	
Netherlands	-1%	-1%	-1%	-1%	-5%	20%
Austria	3%	0%	0%	0%	0%	21%
Poland	-1%	-1%	3%	-1%	-1%	69%
Portugal	0%	0%	0%	2%	1%	24%
Romania	8%	9%	1%	3%	0%	38%
Slovenia	0%	0%	0%	0%	0%	40%
Slovakia	-1%	-1%	4%	-1%	-1%	37%
Finland	-5%	-2%	0%	-1%	1%	38%
Sweden	13%	6%	5%	10%	-4%	15%
United Kingdom	5%	14%	-1%	-1%	-1%	32%
EU 15	**0%**	**1%**	**-1%**	**-1%**	**2%**	
EU 27 /28	**0%**	**-1%**	**0%**	**1%**	**-1%**	
<+/- 2%	14 MS	15 MS	18 MS	21 MS	21 MS	
+/-2-5%	3 MS	4 MS	4 MS	1 MS	3 MS	
> +/- 5%	10 MS	8 MS	5 MS	6 MS	4 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.
NO is reported if there is no solid fuel consumption in the country.
CRF inventory data = 100 %, a positive value indicates that annual Eurostat data is higher than CRF inventory data, a negative value indicates that annual Eurostat data is lower than CRF inventory data.

3.3.3 Gaseous fuels

In 2008 22 Member States showed differences below 2% between annual Eurostat and CRF data for monthly natural gas consumption, contributing with a share of 82% to EU-27 total natural gas consumption. Differences above 5% could be identified for Estonia (see Table 3-11), adding up to a share of only 0.2% of EU-27 total natural gas consumption.

In 2012, the last reporting year for which annual Eurostat and CRF data are available, data differences between annual and CRF data below 2% were found for 24 Member States. The natural gas consumption of these 24 Member States accounts for 99% of the total EU-28 natural gas consumption. For 2012 there are no differences above 5% between annual Eurostat data and CRF data.

Hence, the consistency between annual Eurostat data and the fuel consumption reported in the CRF reference approach tables improved in the case of natural gas.

Table 3-11 Difference between natural gas consumption in CRF and annual Eurostat data, 2008-2012

Member States	2008	2009	2010	2011	2012	Share of emissions from natural gas in total energy CO2 emissions (%) in 2012
Belgium	0%	0%	0%	-1%	0%	38%
Bulgaria	1%	0%	-3%	0%	0%	11%
Czech Republic	0%	0%	0%	0%	0%	16%
Denmark	0%	0%	0%	0%	0%	22%
Germany	4%	9%	0%	-1%	-1%	22%
Estonia	18%	3%	0%	-1%	3%	7%
Ireland	0%	-1%	0%	0%	0%	27%
Greece	3%	2%	1%	2%	2%	9%
Spain	0%	0%	0%	0%	0%	26%
France	0%	0%	-1%	5%	0%	26%
Croatia	NA	NA	NA	11%	-1%	28%
Italy	0%	0%	0%	0%	0%	40%
Cyprus	NO	NO	NO	NO	NO	
Latvia	0%	0%	0%	0%	0%	42%
Lithuania	0%	0%	27%	0%	0%	32%
Luxembourg	0%	0%	0%	0%	0%	25%
Hungary	0%	0%	0%	0%	0%	44%
Malta	NO	NO	NO	NO	NO	
Netherlands	0%	0%	0%	0%	0%	47%
Austria	-1%	-5%	-1%	-1%	0%	28%
Poland	0%	-2%	0%	0%	0%	9%
Portugal	0%	0%	0%	-1%	0%	20%
Romania	0%	0%	0%	0%	0%	33%
Slovenia	0%	0%	0%	0%	0%	11%
Slovakia	0%	0%	0%	0%	0%	35%
Finland	0%	0%	0%	0%	0%	14%
Sweden	1%	12%	-10%	0%	0%	6%
United Kingdom	0%	0%	0%	0%	0%	33%
EU 15	**1%**	**2%**	**0%**	**0%**	**0%**	
EU 27 /28	**-1%**	**-1%**	**0%**	**0%**	**0%**	
<+/- 2%	22 MS	19 MS	22 MS	24 MS	24 MS	
+/-2-5%	2 MS	3 MS	1 MS	1 MS	2 MS	
> +/- 5%	1 MS	3 MS	2 MS	1 MS	0 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 solid fuel consumption in the country.
CRF inventory data = 100%, a positive value indicates that annual Eurostat data is higher than CRF inventory data, a negative value indicates that annual Eurostat data is lower than CRF inventory data.

3.3.4 Detailed differences for individual Member States comparing CRF inventory data and annual Eurostat data

Table 3-12 below details the differences between CRF data and annual Eurostat liquid and solid fuel consumption data for 2012.

Table 3-12 Differences for individual Member States arising from the comparison of CRF data with annual Eurostat data for 2012

Member States	Fuel type	Eurostat annual (kt ,natural gas,TJ NCV)	CRF,1.A.(b) (kt, natural,gas, TJ NCV)	Difference (%)	Systematic issue	Explanations
Denmark	**Solid fuels**	**4,271**	**4,790**	**-10.8%**		
Denmark	Other solid fuels	0	519	-100.0%	YES	Fossil fraction of municipal waste combustion reported under other solid fuels in the CRF reference approach table. These quantities are not included in annual Eurostat data.
Germany	**Solid fuels**	**247,526**	**236,355**	**4.7%**		Details shown here for transparency (rounded up to 5% in other tables). Discrepancy is largely due to lignite.
Germany	Lignite	185,176	173,139	7.0%	NO	Due to lower figures in the CRF than in the annual Eurostat data.
Estonia	**Liquid fuels**	**495**	**460**	**7.7%**		Differences in the reporting of other oil
Ireland	**Liquid fuels**	**5,847**	**5,462**	**7.1%**	NO	
Ireland	Crude Oil & NGL & Other hydrocarbons	3,118	2,758	13.1%	NO	Differences in imports of in Crude Oil & NGL & Other hydrocarbons
Ireland	**Solid fuels**	**6,618**	**6,197**	**6.8%**		
Ireland	Peat	4,168	3,759	10.9%		Peat data confidentiality
Greece	**Liquid fuels**	**12,501**	**11,713**	**6.7%**		
Greece	Residual Fuel Oil	-2,676	-3,354	-20.2%	NO	Differences in imports
France	**Liquid fuels**	**73,169**	**77,070**	**-5.1%**	Yes	Details shown here for transparency (rounded up to 5% in other tables).
France	Kerosenes - Jet fuels	-1,771	-1,397	26.8%	Yes	Differences in amounts of Kerosenes - Jet fuels in international bunkers.
France	**Solid fuels**	**17,342**	**19,473**	**-10.9%**		
France	Coking Coal	4,592	6,394	-28.2%	YES	Differences in imports
Italy	**Liquid fuels**	**55,959**	**59,176**	**-5.4%**		
Italy	Refinery Feedstocks	5,224	8,581	-39.1%	Yes	Ongoing differences in Refinery Feedstocks stock changes.
Lithuania	**Liquid fuels**	**2,255**	**2,425**	**-7.0%**		
Lithuania	Refinery Feedstocks	333	517	-35.6%	YES	The difference is due to additives/oxygenates which are disregarded in the project file because of double counting.
Lithuania	**Solid fuels**	**374**	**426**	**-12.2%**		Differences in total is small, classification of fuel types is different.
Lithuania	Coking Coal	0	254		YES	All flows
Lithuania	Other bituminous Coal	296	NO		YES	All flows
Lithuania	Peat	42	136	-69.1%	NO	Differences in imports
Hungary	Gasoline	93	85	9.4%	YES	Differences in imports and in exports
Malta	**Liquid fuels**	**772**	**864**	**-10.6%**		
Malta	Gas/Diesel Oil	100	185	-46.0%	NO	Differences in stock changes
Malta	Residual Fuel Oil	536	586	-8.5%	NO	Differences in stock changes
Netherlands	**Solid fuels**	**13,143**	**13,900**	**-5.4%**	NO	
Netherlands	Hard Coal	12,790	13,678	-6.5%	NO	Differences in imports and in exports

Individual fuels are included for those Member States for which the differences are greater than 5 %. Sub-rows by fuel type are included when these contribute to an explanation for the differences.

3.4 Comparison of monthly Eurostat data with early national statistics

For calculating reliable early CO_2 emissions for 2013 the quality of the 2012 and the 2013 monthly Eurostat data is essential. 2012 monthly data could already be analysed by comparing monthly Eurostat data with annual Eurostat data and CRF inventory data for the year 2012, but the quality of the 2013 monthly Eurostat 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 month after the reference year that can be used to check the quality of the monthly Eurostat data for 2013. Early national statistics can be used to cross-check the quality of Eurostat monthly data 2013.

This chapter provides a comparison of the trend changes from early national statistics and cumulated monthly fuel consumption data of liquid, solid and gas 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.

For the trend change of the year 2013/2012 early national statistics could be found for 20 Member States. For most of these Member States there is a good correlation for the trend change of monthly Eurostat data and early national energy statistics below +/- 2%.

The results of the detailed comparisons are presented in Table 3-13.

Table 3-13 Comparison of trend changes for fuel categories between Eurostat aggregated monthly data and early national statistics for the years 2013/2012 for individual Member States

	Trend changes 2013/2012 Liquid fuels			Trend changes 2013/2012 Solid fuels			Trend changes 2013/2012 Gaseous fuels		
Member States	Early national statistics	Eurostat monthly data	Difference	Early national statistics	Eurostat monthly data	Difference	Early national statistics	Eurostat monthly data	Difference
Bulgaria	93%	96%	-3%	87%	85%	2%	97%	104%	-8%
Czech Republic	95%	97%	-2%	97%	96%	2%	101%	103%	-2%
Denmark	99%	100%	-1%	129%	127%	3%	94%	101%	-7%
Germany	102%	102%	0%	101%	99%	2%	111%	109%	2%
Estonia	63%	38%	25%	109%	108%	1%	103%	102%	1%
Ireland	101%	102%	-1%	89%	85%	4%	100%	97%	3%
Spain	98%	93%	5%	68%	68%	0%	93%	92%	0%
France	99%	93%	6%	108%	107%	1%	101%	103%	-2%
Italy	94%	95%	-1%	88%	89%	-2%	95%	94%	1%
Latvia	99%	96%	3%	86%	69%	18%	99%	99%	0%
Lithuania	94%	98%	-3%	116%	117%	-1%	82%	81%	0%
Luxembourg	105%	100%	5%	89%	84%	5%	85%	85%	0%
Netherlands	98%	96%	2%	99%	81%	19%	102%	102%	0%
Austria	102%	97%	6%	101%	111%	-10%	94%	95%	0%
Portugal	98%	112%	-14%	93%	91%	2%	96%	96%	0%
Romania	98%	95%	3%	74%	72%	2%	96%	92%	4%
Slovenia	94%	88%	6%	96%	83%	13%	97%	107%	-9%
Finland	96%	89%	6%	106%	98%	8%	93%	95%	-1%
Sweden	99%	94%	4%	104%	104%	1%	94%	95%	-1%
United Kingdom	98%	98%	1%	94%	96%	-2%	99%	99%	0%

For some countries the comparison between monthly Eurostat data and early national statistics showed large discrepancies between the trend changes of the aggregated fuel categories. For Austria the trend changes calculated with early national statistics showed an increase of 2 % for the year 2013 in comparison to the year 2012, while trend changes calculated with monthly Eurostat data showed a decreasing trend of -3% for 2013 in comparison to 2012.

As far as detailed data for early national statistics were available, the large differences have been analysed (see Annex 8.3). The comparison of the trend changes is used as an indication of the quality of the 2013 data and also a check of the consistency in reporting between 2012 and 2013 monthly Eurostat data. The detailed analysis identifies the need for correcting 2012 monthly Eurostat data (as available in April 2013) for some countries, as the quality of the monthly Eurostat data leads to discrepancies in the trend changes. When the reporting of the 2013 monthly Eurostat data has improved, it may no longer be consistent with the reporting of the 2012 monthly Eurostat data (as available in April 2013) which may have a strong influence on the trend changes.

4 Early CO_2 estimates for the year 2013

4.1 Data improvements to correct trend changes of monthly Eurostat data

As the previous chapters have shown, the quality of the monthly Eurostat data in the case of some countries is not sufficient to produce reliable early CO_2 estimates for the year 2013. In order to improve the early CO_2 estimates and for them to be closer to the final CRF inventory estimates of the reference approach, the trend changes of the monthly Eurostat data had to be improved for some countries by correcting 2012 monthly Eurostat data (as available in April 2013).

For improving the trend changes that were used to calculate 2013 CO_2 emissions, different options were used:

1. Some countries provided Eurostat with revised monthly data for the year 2012 in the year 2014. This updated monthly data has been used wherever available (see Table 3-8).
2. For countries that did not provide updated monthly data, but for which monthly data showed stronger inconsistencies or for which trend changes were obviously strange, annual data has been used to replace monthly 2012 data (see Annex Table 8-14).
3. For some countries calculated trend changes in physical units (kt) and calculated trend changes in energy units (TJ) showed large inconsistencies. This is due to countries that changed the share of consumption between solid fuel categories with different net calorific values (NCVs). For the 2013 calculation, trend changes calculated with energy units have been used for Finland and Hungary (see Section 4.1.2).

4.1.1 Corrections for 2012 monthly data to estimate 2013 CO_2 emissions

In April 2014 a new extraction from Eurostat's production database of 2012 monthly data was performed. According to this extraction updated/revised monthly 2012 data were available for 7 Member States: Austria (liquid fuels), Belgium (natural gas), Germany (liquid fuels and natural gas), Denmark (liquid fuels and natural gas), Malta (liquid fuels), Poland (liquid fuels) and Portugal (natural gas) (see Table 8-13). To calculate the early estimates for 2013 the updated monthly 2012 data were used.

A refinement of the methodological approach was recommended for those Member States for which accumulated monthly energy data showed large deviations from annual Eurostat data. In these cases it was recommended that monthly Eurostat data for the year T-2 should be replaced by annual Eurostat data. However, these corrections should be made only for selected Member States:

(1) When the data for year T-2 show strong deviations between monthly Eurostat data and CRF data, and much better consistency between Eurostat annual data and CRF data;

(2) If such strong deviations occur in the same way for all fuel categories or for those fuel categories that dominate the emission estimation.

Such a procedure was recommended for the 2013 early estimates for Austria, France, Estonia and the Netherlands.

For Austria the consumption of hard coal was corrected by using annual data for 2012. This changed the trend 2013/2012 in total solid fuel consumption from 111 % to 93 %.

The same procedure was applied for hard coal consumption in the Netherlands, which changed the trend for total solid fuel consumption between 2013 and 2012 from 81 % to 100 %.

France improved the reporting of international bunkers from jet kerosene in its monthly data for 2013. As reporting of international bunkers in monthly 2012 data was not complete for 2012, the annual data reported for international bunkers were used to correct the trend change. This changed the trend change for total liquid fuel consumption for 2013/2012 from 83 % to 105 %.

For Estonia large differences in reporting between 2012 annual and monthly Eurostat data can be found for other hydrocarbons (which represents shale oil in this case) and residual fuel oil. As the monthly reporting was improved in 2013 and is more consistent with annual 2012 than with monthly 2012, the annual 2012 data for total liquid fuel consumption was used to calculate the trend change between 2013/2012. The trend change applied was 67% for total liquid fuel consumption instead of 38 %.

A table with a detailed analysis of the replacement with annual data is provided in the Annex (see Table 8-14).

4.1.2 Calculation in physical units or energy units

The annual trend change between 2013 and 2012 used to calculate early CO_2 estimates was calculated based on Eurostat monthly data in physical units. Uncertainties arise from this approach if different individual fuels are related to different NCVs and carbon contents and therefore the impact on emissions is not only related to the physical quantity of the fuels. 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 MS NCVs used in 2014 GHG inventories (i.e. NCV reported by the MS 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 8-3 in the Annex).

