Study with Evaluation Criteria on Early Estimates of Main Energy Balance Sheets Components in 2015 and for the Production and Visualisation of Indicators to Monitor Energy Union Implementation

Final Report – Tasks 1 and 2

Contract details

European Commission, DG ENER

Study with Evaluation Criteria on Early Estimates of Main Energy Balance Sheets Components in 2015 and for the Production and Visualisation of Indicators to Monitor Energy Union Implementation

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In association with:

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Executive Summary

This report presents the final results of the *'Study with evaluation criteria on early estimates of main energy balance sheets components in 2015 and for the production and visualisation of indicators to monitoring Energy Union implementation'*. The overarching objective of this study is to support the Commission in advancing the monitoring process of the implementation of the Energy Union. This study aims to improve the monitoring process by:

- ✓ Decreasing the time-lag between reporting and the reported year.
- ✓ Fostering and decreasing the administrative burden of the monitoring process.
- ✓ Making the monitoring process more transparent.

In order to achieve these overall objectives, the Terms of Reference (ToR) for this work requested the following outputs:

- ✓ Options to gain preliminary annual data on energy consumption at EU and MS level within 8 months after the end of the reported year.
- ✓ Estimates for energy consumption data for the year 2015 and their underlying methodology at both EU and MS level.
- ✓ A web tool to produce and visualise indicators for the monitoring of the Energy Union (this aspect of the work is described in a separate report).

The report first identifies and assesses options for collecting or calculating preliminary data (or 'early estimates[1]') on **annual energy consumption** for **EU Member States and the EU** as a whole for the **year t-1** (i.e. currently 2015) within eight to nine months of the end of the year. The assessed options include the implementation methodologies so that they can be critically evaluated. This includes risks, pros and cons, identification of the parties involved, legal implications, and estimated timings.

The second part of the report focuses on producing the early estimates for the year 2015 both for the EU as a whole and for each EU Member State on the basis of the methodologies developed. This involves the following sub tasks:

- Calculation of early estimates of energy balances – according to one of the three methodologies developed and described in the first step.
- Calculation of early estimates for the share of renewable energy.
- Calculation of early estimates of the energy import bill.

The methodology developed within the contract provides early estimates of the annual energy consumption for the EU 28 countries and EU28 aggregate within 8 months of year end. The approach we have developed is the result of a detailed literature review and the experience of the project partners in producing early estimates.

In order to maximise the robustness of the approach, the following steps have been taken:

- Use the most reliable sources of available data.

[1] Known as early estimates because the final annual data is available from Eurostat 13 months after the end of the year.

- Use the most accurate methodology to make extrapolations.
- Validate our estimates with data quality checks.
- Benchmark our calculations against other data available for 2015 (national preliminary or final data, sum of Eurostat monthly data, IEA preliminary statistics, Eurobserv'er final data, ENTSO-E data and EEA preliminary data).

For producing the early estimates we considered the following main sources of data:

- IEA preliminary annual data (from the annual mini-questionnaires the IEA sends to MSs).
- In some cases where IEA preliminary data were published too late to allow for their inclusion for all the countries and all the series, Eurostat monthly data has been used. However, in order to attempt to maximise the he consistency of the approach, Eurostat monthly data were only used if they were close to IEA data. For a number of countries, much of the data, mainly on final consumption, were extrapolated.

We have a high level of confidence in the proposed methodology because it is based on the most credible sources of data available, to mitigate against potential statistical mismatches, the data gaps are filled by solid econometric regressions and we have followed a consistent validation and quality control process. A confidence index reflecting the quality of each estimate is provided in the Excel files.

The proposed methodology is replicable, although the process could be improved in terms of the timeliness and accuracy of the estimates by automating the data collection process from IEA preliminary data.

In the longer term the Eurostat data collection procedures could be adjusted to make them more suitable for producing early estimates. These adjustments could include addressing the issues in consistency between Eurostat monthly data and annual data, adding new enquiries to their monthly data collection questionnaires and using data from the IEA annual mini questionnaires.

Acronyms and Abbreviations

AGEB	Arbeitsgemeinschaft Energiebilanzen
CSP	Concentrated Solar Power
DC	Diesel consumption
EC	European Commission
EEA	European Environment Agency
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSO-G	European Network of Transmission System Operators for Gas
EU	European Commission
ETS	Emissions Trading System
GCV	Gross Calorific Value
GDP	Gross Domestic Product
GIC	Gross Inland Consumption
GSE	Gas Storage Europe
GWh	Giga-watt hours
IEA	International Energy Agency
IPI	Industrial Production Index
Ktoe	Kilo tonnes oil equivalent
kt	Thousand tonnes
LPG	Liquefied Petroleum Gas
Mm^3	Thousand cubic metres (typically of gas at standard temperature and pressure)
MS	Member State
ODEX	ODEX is the index used in the ODYSSEE-MURE project to measure the energy efficiency progress by main sector
OECD	Organisation for Economic Co-operation and Development
PREL	Preliminary data
PV	Photovoltaic
R^2	Coefficient of determination
RED	Renewable Energy Directive
RES	Renewable Energy Sources
t-1	Present year minus one
TJ GCV	Tera Joules – Gross Calorific Value
ToR	Terms of Reference
TJ	Terra Joules
UGS	Underground Gas Storage
VA	Value Added

1 Introduction, context and methodology

1.1 Introduction

This report presents the draft final results of the *'Study with evaluation criteria on early estimates of main energy balance sheets components in 2015 and for the production and visualisation of indicators to monitoring Energy Union implementation'*. The overarching objective of this study is to support the Commission in advancing the monitoring process of the implementation of the Energy Union. This study aims to improve the monitoring process by:

- ✓ Decreasing the time-lag between reporting and the reported year
- ✓ Fostering and decreasing the administrative burden of the monitoring process
- ✓ Making the monitoring process more transparent

In order to achieve these overall objectives, the Terms of Reference (ToR) for this work requested the following outputs:

- ✓ To provide options to gain preliminary annual data on energy consumption at EU and MS level within 8 months after the end of the reported year.
- ✓ To produce estimates for energy consumption data for the year 2015 and their underlying methodology at both EU and MS level.
- ✓ To create a web tool to produce and visualise indicators for the monitoring of the Energy Union.

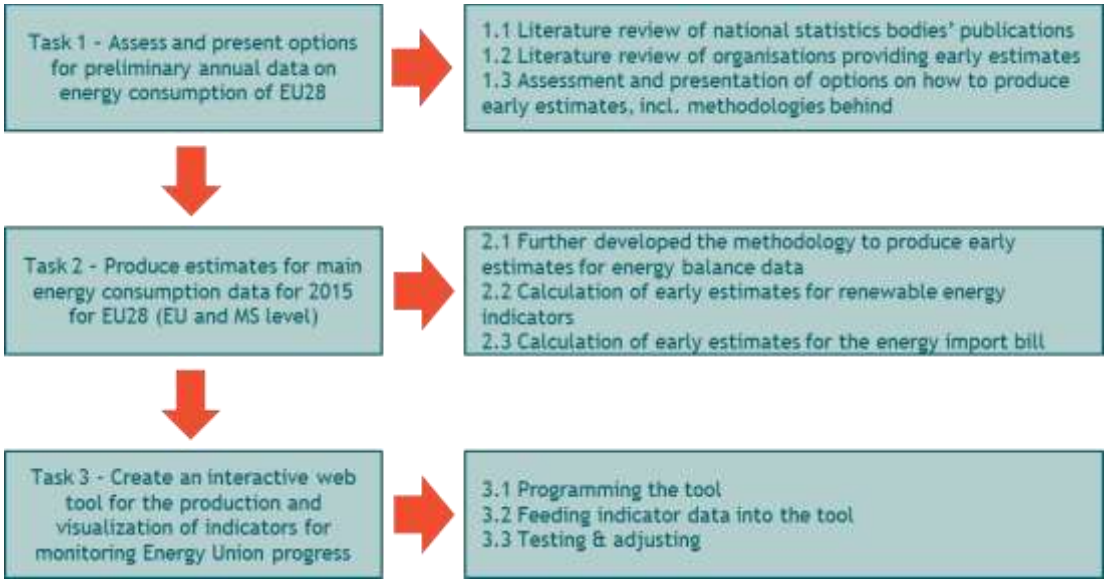
The monitoring and assessment of the process of the Energy Union target and objectives serves various purposes:

- ✓ To provide a holistic assessment of progress towards a competitive and secure energy system
- ✓ To assess progress over time
- ✓ To assess the specific impacts of the 2030 climate and energy policy targets
- ✓ To identify key issues that need to be addressed
- ✓ To detect inconsistencies between market and policy developments and overall objectives
- ✓ To provide a factual base for future policy changes at EU and MS level

An integrated governance and monitoring process, to make sure that energy-related actions at European, regional, national and local level all contribute to the Energy Union's success, is of key importance for achieving the Energy Union objectives. Barriers that hamper the efficient monitoring and assessment of the progress of the Energy Union should be removed.

This report describes all three tasks of this assignment, as depicted in the figure below.

Figure 1-1 Overview of the approach



1.2 Structure of the report

Following this introduction and brief context this report contains the following sections:

- **Section 2 – Data sources and methods:** Identifies and assesses options for collecting or calculating preliminary data (or 'early estimates') on annual energy consumption for EU Member States and the EU as a whole for the year t-1 (i.e. currently 2015) within eight to nine months of the end of the year. The assessed options include the implementation methodologies to enable a critical evaluation of the future implementation of these methodologies. This includes risks, pros and cons, including the parties involved, legal implications, and estimated timings.
- **Section 3 - Calculation of estimates:** Focuses on producing the early estimates for the year 2015 both for the EU as a whole and each EU Member State on the basis of the methodology developed. This involved the following sub tasks: Calculation of early estimates of energy balances – according to three methodologies developed and described in section 2. Calculation of early estimates for the share of renewable energy. Calculation of early estimates of the energy import bill. The early estimates were provides as MS Excel files (1 file per country, 1 file for the EU and 1 file with all the data), with visible formulas proving the methodology and showing the data sources.
- **Conclusions:** A summary of the method for early estimates including a discussion of its strengths and weaknesses in comparison to the two other best known sources of early estimates – the Eurostat monthly figures and the EEA.

1.3 Context

1.3.1 The Energy Union

In February 2015 the European Commission published a communication on the Energy Union Package "A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy". The

package states the goal of the Energy Union as "to give EU consumers – households and businesses – secure, sustainable, competitive and affordable energy".[2]

In order to reach these goals five mutually-reinforcing and closely interrelated dimensions were set out in the package:

- ✓ **Energy security, solidarity and trust:** This dimension entails the diversification of supply (energy sources, suppliers, and routes), enhanced coordination between stakeholders to ensure a high-level of energy security, a stronger role of Europe in the global energy market and more transparency on energy (in particular gas) supply.
- ✓ **A fully-integrated European energy market:** In order to create a well-functioning market with sufficient investments, energy markets need to be connected through (cross-border) interconnections and existing energy legislation must be fully implemented and enforced. Member States must cooperate when developing national energy policies, consumers must be empowered to make informed decisions on energy consumption and vulnerable consumers must be protected (e.g. reducing energy poverty).
- ✓ **Energy efficiency contributing to moderation of demand:** Energy efficiency is seen as an energy source in its own right (i.e. as the value of energy saved). In all economic sectors energy efficiency must be increased, but in particular in the transport and buildings sector. Synergies between national energy efficiency policies, resource efficiency policies and the circular economy must be established.
- ✓ **Decarbonising the economy:** Climate policy is based on an EU-wide carbon market (EU emissions trading system (ETS)), national greenhouse gas reduction targets for sectors that are not included in the EU ETS and an energy policy with a strong focus on the development of renewable energy.
- ✓ **Research, Innovation and Competitiveness:** A new strategy for research and innovation must be created to lead the next generation of both renewable technologies and storage solutions.

These dimensions are not new, as the first EU internal energy markets discussions already started in the 1980s. However, they are now grouped, interlinked and clearly written down in one communication with a clear identification of the way forward.

The communication also stresses that the Energy Union needs an "integrated governance and monitoring process, to make sure that energy-related actions at European, regional, national and local level all contribute to the Energy Union's objectives".[3] The governance system will streamline and bring together separate planning and reporting strands identifying the National Energy and Climate Plans and State of the Union progress reports as essential elements of the new governance system. The Energy Union governance should serve the additional purposes of securing the implementation of the internal energy market and the delivery of the 2030 energy and climate framework goals, carrying out stakeholder energy dialogues, deepening the cooperation between Member States, and improving the knowledge underpinning the Energy Union by pooling and streamlining more fact-based data, analysis and intelligence, and making it more easily accessible to all stakeholders.

[2] COM(2015) 80 final
[3] COM(2015) 80 final

In November 2015 the first annual report of the State of the Energy Union was published consisting of various documents that evaluate the progress made in 2015 for each of the five dimensions and identify key issues that need political attention in 2016. An annex *Guidance to Member States on national energy and climate plans as part of the Energy Union governance*[4] was presented that provides guidance to Member States on the process of developing their integrated national energy and climate plans. The national plans should take a holistic approach addressing the five dimensions of the Energy Union in an integrated way including their interactions. They should build on the national policies for 2020, cover the period from 2021 to 2030 delivering on the commonly agreed objectives of the Energy Union and include a perspective until 2050 in order to ensure consistency with long term policy objectives at the EU and national level.

1.3.2 Monitoring the progress of the Energy Union

In an accompanying document to the Communication of November 2015 - the Commission staff working document *Monitoring progress towards the Energy Union objects – Concept and first analysis of key indicators*[5]- an overview of the selected main indicators of the Energy Union objectives was presented as well as a scoreboard of these indicators per Member State and at EU level. Country fact sheets accompanying the State of the Energy Union communication provided a more detailed overview of the Energy union at MS-level. In addition to the indicators that fall under one of the dimensions of the Energy Union, other indicators and data are also relevant for the monitoring of the progress of the Energy Union. These indicators and data include:

- ✓ Turnover in the renewable energy sector
- ✓ Consumer Prices Index[6]
- ✓ Energy and transport related taxes[7]
- ✓ Progress in Cohesion Policy investments supporting the Energy Union

The European Commission stresses that a timely and regular (annual) monitoring of the trends and values is relevant. With respect to the monitoring of the progress of the Energy Union various challenges can be identified:

- ✓ **To ensure the timely collection of data from Member States:** At the moment, the statistics of energy consumption data are provided 13 months from the end of the reported year and therefore the time-lag of reporting and the reported year can run up to two years.[8] Faster reporting is needed in order to provide an up-to-date overview of the state of the Energy Union. MS statistics on preliminary energy data must be reported to EUROSTAT at a faster level. Furthermore, early estimates of main energy data in the MSs are needed (8 months after the end of the year).
- ✓ **To ensure an accurate, timely and continuous monitoring of the progress:** The progress of the Energy Union should be monitored in a timely and accurate manner. However, collecting data and aggregating them into indicators is complex both at MS-level and EU-level and impedes the timeliness of the monitoring process. A need to automatize this progress exists to reduce the administrative burden of the process. As the Energy Union governance is still in its development phase, the indicators can still be subject to change and may be replaced by more

[4] COM(2015) 572 final Annex 2
[5] SWD(2015) 243 final
[6] This indicator measures the change over a year of the prices of consumer goods and services. It measures the relative contribution of energy to inflation.
[7] Taxation on energy includes taxes on carbon and energy produces. Transport related taxes excluding fuels include registration taxes and circulation taxes
[8] For example, the State of the Union 2015 provides an overview of the scoreboard of indicators in 2013.

suitable indicators. It is relevant to create a consistent database to enable the continuous and consistent monitoring of the state of the Energy Union. The development of a software production tool will not only reduce the administrative burden but can also cope with potential changes in the monitoring process.

- ✓ **To ensure a transparent monitoring process:** The monitoring process should be done in a transparent manner by making the indicators publicly available including a detailed description and sources of each indicator. The key indicators need to be visualised in an understandable manner. An interactive web tool should be created to present the indicators on the web. Comparison of different time frames and Member States should be possible.

2 Options for producing preliminary annual data on energy consumption of the EU as a whole and for each of the 28 Member States within 8 months of year end

2.1 Objectives

This section identifies and assesses options for collecting / calculating preliminary data (or 'early estimates[9]') on **annual energy consumption** for **EU Member States and the EU** as a whole for the **year t-1** (i.e. currently 2015) within eight to nine months of the end of the year, so by September or October 2016 for 2015. The assessed options include the implementation methodologies to enable a critical evaluation of the potential future implementation of these methodologies (risks, pros and cons, including the parties involved, any legal implications, estimated timings etc.)

2.2 Approach

There are two main types of organisations that provide data that can be used to calculate early estimates of annual energy consumption. It is important to note that in many of the cases the data releases in question are monthly data (i.e. data that is released on a monthly basis to give near-time information on energy markets and flows).

- **National energy statistical organisations**, the organisations that provide the information to Eurostat from each country to enable Eurostat to produce energy balance datasets. Depending on the country, these organisations can be the energy statistical unit of a Ministry (for example, as in France and the UK), or the national statistical institute (for example as in Austria and Poland), or the national energy agency (for example as in Ireland and Sweden), or a specialised organisation (as in Germany);
- **Organisations providing early data for most EU countries**
  - International and regional statistical organisations such as Eurostat, the International Energy Agency (IEA)
  - The European Networks of Transmission System Operators for gas and electricity (ENTSO-E, ENTSO-G)
  - European agencies such as the European Environmental Agency (EEA);
  - Private data providers (e.g. Cedigaz, Enerdata, Eurobserv'ER) or energy companies (such as BP).

For each of these sources we have reviewed the data they provide on year t-1, with the review including the date of release. We then identify what are the best options to provide early estimates for each country

2.3 Outputs

The three main outputs of this task are:

[9] Known as early estimates because this annual data is not available from Eurostat until t+13 months.

1. A literature review of national statistics bodies' publications;
2. A literature review of organisations providing early estimates;
3. An assessment and presentation of the options for producing early estimates.

2.4 Literature review of national statistics bodies' publications

This data mapping subtask involved a review of the websites of energy statistics organisations in order to collect early estimates data[10] and provide a comprehensive overview by statistical source of what is available for each country.

We have prepared a matrix (see Table 2-1) to summarise the situation by indicating for each country the type of data released (full energy balance, energy supply data, etc.), the date of publication of preliminary and final data, the cost (if applicable), the language, the match with Eurostat data and the link to the data.

[10] The data are provided within the documents submitted alongside this report

Table 2-1 Data mapping for national energy statistical organisations[11]

Country	Organisation providing early estimates	Type of data provided	Date early estimates	Status	Cost (i)	Date consolidated data	Compatibility with Eurostat methodology (see the criteria below)	Language	Comments
Austria	Statistics Austria	Full energy balance	T+5 month	PREL	Free	T+15 month	3	English	
Belgium	Early Estimates : Synergrid; Consolidated : Energy observatory	Electricity supply, electricity final consumption, Gas supply and gas final consumption	T+3 month	PREL	Free	T+ 16 month	3	French	Data finalised internally in T+11 month
Bulgaria	National Statistical Institute	Natural gas, Solid fuel and electricity supply data			Free	T+15 month		English	
Croatia	Croatian bureau of statistics	Energy supply	T+5 month	PREL	Free	T+12 month	3	English/Croatian	
Cyprus	Republic of Cyprus, Statistical service	Electricity data including final consumption by sector	T+8 month	PREL	Free	T+?	2	English	
Czech Republic	Czech Statistical Office; Energy Regulatory Office	Oil supply, gas supply, final consumption for some sectors and some energies	T+3 month / T+6 month	PREL	Free	T+13 month		English / Czech	
Denmark	Danish Energy Agency	Production and consumption data by energy	T+6 month	PREL	Free	T+10 month	3	English	
Estonia	Statistics Estonia	Electricityand heat production, electricity consumption of industry and hty and households, oil consumption by oil	T+6 month	PREL	Free	T+9 month	3	English	
Finland	Statistics Finland	Full energy balance	T+3 month	PREL	Free	T+12 month	3	English	
France	Ministry of Environment, Energy and Sea	Full energy balance with consumption split by sector	T+3 month	PREL	Free	T+7 month	3	French	
Germany	AGEB	Full energy balance with consumption split by sector	T+3 month	PREL	Free	T+ 17 month	1	English	
Greece									No early estimates
Hungary	Hungarian central statistical office	Total primary energy consumption	T+? month	PREL	Free	T+14 month	3	English	Only useful to validate our estimations
Ireland	Sustainable Energy Authority of Ireland	Supply data and total final consumption data by energy (detailed)	T+5 month	PREL	Free	T+11 month	1	English	
Italy	Minitry of developpement economic (Ministero dello Sviluppo Economico); Gestore dei Servizi Energetici (GSE)	Full energy balance	T+3 month	PREL	Free	T+?	2	Italian	
Latvia	Central Statistical Bureau of Latvia	Heat production and related inputs, electricity production by source	T+8 month	PREL	Free	T+10 month	1	Latvian	
Lithuania	Official Statistics Portal	Gross inland consumption	T+8 month	PREL	Free	T+9 month	1	English	
Luxembourg						T+12 month		English	No early estimates available. 2015 monthly data only.
Malta									No early estimates
Netherlands	Statistics Netherlands	Full energy balance with consumption split by sector	T+5 month	PREL	Free	T+13 month	3	English	
Poland	Central Statistical office of Poland	Supply data	T+1 month	PREL	Free	T+11 month	1	English/Polish	Very few data. Only useful to validate our estimations
Portugal	Direction General of Energy and Geology (DGEG) (Direção Geral de Energia e Geologia)	Electricity production by source	T+4 month	PREL	Free	T+16month	3	English / Portugese	
Romania	Institute national of statistics	Supply energy data detailed by products and power plant inputs	T+2 month		Free	T+11 month	3	Romanian	
Slovakia	Statistical office of the Slovak Republic	Electricity production by main sources	T+? month	PREL	Free	T+12 month	3	English/Slovakian	Very few data
Slovenia	Republic of Slovenia; statistical office	Supply energy data. Not detailed by product	T+5 month	PREL	Free	T+?	1	English	
Spain	Ministry of industry, energy and tourism	Full energy balance with consumption split by sector	T+6 month	PREL	Free	T+ ?	1	Spanish	
Sweden	Swedish energy agency; Statistics Sweden	Final consumption and gross supply of energy	T+7 months	PREL	Free	T+?	3	English	
United Kingdom	Department of Energy and Climate Change (DECC)	Full energy balance	T+3 month	PREL	Free	T+7 month	3	English	

*** see next page for a detailed explanation of this term**

[11] This table and the detailed comparison between national data and Eurostat data are provided in an Excel file submitted alongside this report

The national early estimates data for 2014, were compared with the consolidated Eurostat data for that year for the following 6 data items:

- Gross inland consumption
- Final energy consumption
- Industry
- Transport
- Services
- Residential

For each data item the gap between the consolidated 2014 national annual data from the national early estimate source described above and the Eurostat 2014 consolidated annual data has been calculated. This is intended to give an indication of the match between the data produced via the national statistics methodology with the data produced by Eurostat. A small gap between the two sources indicates that the national data and the Eurostat data are comparable. The table below provides an example of the comparison for Germany (the comparison was also carried out for the other countries):

Comparison between 2014 consolidated national annual data and Eurostat 2014 consolidated data for Germany

Germany - 2014 (ktoe)	Eurostat	National data	Gap 2014 (%)
Gross inland consumption	313936	314789	0.3%
Final energy consumption	208881	207767	-0.5%
Industry	60715	60796	0.1%
Transport	63467	62471	-1.6%
Services	33043	84500	-0.1%
Residential	51527		

Source of national data: Arbeitsgemeinschaft Energiebilanzen (AGEB)

The match between the two data sources was assessed according to the following criteria:

Rating	Criteria
1	Gap 2014 < 5% for all the data covered
2	5% < Gap 2014 < 10% for at least 1 data item
3	10% < Gap 2014 for at least 1 data item

For the German example the gap does not exceed 5% in any of the data items, so the rating is 1. The rating for the other countries is provided in table 2-1 in the 'Match with Eurostat data' column). The detailed comparison tables are provided in an Excel file submitted alongside this report.

The gaps between national data and Eurostat data can be explained by a combination of the following reasons:

- Different definitions, mainly regarding:
    - Aircraft fuel bunkers: Eurostat includes aircraft fuel bunkers in the transport sector whereas the IEA, Enerdata and several countries include them under the international bunkers heading, which means that they are not included in primary and final consumption.

  - Data at real climate or normal climate: French energy consumption statistics are published with a correction for normal climate, i.e. corrected to remove the influence of climatic variations between years.
  - Different classifications of final consumption by sector (for Austria for example).
- Revisions done at different times (there can be a difference in timing between when national sources update the data they release nationally and when they provide this data to Eurostat, although Eurostat publish (and revise) all their data when they receive updates from Member States).

In terms of data coverage and the gap between Eurostat and national data coverage our literature review shows that:

- All countries except 6 (Greece, Hungary, Luxembourg, Malta, Poland and Slovakia) provide some form of early estimates.
- 7 countries (Austria, France, Germany, Italy, Finland, the Netherlands and the UK) provide a full energy balance (supply + final consumption split by sector) covering total energy consumption and almost all the energy types / sources with varying degrees of detail. Among these countries 1 country (Germany) uses a methodology very close to that of Eurostat, 1 country (Italy) provides at least 1 data item where the variation between it and Eurostat data is 5-10% and the other 5 countries use different methodologies. For the 6 countries with the gaps caused by the differences in definition described above we have corrected the data where possible.
- 15 countries provide partial early estimate data. Of these, 5 countries use a methodology very close to that of Eurostat. The results generated differ from that of Eurostat by 5-10% for 2 countries with a larger variation than this for 7 countries. Because of a lack of 2014 data from the source providing early estimates it was not possible to compare Czech Republic National data with those of Eurostat.