There was however a substantial difference for Finland: The trend change for solid fuels based on physical units leads to a decrease of 2.2 % in consumption whereas the trend change based on TJ units resulted in an increase of 7.8 %. This difference is due to the change in peat and hard coal use in Finland from 2012 to 2013 combined with the considerably different NCVs for both fuels. Peat use decreased by around 20 % (-1390 kt) from 2012 to 2013, while the use of hard coal increased by around 24 %

(+1077 kt). In this rather extreme case, it is clear that looking solely at physical units would give a distorted picture and therefore the trend change has to be based on energy units.

Table 4-1 Solid fuel consumption for 2012 and 2013 in kt and TJ for Finland

Fuel	Eurostat monthly data		Trend change	Eurostat monthly data		Trend change
	2012	2013	2013/2012	2012	2013	2013/2012
	kt		%	**TJ**		%
Total solid fuel	**11,593**	**11,337**	**98%**	**193,202**	**208,228**	**108%**
Hard Coal*	4,573	5,650	124%	116,612	144,075	124%
Peat**	6,704	5,314	79%	67,710	53,671	79%
Coke Oven/Gas Coke***	316	373	118%	8,880	10,481	118%
*NCV of 25.5 is used for Hard Coal as conversion factor **NCV of 10.2 is used for Peat as conversion factor ***NCV of 28.1 is used for Coke Oven/Gas Coke as conversion factor						

The same approach was used for Hungary where the trend change calculated based on energy units also showed a larger difference for solid fuels.

Table 4-2 Solid fuel consumption for 2012 and 2013 in kt and TJ for Hungary

Fuel	Eurostat monthly data		Trend change	Eurostat monthly data		Trend change
	2012	2013	2013/2012	2012	2013	2013/2012
	kt		%	**TJ**		%
Total solid fuel	**11,100**	**10,796**	**97%**	**103,170**	**93,190**	**90%**
Hard Coal*	1,497	1,330	89%	37,275	33,117	89%
Lignite**	9,893	9,985	101%	74,198	74,888	101%
BKB***	10	6	60%	247	148	60%
Coke Oven/Gas Coke****	-300	-525	175%	-8,550	-14,963	175%
*NCV of 24.9 is used for Hard Coal as conversion factor **NCV of 7.5 is used for Lignite as conversion factor ***NCV of 24.7 is used for BKB as conversion factor ****NCV of 28.5 is used for Coke Oven/Gas Coke as conversion factor						

4.1.3 Results for corrected trend changes

The following table provides an overview of how the revised trend changes correlate with trend changes from early national statistics.

Table 4-3 Comparison of trend changes and differences from revised Eurostat monthly 2012 data and early national statistics for the year 2013/2012 for individual Member States

	Liquid fuels			Solid fuels			Gaseous fuels		
Member State	Early national statistics	Eurostat monthly data	Difference	Early national statistics	Eurostat monthly data	Difference	Early national statistics	Eurostat monthly data	Difference
Belgium	-	101%		-	99%		-	180%	
Belgium revised*								99%	
Bulgaria	93%	96%	-3%	87%	85%	2%	97%	104%	-8%
Czech Republic	95%	97%	-2%	97%	96%	2%	101%	103%	-2%
Denmark	99%	100%	-1%	129%	127%	3%	94%	101%	-7%
Denmark revised*								96%	-1%
Germany	102%	102%	0%	101%	99%	2%	111%	109%	2%
Germany revised*		101%	1%					108%	3%
Estonia	63%	38%	25%	109%	108%	1%	103%	102%	1%
Estonia revised**		67%	-3%						
Ireland	101%	102%	-1%	89%	85%	4%	100%	97%	3%
Spain	98%	93%	5%	68%	68%	0%	93%	92%	0%
France	99%	93%	6%	108%	107%	1%	101%	103%	-2%
France revised**		98%	1%						
Italy	94%	95%	-1%	88%	89%	-2%	95%	94%	1%
Cyprus			0%			0%			0%
Latvia	99%	96%	3%	86%	69%	18%	99%	99%	0%
Lithuania	94%	98%	-3%	116%	117%	-1%	82%	81%	0%
Luxembourg	105%	100%	5%	89%	84%	5%	85%	85%	0%
Netherlands	98%	96%	2%	99%	81%	19%	102%	102%	0%
Netherlands revised**					100%	-1%			
Austria	102%	97%	6%	101%	111%	-10%	94%	95%	0%
Austria revised*,**		102%	0%		93%	8%			
Portugal	98%	112%	-14%	93%	91%	2%	96%	96%	0%
Romania	98%	95%	3%	74%	72%	2%	96%	92%	4%
Slovenia	94%	88%	6%	96%	83%	13%	97%	107%	-9%
Finland	96%	89%	6%	106%	98%	8%	93%	95%	-1%
Finland revised***					108%	-2%			
Sweden	99%	94%	4%	104%	104%	1%	94%	95%	-1%
United Kingdom	98%	98%	1%	94%	96%	-2%	99%	99%	0%

Note: * Countries submitted new monthly data for 2012 to Eurostat in the year 2014.

** Annual Eurostat data was used instead of monthly Eurostat data for the year 2012.

*** Trend changes in TJ were used instead of trend changes in kt.

Due to the revision of Eurostat monthly 2012 data the trend changes could be improved and correlate more closely with early national statistics for some countries. As no detailed data was available to analyse large differences for Bulgaria, Latvia,

Portugal and Slovenia, no corrections were applied and original Eurostat monthly data was used for calculating early CO_2 estimates for the year 2013.

4.1.4 Corrections applied to Eurostat monthly data 2012 and 2013

For **Ireland peat consumption** data are missing in the Eurostat monthly database for the year 2013 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 70 % of the total peat consumption. This ratio was derived from annual data of past years (2008-2012) for which 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 for hard coal instead of the reported monthly hard coal consumption data. It was assumed that this consumption represents about 80 % of the total hard coal consumption. This ratio was derived from previous data (2008-2012) for which hard coal consumption is available in annual data.

4.2 Results for 2013

The following steps were taken to calculate early CO_2 emissions for 2013:

1. Calculation of trend changes of the fuel consumption for the aggregated fuel categories (liquid, solid and natural gas) from monthly Eurostat data 2012 and 2013;
2. Calculation of CO_2 emissions for the three fuel categories by multiplying the trend changes with the CO_2 emissions of the CRF inventory figures of the Reference Approach for the year 2012 (as available in April 2014).

Table 4-4 and Table 4-5 show the calculation of the early CO_2 emissions according to the different steps.

Table 4-4 Calculation of trend changes for the aggregated fuel categories, 2013/2012

Member States	Monthly Eurostat data for liquid fuel consumption		Trend change liquids	Monthly Eurostat data for solid fuel consumption		Trend change solids	Monthly Eurostat data for natural gas fuel consumption		Trend change natural gas
	2012	2013	2013/2012	2012	2013	2013/2012	2012	2013	2013/2012
	kt		%	kt		%	TJ NCV		%
Belgium***	21,866	21,984	101%	4,032	3,994	99%	601,476	594,578	99%
Bulgaria	3,673	3,509	96%	35,683	30,409	85%	92,539	96,513	104%
Czech Republic	8,227	8,013	97%	49,001	46,801	96%	281,038	289,558	103%
Denmark***	6,507	6,487	100%	4,331	5,485	127%	145,709	139,353	96%
Germany***	97,499	98,874	101%	239,616	237,599	99%	2,838,489	3,075,491	108%
Estonia**	466	310	67%	19,146	20,649	108%	22,835	23,233	102%
Ireland****	5,750	5,891	102%	7,096	6,032	85%	173,475	168,227	97%
Greece	11,978	11,181	93%	60,978	53,193	87%	153,502	135,392	88%
Spain	49,504	46,235	93%	29,881	20,420	68%	1,182,644	1,092,011	92%
France**	73,432	72,122	98%	18,795	20,052	107%	1,523,371	1,570,531	103%
Croatia	3,158	3,083	98%	1,073	1,146	107%	91,488	87,207	95%
Italy	56,387	53,510	95%	24,345	21,783	89%	2,569,179	2,402,257	94%
Cyprus	2,128	1,816	85%	NE	NE	NE	NO	NO	NO
Latvia	1,147	1,101	96%	192	132	69%	50,716	50,200	99%
Lithuania	2,242	2,193	98%	437	513	117%	111,118	90,554	81%
Luxembourg	2,437	2,446	100%	90	76	84%	43,857	37,259	85%
Hungary	5,708	5,787	101%	11,100	10,796	97%	358,854	320,365	89%
Malta***	765	713	93%	NO	NO	NO	NO	NO	NO
Netherlands*	28,973	27,926	96%	12,861	12,890	100%	1,367,723	1,394,339	102%
Austria*	12,039	12,262	102%	4,803	4,449	93%	307,210	290,772	95%
Poland***	23,326	21,781	93%	134,291	137,563	102%	569,380	574,372	101%
Portugal***	9,457	10,569	112%	4,874	4,450	91%	168,559	162,206	96%
Romania	8,519	8,094	95%	35,757	25,754	72%	465,882	430,846	92%
Slovenia	2,465	2,169	88%	4,882	4,045	83%	27,091	28,954	107%
Slovakia	3,062	2,977	97%	7,029	6,657	95%	225,478	203,223	90%
Finland	8,046	7,196	89%	11,593	11,337	98%	125,385	118,526	95%
Sweden	12,261	11,558	94%	3,131	3,252	104%	42,098	40,068	95%
United Kingdom	67,485	65,912	98%	63,554	61,027	96%	2,773,037	2,747,482	99%
EU 15	463,622	454,153	98%	489,980	466,038	95%	14,015,713	13,968,491	100%
EU 13	64,886	61,546	95%	298,591	284,465	95%	2,296,418	2,195,025	96%
EU 28	528,508	515,699	98%	788,571	750,503	95%	16,312,131	16,163,517	99%

Note: * Trend change corrected for hard coal by using annual data;

** Trend change corrected for liquid by using annual data, NO is used if there is no consumption, NE is used if the cumulated monthly data is incomplete.

*** Revised monthly Eurostat data as available in April 2014 has been used (in grey)

**** Lignite consumption is not included in total solid fuel consumption in Ireland due to a error, 8 kt in 2012

For Malta data on international bunkers for monthly Residual fuel oil data has been corrected by gap filling one month

Table 4-5 Calculation of early CO_2 emissions for the year 2013

Member States	CRF Inventory data CO2 emissions from liquid fuels (submission 2014)	Trend change liquids	CO2 emissions liquid fuels calculated with monthly Eurostat data	CRF Inventory data CO2 emissions from solid fuels (submission 2014)	Trend change solids	CO2 emissions solid fuels calculated with monthly Eurostat data	CRF Inventory data CO2 emissions from natural gas (submission 2014)	Trend change natural gas	CO2 emissions natural gas calculated with monthly Eurostat data	Total CO2 emissions calculated with monthly Eurostat data
	2012	2013/2012	2013	2012	2013/2012	2013	2012	2013/2012	2013	2013
	kt CO2	%	kt CO2	kt CO2	%	kt CO2	kt CO2	%	kt CO2	kt CO2
Belgium	42,836	101%	43,067	11,332	99%	11,225	33,463	99%	33,080	87,372
Bulgaria	10,988	96%	10,497	30,023	85%	25,585	5,261	104%	5,487	41,570
Czech Republic	20,763	97%	20,223	62,843	96%	60,022	15,773	103%	16,252	96,497
Denmark	18,277	100%	18,221	11,192	127%	14,174	8,184	96%	7,827	40,222
Germany	260,892	101%	264,571	319,703	99%	317,012	164,599	108%	178,342	759,926
Estonia**	1,290	67%	858	15,034	108%	16,214	1,197	102%	1,218	18,291
Ireland	16,333	102%	16,734	9,589	85%	8,136	9,579	97%	9,289	34,160
Greece	35,264	93%	32,918	42,201	87%	36,813	7,803	88%	6,882	76,614
Spain	131,520	93%	122,835	58,923	68%	40,267	66,009	92%	60,950	224,052
France*	207,725	98%	204,019	47,291	107%	50,453	88,528	103%	91,269	345,741
Croatia	9,406	98%	9,183	2,454	107%	2,621	4,639	95%	4,422	16,226
Italy	158,892	95%	150,785	61,446	89%	54,980	145,171	94%	135,739	341,503
Cyprus	6,499	85%	5,546	1	-	-	NA,NO	-	-	5,546
Latvia	3,528	96%	3,387	354	69%	243	2,803	99%	2,774	6,404
Lithuania	6,890	98%	6,740	943	117%	1,107	3,647	81%	2,972	10,819
Luxembourg	7,417	100%	7,445	184	84%	155	2,499	85%	2,123	9,723
Hungary***	12,933	101%	13,112	11,084	90%	9,979	18,623	89%	16,626	39,717
Malta	2,701	93%	2,518	NA,NE,NO	-	-	IE,NO	-	-	2,518
Netherlands*	54,206	96%	52,247	32,284	100%	32,357	75,957	102%	77,435	162,039
Austria*	30,616	102%	31,184	12,768	93%	11,827	17,198	95%	16,278	59,289
Poland	62,855	93%	58,692	199,325	102%	204,182	27,108	101%	27,345	290,219
Portugal	25,041	112%	27,985	11,008	91%	10,050	9,232	96%	8,884	46,919
Romania	21,459	95%	20,388	28,500	72%	20,527	24,334	92%	22,504	63,419
Slovenia	7,285	88%	6,410	5,836	83%	4,836	1,625	107%	1,736	12,982
Slovakia	7,432	97%	7,226	10,181	95%	9,642	9,598	90%	8,650	25,518
Finland***	20,982	89%	18,765	16,975	108%	18,295	6,419	95%	6,068	43,129
Sweden	30,139	94%	28,411	5,820	104%	6,045	2,159	95%	2,055	36,511
United Kingdom	162,268	98%	158,485	147,715	96%	141,841	156,036	99%	154,598	454,924
EU 15	**1,202,408**		**1,177,670**	**788,432**		**753,632**	**792,837**		**790,820**	**2,722,122**
EU 13	**174,031**		**164,780**	**366,579**		**354,959**	**114,606**		**109,986**	**629,725**
EU 28	**1,376,439**		**1,342,451**	**1,155,011**		**1,108,591**	**907,444**		**900,806**	**3,351,848**

Note: * Trend change corrected for hard coal by using annual data;

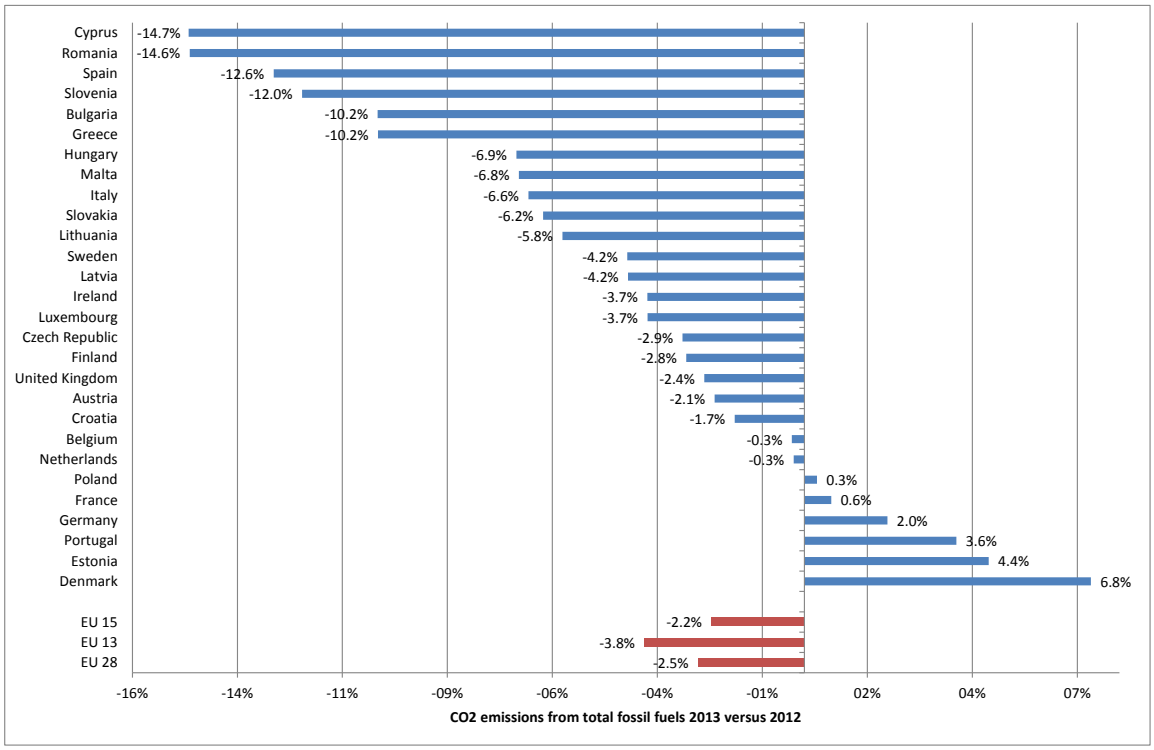
** Trend change corrected for liquid by using annual data;

*** Trend changes for solid fuels have been calculated in energy units;

Further issues: Irish monthly; data on solids (coal and peat) could not be used for confidentiality reasons; Poland provided new estimates for 2012 on the 27th May 2014, this would change the early estimates from 290,219 kt published in the press release (7th May 2014) to 296,412 kt.

Table 4-5 shows the results for early CO_2 estimates for the year 2013 based on the methodological approach described in section 2.1. 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 2013 (see Figure 4-1).

Figure 4-1 Relative changes in total fossil fuel consumption for all 28 EU-Member states for 2013/2012



The early estimates indicate that EU CO_2 emissions from the energy sector decreased by 2.5 % for the EU-28 and by 2.2 % for the EU-15 between 2012 and 2013. However, for EU-13 the early CO_2 estimates indicate a stronger decrease of 3.9 % in 2013 compared to 2012.

A short explanation of the significant decreases or increases in emissions in 2013 for certain countries is provided below:

Relevant countries with emission decreases above 10 %:

- Bulgaria: The decrease of CO_2 emissions by -10 % is due to a strong decrease in hard coal and lignite consumption which is related to a lower electricity production and higher electricity imports in 2013 compared to 2012.

- Spain: The decrease of CO_2 emissions by -13 % is due to a strong decrease in coal consumption. Coal use for electricity production was replaced by hydro power and wind power in Spain. 2013 was a year with high rainfalls and therefore high hydro electricity production whereas 2012 was a particularly dry year in Spain.

- Greece: CO_2 emissions decrease here due to a lower use of solid fuels (-13 %), natural gas (-12 %) and liquid fuels (-7 %). This reflects lower use of coal for electricity production and is related to ongoing effects of the economic crisis.

- Romania: CO_2 emissions mainly decrease here because of a large reduction of the use of solid fuels (-28 %).

- Slovenia: CO_2 emissions fall in this case due to a lower use of solid (-17 %) and liquid fuels (-12 %).

Countries with increasing emissions:

- Denmark: emissions increased by 7 % due to increased use of solid fuels (by 27 %) for electricity production. Denmark imported less electricity from the Nordic electricity market while exports remained on a similar level to the years before.

- Emissions in Germany increased by 2 %, which is mainly due to a higher consumption of natural gas resulting from a cold winter in the beginning of 2013.

Table 8-4 in the Annex provides a comparison of the annual trend changes for the period 2008–2013 for the different data sources (cumulated Eurostat fuel consumption data, annual Eurostat fuel consumption data and inventory (CRF) fuel consumption data).

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

5.1 Results of comparisons between early CO_2 estimates for the years 2009 to 2012 with final inventory data

Table 5-2 provides a comparison of early CO_2 emission estimates based on monthly Eurostat data calculated for the years 2009, 2010, 2011 and 2012 with the final inventory data (CRF table 1.A.(b)) for the same year. This is a comparison of our estimates against the published authoritative CO_2 emissions reports.

The results for the years 2009 – 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 monthly Eurostat data in order to produce reliable early CO_2 estimates.

This comparison shows that in 2009 and 2010 at the EU level, the differences of the early CO_2 estimates were less than 2 %; however for 2011 the closeness of the early CO_2 emission estimates to the final inventory estimates decreased, in particular for the new Member States. For EU-27, the early CO_2 emission estimates were 2.3% higher than the final CO_2 emissions; for EU-15, the early CO_2 estimates were 1.4% higher; and for EU-12, the early estimates were 6.1 % higher. In 2012 the differences at EU-27 were the lowest for the whole time series, making up only 0.3%.

Table 5-1 Overview of closeness of early CO_2 estimates to final inventory emissions

	2009	**2010**	**2011**	**2012**
Difference to final inventory ≤ ±2%	9 MS	12 MS	10 MS	15 MS
Contribution of MS' emissions in total EU-27 emissions	43 %	76%	60%	55%
Difference to final inventory ± >2 and ≤ 5%,	12 MS	6 MS	6 MS	8 MS
Contribution of MS' emissions in total EU-27 emissions	54%	14%	19%	40%
Difference to final inventory > ± 5%	5 MS	8 MS	11 MS	4 MS
Contribution of MS' emissions in total EU-27 emissions	4 %	10 %	21%	5%

Source: Authors' own compilation

Note: This comparison takes into account the resubmission of inventory data from Poland from 27th May 2014

Table 5-1 also shows that the closeness of the early estimates to the final inventory emissions increased again for 2012 compared to the year before. For 15 Member States the differences are less or equal to 2% (9 MS in 2009, 12 MS in 2010 and only 10 MS in 2011), for 8 MS the differences were between 2 % and 5 % (12 MS in 2009, 6 MS in 2010 and 6 MS in 2011) and for only 4 MS the difference was larger than 5 % (5 MS in 2009, 8 MS in 2010 and 11 MS in 2011). The contribution of the Member States with differences lower than 2 % of the total EU-27 decreased to 55 % in 2012, as the differences for countries with high emissions like Germany and France were above 2 % (see Table 5-2). On the other hand, the differences greater than 5 % represent only 5 % of the total EU-27 emissions in 2012.

With regard to absolute differences in 2012, Germany showed the greatest absolute difference (early CO_2 estimates 17,129 kt reduction), followed by France (early estimates 11,249 kt reduction) and the United Kingdom (early estimates 5,511 kt increase).

It should be noted that the countries with large differences between early estimates and final inventory estimates change almost every year. Slovakia is the only Member State with high percentage differences for all 4 years. Spain and Italy show small differences ≤ ± 2% for all 4 years.

Table 5-2 Comparison of early CO_2 emission estimates with final inventory CO_2 emissions (CRF table 1A(b)) for 2009, 2010, 2011 and 2012 based on original monthly Eurostat data (except 2012), without taking into account recalculations

	2009			2010			2011			2012		
Member States	Early CO2 estimates	CRF Table 1.A(b)	Differences	Early CO2 estimates	CRF Table 1.A(b)		Early CO2 estimates	CRF Table 1.A(b)	Differences relative	Early CO2 estimates	CRF Table 1.A(b)	Differences relative
Belgium	104,751	103,066	1.6%	94,439	108,947	-13.3%	115,824	97,472	18.8%	85,939	87,632	-1.9%
Bulgaria	45,849	44,316	3.5%	43,690	46,076	-5.2%	53,729	51,410	4.5%	47,881	46,272	3.5%
Czech Republic	111,782	109,121	2.4%	108,395	107,046	1.3%	108,341	105,131	3.1%	99,646	99,380	0.3%
Denmark	47,713	46,416	2.8%	48,388	47,871	1.1%	41,524	42,961	-3.3%	38,908	37,653	3.3%
Germany	702,937	718,483	-2.2%	730,458	741,056	-1.4%	717,735	721,656	-0.5%	728,065	745,194	-2.3%
Estonia	15,357	14,197	8.2%	16,482	18,284	-9.9%	18,997	18,688	1.7%	18,590	17,521	6.1%
Ireland	47,062	40,581	16.0%	38,934	39,717	-2.0%	43,308	36,605	18.3%	36,132	35,502	1.8%
Greece	97,827	98,264	-0.4%	86,594	90,068	-3.9%	90,567	90,358	0.2%	90,189	85,268	5.8%
Spain	285,657	280,163	2.0%	258,617	258,663	0.0%	263,494	261,523	0.8%	257,760	256,452	0.5%
France	348,520	342,671	1.7%	350,181	356,999	-1.9%	347,897	335,009	3.8%	332,295	343,544	-3.3%
Italy	395,929	394,764	0.3%	399,296	394,577	1.2%	388,255	385,365	0.7%	365,688	365,509	0.0%
Cyprus	7,759	7,387	5.0%	7,229	7,161	1.0%	6,845	6,919	-1.1%	6,332	6,500	-2.6%
Latvia	6,805	6,570	3.6%	6,902	7,159	-3.6%	7,027	6,563	7.1%	6,376	6,685	-4.6%
Lithuania	11,855	12,355	-4.0%	13,329	12,283	8.5%	12,256	11,387	7.6%	11,577	11,480	0.8%
Luxembourg	10,160	10,394	-2.3%	11,326	10,432	8.6%	9,506	10,452	-9.1%	10,272	10,100	1.7%
Hungary	48,842	47,360	3.1%	44,919	46,170	-2.7%	48,392	44,880	7.8%	43,175	42,640	1.3%
Malta	NE	2,582	-	NE	2,479	-	2,297	2,558	-10.2%	2,720	2,701	0.7%
Netherlands	162,529	163,779	-0.8%	175,732	175,836	-0.1%	175,920	162,796	8.1%	157,115	162,447	-3.3%
Austria	63,912	62,690	1.9%	68,913	67,585	2.0%	65,024	64,338	1.1%	61,354	60,583	1.3%
Poland	300,954	294,833	2.1%	298,604	314,134	-4.9%	338,556	312,645	8.3%	296,580	295,158	0.5%
Portugal	51,850	52,981	-2.1%	45,394	46,756	-2.9%	51,250	46,217	10.9%	44,388	45,280	-2.0%
Romania	86,165	83,805	2.8%	86,847	74,663	16.3%	81,371	78,506	3.6%	74,954	74,292	0.9%
Slovenia	15,351	15,200	1.0%	15,641	15,268	2.4%	15,007	15,365	-2.3%	14,979	14,746	1.6%
Slovakia	35,790	32,438	10.3%	30,274	33,577	-9.8%	36,099	32,897	9.7%	30,758	27,211	13.0%
Finland	51,542	51,759	-0.4%	58,750	59,292	-0.9%	53,327	53,248	0.1%	46,970	44,376	5.8%
Sweden	36,320	40,973	-11.4%	53,295	43,959	21.2%	40,530	41,134	-1.5%	36,974	38,118	-3.0%
United Kingdom	484,762	472,285	2.6%	484,797	490,598	-1.2%	446,687	453,785	-1.6%	471,530	466,019	1.2%
EU 15	**2,180,569**	**2,135,835**	**2.1%**	**2,134,045**	**2,168,590**	**-1.6%**	**2,165,121**	**2,095,220**	**3.3%**	**2,049,007**	**2,045,893**	**0.2%**
EU 12	**1,397,409**	**1,413,597**	**-1.1%**	**1,443,380**	**1,448,067**	**-0.3%**	**1,414,644**	**1,394,648**	**1.4%**	**1,368,139**	**1,382,371**	**-1.0%**
EU 27	**3,577,978**	**3,486,742**	**2.6%**	**3,577,425**	**3,549,072**	**0.8%**	**3,579,765**	**3,489,868**	**2.6%**	**3,417,145**	**3,428,264**	**-0.3%**

Note: Green: difference ≤ ± 2%, Yellow: difference ± >2 and ≤ 5%, Red: difference > ± 5%

EU 12 and EU 27 totals in 2009 and 2010 are without the results for Malta due to data gaps for Malta in Eurostat data. For calculating early estimates 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.

5.2 Impact of inventory recalculations

In each year, the Member States perform recalculations of CRF 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 CRF data 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. Therefore, this section analyses the changes that were triggered by inventory recalculations for CO_2 emissions in the energy sector as reported in the 2014 inventory submissions for the reference year 2012. The recalculations may in some cases contribute to the large differences between the Member States' CRF data and early CO_2 estimates based on monthly Eurostat data.

Member States have to submit their national inventory for the year T-2 to the UNFCCC by 15th April. Should they discover inconsistencies within their inventory, they can revise the data and provide the UNFCCC with resubmissions by 27th May. As the early CO_2 estimates are calculated based on the data provided to the UNFCCC on 15th April, the new data cannot be taken into account for the early CO_2 estimates, but will be considered as recalculations when analysing the quality of the early CO_2 estimates in the next year. After 27th May additional recalculations can occur, triggered by the UNFCCC inventory review, which are then reflected in the inventory submission of the subsequent year after the review.

For calculating early CO_2 emissions for the year 2013, the inventory data is used that is published on 15th April 2014 on the UNFCCC websites for the year 2012. This inventory data includes new CO_2 estimates for the year 2012, but also CO_2 estimates for all years from 1990 onwards. If new activity data has become available or methodological changes have been applied, the CO_2 estimates of all previous years have been recalculated. For calculating the 2012 early estimates the inventory data for the year 2011 (as available on 15th April 2013) has been used. Some countries recalculated the year 2011 and provided new CO_2 estimates for 2011 within the new inventory submission in 2014. The following table provides a comparison of the inventory data for the year 2011 as available in April 2013 and available in April 2014.

All Member States recalculated the CO_2 emissions from the reference approach for the year 2011. Most recalculations performed are below 1% as shown in Table 5-3, but they could add up to more than 1% of the total CO_2 emissions, as shown in Table 5-4. As the impact of the recalculations are not related to the accuracy of the methodology or the quality of the monthly Eurostat data and cannot be predicted in advance, it can only be analysed whether this method produces reliable results, if the impacts of the recalculation are known.