The information collected allows us to classify the countries into 6 clusters (Table 2-2). The classification has been done on the basis of the type of data available and the comparability of these data with the data presented by Eurostat.

Table 2-2 Country clustering based on the type of data available and the comparability with Eurostat methodology

Comparability with Eurostat	Type of data		
	A - Full energy balance	B - Few / partial data	C - No data
1	DE	IE, LV, LT, SI, ES, CZ[12]	EL, HU[13], LU, MT, PL, SK[14]
2	IT	BG, CY	
3	AT, FI, FR, NL, UK	BE, HR, DK, EE, PT, RO, SE[15]	

[12] For CZ there is no 2014 data published by the source providing 2015 early estimates. This means that the comparability with the Eurostat data cannot be assessed.

[13] 2015 early estimates available only for total primary consumption

[14] Early estimates available only for electricity production by source

[15] Early estimates available for all data except residential, services and other sector energy consumption

We have concluded from this literature review that three different methodologies are needed to calculate early estimates depending on the availability of national data. Some adjustment of the national data to align them with the Eurostat methodology (e.g. to overcome the differences in definitions) is necessary depending on the comparability of the sources with Eurostat data.

2.5 Literature review of transnational statistics bodies' publications

The aim of this data mapping from transnational sources was to check the data produced by energy statistics organisations and provide a comprehensive overview of what is available by statistical source and country.

We have prepared a matrix (see Table 2-3) to summarise the situation by indicating for each source the type of data released (Full energy balance, supply data, etc.), the date of publication of preliminary and final data, the cost, the language and a link to the data.

Table 2-3 Data mapping for transnational organisations providing early estimates for most of the EU countries

Organisation	Type of data provided	Coverage	Date early estimates	Status	Date consolidated data	Cost (l)	Match with Eurostat data*	Accuracy	+/- compared to Eurostat monthly data	Name/link to data source
Statistical data sources										
Eurostat (Monthly data)	Supply data on oil, gas, coal, power, biofuels	28 EU MS	T+6/T+7 month if we want data for all countries	FIN		Free	1	3		http://ec.europa.eu/eurostat/data/database
IEA	Supply data	21 EU MS	T+5 month	PREL	T+8 month	1520 l/year for 10 users for the Quarterly Statistics and 7000 l/year for the World Energy Statistics	2	1	More data covered and more accurate data	https://www.iea.org/statistics/
JODI (Monthly data)	Supply oil and gasdata	28 EU MS	T+4 month	FIN		Free	3	nr	No additional coverage	https://www.jodidata.org/
European associations and agencies										
Entsoe	Total electricity production & consumption Nuclear, fossil, hydro and other renewable production	28 EU MS			T+13 months	Free		Not enough data to analyse it	Covers PV production data	https://www.entsoe.eu/Pages/default.aspx
EEA	Share of RES in the gross final energy consumption, gross final energy	28 EU MS	T+8 month	FIN		Free	1	3		
Other transnational sources										
Eurobserv'ER	Production, consumption and capacities	28 EU MS	T+2 for wind and T+4 for PV T+5 for CSP capacity T+7 for biofuels	PREL	T+14 for wind and T+18 for PV T+17 for CSP capacity T+19 for biofuels	Free	1	2	Covers PV and wind production data, CSP capacity, Biofuel consumption data	http://www.eurobserv-er.org/
BP	Energy supply	Depends on the energy	T+6 month	PREL	T+18 month	Free	1	1	No additional coverage	http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html
Cedigaz	Gas supply data	12 EU MS	T+4/T+5 month	PREL	T+9 months	8 k/year for "Full members"	3	2	No additional coverage	http://www.cedigaz.org/
Enerdata	Full energy balance	15 EU MS	T+6 month	PREL	T+11	25 k/year for 20 users	2	1	+: Full energy balance, detailled data -: Need to adapt data (aviation bunkers excluded from the consumption, coking coal consumption comptabilised in industry,etc)	http://www.enerdata.net/
Eurogas	Production	28 EU MS	T+3 month	PREL	T+12 months	Free		2	No additional coverage	http://www.eurogas.org/statistics/

* See next page for detailed explanations

The transnational early estimates data have been compared with 2014 German[16] data based on Eurostat; primary consumption data were taken from Enerdata, the IEA and BP; natural gas consumption from Cedigaz and Eurogas; and wind electricity production from Eurobserv'er.

For each source the gap between 2014 transnational consolidated data and 2014 Eurostat consolidated data has been calculated and the comparability with the data produced via the Eurostat methodology has been assessed on the basis of the following scoring criteria:

Criteria used to estimate the compatibility with Eurostat methodology[17]

Score	Criteria
1	Gap 2014 < 5% for the selected data series
2	5% < Gap 2014 <10% for the selected data series
3	10% < Gap 2014 for the selected data series

The two main criteria we relied upon to select the data sources to calculate early estimates are the data coverage and the data accuracy.

2.5.1 Conclusions of the transnational sources' literature review in terms of data coverage, and recommendations

The main findings of this literature review in terms of data coverage are:

- Eurogas provides limited data (natural gas consumption only) and Cedigaz data do not match with Eurostat data.
- BP provides annual data but is not a primary source of data.
- Enerdata provides a full energy balance with detailed data but it is not a primary source of information. The methodology used, although very close to Eurostat, has some differences and in order to make the data comparable some adjustments would need to be made (e.g. aviation bunkers excluded from the consumption, coking coal consumption made compatible for industry, etc.).
- ENTSO-E provides power generation data from oil, gas, coal, biomass and solar including CSP, but only covers installations above 100 MW, meaning that the data is not completely in line with Eurostat data.
- Eurobserv'ER covers wind and PV electricity production and biofuels consumption for transport, and the data are almost in line with Eurostat data.
- The EEA publishes data on the share of renewable energies (RES) in gross electricity production and gross final consumption in August of each year. These data could allow for the estimates of RES shares to be validated.
- Eurostat monthly data are not sufficient to calculate early estimates: they only cover the supply part of the balance and are not available for some important variables, such as:
    - Power production from thermal and solar energy
    - Manufactured gas
    - Derived heat

[16] The comparison has been made in task two for all countries for the sources finally selected to calculate early estimates

  - Solid biofuels and municipal wastes
  - Non-renewable wastes
  - Nuclear heat;
- The IEA data from their monthly survey has a wider coverage of fuel types than the Eurostat monthly data but only provides supply data and only covers 21[18] MS. The IEA methodology is very close to the Eurostat methodology, with the exception of the accounting of aviation bunkers, which are included in the energy consumption for Eurostat and excluded for the IEA.

Our recommendations in terms of data coverage are:

⇨ In order to maximise the coverage of the early estimates we recommend using a mix of the following transnational sources: IEA, Eurostat monthly, ENTSO-E and Eurobserv'er. Enerdata and BP are not primary data sources, and Eurogas and Cedigaz provide limited data or data that does not match with Eurostat data. These data sources can be used to validate the early estimates, if necessary.

⇨ Whatever the source, some gaps between the source and Eurostat yearly data occur. To calculate early estimates, we recommend starting from Eurostat data at year t-2 in physical units specific to each energy carrier (e.g. GWh for electricity, Mm^3 for gas, etc.) and applying the annual variation between t-1 and t-2 from one of the transnational data sources listed in the bullet point above. Whenever possible, national data would be harmonised to the Eurostat definition (mainly for air bunkers and data at normal climate). In addition, a restatement of the IEA gross inland consumption data is necessary for oil and total consumption to include aviation bunkers in the consumption.

2.5.2 *Conclusions of the transnational sources' literature review in terms of data suitability for producing early estimates, and recommendations*

Assessment of the deviation between Eurostat monthly and annual data with regard to using the Eurostat monthly data to calculate early estimates

Eurostat release monthly energy data for each Member State some 2-4 months after the month to which it refers, i.e. in September 2016 Eurostat published data up to July 2016. To assess the differences between the data that Eurostat releases on a monthly basis with the consolidated data it releases on an annual basis, we have compared the annual total of the monthly data for the years 2013 and 2014 with the consolidated Eurostat annual data for the same years.

The comparison shows that in 2013 and 2014 the sum of the monthly Eurostat data is generally close to annual data for natural gas and gross inland consumption (see table 2-4 below). In these two years the gap is never greater than +/- 5% except for Croatia and Slovakia. The gap is between +/- 1% for 18 countries.

[18] 20 OECD +1 Non-OECD MS

Table 2-4 Comparison of monthly (M) and annual (A) Eurostat data for natural gas gross inland consumption

GEO/TIME	2013A (TJ GCV)	2013M (TJ GCV)	GAP M/A 2013	2014A (TJ GCV)	2014M (TJ GCV)	GAP M/A 2014
European Union (EU28)	18 018 641	17 960 137	-0.3%	15 951 323	16 038 719	0.5%
Belgium	669 671	660 514	-1.4%	586 118	578 598	-1.3%
Bulgaria	111 543	107 237	-3.9%	109 908	106 221	-3.4%
Czech republic	323 147	321 731	-0.4%	287 592	287 317	-0.1%
Denmark	154 259	154 837	0.4%	130 877	129 368	-1.2%
Germany	3 400 715	3 417 212	0.5%	2 934 985	3 042 405	3.7%
Estonia	25 814	25 814	0.0%	20 262	20 262	0.0%
Ireland	178 379	186 919	4.8%	173 172	173 190	0.0%
Greece	150 552	150 436	-0.1%	115 570	115 314	-0.2%
Spain	1 217 097	1 213 346	-0.3%	1 100 956	1 101 056	0.0%
France	1 814 656	1 745 034	-3.8%	1 516 418	1 516 357	0.0%
Croatia	106 152	96 897	-8.7%	93 943	88 462	-5.8%
Italy	2 669 630	2 669 174	0.0%	2 358 847	2 358 852	0.0%
Cyprus	0	0		0	0	
Latvia	56 042	55 778	-0.5%	50 318	50 304	0.0%
Lithuania	100 693	100 616	-0.1%	96 041	95 730	-0.3%
Luxembourg	41 574	41 399	-0.4%	39 414	39 224	-0.5%
Hungary	363 205	355 961	-2.0%	324 785	324 618	-0.1%
Malta	0	0		0	0	
Netherlands	1 558 389	1 549 265	-0.6%	1 351 762	1 352 961	0.1%
Austria	328 431	323 080	-1.6%	299 813	296 802	-1.0%
Poland	638 991	641 719	0.4%	623 574	624 820	0.2%
Portugal	174 723	180 229	3.2%	161 580	166 555	3.1%
Romania	457 708	478 718	4.6%	435 628	449 656	3.2%
Slovenia	32 185	32 171	0.0%	29 122	29 157	0.1%
Slovakia	212 040	223 077	5.2%	175 489	148 059	-15.6%
Finland	133 008	131 695	-1.0%	117 049	115 651	-1.2%
Sweden	44 440	44 520	0.2%	36 939	36 939	0.0%
United Kingdom	3 055 597	3 052 758	-0.1%	2 781 161	2 790 841	0.3%

M: Monthly data , A: Annual data

Red= GAP<-5% or GAP>5%

However, the gaps between the monthly and annual values are much larger for oil. Table 2-5 below shows that the gaps between total oil gross inland consumption in Eurostat monthly and annual data are below -5% or above +5% for 6 countries in 2013 (Belgium, Latvia, Hungary, Malta, the Netherlands and Portugal) and for 4 countries in 2014 (Belgium, Bulgaria, Estonia and the Netherlands).