Table 5-3 CO_2 estimates for the year 2011 by comparing the original inventory data (2013 submission) and the recalculated data (2014 submission)

Member States	CO2 emissions from liquid fuel consumption		Difference	CO2 emissions from solid fuel consumption		Difference	CO2 emissions from natural gas consumption		Difference
	2013 submission	Recalculations 2014 submission		2013 submission	Recalculations 2014 submission	2013/2012	2013 submission	Recalculations 2014 submission	
	2011			2011			2011		
	Gg CO2		%	Gg CO2		%	Gg CO2		%
Belgium	49,852	45,471	9.6%	12,290	13,161	-6.6%	35,330	34,936	1.1%
Bulgaria	10,475	10,413	0.6%	34,970	34,914	0.2%	5,964	5,532	7.8%
Czech Republic	21,367	21,363	0.0%	68,179	68,179	0.0%	15,584	15,665	-0.5%
Denmark	19,981	19,230	3.9%	14,249	14,242	0.0%	8,731	8,711	0.2%
Germany	264,483	256,329	3.2%	305,995	305,758	0.1%	151,177	162,092	-6.7%
Estonia	1,357	1,333	1.8%	16,164	16,209	-0.3%	1,168	-	-
Ireland	18,433	18,486	-0.3%	8,321	-	-	9,851	9,853	0.0%
Greece	40,827	40,452	0.9%	41,061	-	-	8,470	8,428	0.5%
Spain	145,300	145,170	0.1%	48,113	47,788	0.7%	68,110	67,924	0.3%
France	210,763	209,876	0.4%	42,490	42,739	-0.6%	81,757	-	-
Italy	173,890	173,980	-0.1%	60,831	-	-	150,644	150,635	0.0%
Cyprus	6,885	6,887	0.0%	34	30	11.9%	NA,NO	NA,NO	NA,NO
Latvia	3,144	3,590	-12.4%	421	427	-1.4%	2,998	2,986	0.4%
Lithuania	6,548	6,611	-1.0%	968	962	0.6%	3,871	-	-
Luxembourg	7,798	7,651	1.9%	191	-	-	2,463	-	-
Hungary	14,251	13,477	5.7%	9,363	11,314	-17.2%	21,266	21,167	0.5%
Malta	2,558	-	-	NA,NE,NO	NA,NE,NO	NA,NE,NO	IE,NO	IE,NO	IE,NO
Netherlands	54,221	-	-	29,286	-	-	79,288	-	-
Austria	32,520	31,453	3.4%	13,649	13,781	-1.0%	18,169	18,059	0.6%
Poland	64,413	62,300	3.4%	222,216	222,132	0.0%	25,760	25,760	0.0%
Portugal	27,326	27,089	0.9%	8,393	-	-	10,499	10,477	0.2%
Romania	22,701	22,047	3.0%	30,819	29,776	3.5%	24,986	-	-
Slovenia	7,457	7,437	0.3%	6,222	6,118	1.7%	1,687	-	-
Slovakia	7,631	7,711	-1.0%	14,849	11,549	28.6%	10,416	10,122	2.9%
Finland	24,027	23,871	0.7%	21,972	21,972	0.0%	7,249	-	-
Sweden	32,294	33,327	-3.1%	6,330	-	-	2,510	-	-
United Kingdom	173,318	164,744	5.2%	115,535	115,776	-0.2%	164,932	164,938	0.0%

Note: Green: difference ≤ ± 2%, Yellow: difference ± >2 and ≤ 5%, Red: difference > ± 5%, For Poland the resubmission of the inventory data on 27th May 2014 was used to compare the results of the 2012 estimates.

If the calculated trend changes for monthly Eurostat data were multiplied with the recalculated CO_2 emissions (as available in 2014), the differences in the results would indicate whether the monthly Eurostat data is correct. Thus Table 5-4 shows the differences that appear due to the recalculations of the CO_2 emissions for the year 2011 (as available in April 2014) and the real differences that are due to discrepancies in the monthly Eurostat data that affect the trend change.

Table 5-4 Impact of inventory recalculations for uncertainties of early estimates of CO_2 estimates

Member States	Total CO2 emissions CRF Table 1.A(b)		Trend change	2011 (2013 submission) CO2 emissions CRF Table 1.A(b) as available on 15th of April 2013	Early CO2 estimates 2012	Trend change	Comparison of results and impacts of recalculations			
	2011 (2014 submission) as available on 27th of May 2014	2012 (2014 submission) as available on 27th of May 2014	2012/2011			2012/2011	Difference Early estimates /CRF	Impact of recalculations	Differences Early estimates/CRF without impact of reclaculations	Improvements
	A	B	C	D	E	F	E/B=G	A/D=H	G+H or C-F	
	Gg CO2		%	Gg CO2		%	%	%	%	
Belgium	93,568	87,632	-6.3%	97,472	85,939	-11.8%	-1.9%	-4.0%	-5.9%	-
Bulgaria	50,859	46,272	-9.0%	51,410	47,881	-6.9%	3.5%	-1.1%	2.4%	+
Czech Republic	105,207	99,380	-5.5%	105,131	99,646	-5.2%	0.3%	0.1%	0.3%	0
Denmark	42,183	37,653	-10.7%	42,961	38,908	-9.4%	3.3%	-1.8%	1.5%	+
Germany	724,179	745,194	2.9%	721,656	728,065	0.9%	-2.3%	0.3%	-1.9%	+
Estonia	18,709	17,521	-6.3%	18,688	18,590	-0.5%	6.1%	0.1%	6.2%	-
Ireland	36,661	35,502	-3.2%	36,605	36,132	-1.3%	1.8%	0.2%	1.9%	-
Greece	89,941	85,268	-5.2%	90,358	90,189	-0.2%	5.8%	-0.5%	5.3%	+
Spain	260,882	256,452	-1.7%	261,523	257,760	-1.4%	0.5%	-0.2%	0.3%	+
France	338,405	343,544	1.5%	335,009	332,295	-0.8%	-3.3%	1.0%	-2.3%	+
Italy	385,446	365,509	-5.2%	385,365	365,688	-5.1%	0.0%	0.0%	0.1%	-
Cyprus	6,917	6,500	0	6,919	6,332	-8.5%	-2.6%	0.0%	-2.6%	0
Latvia	7,003	6,685	-4.5%	6,563	6,376	-2.8%	-4.6%	6.7%	2.1%	+
Lithuania	11,445	11,480	0.3%	11,387	11,577	1.7%	0.8%	0.5%	1.3%	-
Luxembourg	10,304	10,100	-2.0%	10,452	10,272	-1.7%	1.7%	-1.4%	0.3%	+
Hungary	45,958	42,640	-7.2%	44,880	43,175	-3.8%	1.3%	2.4%	3.7%	-
Malta	2,558	2,701	0	2,558	2,720	6.3%	0.7%	0.0%	0.7%	0
Netherlands	162,796	162,447	-0.2%	162,796	157,115	-3.5%	-3.3%	0.0%	-3.3%	0
Austria	63,292	60,583	-4.3%	64,338	61,354	-4.6%	1.3%	-1.6%	-0.4%	+
Poland	310,191	295,158	-4.8%	312,253	296,580	-5.0%	0.5%	-0.7%	-0.2%	+
Portugal	45,958	45,280	-1.5%	46,217	44,388	-4.0%	-2.0%	-0.6%	-2.5%	-
Romania	76,809	74,292	-3.3%	78,506	74,954	-4.5%	0.9%	-2.2%	-1.3%	-
Slovenia	15,241	14,746	-3.2%	15,365	14,979	-2.5%	1.6%	-0.8%	0.8%	+
Slovakia	29,382	27,211	-7.4%	32,897	30,758	-6.5%	13.0%	-10.7%	2.3%	+
Finland	53,092	44,376	-16.4%	53,248	46,970	-11.8%	5.8%	-0.3%	5.6%	+
Sweden	42,167	38,118	-9.6%	41,134	36,974	-10.1%	-3.0%	2.5%	-0.5%	+
United Kingdom	445,459	466,019	4.6%	453,785	471,530	3.9%	1.2%	-1.8%	-0.7%	+

Note: Green: difference ≤ ± 2%, Yellow: difference ± >2 and ≤ 5%, Red: difference > ± 5%, For Poland the resubmission of the inventory data on 27th May 2014 was used to compare the results of the 2012 estimates.

In the 2014 submissions, all Member States reported recalculations of CO_2 emissions from fuel combustion for the year 2011. The following applies:

- When inventory recalculations for CO_2 emissions are taken into account, the comparability of early CO_2 estimates with CRF data improves for 15 Member States (AT, BG,CY, DE, DK, ES, FI, FR, EL, LU, LV, PL, SE, SI, SK and UK).
- For 8 Member States (BE, EE, HU, IE, IT, LT, PT and RO), the results of the early CO_2 estimates do not match as well when inventory recalculations are taken into account.

The large differences for Slovakia of more than 10% can be explained by the recalculations which took place. Thus, Slovakia reported consistently incorrect natural gas consumption, which does not influence the trend change.

5.3 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 CRF data for the year 2012 for those Member States for which the comparison with inventory data showed differences exceeding ±5%.

For this purpose Table 8-4 in the Annex presents a comparison of the annual trend changes derived for different fuel types from the fuel consumption data for the Eurostat monthly data, the Eurostat annual data and the data reported in Member States GHG inventories (CRF).

After taking into account the impact of recalculations of the CRF inventory tables for the year 2011, only Belgium, Estonia and Greece show differences between early CO_2 emission estimates and Member States' CRF data of more than 5%.

5.3.1 Belgium

- For Belgium the early CO_2 estimate for 2012 was 5.9 pp higher than the final CRF inventory CO_2 emissions. This difference can mainly be explained by the large differences in natural gas consumption in 2012.

Table 5-5 Differences between cumulated fuel consumption in monthly data and CRF data for Belgium for the years 2008–2012

		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	%
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				3,994				594,578			

- Table 5-5 shows that there were large differences between monthly Eurostat data for liquid fuels, solid fuels and in particular for gaseous fuels for the year 2012. As the reporting of monthly natural gas data was not consistent with the CRF natural gas data for all 4 years, the differences in trend change are not as high as the differences in the absolute data (Table 5-6).

Table 5-6 Annual trend changes for consumption in aggregated fuel categories for Belgium for the years 2008–2013 based on monthly Eurostat data, annual Eurostat data and CRF data

		Liquid fuels			Solid fuels			Gaseous fuels		
Member States		Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF
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%	112%	150%	100%	99%	69%	95%	94%
	2013/2012	101%			99%			180%		

Note: To calculate the trend changes for the CRF the inventory submission of the year x-2 is used for both years (for trend change 2012/2011, inventory submissions 2014 are used and the year 2012 and 2011 - instead of the year 2011 from the 2013 inventory submission and the year 2012 from the 2014 inventory submission)

Belgium provided Eurostat with updated monthly data for the year 2012 (see Table 8-13 in the Annex). Thus, the strong inconsistency of the 2012 natural gas value will not affect the calculation of CO_2 estimates in 2013.

5.3.2 Estonia

- For Estonia the early CO_2 estimate for 2012 was 6.2 % lower than the final inventory CO_2 (=CRF) emissions.

Table 5-7 Differences between cumulated fuel consumption in monthly data fuel consumption and CRF data for Estonia for the years 2008–2012

		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	%
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	17,822	1,324	7%		22,835	22,109	726	3%
	2013	310					20,649					23,233			

- Table 5-7 shows that there were large differences between monthly Eurostat and CRF data for liquid fuels for all 4 years, while there are large differences for solid fuels, in particular in the year 2012 and 2009. The differences for natural gas consumption in the last two years were below 5%, but in 2011 the difference was positive and in 2012 negative. The differences in solid fuels and natural gas consumption resulted in a significantly different trend change 2012/2011 between Eurostat monthly data and CRF data for solid fuels (6 pp difference) and natural gas (7 pp difference) (Table 5-8). Annual and monthly liquid fuel consumption shows the largest discrepancies of more than 100% in recent years. Nevertheless, as liquid fuel consumption is consistently overreported in monthly Eurostat data the trend change is rather consistent. Also liquid fuel consumption is very low compared to solid fuel consumption and constitutes only 7 % of the total CO_2 emissions in the year 2012. Thus, the influence of liquid fuel consumption in general is very small.

Table 5-8 Annual trend changes for consumption of aggregate fuel categories for Estonia for the years 2008–2012 based on monthly Eurostat data, annual Eurostat data and CRF data

Member States		Liquid fuels			Solid fuels			Gaseous fuels		
		Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF
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%	96%	100%	94%	94%	111%	108%	104%
	2013/2012	38%			108%			102%		

Note: To calculate the trend changes for the CRF, the inventory submission of the year x-2 is used for both years (for trend change 2012/2011 inventory submissions 2014 is used and the year 2012 and 2011 - instead of the year 2011 from the 2013 inventory submission and the year 2012 from the 2014 inventory submission).

5.3.3 Greece

- For Greece the early CO_2 estimate for 2012 was 5.3 % higher than the final inventory (= CRF data) CO_2 emissions.

Table 5-9 Differences between cumulated fuel consumption in monthly data and CRF data for Greece for the years 2008–2012

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	%
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				53,193				135,392			

- Table 5-9 shows that in 2012 the data quality improved in the case of liquid and solid fuel 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 2012/2011 (Table 5-10) are inconsistent with the CRF trend changes for liquid fuels (difference 8 pp) and for solid fuels (Difference 4 pp).

Table 5-10 Annual trend changes for consumption of aggregate fuel categories for Greece for the years 2008–2012 based on monthly Eurostat data, annual Eurostat data and CRF data

Member States		Liquid fuels			Solid fuels			Gaseous fuels		
		Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF	Eurostat Monthly	Eurostat annual	CRF
Greece	2009/2008	96%	96%	99%	98%	101%	100%	85%	85%	82%
	2010/2009	92%	89%	87%	81%	89%	89%	109%	109%	108%
	2011/2010	85%	88%	93%	114%	103%	104%	123%	123%	121%
	2012/2011	94%	99%	87%	107%	103%	103%	92%	92%	92%
	2013/2012	93%			87%			88%		

Note: To calculate the trend changes for the CRF the inventory submission of the year x-2 is used for both years (for trend change 2012/2011 inventory submissions 2014 is used and the year 2012 and 2011 - instead of the year 2011 from the 2013 inventory submission and the year 2012 from the 2014 inventory submission).

5.3.4 Slovakia

For Slovakia the early CO_2 estimate for 2012 was 13.0 % higher than the final inventory CO_2 emissions. Taking the impact of recalculations into account improves the results significantly and reduces the differences between the early estimates and the final inventory to only 2.3 % (see Table 5-3 and Table 5-4).

Slovakia recalculated the solid fuel consumption data for the year 2011 and provided slightly different data for liquid fuel consumption and natural gas consumption as well.

This changed the CO_2 emissions of the aggregated fuel categories of Slovakia's GHG inventory for the year 2011, to which the trend changes of the cumulated monthly fuel consumption data was applied to estimate 2012 emissions.

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 3 to 4 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 monthly Eurostat data for the years 2009, 2010, 2011, 2012 and 2013. The trend changes of 2010/2009, 2011/2010, 2012/2011 and 2013/2012 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 2012 and 2013 for a given Member State are compared and a trend change is calculated for each fuel type. The 2013 value is simply divided by the 2012 value. The result is the trend change expressed as a percentage. Then the CRF values (CO_2 emissions in Gg) for the different fuel types of the year 2012 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 2013 in Gg. A year later the estimate can be checked for its closeness to reality by comparing it with the respective CRF values for the reference year 2013.

The methodological approach has been applied consecutively for the five years of 2009, 2010, 2011, 2012 and 2013. Table 5-2 provides a comparison of early CO_2 emission estimates based on monthly Eurostat data calculated for the years of 2009, 2010, 2011 and 2012 with the final inventory data (CRF table 1.A.(b)) for the same year.

Table 6-1 also shows that the closeness of the early estimates to the final inventory emissions decreased for 2011 compared to the years before, but increased again in 2012. For 15 Member States the differences are less than or equal to 2 % (9 MS in 2009 and 12 MS in 2010, 10 MS in 2011); for 8 Member States the differences were between 2 % and 5 % (12 MS in 2009, 6 MS in 2010 and 6 MS in 2011); and for 4 Member States the difference was larger than 5 % (only 5 MS in 2009, 8 MS in 2010 and 11 MS in 2011).

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 data still occur and a further improvement of the quality of monthly fuel consumption data – at least in the form of an evaluation and correction at the end of each reporting year – is necessary.

Table 6-1 Overview of closeness of early CO_2 estimates to final inventory emissions

	2009	2010	2011	2012
Difference to final inventory ≤ ±2%	9 MS	12 MS	10 MS	15 MS
Contribution of MS' emissions in total EU-27 emissions	43 %	76 %	60 %	55 %
Difference to final inventory ± >2 and ≤ 5%,	12 MS	6 MS	6 MS	8 MS
Contribution of MS' emissions in total EU-27 emissions	54 %	14 %	19 %	40 %
Difference to final inventory > ± 5%	5 MS	8 MS	11 MS	4 MS
Contribution of MS' emissions in total EU-27 emissions	4 %	10 %	21 %	5 %

Source: Authors' own compilation

For the calculation in 2013, the monthly 2012 data was corrected for some Member States. Where available, updated monthly Eurostat data available in April 2014 were used to replace old monthly 2012 data, which were available in April 2013. For Austria, France, the Netherlands and Estonia 2012 monthly data were partly replaced with annual 2012 data, as the reporting of monthly 2013 data seem to have improved and correspond more with the reporting of the annual 2012 data.

An analysis of the data quality by comparing annual and monthly Eurostat data for the years 2008–2012 shows that the data quality varies throughout the years for all countries and has not continuously improved over the time series (see analysis in Chapter 3.2).

The analysis of this report shows that in the year 2013 there seems to be an improvement in the monthly data reporting. Nevertheless, as the trend change is affected by changes of the reporting consistency, it does not seem possible to produce reliable results without adapting monthly data for the year 2012. For countries like Hungary and Finland for which the share of consumption between different solid fuels changes, the method used by calculating the trend changes in physical units (kt) instead of energy units (TJ) is not practicable. Thus taken the various corrections of the monthly 2012 Eurostat data the method cannot consistently applied to all 28 EU Member States and produce reliable early CO_2 estimates. Nevertheless, as the correction affected the old 2012 monthly Eurostat data (as available in April 2013) and were applied due to improvements in the reporting of the monthly 2013 data (as available in April 2014), it is a further step towards having a harmonised method. 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.

In the year 2013 data quality seems to have improved considerably, as the comparison with early national statistics shows. However, a detailed analysis can only be carried out when annual Eurostat and CRF data are available for reference year 2013 in spring 2015.

6.2 Priorities by Member State

The three summary tables below list the most significant problems related to completeness, coherence between annual and monthly Eurostat data, coherence between CRF and Eurostat data and the quality of the early CO_2 estimates. These tables analyse the data quality of the year 2012 and the differences in the trend changes between monthly Eurostat data and early national statistics for 2013/2012. In the first column the differences between the early CO_2 estimates and the CRF inventory are presented, without taking into account the impact of recalculations for the year 2012. The next three columns provide the information of whether there is a difference in monthly and annual Eurostat data for the year 2012, annual Eurostat and CRF inventory data for the year 2012 and in the trend changes for 2013/2012 between monthly Eurostat data and the early national statistics of above 5 %. This gives an overview of the problems related to the data quality of the monthly Eurostat data for the year 2012. The last two columns provide an explanation and the required action to solve the problems in the data quality, if needed.

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

	Differences for liquid fuels above 5%					
Member States	Difference in Total CO2 calculation 2012 without recalculations	Monthly vs. Annual Eurostat data 2012	Annual Eurostat vs. CRF inventory data 2012	Trend changes Early national statistics/ monthly Eurostat data 2013/2012	Explanation	Action
		Differences for liquid fuels above 5%				
Belgium	-2%	-	-	**NA**	-	No action required.
Bulgaria	3%	-	-	-	-	No action required.
Czech Republic	0%	-	-	-	-	No action required.
Denmark	3%	**x**	-	-	Large differences due to reporting of international bunkers.	No action required, as the bunkers are reported consistently over the time series with no influence on the trend changes.
Germany	-2%	-	-	-	-	No action required.
Estonia	6%	**x**	-	**x**	Large differences due to reporting of shale oil	Trend changes for calculating 2013 CO2 emissions have been corrected by using annual data. Reporting of shale oil seems to have improved in 2013
Ireland	2%	-	**x**	-	Large differences due to reporting of crude oil imports.	Check again next year.
Greece	6%	**x**	**x**	**NA**	Large differences due to reporting of residual fuel oil.	Eurostat monthly data is more consistent with CRF inventory data. No action required, needs to be checked next year again.
Spain	1%	-	-	-	-	No action required.
France	-3%	**x**	-	**x**	Large differences due to reporting of international bunkers.	Trend changes for calculating 2013 CO2 emissions have been corrected by using annual data for international bunkers. Reporting of international bunkers seems have improved in 2013.
Italy	0%	-	**x**	-	Large differences due to reporting of refinery feedstock stock changes.	Stock changes are reported differently to CRF inventory data for all years. This leads to differences in liquid fuel consumption. Follow-up with IT necessary.
Cyprus	-3%	-	-	**NA**	-	No action required.
Latvia	-5%	**x**	-	-	Differences due to reporting of Gasoline and Gas/Diesel Oil.	Check again next year.
Lithuania	1%	-	**x**	-	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	2%	-	-	-	-	No action required.
Hungary	1%	**x**	**x**	**NA**	Large differences due to reporting of Other oil + bitumen + lubricants	Eurostat monthly data is more consistent with CRF inventory data. No action required, need to be checked next year again.
Malta	1%	**x**	**x**	**NA**	Large differences due to reporting of international bunkers for all liquid fuels between annual and monthly Eurostat data. Differences between CRF and annual Eurostat data due to stock changes for most liquid fuels.	Follow-up with MT necessary.
Netherlands	-3%	-	-	-	-	No action required.
Austria	1%	**x**	-	**x**	Large differences due to reporting of international bunkers and refinery feedstocks.	Updated monthly data for 2012 has been provided by Austria in April 2014. This decreases the differences below 5% for monthly-annual data and trend changes.
Poland	0%	-	-	**NA**	-	No action required.
Portugal	-2%	**x**	-	**x**	Large differences due to reporting of international bunkers.	No action required, as the bunkers are reported consistently over the time series with no influence on the trend changes.
Romania	1%	-	-	-	-	No action required.
Slovenia	2%	-	-	**x**	-	No action required.
Slovakia	13%	**x**	-	**NA**	Differences in the reporting of other oil, bitumen and lubricants.	Check again next year.
Finland	6%	**x**	-	**x**	Differences in the reporting of other oil, bitumen and lubricants	Check again next year.
Sweden	-3%	-	-	-	-	No action required.
United Kingdom	1%	**x**	-	-	Large differences due to reporting of international bunkers.	No action required, as the bunkers are reported consistently over the time series with no influence on the trend changes.

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

	Differences for solid fuels above 5%					
Member States	Difference in Total CO2 calculation 2012 without recalculations	Monthly vs. Annual Eurostat data 2012	Annual Eurostat vs. CRF inventory data 2012	Trend changes Early national statistics/ monthly Eurostat data 2013/2012	Explanation	Action
		Differences for solid fuels above 5%				
Belgium	-2%	x			Large differences due to reporting of hard coal, lignite and Coke oven/Gas coke.	Check again next year.
Bulgaria	3%	-	-	-	-	No action required.
Czech Republic	0%	-	-	-	-	No action required.
Denmark	3%	-	x	-	Large differences due to reporting of fossil fraction of municipal solid waste in CRF inventory data.	No action required. Nevertheless gap filling could be applied.
Germany	-2%	-	-	-	-	No action required.
Estonia	6%	x	-	-	Large differences due to reporting of oil shale. Only small amount of stock changes included under monthly Eurostat data.	Check again next year.
Ireland	2%	x	x	-	Large differences between annual and monthly Eurostat data due to reporting of hard coal and peat. Differences between CRF and monthly Eurostat data due to reporting of peat.	No monthly data provided for peat and hard coal. Gap filling based on assumption that reported peat deliveries to main activity producer power plants is 66% of total peat consumption. For hard coal assumption that deliveries to main activity pro-ducer power plants are 77% of the total hard coal consumption. Continue with gap filling method in 2015.
Greece	6%	-	-	NA	-	No action required.
Spain	1%	-	-	-	-	No action required.
France	-3%	x	x	-	Large differences due to reporting of hard coal imports.	Eurostat monthly data is more consistent with CRF inventory data. No action required, needs to be checked next year again.
Italy	0%	-	-	-	-	No action required.
Cyprus	-3%	NO	NO	NA	-	No action required.
Latvia	-5%	x	-	x	Large differences due to reporting of hard coal imports in 2012.	No action required. Reporting seems to have improved in 2013. Eurostat monthly data consistent with National statistics in 2013.
Lithuania	1%	-	-	-	-	No action required.
Luxembourg	2%	-	-	-	-	No action required.
Hungary	1%	-	-	NA	-	No action required.
Malta	1%	NO	NO	NA	-	No action required.
Netherlands	-3%	x	x	x	Large differences due to reporting of hard coal in 2012.	Trend changes for calculating 2013 CO2 emissions have been corrected by using annual data for hard coal consumption. Reporting seems to have improved in 2013. Eurostat monthly data more consistent with National statistics in 2013.
Austria	1%	x	-	x	Large differences due to reporting of hard coal.	Trend changes for calculating 2013 CO2 emissions have been corrected by using annual data for hard coal consumption.
Poland	0%	-	-	NA	-	No action required.
Portugal	-2%	-	-	-	-	No action required.
Romania	1%	-	-	-	-	No action required.
Slovenia	2%	-	-	x	Differences due to strong decrease in solid fuel consumption in monthly Eurostat data in 2013. Not reflected in ealry national staistics.	To be checked next year.
Slovakia	13%	-	-	NA	-	No action required.
Finland	6%	-	-	x	Differences in trend changes due to calculation in different units. Monthly Eurostat kt, National statistics TJ.	Trend changes for calculating 2013 CO2 emissions have been corrected by calculating trend changes after conversion of data in TJ. This decreases the differences between trend changes to -2%.
Sweden	-3%	x	-	-	Large differences due to reporting of hard coal stock changes in 2012.	Stock changes are not reported completely in monthly data for all years. This leads to differences in solid fuel consumption. Follow-up with SE necessary.
United Kingdom	1%	-	-	-	-	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	Difference in Total CO2 calculation 2012 without recalculations	Monthly vs. Annual Eurostat data 2012	Annual Eurostat vs. CRF inventory data 2012	Trend changes Early national statistics/ monthly Eurostat data 2013/2012	Explanation	Action
		Differences for natural gas above 5%				
Belgium	-2%	x			Large differences for all flows.	Updated monthly data for 2012 have been provided by Belgium in April 2014.
Bulgaria	3%	x			Large differences due to reporting of natural gas production in 2012.	No action required. Reporting seem to be improved in 2013. Eurostat monthly data consistent with National statistics in 2013.
Czech Republic	0%	-	-	-	-	No action required.
Denmark	3%	**x**	-	**x**	Large differences due to reporting of natural gas imports in 2012.	Updated monthly data for 2012 have been provided by Denmark in April 2014. This reduces the differences to -1%.
Germany	-2%	-	-	-	-	No action required.
Estonia	6%	-	-	-	-	No action required.
Ireland	2%	-	-	-	-	No action required.
Greece	6%	-	-	**NA**	-	No action required.
Spain	1%	-	-	-	-	No action required.
France	-3%	-	-	-	-	No action required.
Italy	0%	-	-	-	-	No action required.
Cyprus	-3%	**NO**	**NO**	**NA**	-	No action required.
Latvia	-5%	-	-	-	-	No action required.
Lithuania	1%	-	-	-	-	No action required.
Luxembourg	2%	-	-	-	-	No action required.
Hungary	1%	-	-	**NA**	-	No action required.
Malta	1%	**NO**	**NO**	**NA**	-	No action required.
Netherlands	-3%	-	-	-	-	No action required.
Austria	1%	-	-	-	-	No action required.
Poland	0%	-	-	**NA**	-	No action required.
Portugal	-2%	-	-	-	-	No action required.
Romania	1%	-	-	-	-	No action required.
Slovenia	2%	**x**	-	**x**	Large differences due to reporting of natural gas imports in 2012.	No action required. Reporting seem to be improved in 2013. Eurostat monthly data consistent with National statistics in 2013.
Slovakia	13%	**x**	-	**NA**	Large differences due to reporting of natural gas imports in 2012.	No action required. Reporting seem to be improved in 2013. To be checked next year.
Finland	6%	-	-	-	-	No action required.
Sweden	-3%	-	-	-	-	No action required.
United Kingdom	1%	-	-	-	-	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 submissions)
- Eurostat Monthly Coal Questionnaire (2008, 2009, 2010, 2011, 2012, 2013 submissions)
- Data from Eurostat database for monthly and annual fuel consumption for the years 2008 - 2012

Inventory data: Data as reported by Member States to the UNFCCC in CRF table 1.A.(b). For the comparison of CO_2 emissions the most recent submissions (= data for reference year 2012) from May 2014 were used:
http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php

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

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Early national statistics:

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

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

Czech Republic
http://www.mpo.cz/en/energy-and-raw-materials/statistics/

Denmark:
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Germany:
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Estonia:
http://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/database/statfin/ene/ehk/ehk_en.asp

France:

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Ireland:

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

Italy:

http://dgerm.sviluppoeconomico.gov.it/dgerm/ben.asp

Latvia:

http://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:

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

Luxembourg:

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

Netherlands:

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

Portugal:

http://www.apren.pt/fotos/newsletter/conteudos/dgeg_2014_balanco_energetico_sintetico_2013_1404920046.pdf

Romania:

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

Slovenia:

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

Spain:

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

Sweden:

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

United Kingdom:

http://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		21,984				3,994				594,578		
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	3,838	3,673	-165	-4%	35,273	35,683	410	1%	102,625	92,539	-10,086	-10%
	2013		3,509				30,409				96,513		
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	8,289	8,227	-62	-1%	49,222	49,001	-221	0%	287,051	281,038	-6,014	-2%
	2013		8,013				46,801				289,558		
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		6,487				5,485				139,353		
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	98,105	96,976	-1,129	-1%	247,526	239,616	-7,910	-3%	2,923,196	2,814,948	-108,248	-4%
	2013		98,874				237,599				3,075,491		

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		310				20,649				23,233		
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	5,847	5,750	-97	-2%	6,618	7,104	486	7%	168,076	173,475	5,399	3%
	2013		5,891				6,032				168,227		
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		11,181				53,193				135,392		
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	49,044	49,504	460	1%	28,693	29,881	1,188	4%	1,180,239	1,182,644	2,405	0%
	2013		46,235				20,420				1,092,011		
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	73,169	77,623	4,454	6%	17,342	18,795	1,453	8%	1,600,211	1,523,371	-76,840	-5%
	2013		72,122				20,052				1,570,531		

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	3,172	3,158	-14	0%	1,080	1,073	-7	-1%	101,038	91,488	-9,550	-9%
	2013		3,083				1,146				87,207		
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	55,959	56,387	428	1%	24,950	24,345	-605	-2%	2,568,837	2,569,179	342	0%
	2013		53,510				21,783				2,402,257		
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		1,816				0						
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	1,258	1,147	-111	-9%	148	192	44	30%	50,709	50,716	7	0%
	2013		1,101				132				50,200		
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	2,255	2,242	-13	-1%	442	437	-5	-1%	111,119	111,118	-2	0%
	2013		2,193				513				90,554		

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		2,446				76				37,259		
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	5,745	5,708	-37	-1%	11,057	11,100	43	0%	347,753	358,854	11,102	3%
	2013		5,787				10,796				320,365		
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		713										
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	29,517	28,973	-544	-2%	13,143	15,997	2,854	22%	1,372,878	1,367,723	-5,155	0%
	2013		27,926				12,890				1,394,339		
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		12,262				4,449				290,772		

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	23,714	23,329	-385	-2%	132,657	134,291	1,634	1%	569,447	569,380	-67	0%
	2013		21,781				137,563				574,372		
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	8,913	9,457	544	6%	4,874	4,874	0	0%	164,651	168,567	3,916	2%
	2013		10,569				4,450				162,206		
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	8,486	8,519	33	0%	35,870	35,757	-113	0%	452,715	465,882	13,167	3%
	2013		8,094				25,754				430,846		
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		2,169				4,045				28,954		
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	3,132	3,062	-70	-2%	6,982	7,029	47	1%	182,768	225,478	42,710	23%
	2013		2,977				6,657				203,223		