Table 2-5 Comparison of monthly (M) and annual (A) Eurostat data for oil gross inland consumption

GEO/TIME	2013A (kt)	2013M (kt)	GAP M/A 2013	2014A (kt)	2014M (kt)	GAP M/A 2014
European Union (EU28)	549 362	571369	4.0%	548 989	568651	-3.5%
Belgium	22 478	24273	8.0%	23 123	24796	-6.7%
Bulgaria	3 689	3673	-0.4%	4 095	3892	5.2%
Czech republic	8 405	8588	2.2%	8 904	9137	-2.6%
Denmark	6 920	6817	-1.5%	6 633	6836	-3.0%
Germany	109 635	113137	3.2%	107 340	110826	-3.1%
Estonia	1 067	1017	-4.7%	1 088	1235	-11.9%
Ireland	6 595	6586	-0.1%	6 452	6586	-2.0%
Greece	11 435	11992	4.9%	12 004	12013	-0.1%
Spain	49 787	51046	2.5%	48 796	50220	-2.8%
France	76 706	78557	2.4%	75 711	77394	-2.2%
Croatia	3 220	3310	2.8%	3 189	3088	3.3%
Italy	56 950	57838	1.6%	55 077	55633	-1.0%
Cyprus	2 061	2058	-0.1%	2 108	2115	-0.3%
Latvia	1 374	1285	-6.5%	1 398	1382	1.2%
Lithuania	2 457	2531	3.0%	2 474	2573	-3.8%
Luxembourg	2 735	2806	2.6%	2 626	2681	-2.1%
Hungary	5 690	6332	11.3%	6 393	6454	-0.9%
Malta	870	817	-6.1%	877	843	4.0%
Netherlands	31 660	40602	28.2%	33 946	39157	-13.3%
Austria	12 091	12291	1.7%	11 845	11997	-1.3%
Poland	22 715	22887	0.8%	22 554	23729	-5.0%
Portugal	10 050	10930	8.8%	9 945	10024	-0.8%
Romania	8 302	8217	-1.0%	8 473	8559	-1.0%
Slovenia	2 319	2309	-0.4%	2 300	2250	2.2%
Slovakia	3 505	3484	-0.6%	3 256	3352	-2.9%
Finland	8 275	8046	-2.8%	9 467	9328	1.5%
Sweden	12 178	12227	0.4%	12 040	12098	-0.5%
United Kingdom	66 193	67713	2.3%	66 875	70453	-5.1%

M: Monthly data , A: Annual data

Red= GAP<-5% or GAP>5%

Tables 2-6 and 2-7 show that several gaps above 5% and below -5% also occur for coal (14 of 28 MS) and lignite gross inland consumption.

Table 2-6 Comparison of monthly and annual Eurostat data for coal gross inland consumption

GEO/TIME	2013A (kt)	2013M (kt)	GAP M/A 2013	2014A (kt)	2014M (kt)	GAP M/A 2014
European Union (EU28)	321573	308 024	-4.2%	295878	285 346	-3.6%
Belgium	4997	4 092	-18.1%	4484	4 392	-2.1%
Bulgaria	1759	1 810	2.9%	1848	1 978	7.0%
Czech republic	7057	7 180	1.7%	7371	7 397	0.4%
Denmark	5344	5 467	2.3%	4028	4 424	9.8%
Germany	62744	53 204	-15.2%	61730	54 305	-12.0%
Estonia	61	59	-3.3%	78	82	5.1%
Ireland	2133	930	-56.4%	2029	501	-75.3%
Greece	302	106	-64.9%	274	177	-35.4%
Spain	20610	18 475	-10.4%	21385	20 160	-5.7%
France	18329	19 876	8.4%	13211	14 378	8.8%
Croatia	1058	1 072	1.3%	1028	1 031	0.3%
Italy	21071	21 306	1.1%	20103	20 025	-0.4%
Cyprus	0	0		4	4	0.0%
Latvia	121	127	5.0%	102	97	-4.9%
Lithuania	356	357	0.3%	308	311	1.0%
Luxembourg	75	75	0.0%	85	78	-8.2%
Hungary	1591	1 330	-16.4%	1534	1 367	-10.9%
Malta	0	0		0	0	
Netherlands	12969	12 891	-0.6%	14610	13 204	-9.6%
Austria	3561	3 461	-2.8%	3212	3 130	-2.6%
Poland	78783	78 521	-0.3%	73559	73 227	-0.5%
Portugal	4448	4 450	0.0%	4517	4 519	0.0%
Romania	920	899	-2.3%	800	728	-9.0%
Slovenia	421	0		394	0	
Slovakia	3917	3 783	-3.4%	3848	3 766	-2.1%
Finland	5836	5 650	-3.2%	4558	4 555	-0.1%
Sweden	2832	2 530	-10.7%	2672	2 759	3.3%
United Kingdom	60278	60 374	0.2%	48106	48 751	1.3%

M: Monthly data , A: Annual data

Red= GAP<-5% or GAP>5%

Table 2-7 Comparison of monthly (M) and annual (A) Eurostat data for lignite gross inland consumption

GEO/TIME	2013A (kt)	2013M (kt)	GAP M/A 2013	2014A (kt)	2014M (kt)	GAP M/A 2014
Belgium	0	0		0	0	
Bulgaria	28719	28 540	-0.6%	31440	31 225	-0.7%
Czech republic	38936	39 579	1.7%	38330	38 660	0.9%
Denmark	0	0		0	0	
Germany	182491	182 520	0.0%	176956	177 042	0.0%
Estonia	0	20 187		0	20 254	
Ireland	0	9		0	1	
Greece	54386	53 085	-2.4%	51878	49 023	-5.5%
Spain	0	1 754		0	1 694	
France	146	146	0.0%	177	161	-9.0%
Croatia	56	49	-12.5%	46	44	-4.3%
Italy	5	1	-80.0%	3	0	
Cyprus	1	0	-100.0%	0	0	
Latvia	0	0		0	0	
Lithuania	1	0		0	0	
Luxembourg	0	1		0	0	
Hungary	9662	9 985	3.3%	9189	9 381	2.1%
Malta	:	0		:	0	
Netherlands	24	25	4.2%	31	47	51.6%
Austria	11	83	654.5%	12	94	683.3%
Poland	65934	65 888	-0.1%	63845	63 793	-0.1%
Portugal	0	0		0	0	
Romania	24971	24 128	-3.4%	25435	24 406	-4.0%
Slovenia	4030	4 037	0.2%	3186	3 157	-0.9%
Slovakia	2730	2 691	-1.4%	2451	2 518	2.7%
Finland	0	0		0	0	
Sweden	0	0		0	0	
United Kingdom	0	0		0	0	

M: Monthly data , A: Annual data

Red= GAP<-5% or GAP>5%

Even in the case of countries where the monthly total is very close to the annual consolidated total, some large gaps between monthly and annual Eurostat data can occur for some series. Table 2-8 below shows, for the example of Germany, that Eurostat monthly data are very close (and sometime equal) to the yearly Eurostat data for oil, electricity, natural gas and coal, with the exception of the following:

- **Stock changes statistics:** The sum of monthly data does not provide a good estimate of the annual stock changes. A possible explanation is that, for annual data, stock changes are often used as a swing variable by statisticians to improve the consistency of supply data (i.e. if the annual production, imports, exports, stock change and gross inland consumption data are not consistent then the consistency is achieved by adjusting the stock changes statistics)
- **Imports and export statistics for coal and gas:** Natural gas and coal trade data include transit in monthly data but they are excluded in annual data

Table 2-8 Comparison between Eurostat monthly data (M) and annual data (A) for EU-28 in 2013 and 2014[19]

Oil (total)						kt
	2013A	2013M	GAP 2013	2014A	2014M	GAP 2014
Production	7 426	7 437	0%	7 185	7 179	0%
Imports	128 153	128 240	0%	126 332	126 498	0%
Exports	20 048	20 114	0%	21 105	21 131	0%
Stock Changes	-379	-74	80%	479	636	33%
Bunkers	2 355	2 352	0%	2 357	2 356	0%
Gross Inland Consumption	109 635	113 137	3%	-3 192	0	-100%

[19] As the sign of stock changes is the opposite between monthly and annual data (except for natural gas), it has been changed for monthly data (except for natural gas), to allow the comparison.

Natural gas						TJ GCV
	2013A	2013M	GAP 2013	2014A	2014M	GAP 2014
Production	412 433	418 068	1%	319 315	358 392	12%
Imports	3 812 138	3 700 714	-3%	3 504 877	5 607 787	60%
Exports	856 197	733 911	-14%	868 427	2 916 187	236%
Stock Changes	32 341	32 341	0%	-20 780	-7 587	-63%
Gross Inland Consumption	3 400 715	3 417 212	0%	2 934 985	3 042 405	4%

Electricity						Gwh
	2013A	2013M	GAP 2013	2014A	2014M	GAP 2014
Production	0	0	0%	0	0	0%
Imports	39 222	39 222	0%	40 435	40 435	0%
Exports	71 415	71 418	0%	74 320	74 322	0%
Stock Changes	0	0	0%	0	0	0%
Gross Inland Consumption	-32 193	-32 196	0%	-33 885	-33 887	0%

Coal						kt
	2013A	2013M	GAP 2013	2014A	2014M	GAP 2014
Production	8 260	8 260	0%	8 337	8 336	0%
Imports	54 319	44 849	-17%	53 740	45 935	-15%
Exports	251	176	-30%	208	142	-32%
Stock Changes	416	271	-35%	-139	-176	27%
Gross Inland Consumption	62 744	53 204	-15%	61 730	54 305	-12%

Lignite						kt
	2013A	2013M	GAP 2013	2014A	2014M	GAP 2014
Production	182 696	182 696	0%	178 178	178 178	0%
Imports	18	0	-100%	13	14	8%
Exports	179	179	0%	1 171	1 171	0%
Stock Changes	-44	-3	-93%	-64	-21	-67%
Gross Inland Consumption	182 491	182 520	0%	176 956	177 042	0%

The comparison made above for a selection of series showed that large gap can occur between monthly and annual Eurostat data. The use of Eurostat monthly data to provide early estimates for a country is suitable for countries and series with a small gap between the monthly and annual Eurostat data. It is therefore necessary to carry out a systematic check of the size of this gap for all the series before using monthly Eurostat data to calculate early estimates.

Assessment of IEA preliminary data for use to calculate early estimates

The table below shows that the preliminary data provided by the IEA is generally a close match with the consolidated IEA data for almost all countries and the gap between the preliminary and the consolidated data rarely exceeds 1%. The IEA preliminary data can therefore be considered as an accurate source of data.

Table 2-9 Data comparison between IEA monthly and annual consolidated data[20] and the gap between these figures in 2013 and 2014

Oil consumption (kt)												
COUNTRY	2011E	2 011	Gap2011%	2012E	2 012	Gap2012%	2013E	2 013	Gap2013%	2014E	2 014	Gap2014%
OECD europe	1 262 702	1 269 094	-0.5%	1 238 633	1 241 068	-0.2%	1 212 315	1 216 794	-0.4%	1 201 240	1 202 695	-0.1%
Austria	21 282	21 484	-0.9%	21 402	20 754	3.1%	21 019	21 100	-0.4%	20 992	20 949	0.2%
Belgium	54 102	54 102	0.0%	56 794	56 794	0.0%	54 627	54 627	0.0%	58 673	58 637	0.1%
Czech republic	16 462	16 462	0.0%	16 621	16 621	0.0%	15 667	15 667	0.0%	17 112	17 112	0.0%
Denmark	13 626	13 626	0.0%	14 540	14 502	0.3%	15 043	15 119	-0.5%	14 931	14 928	0.0%
Estonia	-	952		1 038	1 049	-1.0%	931	936	-0.5%	1 014	1 014	0.0%
Finland	23 444	23 444	0.0%	22 492	22 492	0.0%	22 488	22 460	0.1%	21 826	21 826	0.0%
France	153 804	153 804	0.0%	140 936	140 936	0.0%	137 463	137 463	0.0%	135 539	135 539	0.0%
Germany	214 068	214 679	-0.3%	213 921	215 780	-0.9%	213 526	215 094	-0.7%	212 797	214 100	-0.6%
Greece	32 585	32 585	0.0%	34 772	34 772	0.0%	35 641	35 641	0.0%	38 870	38 193	1.8%
Hungary	15 099	15 099	0.0%	13 928	13 928	0.0%	14 019	13 994	0.2%	14 637	14 629	0.1%
Ireland	9 922	9 975	-0.5%	9 363	9 367	0.0%	9 255	9 226	0.3%	9 221	9 221	0.0%
Italy	149 845	149 845	0.0%	138 935	138 935	0.0%	127 617	127 664	0.0%	120 668	120 668	0.0%
Luxembourg	2 800	2 800	0.0%	2 701	2 833	-4.7%	2 800	2 800	0.0%	2 679	2 690	-0.4%
Netherland	91 482	91 482	0.0%	92 053	92 053	0.0%	89 742	89 742	0.0%	89 538	89 538	0.0%
Poland	51 330	51 442	-0.2%	51 338	51 354	0.0%	49 343	49 342	0.0%	49 363	48 825	1.1%
Portugal	22 058	22 058	0.0%	21 313	21 313	0.0%	23 646	23 646	0.0%	22 575	22 709	-0.6%
Slovakia	10 039	10 039	0.0%	9 255	9 255	0.0%	9 623	9 623	0.0%	9 040	9 040	0.0%
Slovenia	-	2 518		2 464	2 464	0.0%	2 218	2 309	-3.9%	2 250	2 250	0.0%
Spain	112 607	112 607	0.0%	113 041	113 041	0.0%	108 160	108 160	0.0%	107 743	107 743	0.0%
Sweden	32 848	32 848	0.0%	34 104	34 300	-0.6%	30 266	30 282	-0.1%	32 025	31 998	0.1%
UK	141 314	141 314	0.0%	132 700	132 700	0.0%	130 144	130 445	-0.2%	124 777	125 773	-0.8%