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	7,884	8,046	162	2%	11,336	11,593	257	2%	125,819	125,385	-434	0%
	2013		7,196				11,337				118,526		
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		11,558				3,252				40,068		
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	55,966	67,485	11,519	21%	63,316	63,554	238	0%	2,777,984	2,773,037	-4,947	0%
	2013		65,912				61,027				2,747,482		
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	449,938	467,941	18,003	4%	497,492	492,339	-5,153	-1%	14,179,161	13,712,916	-466,245	-3%
	2013		454,153				466,038				13,968,491		
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	515,766	533,437	17,671	3%	793,031	790,930	-2,101	0%	16,436,950	16,009,333	-427,617	-3%
	2013		515,699				750,503				16,163,517		

Table 8-2 Net Calorific Values used for the purposes of converting CRF data in physical units

			Belgium	Bulgaria	Czech Republic	Denmark	Germany	Estonia	Ireland	Greece	Spain	France
FUEL TYPES												
Liquid Fossil	Primary Fuels	Crude Oil	41.9	42.5	42.4	43.0	42.7		42.8	42.8	41.9	42.0
		Other hydrocarbons		41.9		27.7		42.5	41.9			27.5
		NGL	44.2				46.0		44.0	41.6		44.0
	Secondary Fuels	Motor spirit	44.0	44.0	43.4	43.8	43.5	44.0	44.6	44.0	44.8	44.0
		Kerosenes - Jet fuels	43.1	43.0	43.3	43.5	42.8	43.0	44.1	44.6	43.4	44.0
		Gas / Diesel Oil	42.7	42.3	42.6	42.7	43.0	42.3	43.3	43.0	43.1	42.0
		Residual Fuel Oil	40.6	40.0	39.5	40.7	40.4	40.2	41.2	40.2	40.5	40.0
		LPG	46.0	46.0	46.0	46.0	46.0	45.5	47.2	47.3	44.8	46.0
		Ethane		49.5								47.5
		Naphta	44.0	44.0	44.0	44.5	44.0		44.0	45.0	45.0	45.0
		Bitumen	37.7	37.7	40.2	39.8	40.2	40.2	37.7	40.2	40.2	40.0
		Lubricants	42.3	42.3	40.2	41.9	40.2	40.2	42.3	40.2	40.2	40.0
		Petroleum Coke	31.4	31.4	38.5	31.4	31.5		32.5	32.4	32.5	32.0
		Refinery Feedstocks	41.9	42.5	39.0	42.7	44.3		42.5	41.3	44.8	44.8
Other Liquid Fossil		Refinery gas + paraffin waxes + white spirit & SBP +	1.0	40.4	40.4	52.0	39.5		40.0	40.2	40.2	40.0
Liquid Fossil Totals												
Solid	Primary	Hard Coal	26.3	25.7	22.7	24.2	38.1	27.2	25.2	25.0	22.5	26.0
		Lignite	21.6	7.0	12.2		9.7	9.0	19.8	5.3	10.0	17.0
		Peat						10.0	7.8			11.6
	Secondary Fuels	BKB (Brown coal / peat briquettes) and Patent Fuel	24.7	12.5	20.8		19.7		18.5			32.0
		Coke Oven Coke + Gas Coke	29.3	28.5	28.4	28.5	16.1	28.5		27.8	27.7	28.0

			Croatia	Italy	Cyprus	Latvia	Lithuania	Luxembourg	Hungary	Malta	Netherlands	Austria
FUEL TYPES												
Liquid	Primary	Crude Oil	42.7	42.6	42.20		42.8		40.8		42.2	42.5
Fossil	Fuels	Other hydrocarbons							40.0			
		NGL	42.5						43.0		44.0	42.5
	Secondary	Motor spirit	44.6	44.0	44.8	44.0	44.8	43.0	42.0	44.8	44.0	41.3
	Fuels	Kerosenes - Jet fuels	44.0	43.0	44.6	43.2	43.2	43.1	42.0	44.1	43.5	43.3
		Gas / Diesel Oil	42.7	42.6	43.3	42.5	43.1	42.5	42.0	43.3	42.7	42.1
		Residual Fuel Oil	40.2	40.0	40.2	40.6	40.1	40.0	40.0	40.2	40.0	40.4
		LPG	46.9	46.0	47.3	45.5	46.4	46.0	47.0	47.3	45.2	46.1
		Ethane	47.5									
		Naphta	44.6	44.0					42.0		44.0	45.0
		Bitumen	33.5		40.2	41.9	39.0	40.2	37.7		41.9	44.3
		Lubricants	33.5	42.0	40.2	41.9	42.0	40.2	39.8		41.4	41.8
		Petroleum Coke	31.0	32.0	31.0	33.0		31.5	29.4			35.2
		Refinery Feedstocks	42.6	41.9			44.0		41.8			42.6
Other Liquid Fossil		Refinery gas + paraffin waxes + white spirit & SBP +	42.7	40.0	40.2	41.9	40.0	39.5	40.1	41.0	40.0	44.3
Liquid Fossil Totals												
Solid	Primary	Hard Coal	24.6	26.6	25.5	26.2	25.1	24.4	24.9		24.7	27.3
		Lignite	10.7	10.5	11.9			22.2	7.2		20.0	19.4
		Peat				10.1	11.7					8.8
	Secondary	BKB (Brown coal / peat briquettes) and Patent Fuel	16.7				24.7	22.2	24.7			19.3
	Fuels	Coke Oven Coke + Gas Coke	29.3	28.5		26.8	28.5	28.5	28.5		28.5	29.0

			21	22	23	25	26	10	24	28
			Poland	Portugal	Romania	Slovenia	Slovakia	Finland	Sweden	United Kingdom
FUEL TYPES										
Liquid Fossil	Primary Fuels	Crude Oil	42.6	42.4	41.4		42.0	42.7	36.3	43.4
		Other hydrocarbons		28.0	38.9	42.5	27.5		1.0	28.2
		NGL			49.5		37.0	45.2	1.0	46.9
	Secondary Fuels	Motor spirit	44.0	44.0	43.5	43.6	43.7	43.0	32.8	44.8
		Kerosenes - Jet fuels	43.0	43.8	48.8	43.5	43.3	43.3	35.3	43.9
		Gas / Diesel Oil	42.6	42.6	42.4	42.6	42.2	42.8	35.3	43.3
		Residual Fuel Oil	40.0	40.0	39.4	41.4	40.4	40.8	38.2	41.2
		LPG	46.0	46.0	48.1	46.1	46.0	46.2	46.1	45.4
		Ethane					47.4		50.4	47.5
		Naphta	44.0	44.0	44.0		43.6	44.3	28.5	45.4
		Bitumen	39.0	39.0	35.2	40.2	40.2	40.2	41.9	40.2
		Lubricants	42.0	42.0	35.2	42.1	42.0	40.2	41.4	40.2
		Petroleum Coke	32.0	32.0	34.3	31.8	34.9	33.5	34.8	34.0
		Refinery Feedstocks	42.5	44.0	44.8		43.9	42.5	36.3	42.5
Other Liquid Fossil		Refinery gas + paraffin waxes + white spirit & SBP +	1.0	40.0	40.0	40.2	30.0	42.0	32.8	40.9
Liquid Fossil Totals										
Solid	Primary	Hard Coal	22.4	25.2	22.0	25.5	25.5	25.5	27.2	24.7
		Lignite	8.4	16.4	7.8	10.7	10.6			
		Peat			8.8		9.8	10.1	11.5	12.8
	Secondary Fuels	BKB (Brown coal / peat briquettes) and Patent Fuel	1.0				25.6		1.0	31.0
		Coke Oven Coke + Gas Coke	28.5	17.6	31.8	29.9	28.0	28.1	28.1	28.3

Table 8-3 Comparison of calculation approaches of trend changes for CO_2 emissions with different ways of converting the units

Member States	Total CO_2 emissions, Reference Approach [Gg CO2]		Difference relative 2013/2012 approach based on energy units	Difference relative 2013/2012 approach based on physical units
	Early estimates 2013 Eurostat (conversion to energy units)	Early estimates 2013 Eurostat (physical units)		
Belgium	87,589	87,372	0.0%	-0.3%
Bulgaria	41,264	41,570	-10.8%	-10.2%
Czech Republic	97,474	96,497	-1.9%	-2.9%
Denmark	40,824	40,222	6.8%	6.8%
Germany	762,038	759,926	2.3%	2.0%
Estonia	18,316	18,291	4.5%	4.4%
Ireland	33,996	34,160	-4.2%	-3.7%
Greece	76,326	76,614	-10.5%	-10.2%
Spain	224,836	224,052	-12.3%	-12.6%
France	345,891	345,741	0.7%	0.6%
Croatia	16,214	16,226	-1.7%	-1.7%
Italy	341,666	341,503	-6.5%	-6.6%
Cyprus	5,540	5,547	-14.8%	-14.7%
Latvia	6,411	6,404	-4.1%	-4.2%
Lithuania	10,819	10,819	-5.8%	-5.8%
Luxembourg	9,705	9,723	-3.9%	-3.7%
Hungary	39,747	40,518	-6.8%	-5.0%
Malta	2,538	2,518	-6.0%	-6.8%
Netherlands	162,029	162,039	-0.3%	-0.3%
Austria	59,323	59,289	-2.1%	-2.1%
Poland	289,639	290,219	0.1%	0.3%
Portugal	47,004	46,919	3.8%	3.6%
Romania	63,709	63,419	-14.2%	-14.6%
Slovenia	12,998	12,982	-11.9%	-12.0%
Slovakia	25,780	25,518	-5.3%	-6.2%
Finland	43,118	41,434	0.0%	-6.6%
Sweden	36,897	36,511	-3.2%	-4.2%
United Kingdom	454,823	454,924	-2.4%	-2.4%
EU 15	**2,726,065**	**2,720,428**	**-2.1%**	**-2.2%**
EU 13	**630,450**	**630,528**	**-3.8%**	**-3.9%**
EU 28	**3,356,515**	**3,350,955**	**-2.4%**	**-2.5%**

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 Hungary and Finland. Results for HU and FI are different from Table 4-5 as only the trend change for solid fuels was changed

Table 8-4 Trend changes of aggregate fuel categories – comparison between Eurostat monthly, Early national statistics, Eurostat annual and CRF data

Member States		Liquid fuels				Solid fuels				Gaseous fuels			
		Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF
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%	112%	150%		100%	99%	69%		95%	94%
	2013/2012	101%				99%				180%			
Bulgaria	2009/2008	90%		90%	91%	90%		92%	92%	72%		74%	74%
	2010/2009	73%		91%	92%	107%		108%	108%	110%		104%	106%
	2011/2010	101%		95%	95%	124%		123%	123%	110%		117%	114%
	2012/2011	111%	111%	107%	106%	89%	87%	88%	88%	88%	93%	93%	93%
	2013/2012	96%	93%			85%	87%			104%	97%		
Czech Republic	2009/2008	96%		96%	96%	95%		94%	89%	94%		94%	94%
	2010/2009	95%		99%	98%	97%		102%	104%	115%		119%	119%
	2011/2010	98%		96%	97%	106%		101%	103%	88%		84%	84%
	2012/2011	99%		98%	98%	92%		93%	0%	99%		101%	101%
	2013/2012	97%	95%			96%	97%			103%	101%		
Denmark	2009/2008	97%		96%	92%	100%		99%	100%	97%		96%	96%
	2010/2009	108%		86%	103%	95%		96%	95%	112%		113%	114%
	2011/2010	91%		107%	96%	85%		85%	85%	82%		84%	84%
	2012/2011	99%	96%	96%	95%	78%	77%	77%	79%	92%	93%	94%	94%
	2013/2012	100%	99%			127%	129%			101%	94%		
Germany	2009/2008	94%		95%	95%	93%		93%	90%	99%		100%	96%
	2010/2009	100%		101%	102%	100%		103%	107%	106%		96%	105%
	2011/2010	98%		97%	97%	104%		102%	102%	83%		90%	91%
	2012/2011	98%	99%	99%	101%	103%	104%	105%	100%	101%	101%	106%	107%
	2013/2012	102%	102%			99%	101%			109%	111%		

Member States		Liquid fuels				Solid fuels				Gaseous fuels			
		Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF
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%	94%	107%	96%	100%	99%	94%	94%	111%	104%	108%	104%
	2013/2012	38%	63%			108%	109%			102%	103%		
Ireland	2009/2008	100%		95%	87%	99%		95%	95%	121%		96%	96%
	2010/2009	102%		97%	95%	64%		97%	98%	110%		110%	109%
	2011/2010	89%		88%	92%	182%		98%	97%	90%		88%	88%
	2012/2011	90%	88%	97%	89%	120%	113%	113%	106%	98%	95%	98%	98%
	2013/2012	102%	101%			85%	89%			97%	100%		
Greece	2009/2008	96%		96%	99%	98%		101%	100%	85%		85%	82%
	2010/2009	92%		89%	87%	81%		89%	89%	109%		109%	108%
	2011/2010	85%		88%	93%	114%		103%	104%	123%		123%	121%
	2012/2011	94%		99%	87%	107%		103%	103%	92%		92%	92%
	2013/2012	93%				87%				88%			
Spain	2009/2008	93%		93%	93%	85%		76%	75%	90%		90%	90%
	2010/2009	94%		96%	96%	71%		74%	74%	100%		100%	100%
	2011/2010	94%		94%	94%	160%		166%	166%	93%		93%	93%
	2012/2011	92%	93%	91%	91%	121%	118%	120%	120%	98%	97%	97%	97%
	2013/2012	93%	98%			68%	68%			92%	93%		
France	2009/2008	96%		97%	93%	88%		90%	83%	90%		96%	96%
	2010/2009	94%		94%	96%	112%		105%	108%	117%		111%	111%
	2011/2010	103%		99%	99%	86%		86%	87%	91%		87%	82%
	2012/2011	97%	98%	97%	98%	115%	112%	111%	112%	97%	104%	103%	108%
	2013/2012	93%	99%			107%	108%			103%	101%		

Member States		Liquid fuels				Solid fuels				Gaseous fuels			
		Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF
Croatia	2009/2008												
	2010/2009												
	2011/2010												
	2012/2011	93%		93%	90%	88%		88%	88%	81%		85%	94%
	2013/2012	98%	92%			107%	107%			95%	92%		
Italy	2009/2008	95%		93%	94%	73%		80%	79%	92%		92%	92%
	2010/2009	95%		97%	99%	108%		110%	111%	106%		107%	107%
	2011/2010	96%		96%	95%	120%		112%	112%	94%		94%	94%
	2012/2011	92%	92%	89%	91%	100%	100%	103%	103%	96%	96%	96%	96%
	2013/2012	95%	94%			89%	88%			94%	95%		
Cyprus	2009/2008	104%		98%	99%	50%		54%	51%				
	2010/2009	98%		97%	96%	124%		123%	124%				
	2011/2010	96%		96%	97%	42%		48%	46%				
	2012/2011	92%		95%	93%	0%		8%	8%				
	2013/2012	85%											
Latvia	2009/2008	86%		83%	83%	85%		78%	79%	92%		92%	92%
	2010/2009	91%		92%	98%	123%		130%	126%	119%		119%	119%
	2011/2010	107%		102%	96%	106%		108%	106%	88%		88%	88%
	2012/2011	100%	100%	114%	99%	99%	74%	76%	82%	94%	94%	94%	94%
	2013/2012	96%	99%			69%	86%			99%	99%		
Lithuania	2009/2008	80%		83%	86%	73%		76%	75%	84%		84%	84%
	2010/2009	101%		100%	101%	137%		123%	127%	114%		114%	122%
	2011/2010	93%		95%	95%	102%		125%	133%	109%		109%	139%
	2012/2011	103%	99%	104%	102%	111%	109%	99%	97%	98%	98%	98%	98%
	2013/2012	98%	94%			117%	116%			81%	82%		

Member States		Liquid fuels				Solid fuels				Gaseous fuels			
		Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF
Luxembourg	2009/2008	93%		93%	93%	92%		91%	91%	105%		102%	102%
	2010/2009	110%		105%	117%	98%		100%	100%	108%		108%	108%
	2011/2010	93%		106%	106%	100%		88%	88%	86%		86%	86%
	2012/2011	97%		98%	97%	93%		93%	92%	101%		102%	102%
	2013/2012	100%	105%			84%				85%			
Hungary	2009/2008	95%		99%	96%	90%		92%	84%	84%		87%	87%
	2010/2009	90%		94%	95%	103%		101%	107%	94%		107%	107%
	2011/2010	102%		94%	100%	105%		105%	103%	106%		95%	95%
	2012/2011	93%		95%	94%	98%		98%	92%	94%		89%	89%
	2013/2012	101%				97%				89%			
Malta	2009/2008			89%									
	2010/2009	216%		113%	89%								
	2011/2010	93%		130%	100%								
	2012/2011	130%		70%	106%								
	2013/2012	69%											
Netherlands	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%	104%	102%	97%	110%	110%	115%	93%	96%	96%	96%
	2013/2012	96%	98%			81%	99%			102%	102%		
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%	99%	84%		93%	94%	100%		96%	95%
	2013/2012	97%	102%			111%	101%			95%	94%		

Member States		Liquid fuels				Solid fuels				Gaseous fuels			
		Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF	Eurostat Monthly	Early national statistics	Eurostat annual	CRF
Poland	2009/2008	114%		98%	98%	92%		95%	94%	95%		96%	99%
	2010/2009	105%		105%	105%	100%		105%	106%	104%		107%	107%
	2011/2010	103%		101%	99%	110%		104%	108%	100%		100%	100%
	2012/2011	93%		95%	112%	94%		96%	95%	106%		106%	106%
	2013/2012	93%				102%				101%			
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%			91%	93%			96%	96%		
Romania	2009/2008	81%		85%	80%	83%		87%	77%	87%		85%	85%
	2010/2009	103%		104%	109%	102%		93%	92%	106%		102%	102%
	2011/2010	106%		99%	103%	117%		119%	118%	103%		103%	103%
	2012/2011	96%	96%	98%	97%	93%	93%	92%	95%	97%	98%	97%	97%
	2013/2012	95%	98%			72%	74%			92%	96%		
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%	98%	98%	99%	97%	98%	99%	94%	96%	96%	96%
	2013/2012	88%	94%			83%	96%			107%	97%		
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%				95%				90%			

Member States		Liquid fuels				Solid fuels				Gaseous fuels			
		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%			98%	106%			95%	93%		
Sweden	2009/2008	89%		87%	96%	68%		81%	80%	135%		147%	133%
	2010/2009	117%		116%	107%	163%		124%	127%	228%		108%	134%
	2011/2010	97%		101%	98%	89%		100%	95%	45%		88%	79%
	2012/2011	93%	97%	91%	92%	76%	92%	86%	99%	87%	90%	87%	87%
	2013/2012	94%	99%			104%	104%			95%	94%		
United Kingdom	2009/2008	104%		95%	95%	84%		83%	76%	89%		92%	92%
	2010/2009	95%		98%	100%	103%		104%	104%	110%		109%	108%
	2011/2010	94%		96%	97%	100%		99%	99%	83%		83%	83%
	2012/2011	98%	97%	96%	97%	127%	124%	127%	127%	94%	95%	95%	95%
	2013/2012	98%	98%			96%	94%			99%	99%		
EU 15	2009/2008	97%		95%	95%	91%		91%	90%	94%		95%	95%
	2010/2009	98%		98%	99%	97%		101%	103%	108%		106%	108%
	2011/2010	96%		96%	96%	108%		103%	103%	88%		89%	89%
	2012/2011	96%		95%	96%	107%		107%	104%	96%		98%	99%
	2013/2012	97%				95%				102%			
EU 28	2009/2008	97%		95%	95%	91%		91%	91%	93%		95%	94%
	2010/2009	98%		98%	99%	99%		102%	103%	108%		106%	108%
	2011/2010	98%		97%	96%	109%		105%	105%	90%		91%	90%
	2012/2011	96%		95%	96%	101%		102%	100%	96%		98%	99%
	2013/2012	97%				95%				101%			

Table 8-5 Comparison of Eurostat annual fuel consumption data with inventory CRF 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%
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	3,838	3,797	41	1%	35,273	35,273	0	0%	102,625	102,637	-12	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	8,289	8,269	20	0%	49,222	50,486	-1,264	-3%	287,051	287,051	0	0%
Denmark	2008	7,208	7,122	86	1%	6,872	7,382	-510	-7%	170,741	170,740	1	0%
	2009	6,950	6,549	401	6%	6,808	7,300	-492	-7%	163,437	163,436	1	0%
	2010	5,977	6,844	-867	-13%	6,521	7,076	-555	-8%	185,203	185,204	-1	0%
	2011	6,422	6,601	-179	-3%	5,546	6,025	-479	-8%	155,640	155,640	0	0%
	2012	6,182	6,032	150	2%	4,271	4,790	-519	-11%	145,886	145,885	1	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	98,105	99,143	-1,038	-1%	247,526	236,355	11,171	5%	2,923,196	2,966,298	-43,103	-1%

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	17,822	0	0%	22,835	22,109	726	3%
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	5,847	5,462	385	7%	6,618	6,197	421	7%	168,076	168,449	-374	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%
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	49,044	48,435	609	1%	28,693	28,693	0	0%	1,180,239	1,181,551	-1,311	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	73,169	77,070	-3,901	-5%	17,342	19,473	-2,131	-11%	1,600,211	1,605,645	-5,434	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	3,172	3,167	5	0%	1,080	1,081	-1	0%	101,038	101,781	-743	-1%
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	55,959	59,176	-3,217	-5%	24,950	24,500	450	2%	2,568,837	2,567,407	1,429	0%
Cyprus	2008	2,520	2,365	155	7%	41	26	15	60%				
	2009	2,457	2,349	108	5%	22	13	9	68%				
	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%				
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	1,258	1,226	32	3%	148	148	0	0%	50,709	50,812	-104	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	2,255	2,425	-170	-7%	442	426	16	4%	111,119	111,132	-13	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	221	-108	-49%	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%
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	5,745	5,779	-34	-1%	11,057	11,034	23	0%	347,753	347,753	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%								
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	29,517	29,887	-370	-1%	13,143	13,900	-757	-5%	1,372,878	1,372,754	124	0%
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%

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	23,714	23,773	-59	0%	132,657	133,593	-936	-1%	569,447	569,447	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	8,913	9,158	-245	-3%	4,874	4,846	28	1%	164,651	165,391	-740	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	32,237	2,899	9%	443,775	445,570	-1,795	0%
	2010	8,807	8,147	660	8%	32,649	32,172	477	1%	451,681	451,681	0	0%
	2011	8,675	8,433	242	3%	39,010	38,004	1,006	3%	464,946	464,946	0	0%
	2012	8,486	8,615	-129	-1%	35,870	35,952	-82	0%	452,715	452,715	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%
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	3,132	3,203	-71	-2%	6,982	7,042	-60	-1%	182,768	182,788	-20	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	7,884	7,705	179	2%	11,336	11,241	95	1%	125,819	125,848	-28	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%
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	55,966	56,871	-905	-2%	63,316	63,965	-649	-1%	2,777,984	2,772,837	5,147	0%
EU 15	2008	526,473	529,480	-3,007	-1%	495,550	493,908	1,642	0%	16,089,129	15,961,572	127,557	1%
	2009	499,921	501,379	-1,458	0%	449,426	445,325	4,101	1%	15,355,883	15,101,507	254,376	2%
	2010	490,367	495,564	-5,197	-1%	452,255	456,632	-4,377	-1%	16,226,916	16,248,810	-21,894	0%
	2011	472,575	476,306	-3,731	-1%	465,936	469,130	-3,194	-1%	14,438,024	14,396,219	41,805	0%
	2012	449,938	456,929	-6,991	-2%	497,492	489,497	7,995	2%	14,179,161	14,220,365	-41,204	0%
EU 28	2008	595,727	599,435	-3,708	-1%	799,690	796,976	2,714	0%	18,447,915	18,315,892	132,022	1%
	2009	564,682	567,173	-2,491	0%	731,119	723,358	7,761	1%	17,442,230	17,200,953	241,277	1%
	2010	555,892	561,083	-5,191	-1%	745,302	745,446	-144	0%	18,490,035	18,493,044	-3,009	0%
	2011	540,609	544,209	-3,600	-1%	781,154	786,075	-4,921	-1%	16,759,174	16,705,124	54,050	0%
	2012	515,766	523,110	-7,344	-1%	793,031	787,341	5,690	1%	16,436,950	16,478,331	-41,381	0%

8.2 Gaps and zero values

Table 8-6 List of gaps for individual months examined in the monthly fuel data for the year 2013

MS	Product in kilo tonnes[1]	Flow	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Notes
BG	Natural gas[1]	Stock change	-3380	-2780	-1583	2	2095	2698	3776	2617	1489			-1147	3787	Gap due to stock change
CZ	Natural gas	Production	688	688	740	688	635	580	608	571	567	571				New data sent
CZ	Natural gas	Imports	19,351	27,469	130,823	122,968	120,375	118,837	128,459	120,010	116,573	113,809				New data sent
CZ	Natural gas	Exports	299	328	104,387	103,465	99,942	88,886	94,369	87,509	85,584	80,896				New data sent
CZ	Natural gas	Stock change	-27,008	-12,655	-14,382	-5,365	4,588	17,299	23,327	21,592	16,011	8,606				New data sent
DK	Kerosene Type Jet Fuel	Total exports	27	1	1	4	5	5	18	1	1	4	3		70	Minor gap(s)
DE	Petroleum Coke	Stock change	-4	-2	1	-1	-3	13		-1	5	-38		8	-22	Minor gap(s)
IE	Kerosene Type Jet Fuel	Int. Aviation	37	34	42		57	62	68	65	57	52	44	42	560	3247A includes this value in April
GR	Motor Gasoline	Total imports	33	25	28	29	30	36	33	45	27	28		25	339	Not relevant
GR	Gas/Diesel oil	Bunkers	21	17		24	21	22	22	23	24	26	19	20	239	Not relevant
GR	Heating and other Gasoil	Total exports	25	10	17	72		30	40	71	13	15	10	19	322	Not relevant
GR	Heating and other Gasoil	Bunkers	21	17		24	21	22	22	23	24	26	19	20	239	Not relevant
GR	Petroleum Coke	Total imports	14	10	111	53	191		165	19	14	100	122	28	827	Not relevant
GR	Gas/Diesel Oil[2]	Bunkers	21	17		24	21	22	22	23	24	26	19	20	239	Not relevant
ES	Naphta	Total imports	136	77	133	85	136	73	153	138	34	108	122		1195	Explained
HR	Naphta	Total exports	8	3	1		3		2	2	2	1	1	4	27	Plausible
HR	Fuel Oil - High Sulphur	Total exports	27	33	6	39	42	21	40	34	45	9		34	330	Not relevant
IT	Motor Gasoline	Stock change	218	-59	-119	-7	-204	102	69	49		10	-83	-236	-260	Not relevant
LV	Natural gas[1]	Total imports				5955	15510	16507	14541	19222	18656	7778			98169	Explained
LV	Natural gas[1]	Total exports	9133	4170	8329	1222		311	420			320	3373	4331	31609	Explained
LV	Kerosene Type Jet Fuel[2]	Total exports				5		1	6	2	1	3	1	1	20	Minor gap(s)
LT	Natural gas[1]	Stock change	37				-74	-37	111	-74	37	37	-37	74	74	Stock change
HU	Crude Oil	Stock change		32	-13	-20	53		20	2	-27	-61	-42	-42	-98	Stock change
HU	Refinery Feedstocks	Stock change	-15	3	76	-17	-67	9	1		26	-4	20	20	52	Stock change
NL	Other Kerosene	Stock change	70	-69	5	6	-7	11	2	4	-12	24	-10		24	Plausible
AT	Refinery Feedstocks	Total imports				3							2		5	Minor gap(s)
PT	Natural gas[1]	Total exports		37	665	661	689	437	5920	2413	843	379	3373	90	15507	Low amount, quantitative impact minor
RO	Petroleum Coke	Total imports	10	1	27	6	6	4	17	5	3	12	2		93	Not relevant
RO	Motor Gasoline	Stock change	16	-9	-35		-6		13	11	-37	9	24	20	6	Stock change
SI	Natural gas[1]	Total exports		3739	3663	3242	3147	3047	3108	2394	1957	3728	4256	3914	36195	New data sent
SK	Natural gas[1]	Total exports		113997	140677	138156	135488	152825	176808	166534	174179	164559	156806	185764	1705793	New data sent
FI	Natural Gas Liquids	Total imports	35	40	85	68	42		73	87	64	24	35	45	598	Not relevant

MS	Product in kilo tonnes[1]	Flow	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Notes
SE	Kerosene Type Jet Fuel[2]	Stock change	29	-5	-7	-3	-19	-2	31	5	-13	-19	-11		-14	Stock change

1 Natural gas in TJ, gross calorific value
2 All together incl. biofuels

Table 8-7 List of zero values for individual months identified in the monthly fuel data for the year 2013

MS	Product in kilo tonnes	Flow	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
BE	Patent Fuels	Total exports	1	1	1	1	0	1	0	1	1	2	1	1	11
BE	Patent Fuels	Total imports	1	1	1	1	0	3	1	0	2	2	1	1	14
BG	Hard coal	Primary prod	1	1	1	0	0	1	0	0	0	0	0	0	4
BG	Hard coal	Total exports	0	1	0	0	0	0	0	0	0	0	0	0	1
DK	Hard coal	Total exports	21	0	0	20	0	0	0	0	0	0	11	0	52
DK	Coke Oven Coke	Total imports	2	1	1	1	0	1	0	0	1	1	2	1	11
DE	Lignite/Brown Coal	Total exports	0	0	3	0	111	20	26	10	4	0	2	3	179
EE	Hard coal	Total imports	6	3	1	0	1	0	1	1	0	13	31	2	59
IE	Hard coal	Total imports	0	216	31	0	0	215	0	144	41	54	223	245	1169
IE	Patent Fuels	Total imports	0	2	0	2	2	0	0	3	3	0	0	0	12
IE	Lignite/Brown Coal	Total imports	0	0	0	0	7	6	5	0	0	0	0	0	18
GR	Hard coal	Total imports	87.1	0	0	32.0	0	0	0	0	0	0	22	0	141.1
ES	Coke Oven Coke	Total exports	34	0	13	3	9	12	8	12	28	13	22	7	161
FR	Coke Oven Coke	Total exports	0	0	0	9	3	0	0	0	0	0	0	0	12
HR	Lignite/Brown Coal	Total imports	1	1	5	11	1	1	0	2	10	5	13	3	53
IT	Hard coal	Primary prod	8	6	4	0	3	2	0	0	0	0	0	0	23
IT	Lignite/Brown Coal	Total imports	0	0	0	0	0	0	0	0	0	0	1	0	1
LV	Hard coal	Total exports	0	1	0	0	0	0	0	0	0	0	1	3	5
LV	Coke Oven Coke	Total imports	0	1	1	0	0	0	0	0	0	0	0	0	2
LT	BKB/PB	Total exports	0	0	0	0	0	4	0	2	0	1	0	0	7
LU	Lignite/Brown Coal	Total imports	0	0	0	0	0	0	0	0	0	1	0	0	1
HU	Coke Oven Coke	Total imports	1	0	1	0	1	1	1	1	1	0	1	1	9
HU	BKB/PB	Total imports	1	0	0	0	0	0	1	1	2	1	0	0	6
NL	Lignite/Brown Coal	Total exports	0	0	0	0	0	0	0	0	0	0	0	1	1
NL	Lignite/Brown Coal	Total imports	2	2	0	0	0	0	1	8	1	4	4	4	26
AT	Lignite/Brown Coal	Total imports	0	1	1	1	2	2	2	2	2	2	2	1	18
AT	BKB/PB	Total imports	0	0	0	0	1	2	0	0	0	0	1	0	4
PL	Lignite/Brown Coal	Total exports	18	18	15	16	24	0	0	1	11	39	42	34	218
RO	Hard coal	Total exports	0	0	0	0	0	1	2	3	0	0	0	0	6
RO	Lignite/Brown Coal	Total imports	0	0	0	0	0	0	0	0	0	1	0	0	1
SI	Coke Oven Coke	Total imports	1	1	1	1	1	1	1	0	1	0	0	0	8
SI	Lignite/Brown Coal	Total imports	0	0	19	0	0	0	0	0	7	0	15	0	41
SK	Patent Fuels	Total imports	0	0	0	1	1	1	3	1	1	1	1	0	10
SK	BKB/PB	Total imports	0	0	0	2	2	1	1	1	1	2	1	1	12

MS	Product in kilo tonnes	Flow	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UK	Patent Fuels	Total exports	2.7	2.4	0	1.7	3.7	0	3.6	3.0	0	5	3	1	26.2
UK	Coke Oven Coke	Total exports	12.5	11.7	6.8	17.6	11.7	0	6.2	6.1	4.2	6	9	3	94.7
UK	Patent Fuels	Total imports	0	0	0	0	0	0	4.3	0	0	0	4	1	9.3

8.3 Comparison of monthly Eurostat data with early national statistics

8.3.1 Liquid fuels

For liquid fuels discrepancies above 5 % occur for the trend changes for Austria, Estonia, Finland, France, Portugal and Slovenia.