[20] Source: World Energy statistics

Gas consumption (mcm)												
COUNTRY	2011E	2 011	Gap2011%	2012E	2 012	Gap2012%	2013E	2 013	Gap2013%	2014E	2 014	Gap2014%
OECD europe	511 584	515 617	-0.8%	505 581	502 340	0.6%	500 452	502 612	-0.4%	452 102	451 674	0.1%
Austria	8 546	9 015	-5.2%	9 004	9 004	0.0%	8 531	8 531	0.0%	7 752	7 752	0.0%
Belgium	13 461	20 724	-35.0%	20 956	16 833	24.6%	17 739	17 742	0.0%	15 556	15 556	0.0%
Czech republic	8 944	8 944	0.0%	8 188	8 188	0.0%	8 418	8 418	0.0%	7 511	7 511	0.0%
Denmark	4 179	4 179	0.0%	3 898	3 898	0.0%	3 731	3 731	0.0%	3 159	3 159	0.0%
Estonia	-	619		667	667	0.0%	678	678	0.0%	530	530	0.0%
Finland	4 101	4 101	0.0%	3 683	3 683	0.0%	3 484	3 484	0.0%	3 057	3 057	0.0%
France	41519	41519	0.0%	42 586	42 586	0.0%	43 314	43 314	0.0%	36 279	36 279	0.0%
Germany	83 200	78 392	6.1%	81511	82 277	-0.9%	88 811	90 923	-2.3%	77 851	77 611	0.3%
Greece	4 737	4 737	0.0%	4 336	4 336	0.0%	3 841	3 841	0.0%	2 922	2 922	0.0%
Hungary	11 245	11 245	0.0%	10 437	10 437	0.0%	9 284	9 284	0.0%	8 501	8 390	1.3%
Ireland	4 981	4 981	0.0%	4 894	4 894	0.0%	4 740	4 740	0.0%	4 739	4 417	7.3%
Italy	77 832	77 832	0.0%	74 925	74 925	0.0%	70 057	70 057	0.0%	61912	61912	0.0%
Luxembourg	1183	1183	0.0%	1210	1210	0.0%	1028	1028	0.0%	973	973	0.0%
Netherland	49 052	49 052	0.0%	45 609	45 820	-0.5%	46 520	46 520	0.0%	40 605	40 605	0.0%
Poland	17 171	17 171	0.0%	18 111	18 111	0.0%	18 196	18 312	-0.6%	17 835	17 835	0.0%
Portugal	5 212	5 212	0.0%	4 625	4 625	0.0%	4 301	4 301	0.0%	4 026	4 026	0.0%
Slovakia	6 468	6 468	0.0%	6 537	6 537	0.0%	5 878	5 805	1.2%	3 838	3 838	0.0%
Slovenia	-	844		795	795	0.0%	846	846	0.0%	786	786	0.0%
Spain	33 555	33 555	0.0%	32 496	32 496	0.0%	29 908	29 908	0.0%	27 094	27 094	0.0%
Sweden	1296	1296	0.0%	1130	1130	0.0%	1085	1085	0.0%	891	891	0.0%
UK	82 215	82 215	0.0%	78 091	78 091	0.0%	77 631	77 361	0.3%	70 809	70 809	0.0%

Electricity consumption (GWh)										
COUNTRY	2011E	2 011	Gap2011%	2012E	2 012	Gap2012%	2013E	2 013	Gap2013%	2014E
OECD europe	3 416 792	3 425 563	-0.3%	3 435 821	3 458 025	-0.6%	3 436 337	3 434 213	0.1%	3 349 661
Austria	71641	71514	0.2%	68 815	73 713	-6.6%	74 076	73 133	1.3%	72 569
Belgium	88 345	89 267	-1.0%	85 487	89 873	-4.9%	90 377	89 831	0.6%	87 389
Czech republic	64 010	63 879	0.2%	64 024	63 969	0.1%	63 865	63 973	-0.2%	62 952
Denmark	34 670	34 811	-0.4%	34 309	34 438	-0.4%	34 104	34 228	-0.4%	33 492
Estonia	8 265	8 104	2.0%	8 576	8 286	3.5%	8 340	8 235	1.3%	8 361
Finland	84 421	84 242	0.2%	85 117	85 128	0.0%	83 723	84 046	-0.4%	83 292
France	481027	480 927	0.0%	492 701	495 301	-0.5%	502 333	500 224	0.4%	472 083
Germany	572 493	569 123	0.6%	563 386	572 201	-1.5%	566 112	564 509	0.3%	545 850
Greece	52 449	57 245	-8.4%	54 866	55 440	-1.0%	54 834	54 444	0.7%	52 105
Hungary	40 365	40 144	0.6%	39 952	40 277	-0.8%	40 134	39 906	0.6%	40 675
Ireland	26 853	26 861	0.0%	26 974	26 854	0.4%	27 159	27 215	-0.2%	27 397
Italy	334 893	337 173	-0.7%	328 612	330 907	-0.7%	319 914	320 968	-0.3%	311935
Luxembourg	8 153	8 179	-0.3%	7 884	7 891	-0.1%	7 781	7 802	-0.3%	7 803
Netherland	117 634	118 130	-0.4%	115 652	115 761	-0.1%	113 637	115 045	-1.2%	113 421
Poland	142 997	143 650	-0.5%	144 751	144 722	0.0%	145 370	145 521	-0.1%	147 237
Portugal	50 644	53 937	-6.1%	53 210	53 146	0.1%	53 230	53 185	0.1%	52 585
Slovakia	24 602	26 819	-8.3%	26 470	26 533	-0.2%	26 079	27 264	-4.3%	25 773
Slovenia	13 745	13 737	0.1%	13 796	13 790	0.0%	13 937	13 938	0.0%	13 813
Spain	275 171	275 215	0.0%	275 256	275 370	0.0%	268 787	267 724	0.4%	265 095
Sweden	142 064	139 701	1.7%	142 265	143 259	-0.7%	139 001	139 535	-0.4%	134 994
UK	355 712	357 568	-0.5%	359 386	357 878	0.4%	355 067	355 697	-0.2%	340 150

E= Early estimates

Assessment of Eurobserv'er data for use to calculate early estimates

Table 2-10 below tests the annual preliminary Eurobserv'er data for electricity production from wind. It shows that the gap between Eurobserv'er preliminary and consolidated data was generally within +/- 5%, with the exception of one country for 2013 data and with the exception of three countries for 2012 and 2011 data. We can therefore conclude that the Eurobserv'er preliminary data releases are generally close to the consolidated figures they release.

Table 2-10 Data comparison between Eurobserv'er monthly and annual consolidated wind electricity production data [21] and the gap between these figures in 2011-2013

Wind energy (TWh)										
COUNTRY	**2011E**	**2011**	**GAP2011%**	**2012E**	**2012**	**GAP2012%**	**2013E**	**2013**	**GAP2013%**	**2014E**
Austria	1.9	1.9	**0.0%**	2.5	2.5	**0.0%**	3.1	3.1	**0.0%**	3.8
Belgium	2.3	2.3	**0.0%**	2.8	2.8	**0.0%**	3.6	3.7	**-2.7%**	4.6
Bulgaria	1	0.9	**11.1%**	1	1.2	**-16.7%**	1.2	1.2	**0.0%**	1.3
Croatia	-	-	-	-	0.3	-	0.5	0.5	**0.0%**	0.7
Cyprus	0.2	0.1	**100.0%**	0.2	0.2	**0.0%**	0.2	0.2	**0.0%**	0.2
Czech Republic	0.4	0.4	**0.0%**	0.4	0.4	**0.0%**	0.5	0.5	**0.0%**	0.5
Denmark	9.8	9.8	**0.0%**	10.3	10.3	**0.0%**	11.1	11.1	**0.0%**	13.1
Estonia	0.4	0.4	**0.0%**	0.4	0.4	**0.0%**	0.5	0.5	**0.0%**	0.6
Finland	0.5	0.5	**0.0%**	0.5	0.5	**0.0%**	0.8	0.8	**0.0%**	1.1
France	12.3	12.3	**0.0%**	15	15	**0.0%**	16	16	**0.0%**	17.2
Germany	48.9	48.9	**0.0%**	50.7	50.7	**0.0%**	51.7	51.7	**0.0%**	57.4
Greece	3.3	3.3	**0.0%**	3.3	3.9	**-15.4%**	4.1	4.1	**0.0%**	3.7
Hungary	0.6	0.6	**0.0%**	0.8	0.8	**0.0%**	0.7	0.7	**0.0%**	0.7
Italy	9.9	9.8	**1.0%**	13.4	13.4	**0.0%**	14.9	14.9	**0.0%**	15.2
Latvia	0.1	0.1	**0.0%**	0.1	0.1	**0.0%**	0.1	0.1	**0.0%**	0.1
Lituania	0.3	0.5	**-40.0%**	0.5	0.5	**0.0%**	0.6	0.6	**0.0%**	0.6
Luxembourg	0.1	0.1	**0.0%**	0.1	0.1	**0.0%**	0.1	0.1	**0.0%**	0.1
Malta	-	-	-	-	0	-	0	0	-	0
Netherlands	5.1	5.1	**0.0%**	5	5	**0.0%**	5.6	5.4	**3.7%**	5.8
Poland	3.2	3.2	**0.0%**	4.7	4.7	**0.0%**	6	6	**0.0%**	7.7
Portugal	9.2	9.1	**1.1%**	10.3	10.3	**0.0%**	12	12	**0.0%**	12.1
Republic of Ireland	4.4	4.4	**0.0%**	4	4	**0.0%**	4.5	4.5	**0.0%**	5.1
Romania	1.4	1.4	**0.0%**	2.9	2.6	**11.5%**	4	4.7	**-14.9%**	4.7
Slovakia	0	0	-	0	0	-	0	0	-	0
Slovenia		0	-	0	0	-	0	0	-	0
Spain	42.4	44.6	**-4.9%**	47.6	49.5	**-3.8%**	54	55.6	**-2.9%**	52
Sweden	6.1	6.1	**0.0%**	7.2	7.2	**0.0%**	9.8	9.8	**0.0%**	11.2
United Kingdom	15.5	15.5	**0.0%**	19.6	19.7	**-0.5%**	28.4	28.4	**0.0%**	32
EU	179.1	181.3	**-1.2%**	203.1	206	**-1.4%**	234.4	236.6	**-0.9%**	251.6
Red : -10%<gap<10%										

The preceding analyses lead us to recommend using the following principles to calculate early estimates:

1. To favour the use of annual data, rather than monthly data as they are generally more accurate (i.e. the use of IEA, Eurobserv'er or national annual data is prioritised over Eurostat monthly data[22]).
2. To minimise the number sources of data used to prevent the introduction of statistical inconsistencies (i.e. if a national source provides the full energy balance for a country, national data will be used for the supply and consumption data even if the IEA provides supply data). Using IEA data for the supply and national data for the final consumption would induce some statistical inconsistencies.

2.6 Assessment and presentation of options for producing early estimates

Based on the literature review in tasks 1.1 and 1.2 and the principles mentioned above we have calculated early estimates by using a combination of three different primary sources for energy supply and transformation data and three different methodologies for the final consumption data, with the

[21] Source: Wind energy barometers

[22] In practice, to take into account the time constraint of the project (need to provide estimations for all the EU countries by 15 September 2016), and as the IEA published their early estimates on 8th August 2016, for several series and several countries Eurostat monthly data have been used even if IEA data were available but we checked that the Eurostat monthly data 2015/2014 variation for the main series was in line with the IEA yearly data variation.

choice of source and methodology varying by Member State depending on the availability of national and IEA data.

In total 6 different approaches were applied, each corresponding to the most accurate method for each country based on the availability of data. They are summarised in the table below:

Table 2-11 Summary of the primary data sources used to calculate early estimates for each country

Supply and transformation data source	Final consumption data source		
	National data	National data and extrapolations	Extrapolations
National data	AT, DE, FI, FR, IT, NL, UK	HR, IE, SI, ES, LV, LT, PT, SE[23]	
IEA		BE, CZ, DK, EE	EL, HU[24], LU, PL, SK[25]
Eurostat data		BG, CY, RO	MT

We have then defined six clusters, with cluster 1 including the countries with the most accurate early estimates and cluster 6 including those countries with the least accurate estimates.

- **Cluster 1 – Full energy balance data available from national source: Austria, Finland, France, Germany, Italy, the Netherlands and the UK.**
  In these countries all (or almost all) the energy balance data are available from national sources. In this case national data are the main source of data and transversal data secondary sources. No extrapolation[26] is necessary.

  Cluster 2 - Supply and transformation data are provided by national sources, and national data for final consumption are partially available (no split by sector or split by sector only available for a few energy carriers): Croatia, Ireland, Slovenia, Spain, Latvia, Lithuania, Portugal and Sweden.
  The main data gaps relate to final energy consumption data which implies the need to develop specific methodologies to address the gap. Extrapolations for the breakdown of the final consumption by sector are needed.

  Cluster 3 – Supply and transformation data are provided by the IEA and national data for final consumption are partially available: Belgium, Czech Republic, Denmark, Estonia.
  As for the cluster 2 the main data gaps relate to final energy consumption data which implies the need to develop specific methodologies to address the gap. Extrapolations for the breakdown of the final consumption by sector are needed.

  Cluster 4 –Supply and transformation data are only available from Eurostat monthly data and national data for final consumption are partially available: Bulgaria, Cyprus and Romania.

23 Early estimates available for all data except residential, services and other sector energy consumption
24 2015 early estimates available only for total primary consumption
25 Early estimates available only for electricity production by source
26 The term ''extrapolation'' as used in this report relates to a linear econometric regression, an estimation from a linear trend, an estimation from an allocation key or a duplication (the used of the t-2 data)

In this case early estimate calculations do not use annual data, so the quality of the estimates are slightly lower than for the 3 previous methods. Extrapolations are needed for the breakdown of the final consumption by sector.

Cluster 5 – Supply and transformation data are provided by the IEA and no data is available for final consumption: Greece, Hungary, Luxembourg, Poland and Slovakia.

As for the cluster 2 the main data gaps relate to final energy consumption data which implies the need to develop specific methodologies to address the gap. Extrapolations are needed for the final consumption and its breakdown by sector.

Cluster 6 – Supply and transformation data are only available from Eurostat monthly data and no data is available for final consumption: Malta.

In this case, early estimate calculations do not use annual data, so the quality of the estimates are relatively low (the gap between 2013 Eurostat monthly and annual data is below 5%). Extrapolations are needed for the final consumption and its breakdown by sector.

The calculation of early estimates has two main parts:

- The calculation of early estimates on the basis of available data.
- The extrapolation of missing data; mainly final consumption data.

2.6.1 Part 1: Calculation of early estimates on the basis of available data

As mentioned in task 1.2 the calculation of the 2015 early estimates relies on the following sources: national sources, the IEA, Eurobserv'er, Eurostat and ENTSO-E. In the framework of this project data have been collected from the website of each organisation. The text box below discusses three ways in which the collection of European energy statistics could possibly be adapted to better facilitate early estimates.

Box: Potential options to adapt data collection within European energy statistics in order to better facilitate early estimates

1. Use the existing Eurostat monthly oil, gas, electricity and coal questionnaires and improve the consistency between monthly data and annual data

Our literature review identified several consistency issues between the monthly and annual data from the European energy statistics. They relate to specific series such as coal and gas transit and stock changes and to some specific countries.

- Regarding the exclusion of coal and gas transit, we propose the assessment and adoption of a methodology to make the monthly and annual data sets more consistent – for the purpose of producing early estimates. In this respect we see two potential approaches:
  - For natural gas, a solution could be to rely on the data provided by the European Network of Transmission System Operators for Gas (ENTSO-G) and establish a balance for a given country, accounting for all inward and outgoing flows on all connection points of that country. In theory, it would be possible to establish the Underground Gas Storage (UGS) balance for that same country based on Gas Storage Europe (GSE) data and, by using both, calculate the balance, net of UGS movements.
  - For natural gas and coal, the IEA preliminary data do not include transit. Therefore it may be useful to carry out a further assessment of the IEA methodology in order to clean the data from transit.

- Regarding stock changes, we propose an exchange with the MSs to understand the reasons behind the gaps in order to see if there is a way to improve the methodology.
- The literature review also revealed that major inconsistencies can occur for some specific countries and fuels. We propose an exchange with these MSs to see if there is a way to improve the data.

Achieving the same level of quality for monthly data and yearly data will require sufficient capacity at MS level.

2. Broaden the range of the European energy statistics by adding new yearly data collection questionnaires

The literature review carried out for task 1.1 showed that several countries publish early estimates before August, with some countries doing so earlier in the year. Finland, France, Germany and the UK provide full energy balance data including final consumption data by sector by March, with Ireland doing so in May.

Implementing this option would result in additional statistical work for the MSs (e.g. add the need to fill in a larger questionnaire and adapt more data to the Eurostat methodology), and additional administrative work to further adapt the European energy statistics (e.g. a new regulation would need to be implemented; a new questionnaire would need to be produced). However, it would provide the best early estimates in terms of data coverage and data quality.

3. Use data from the IEA annual mini questionnaires

An intermediate approach could be to use the data from the annual mini questionnaires that the IEA sends to their members. The main positive aspects of this approach would be:

- IEA and Eurostat already share their questionnaires;
- IEA and Eurostat data are consistent, although some methodological differences exist (i.e. the accounting of energy in aviation bunkers);
- The IEA mini questionnaire covers more fuels than the Eurostat monthly data and also collects annual data;
- Coal and natural gas trade data are cleaned from transit.

Only 20 of the 28 Member States are IEA members, and fill in these questionnaires. Slovenia is an OECD member and, although not an IEA member, it completes the questionnaire. There would therefore be a need for the seven EU Member States that do not already complete the IEA mini-questionnaires[27] to collate and submit this data.

2.6.2 *Part 2: The extrapolation of missing data; mainly final energy consumption data*

The early estimates of final energy consumption have been calculated using 3 different methodologies depending on the level of availability of national data (as described above):

- **Method 1 – Countries with national data available for all energy balances: Austria, Finland, France, Germany, Italy, the Netherlands and the UK.**

[27] The eight MSs that are not members of the IEA are: Bulgaria, Croatia, Cyprus, Latvia, Lithuania, Malta, Romania and Slovenia

- **Method 2 – Countries with partial national data on the final energy consumption by sector: Belgium, Bulgaria, Cyprus, Czech Republic, Croatia, Denmark, Estonia, Ireland, Portugal, Slovakia, Latvia, Lithuania, Slovenia, Spain and Sweden.**

- **Method 3 –No final consumption data available: countries not listed above.**

The detailed methodologies are presented below.

2.6.3 Method 1: Countries with national data available for all energy balances

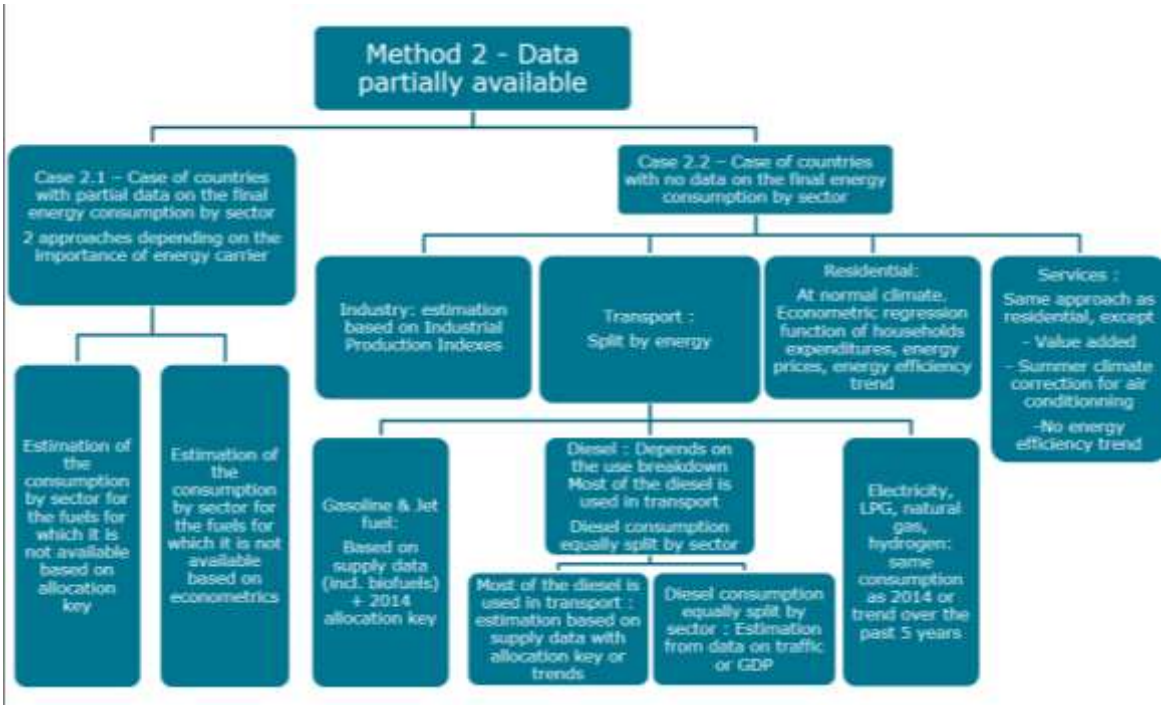
This methodology applies to countries for which all the energy balance data are available from national sources (seven countries). No extrapolation, or very minor extrapolations, are needed.

In this case the difficulty is to match national data with Eurostat data as in task 1.2 we identified that some gaps occur for six countries. To solve this problem, we started from Eurostat data at year t-2 in physical units specific to each energy carrier (e.g. GWh for electricity, Mm^3 for gas, etc.) and applied the annual variation between t-1 and t-2 from national data. In addition, whenever possible, national data have been harmonised to Eurostat definitions (mainly for aircraft fuel bunkers).

2.6.4 Method 2: Countries with partial national data on final energy consumption by sector

National data have been used to calculate the final energy by sector for the fuels for which data are available.

Figure 2-1 Methodological architecture Method two



There are two sub sets within this case, as follows:

2.1 Case of countries with partial data on the final energy consumption

In this case there is data for one or two energy carriers (e.g. electricity and gas), with a breakdown by sector from the national data source.

For the fuels for which data are not available final consumption by sector was calculated by using a methodology selected depending upon the importance of each energy carrier by country. The methodologies were as follows:

A. Use of an allocation key

Use of an allocation key based on the information available at year t-2 from Eurostat (i.e. % of consumption by sector), assuming the same allocation for t-1 as for t-2. For oil products, the estimates were made by type of product as they correspond to specific uses (e.g. gasoline or jet fuel in transport, residual fuel oil mainly in industry, LPG in the residential and services sector). In the case of very different climatic conditions between t-2 and t-1 when the energy used for heating would be expected to vary the allocation key was calculated at normal (average) climate. This means that the consumption by sector was first calculated at normal climate and then at real climate.

B. Use extrapolations

The approach to extrapolate the energy consumption differs depending on the sector.

Industry: We identified 4 options to calculate early estimates:

1. Data on the production activity are available by branch based on the index of production provided by Eurostat. A first estimate of the consumption at t-1 can be done as the sum of the consumptions by branch; for each branch the consumption can be calculated on the basis of the variation of the industrial production index (IPI), assuming no change in unit consumption, i.e. the ratio of energy consumption over production index. This approach has the advantage of taking structural changes into account in an effective manner. The drawback of the approach is that it may overestimate consumption as it does not take into account energy efficiency improvements (i.e. reduction in the energy consumption per unit of production).
2. It is possible to improve the first option by assuming the average from the last 3 years of the variation in the unit consumption.
3. A simplification can be made for countries with small structural changes by directly calculating the unit consumption at the level of industry as a whole, and not by branch.
4. Alternatively, the variation of the industry production index to the industry energy consumption can be applied.

In the Excel files for each country we have included a number of automatic tests to evaluate the most appropriate approach for each country. These tests are based on the comparison of 2014 estimates (as a result of applying each method) and real data. The chosen option for each country is the one that minimises the gap between the estimate and reality for the majority of fuels covered. In the Czech Republic case study presented in table 2-7 below option 3 is the best option for almost all energy sources.

The validation performed below was done for all Member States and all series for which an extrapolation was needed. The methodology was only used if the gap between the extrapolation calculated for 2014 and the real data was below 10%. If the gap was larger than this, the industry consumption was estimated from a linear trend extrapolation, or an allocation key (% of t-2) or was duplicated from t-2 depending on the case.