Austria

Austria provided Eurostat with updated monthly data for the year 2012 in 2014. If the updated monthly data for 2012 are taken into account, the differences in the trend changes between early national statistics and monthly Eurostat data for liquid fuels are reduced to zero (see Table 4-3).

Estonia

For Estonia there were major differences in the reporting of shale oil in early national statistics and in the monthly data provided to Eurostat in recent years. The large differences in the results for the trend changes are mainly due to strong inconsistencies in the data in 2012 (see Table 8-8). In the previous project Estonia indicated that the cumulated monthly data of residual fuel oil also includes the production and export of shale oil, and other heavy fuel oil imports.

Table 8-8 EE, consumption of selected liquid fuels from different data sources

Fuel (kt)	Eurostat monthly data	Early national statistics	Differences	Annual Eurostat	CRF	Eurostat monthly data	Early national statistics	Differences
	2012			2012		2013		
Shale Oil Consumption*	**246**	**-473**	**719**	**-469**	**-472**	**-510**	**-518**	**8**
Production	355	0	355	0	0	57	0	57
Imports	0	0	0	0	0	0	0	0
Exports	117	469	-352	469	469	576	541	35
Stock changes	-8	4	-12	0	3	-9	-23	14
Residual fuel oil Consumption**	**-343**	**1**	**-344**	**-1**	**1**	**-11**	**-1**	**-10**
Exports	368	581	-213	581	581	182	56	126
Imports	66	906	-840	906	906	393	448	-55
Stock Changes	13	1	12	1	-1	-14	1	-15
Bunkers	28	325	-297	325	325	236	392	-156

*conversion factor of 39.2 is used for shale oil

**conversion factor of 40.2 is used for residual fuel oil

National data for residual fuel oil 2012 has been updated

Note: Consumption of primary fuels (shale oil) is calculated as: Production + Imports – Exports – Stock changes, Consumption of secondary fuels is calculated as: Imports-Exports-Stock Changes- International Bunkers

In comparison to the reporting year 2012, the reporting for shale oil to Eurostat improved considerably for the year 2013. There is only a small amount reported under production and the reported exports are close to exports reported in early national statistics. Also the reporting of residual fuel oil in monthly Eurostat data improved in 2013 and correlates more closely with the reporting in the early national statistics.

For shale oil consumption early national statistics are more consistent with the CRF data and Eurostat annual data than with Eurostat monthly data. For calculating early CO_2 estimates for 2013, annual data for total liquid fuels was used for 2012, instead of the monthly data (see Table 4-3).

France

For France the early national data does not include disaggregated data related to individual fuel types. Nevertheless, detailed data was provided on the basis of flows. The main differences in the trend changes of single flows could be found for international bunkers. According to Eurostat monthly data the trend change for international bunkers is calculated with 167% between 2013/2012. Early national statistics indicate a trend change of 91% for international bunkers.

In recent years France reported only parts of international bunkers for jet kerosene as part of monthly Eurostat data (underreporting). In 2013 France improved its reporting and monthly data on international bunkers for jet kerosene seems to be more consistent with annual data. This has considerable influence on the trend change of liquid fuels. For calculating early CO_2 estimates for 2013 annual data for international bunkers has been used for 2012, instead of the monthly data (see Table 8-14). This improved the trend changes significantly (see Table 4-3).

Finland, Portugal and Slovenia

For Finland, Portugal and Slovenia the early national data does not include disaggregated data related to individual fuel types. Therefore, the difference cannot be further analysed.

8.3.2 Solid fuels

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

Austria

According to monthly Eurostat data, hard coal consumption between 2012 and 2013 increased considerably by 116 %, whereas the trend for hard coal consumption in early national statistics remains at 100 %. A comparison between annual and monthly Eurostat data for 2012 shows a difference of -22% for hard coal consumption. For calculating early CO_2 estimates for 2013 annual data for hard coal consumption was used for 2012, instead of the monthly data; this changes the trend for hard coal consumption to 91 % (see Table 4-3, Table 8-14).

Finland

The trend changes from early national statistics are calculated using TJ, whereas the trend based on monthly Eurostat data is calculated in kt. There is a change in solid fuel consumption between 2012 and 2013 from consumption of peat to more consumption of hard coal. The trend change for solid fuels based on physical units results in a decrease of 2.2% in consumption, whereas the trend change based on TJ units resulted in an increase of 7.8%. Peat has an NCV of 10.1 and hard coal an NCV of 25.5, thus increasing the consumption of hard coal and decreasing the consumption of peat results in higher energy consumption, due to the higher energy value of hard coal. For calculating CO_2 emissions for 2013, the trend change calculated with energy units was used (see Table 4-3 and Section 4.1).

Latvia

The monthly Eurostat data for hard coal for the year 2012 is very high in comparison to early national statistics and to annual Eurostat data, whereas the monthly Eurostat value provided for 2013 is more consistent with early national statistics (see Table 4-3). The differences in trend changes occur due to large differences between early national statistics and Eurostat monthly data in 2012.

Table 8-9 LV, Hard Coal consumption from Eurostat monthly data and early national statistics for the years 2012 and 2013

Fuel (kt)		Eurostat monthly data	Early national statistics	Differences		Eurostat monthly data	Early national statistics	Differences
		2012				2013		
Hard coal		179	138	30%		127	127	0%

Netherlands

In the Netherlands data for total solid fuel consumption on national level is 20% lower in 2012 than Eurostat monthly data. For 2013 the monthly Eurostat data improved and is more consistent with the data from early national statistics for solid fuel consumption (see Table 4-3).

Table 8-10 NL, Hard coal consumption from Eurostat monthly data and early national statistics

Fuel (TJ)	Eurostat monthly data	Early national statistics	Differences		Eurostat monthly data	Early national statistics	Differences
	2012				2013		
Total solid fuel (mainly Hard coal*)	414,322	344,000	20.4%		333,877	341,000	-2.1%
* conversion factor of 25.9 is used for coal							

This improvement of 2013 monthly Eurostat data leads to a strong difference in trend change. For calculating 2013 CO_2 emissions the trend change was adapted by using annual data for hard coal consumption in the year 2012. This improves the trend considerably (see Table 4-3, Table 8-14). It seems, however, that there is a strong need to improve monthly and annual coal statistics considerably in the near future (see table 3-6).

Slovenia

According to Eurostat monthly data there is a strong decrease of lignite consumption in the year 2013 in comparison to the year 2012. This strong decrease is not reflected in early national statistics. In the Eurostat monthly data, total solid fuel consumption is only related to lignite fuel consumption; hard coal data are not reported at all. The early national statistics provide data on total solid fuels for the different flows in TJ. There are differences in the reporting between monthly Eurostat data and early national statistics for all flows (see Table 4-3).

Table 8-11 SI, total solid fuel consumption from Eurostat monthly data and early national statistics

Fuel (TJ)		Eurostat monthly data	Early national statistics	Differences	Eurostat monthly data	Early national statistics	Differences	Trend changes Eurostat monthly	Trend changes early national statistics
		2012			2013			2013/2012	
Total solid fuels	**Consumption**	**49,308**	**58,378**	**-16%**	**40,855**	**56,166**	**-27%**	**83%**	**96%**
	Production	43,228	45,774	-6%	38,067	45,010	-15%	88%	98%
	Imports	5,070	12,576	-60%	495	11,212	-96%	10%	89%
	Exports	121	21	477%	0	186	-100%	0%	886%
	Stock changes	-1,131	-49	2209%	-2,293	-130	1664%	203%	265%

8.3.3 Natural Gas

The trend changes for Bulgaria, Denmark and Slovenia show differences for gaseous fuels. In all three countries there are differences in the absolute values in the year 2012 that explain the discrepancies in trend changes.

Table 8-12 Natural gas consumption in Bulgaria, Denmark, Sweden and Slovenia from different data sources

Fuel (TJ)	Eurostat monthly data	Early national statistics	Differences	Eurostat monthly data	Early national statistics	Differences
	2012			2013		
Natural gas consumption Bulgaria	92,539	102,644	-9.8%	96,513	99,158	-2.7%
Natural gas consumption Denmark	138,151	146,178	-5.5%	139,353	137,872	1.1%
Denmark revised	145,709		-0.3%			
Natural gas consumption Slovenia	27,091	29,716	-8.8%	28,954	28,965	0.0%

Bulgaria and Slovenia

For Bulgaria and Slovenia differences in trend changes occur due to large differences between early national statistics and Eurostat monthly data in 2012.

Denmark

Denmark only provided Eurostat with updated monthly data for the year 2012 in February 2014. Taking into account the updated monthly data for 2012 reduces the differences in the trend changes between early national statistics and monthly Eurostat data for natural gas fuels to less than - 1 %.

8.4 Tables with refinements for 2012 for calculating 2013 early estimates

Table 8-13 Updated monthly 2012 data as available in April 2014 and differences to data available in April 2013

Member States	Liquid fuels			Natural gas		
	2012 monthly Eurostat data as available in April 2013	2012 monthly Eurostat data as available in April 2014	Difference	2012 monthly Eurostat data as available in April 2013	2012 monthly Eurostat data as available in April 2014	Difference
	kt		%	kt		%
Belgium	-	-	-	329,770	601,476	82.4%
Denmark	6,490	6,507	0.3%	138,151	145,709	5.5%
Germany	96,976	97,499	0.5%	2,814,948	2,838,489	0.8%
Malta*	1,031	765	-25.8%	-	-	-
Poland	23,329	23,326	0.0%	-	-	-
Portugal	-	-	-	168,567	168,559	0.0%

Note: * Data for Malta on international bunkers for monthly residual fuel oil data has been corrected by gap filling

Table 8-14 Correction of monthly Eurostat data 2012 with annual Eurostat data 2012

				2012 Eurostat				2013 Eurostat	Trend change	Trend change
	Fuel type	Flow		Annual	Cumulated Monthly	Difference absolute	%	Cumulated Monthly	Monthly 2013/Monthly 2012	Monthly 2013/Monhtly 2012 corrected
Estonia	Shale Oil	Gross Inland Consumption	kt	-469	246	-715	-152.5%	-510	-207%	
		Production	kt	0	355	-355		57		
		Total Exports	kt	469	117	352	-75.1%	576		
	Shale oil corrected	Gross Inland Consumption	kt	-469	-469	0	0.0%	-510		109%
				Annual	Cumulated Monthly	Difference absolute	%	Cumulated Monthly	Monthly 2013/Monthly 2012	Monthly 2013/Monhtly 2012 corrected
	Residual Fuel Oil	Gross Inland Consumption	kt	-1	-343	342	34200.0%	-11	3%	
		Exports	kt	581	368	213	-36.7%	182		
		Imports	kt	906	66	840	-92.7%	393		
		Stock Change	kt	1	13	-12	1200.0%	-14		
		International Bunkers	kt	325	28	297	-91.4%	236		
	Residual Fuel Oil corrected	Gross Inland Consumption	kt	-1	-1	0	0.0%	-11		1100%
				2012 Eurostat				2013 Eurostat	Trend change	Trend change
				Annual	Cumulated Monthly	Difference absolute	%	Cumulated Monthly	Monthly 2013/Monthly 2012	Monthly 2013/Monhtly 2012 corrected
	Total Liquid fuels	Gross Inland Consumption	kt	466	807	-341	73.2%	310	38%	
	Total Liquid fuels corrected	Gross Inland Consumption	kt	466	466	0	0.0%	310		67%

Note: Other oil is missing in annual Eurostat data 2012, this explains the differences in annual liquid fuel consumption compared to Table 8-1

				2012 Eurostat				2013 Eurostat	Trend change	Trend change
	Fuel type	Flow		Annual	Cumulated Monthly	Difference absolute	%	Cumulated Monthly	Monthly 2013/Monthly 2012	Monthly 2013/Monhtly 2012 corrected
France	Jet Kerosene	Gross Inland Consumption	kt	-1,771	2,294	-4,065	-229.5%	-558	-24%	
		International Bunkers	kt	5,491	1,300	4,191	-76.3%	4,200		
	Jet Kerosene corrected	Gross Inland Consumption	kt	-1,771	-1,897	126	-6.6%	-558		29%
		International Bunkers	kt	5,491	5,491	0	0.0%	4,200		

				2012 Eurostat				2013 Eurostat	Trend change	Trend change
	France			Annual	Cumulated Monthly	Difference absolute	%	Cumulated Monthly	Monthly 2013/Monthly 2012	Monthly 2013/Monhtly 2012 corrected
	Total Liquid fuels	Gross Inland Consumption	kt	73,526	77,623	-3,623	21.7%	72,122	93%	
	Total Liquid fuels corrected for Jet Kerosene International bunkers	Gross Inland Consumption	kt	73,526	73,432	94	0.1%	72,122		98%

Note: Other oil is missing in annual Eurostat data 2012, this explains the differences in annual liquid fuel consumption compared to Table 8-1

				2012 Eurostat				2013 Eurostat	Trend change	Trend change
	Fuel type	Flow		Annual	Cumulated Monthly	Difference absolute	%	Cumulated Monthly	Monthly 2013/Monthly 2012	Monthly 2013/Monhtly 2012 corrected
The Netherlands	Hard Coal	Gross Inland Consumption	kt	12,790	15,926	-3,136	24.5%	12,891	81%	
	Hard Coal corrected	Gross Inland Consumption	kt	12,790	12,790	0	0.0%	12,891		101%
	Total Solid fuel	Gross Inland Consumption	kt	13,143	15,997	-2,854	21.7%	12,890	81%	
	Total Solid fuel corrected for hard coal	Gross Inland Consumption	kt	13,143	12,861	282	2.2%	12,890		100%

				2012 Eurostat				2013 Eurostat	Trend change	Trend change
	Fuel type	Flow		Annual	Cumulated Monthly	Difference absolute	%	Cumulated Monthly	Monthly 2013/Monthly 2012	Monthly 2013/Monhtly 2012 corrected
Austria	Hard Coal	Gross Inland Consumption	kt	3,564	2,779	785	-22.0%	3,229	116%	
	Hard Coal corrected	Gross Inland Consumption	kt	3,564	3,564	0	0.0%	3,229		91%
	Total Solid fuel	Gross Inland Consumption	kt	4,825	4,018	807	-16.7%	4,449	111%	
	Total Solid fuel corrected for hard coal	Gross Inland Consumption	kt	4,825	4,803	22	0.5%	4,449		93%

8.5 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

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 X-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.