Table 2-7 Validation of the methodology used to estimate 2015 industrial consumption: Czech Rep. case study

Option 1 : IPI growth rate applied by branch

	Real 2013	Real 2014	2014 estimation	2015 estimation	Gap est./ Real 2014
Gas	2501	2601	2641	2741	1.5%
Fuel Oil	40	30	42	31	42.8%
Gas/Diesel	53	51	56	55	8.7%
Electricity	1995	1978	2129	2083	7.6%
Coal	340	209	356	220	70.1%
Lignite	267	238	285	241	20.0%

Option 2 : Trends in unit consumption of branches

	Real 2013	Real 2014	2014 estimation	2015 estimation	Gap est./ Real 2014
Gas	2501	2601	2640	2730	1.5%
Fuel Oil	40	30	37	29	26.4%
Gas/Diesel	53	51	55	54	6.5%
Electricity	1995	1978	2110	2026	6.7%
Coal	340	209	324	198	54.8%
Lignite	267	238	247	191	4.0%

Option 3 : Trends in unit consumption of industry

	Real 2013	Real 2014	2014 estimation	2015 estimation	Gap est./ Real 2014
Gas	2501	2601	2600	2688	0.0%
Fuel Oil	40	30	32	22	8.5%
Gas/Diesel	53	51	50	46	2.2%
Electricity	1995	1978	2102	2025	6.3%
Coal	340	209	318	176	52.1%
Lignite	267	238	239	186	0.6%

Option 4 : Industry IPI variation applyied to total industrial energy consumption

	Real 2013	Real 2014	2014 estimation	2015 estimation	Gap est./ Real 2014
Gas	2501	2601	2657	2748	2.1%
Fuel Oil	40	30	43	31	43.9%
Gas/Diesel	53	51	57	54	10.6%
Electricity	1995	1978	2120	2090	7.2%
Coal	340	209	361	221	72.4%
Lignite	267	238	284	251	19.5%

Orange= gap > 5%

Transport: For transport the use by type of fuel is quite specific.

- ✓ For gasoline and jet fuels that are mainly used in transport, the final consumption has been extrapolated from the total consumption of these products using an allocation key (% of the total consumption going to transport e.g. 100% for jet fuels, 90-100% for gasoline); The allocation key was calculated from Eurostat annual data at year t-2[28]. The total consumption was obtained from the supply part of the energy balance;
- ✓ For fuels that generally have a minor role in transport (e.g. electricity, LPG, natural gas, hydrogen) the consumption was:

- extrapolated from the trend over the last 5 years when the correlation coefficient (R^2) is above 0.8,
- assumed to be the same as year t-2 else.

✓ Diesel is the most complicated case as this fuel is used in all sectors.[29] The approach depends on the distribution by sector. For countries where most (over 80%) of the diesel is used in transport, the same approach was used for gasoline and jet fuel, based on an allocation key (i.e. % of diesel used in transport, either an extrapolation of the last 5 years when possible (R^2>0.8) or the same values as for t-2). If the diesel consumption is equally split by sector, the consumption of transport has been:

- Case 1: preferably extrapolated from GDP (from Eurostat) with a linear econometric regression when possible and relevant,
- Case 2: estimated as an extrapolation of the last 5 years when possible (R^2>0.8),
- Case 3: estimated by applying the same % of the year t-2 if it was not possible to make extrapolations.

Econometric linear regressions have been systematically validated before using them to make extrapolations. The validation technique is described in the box below.

General rules of validation of the linear econometric regressions

An estimation was validated if the linear regression was validated:

- Econometrically[30]:
  - R^2>0.8
  - Fisher Test and Student T tests validated accordingly to the numbers of variables of the equation, the number of observations and the statistical tables
- Economically: each calculated elasticity must have an economic sense (i.e. positive elasticity to the activity variable (GDP, value added, household expenditure, etc.), negative elasticity to the prices between -0.5 and -0.1.
- Empirically: If the gap between the estimated variable and the real variable is generally below 5% over the period of regression.

Example of validation of the linear regression for Spain

In the case of Spain, the diesel consumption of transport was extrapolated from GDP by using the following linear regression:

$$DC = 7.17 \times GDP^{0.26}$$ (or $\ln[31](DC) = 0.26 * \ln(GDP) + 7.17$ once linearised)

with DC: Diesel consumption. The extrapolation was calibrated over the 2012-2014 period[32].The 3 necessary conditions to validate the econometric regression were met:

- The R^2 was equal to 0.89, the Student T and Fisher tests were significant.
- The regression had economic sense.

[29] Heating oil is the same product as diesel and in supply statistics is combined with diesel.

[30] The Durbin-Watson test should have been applied as well in addition to the three econometric tests listed here to ensure errors are not autocorrelated. However, adding this condition would not allow to calibrate a large part of the regression made. We have then chosen to select some regressions for which all the other conditions were validated even if an autocorrelation of residuals remained.

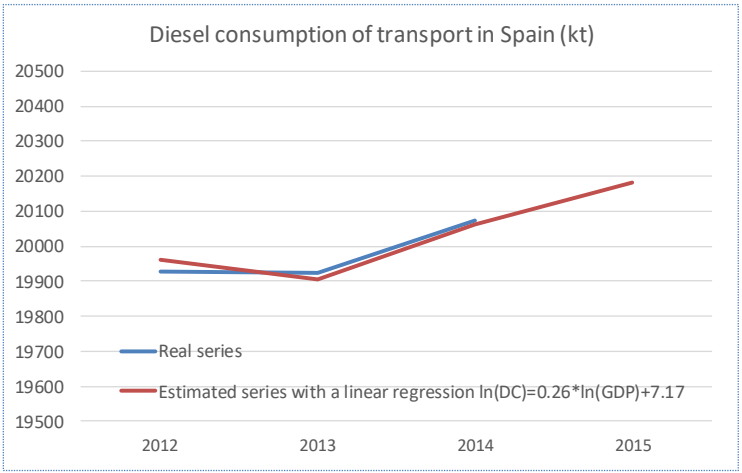
[31] "ln" refers to Naperian logarithm.

[32] Pure econometrists could discuss this choice as the linear regressions should be calibrated over a longer time period. In this particular case there was a strong break in the time series in 2012 that prevented the calibration of the regression over a longer period. As figure 2-3 shows this approach provides a better estimation than an approach using a trend over the 2012-2014 period, so we prefer to calculate the estimate by using the regression with the GDP.

- The figure below shows that the estimated variable was close to the real variable over the 2012-2014 period.

We then based our estimate of the 2015 diesel consumption for transport on the estimate generated from this linear regression.

Figure 2-3 Comparison of estimated and real diesel consumption for transport in Spain



Residential sector: The calculation for the residential sector was made in the following ways, depending on the country:

Case 1: Extrapolation with a linear regression when possible. The extrapolation involved two steps: 1) At normal climate[33] to remove the effect of climate variation; and 2) at real climate.
The consumption at normal climate was estimated from a regression including up to 4 explanatory variables[34]:

- ✓ The household expenditure, as a proxy for the household income;
- ✓ The average energy price (weighted average);
- ✓ An energy efficiency trend, based on the past trend, as measured from the ODYSSEE energy efficiency index (ODEX).
- ✓ The residential sector consumption with a lag in order to estimate the short term price elasticity (better than the average elasticity as we are only estimating for 1 year).

Case 2: Extrapolation by using a linear trend when it was not possible to calibrate a linear regression.

Case 3: Estimated with an allocation key.

Econometric linear regressions were systematically validated before being used to make extrapolations.

Example of validation of the linear regression approach for natural gas consumption in Bulgaria
In the case of Bulgaria, the natural gas consumption of households was extrapolated by using the following linear econometric regression:
$HH\ cons = 25.19 \times HH\ expend^{2.03} \times Energy\ price^{-0.31} \times ODEX^{3.64} \times HH\ cons_{-1}^{-0.15}$

[33] The consumption at normal climate was calculated by applying the methodology developed in the ODYSSEE-MURE project

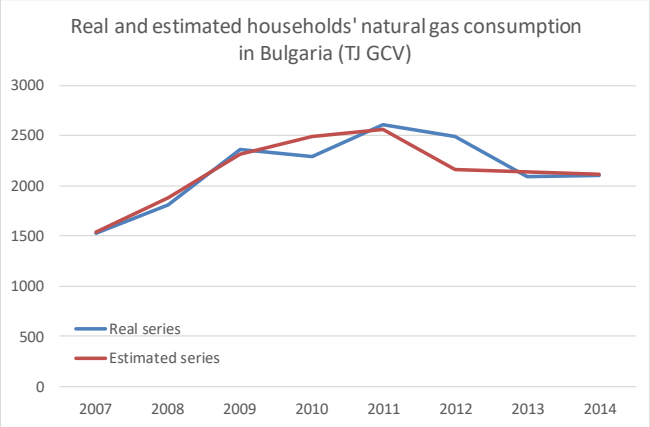
(or ln (HH cons) = 2.03 *ln(HH expend.) -0.31 *Energy price+ 3.64 *ODEX[35] -0.15 *HH $cons._{-1}$ -25.19 once linearised)

The extrapolation was calibrated over the 2007-2014 period. The 3 necessary conditions to validate the econometric regressions were met:

- The R^2 was equal to 0.88, the Student T and Fisher tests were significant.
- The regression had economic sense.
- The figure below shows that the estimated variable was close to the real variable over the 2007-2014 period (always between +/- 5% and generally around +/- 2%) except in 2010 and 2012 when the gaps were 9% and 13% respectively.

We then based our estimate of the 2015 households' natural gas consumption on the estimate generated from this linear regression.

Figure 2-5 Comparison of estimated and real households' natural gas consumption in Bulgaria[36]



Services: The approach for services was similar to the method for the household sector (3 cases depending on the ability to calibrate extrapolations). The energy consumption linear extrapolation was carried out by using a similar method to that used in the household sector, with three differences:

- ✓ including climatic corrections for countries with a significant use of electricity for air conditioning in summer (e.g. Spain, Greece);
- ✓ Using value added as the driver instead of private expenditure;
- ✓ Removing the energy efficiency trend, as it is very difficult to measure due to a lack of detailed data by end-use.

Each linear econometric regression was validated in the same way as for households and transport.

Example of validation of the linear regression approach for natural gas consumption in Bulgaria

In the case of Bulgaria, the natural gas consumption in the services sector was extrapolated by using the following linear econometric regression:

Services cons = -18 x Serv VA $^{3.88}$ x Energy price$^{-0.68}$ x Serv $cons._{-1}^{-0.83}$

(or ln (Services cons) = 3.88 *ln(Serv VA) -0.68 *Energy price -0.83 *Serv. $cons._{-1}$ -18 once linearised)

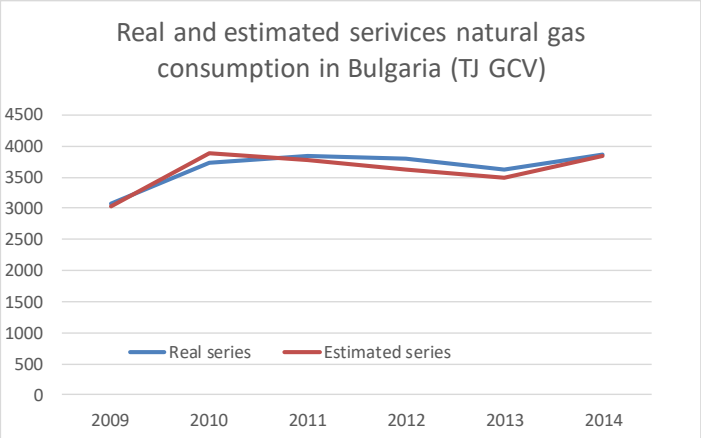
[35] Energy efficiency index calculated in the framework of the ODYSSEE project
[36] Series at real climate, regressions made at normal climate

The extrapolation was calibrated over the 2009-2014 period. The 3 necessary conditions to validate the econometric regressions were met:

- The R^2 was equal to 1, the Student T and Fisher tests were significant.
- The regression had economic sense.
- The figure below shows that the estimated variable was close to the real variable over the 2009-2014 period (always between +/-5%).

We based our estimation of the 2015 services natural gas consumption on the estimate generated from this linear regression.

Figure 2-6 Comparison of estimated and real natural gas consumption of services in Bulgaria[37]



2.2 Case of countries with no data on the final energy consumption by sector

In this case the final energy consumption data by sector was calculated on the basis of extrapolations. Final energy consumption by sector and product has been estimated as explained in case 2.1 above.

2.6.5 Method 3: Case of countries with no national data

In this case no total final consumption data were available and the series had to be calculated.

Total final consumption data has been calculated according to 3 cases:

- Case 1: from supply data when possible.
- Case 2: Estimated by applying a trend if the correlation coefficient (R^2) is >0.8
- Case 3: By applying an allocation key.

In this case the methodology to calculate early estimates for final energy consumption was the same as in the method 2, case 2.2.

[37] Series at real climate, regressions made at normal climate

3 Estimates for main energy consumption data for each MS and the EU for 2015

3.1 Objective, approach and outputs

The objective was to produce early estimates for the year 2015 both for the EU as a whole and each EU Member State on the basis of the methodology developed in the previous section. This involved the following sub tasks:

- Calculation of early estimates of energy balances – according to one of the three methodologies developed and described in the previous chapter.
- Calculation of early estimates for the share of renewable energy.
- Calculation of early estimates of the energy import bill.

The outputs from this task were MS Excel files (1 file per country, 1 file for the EU and 1 file with all the data) with early estimates of the energy data in 2015 for the EU as a whole and for each Member State, with visible formulas proving the methodology and showing the data sources.

3.2 Calculation of early estimates of energy balances

3.2.1 Energy carrier and product coverage

The calculations have been made for eight energy carriers (same energy carriers for all countries) corresponding to the seven main columns of the Eurostat energy balance, as follows:

- Oil;
- Solid fuels;
- Gas;
- Electricity;
- Renewables;
- Derived heat;
- Nuclear heat; and
- Non-renewable waste

If the contribution of a product is low and good statistical data are not available, the product was not covered. The products covered correspond to those covered by the Eurostat and the IEA monthly data plus the strategic variables required to calculate the RES share of energy. The table below provides a detailed breakdown of the products.

Table 3-5: Early estimates data coverage by energy carrier and product

Total all products	**Solid fuels**
Oil (total)	Coal
Crude oil, NGL, Refinery feedstocks, additive, other	Lignite
Petroleum products:	Other
Naphta	**Renewable energies**
	Hydro

LPG	Wind
Motor gasoline	Geothermal
Kerosene Type Jet Fuel	Solar electricity
Gas/Diesel Oil (w/o bio)	Solar heat
Fuel oil	Solid biofuels + renewable wastes
Aviation gasoline	Biogasoline
Refinery gas	Biodiesel
Ethane	Other
Kerosene	**Electricity**
Petroleum coke	**Nuclear heat**
Other	**Derived heat**
Total gas	**Wastes (non-renewable)**
Natural gas	

3.2.2 *Series coverage*

For each energy product the supply, energy transformation and consumption data have been covered.

Table 3-6: Series coverage for Diesel (sample)

	2013	2014	2015	2015/2014 Growth	Confidence index
Gas/Diesel Oil (w/o bio)			kt		
Production	0	0	0	-	
Imports	4658	3804	3547	-6.8%	*
Exports	5400	5071	4181	-17.5%	*
Stock Changes	426	-520	-820		**
Bunkers	1216	1264	1670	32.1%	**
Other	0	0	0	-	
Gross Inland Consumption	-1532	-3051	-3124	2.4%	*
Transformation input	939	1142	1356	18.8%	*
Power plants	939	1142	1356	18.8%	*
Refineries	0	0	0	-	
Other	0	0	0	-	
Transformation output	26783	27110	27132	0.1%	**
Power plants	0	0	0	-	
Refineries	26783	27110	27132	0.1%	**
Other	0	0	0	-	
Exchanges and transfers, returns	785	2113	2844	34.6%	*
Consumption of the energy branch	21	20	20	0.0%	*
Distribution losses	0	0	0	-	
Available for Final Consumption	25076	25010	25476	1.9%	**
Final non-energy consumption	0	0	0	-	
Final energy consumption	25228	25036	25502	1.9%	**
Industry	912	876	879	0.3%	
Transport	19925	20074	20191	0.6%	
Other Sectors	4391	4086	4432	8.5%	
Residential	1517	1566	1670	6.7%	
Services	1247	999	1084	8.5%	
Other	1627	1521	1678	10.3%	
Statistical differences	-152	-26	-26		

3.2.3 *Sources of data*

The sources of data used to calculate early estimates depend on the availability of information and then the position of the country in question in the cluster of countries identified in the previous section. Three types of data source have been used to calculate the early estimates:

- A principal source of data has been identified to estimate supply and transformation series.
- Secondary sources.
- Extrapolations (linear econometric regressions, linear trend, allocation key, duplication) mainly to calculate the final energy consumption and its split by sector.

Table 3-7: Detailed source of data by cluster of country

Cluster	Main source of data	Secondary sources	Extrapolations
AT, DE, FI, FR, IT, NL, UK	National data	- IEA - Eurostat for ethane and aviation gasoline - Eurobserv'er for biogasoline and biodiesel	None, or minor
HR, IE, SI, ES, LV, LT, PT, SE[38]	National data	- IEA (if any) - Eurostat monthly - Eurobserv'er for biogasoline and biodiesel	To estimate the breakdown of final energy consumption by sector
BE, CZ, DK, EE	IEA	- IEA (if any) - Eurostat monthly - Eurobserv'er for biogasoline and biodiesel	To estimate the breakdown of final energy consumption by sector
BG, CY, RO	Eurostat monthly data[39]	- ENTSOE for the breakdown of thermal electricity production - Eurobserv'er for biogasoline and biodiesel	To estimate the breakdown of final energy consumption by sector
EL, HU[40], LU, PL, SK[41]	IEA	- IEA - Eurostat for ethane and aviation gasoline - Eurobserv'er for biogasoline and biodiesel	To estimate the total final energy consumption and its split by sector
MT	Eurostat monthly data	- ENTSOE for the breakdown of termal electricity production - Eurobserv'er for biogasoline and biodiesel	To estimate the total final energy consumption and its split by sector

The source used for each series is given in the country Excel files.

3.2.4 Calculations

The calculation of early estimates was based on a bottom-up approach (i.e. the total consumption is the sum of the consumption by product) and was split into 4 stages, as follows:

1- Calculation of early estimates for physical data (e.g. GWh for electricity, Mm^3 for gas, etc.) at the energy carrier and product level.

2- Calculation of early estimates at the energy unit level. The conversion of data from physical units to harmonised energy units (toe) is made on the basis of the same conversion coefficients as for the year 2014.

[38] Early estimates available for all data except residential, services and other sector energy consumption

[39] Eurostat data was extracted from the online database, rather than the Eurostat energy balance sheets. There are differences in the timing of the updates between the two sources.

[40] 2015 early estimates available only for total primary consumption

[41] Early estimates available only for electricity production by source

3- Calculation of the total energy consumption by adding all energy carriers.
4- Match the sum of the estimates by sector and by fuel with the total final consumption published by national statistics when available.

Calculations have been made differently depending on whether a data source is available or not.

3.2.5 Calculation from a data source

In task 1 we identified a number of gaps between the data sources and Eurostat annual data. To remove the impact of these gaps from our estimates we have calculated them based on the annual variation between t-1 and t-2 of national/transnational data. Whenever possible, national/transnational data have been harmonised to the Eurostat definition (mainly for aircraft fuel bunkers and data at normal climate).

For some countries and/or series important gaps can occur between Eurostat monthly and annual data due to data quality issues. In order to test for these gaps a comparison between the sum of Eurostat monthly data for 2014 and 2014 annual data has been done in the Excel file for each estimated series before completing the estimate. If the gap was over 10% another source was used to make the estimate, if available. If no other source was available, the confidence index of the estimate has been valued at "*"[42] .

3.2.6 Extrapolations

Good statistical data are not available for each product's energy balance. Therefore, where no data is published within the required time period, extrapolations have been applied. Four different methods have been used to extrapolate data (in order of priority based on the precision of the extrapolation):

- A linear econometric regression when it was possible to calibrate it (statistical, economical and empirical validation)[43]
- A linear trend when $R^2 \geq 0.8$[44].
- Allocation key
- Duplication: use of the t-2 data

The methodology used to extrapolate the data is given in the country Excel files.

3.2.7 Confidence index

For each calculation of an early estimate a confidence index has been to reflect the quality of the estimate. The index is as follows:

- " ** " if the early estimate has been calculated from identified data sources and Eurostat monthly data for which the gap between the sum of 2014 monthly and annual data is below 10%.
- " * " for extrapolations and estimations from Eurostat monthly data where the gap between the sum of 2014 monthly and annual data is over 10%.

3.2.8 Data quality checks

[42] See below for the description of the confidence index
[43] Detailed explanation of the linear econometric regression validation available in the task 1
[44] R^2 is a measure of the strength of correlation, with 1 equal to a complete match, and 0 no match.

Validating the calculations is crucial to ensuring the good quality of the work. The quality of the estimates has been ensured in three ways:

3.2.9 Data validation by product

For each product, we have developed a set of consistency indicators allowing us to ensure the consistency of the calculations for the years 2015 and before. The consistency tests should equal zero in cases of data consistency. These consistency tests were:

- Ctrl Gross inland consumption (GIC) = production + imports-exports-stock changes-bunkers-other-GIC
- Ctrl input = power plants input + refineries input + Other input - Transformation input
- Ctrl output = Power plants output + Refineries output + Other output - Transformation output
- Ctrl available final cons = GIC - Transformation input + Transformation output + Exchanges and transfers, returns - Consumption of the energy branch - Distribution losses – Available for final consumption
- Ctrl final energy cons up = Available for final consumption - Final non-energy consumption – Final consumption
- Ctrl final energy cons down: Final consumption – Industry – Transport – Other sectors
- Ctrl other sector = Other sectors – Residential – Services - Other

All of the tests returned a zero, indicating a lack of error.

3.2.10 Data validation by series

For each country a set of indicators validates that the total energy consumption of each series equals the sum of the consumption of each product. The consistency test should equal zero when the data is consistent – as shown by the Data validation column in the table below.

Table 3-8: Example of consistency tests by series

Energy balances - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity	Data validation
Production	**33858**	232	54	1062	17475	15035	0	0
Imports	122752	**81065**	28184	11490	785	0	1226	0
Exports	28451	**21462**	4394	302	1059	0	1234	0
Net imports (imports-exports)	94301	59604	23791	11188	-274	0	-8	0
Gross inland consumption	**121948**	**50831**	**24554**	**14257**	**17298**	**15035**	**-8**	0
Transformation input	111916	68817	8950	14838	4276	15035	0	0
Transformation output	83715	65226	814	1110	27	0	16539	0
Distribution losses	2695	0	209	0	0	0	2487	0
Available for final consumption	**82965**	**42703**	**14535**	**480**	**5245**	**0**	**20002**	0
Final non-energy consumption	3964	3484	479	0	0	0	0	0
Final energy consumption	**80303**	**39560**	**14093**	**1369**	**5286**	**0**	**19996**	0
Industry	20331	2585	9025	1200	1179	0	6343	0
Transport	32329	30882	82	0	998	0	367	0
Residential	14607	2837	2828	96	2628	0	6218	0
Services	8920	1263	1326	0	148	0	6183	0
Others	4115	1995	833	73	332	0	885	0

3.2.11 Benchmark of the early estimates with other sources

For each country the 2015/2014 variation of early estimates has been compared with the variation of the different data sources available (National data, Eurostat monthly, the IEA, Eurobserv'er and EEA) to ensure their consistency.

Table 2-9 below shows that the 2015/2014 variation of the early estimates is in line with the variation of the national source for total, oil, gas and solid fuels Gross Inland Consumption (GIC), with the IEA for renewable electricity sources except solar electricity generation and with Eurosbserv'er for solar electricity generation.

The estimates are not in line with EEA calculations for total GIC, hydro, wind and solar electricity generation, but as our calculations are close to those used in national and IEA sources we estimate that our calculations are more accurate than those of the EEA. This is true for Spain and for the majority of the other countries.

Table 3-9: Example of early estimates benchmark for Spain

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	4.5%	-	4.6%	3.7%	-	2.1%
Oil GIC	3.2%	3.3%	3.9%	4.3%	-	-
Gas GIC	3.7%	3.7%	3.9%	3.9%	-	-
Solid fuel GIC	23.9%	-	23.9%	13.7%	-	-
Final electricity consumption	2.5%	-	2.5%	-	-	-
Hydro electricity generation	-26.4%	-9.8%	-	-28.9%	-	-0.4%
Wind electricity generation	-3.6%	33.1%	-	-5.1%	-	-1.0%
Solar electricity generation	0.6%	-	-	1.4%	0.6%	0.3%
Solar thermal heat generation	1.7%	-	-	1.7%	-	-
Biogasoline consumption	-4.2%	0.4%	-	-4.2%	-4.0%	-
Biodiesel consumption	1.2%	6.0%	-	1.2%	-1.9%	-
Share RES electricity 2015	38.0%	-		-	-	36.0%
Share RES energy 2015	16.2%	-		-	-	15.6%

The early estimates benchmark for all countries is available in Annex A.

3.2.12 Results

The detailed calculations and results are provided in the “Total consumption”, “Oil”, “Gas”, “Coal”, “Renewables” and “Other” sheets of the country Excel files.

The detailed energy balance for each country and total energy consumption estimate are available in Annex B.

3.2.13 European Union

The table below presents the early estimates for the European Union as a whole. These have been calculated for each series as the sum of the early estimates of each country.

Table 3-11: 2015 energy balance for the European Union

Energy balance - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity
Production	**774364**	**86304**	**107006**	**145462**	**201859**	**233733**	**0**
Imports	1463912	925990	338136	148860	15300	271	35355
Exports	557750	393497	85519	34711	9921	35	34066
Net imports (imports-exports)	906161	532493	252617	114149	5378	236	1289
Gross inland consumption	**1627389**	**560442**	**358879**	**265427**	**207368**	**233974**	**1299**
Transformation input	1297662	**652321**	104671	251340	57610	231719	0
Transformation output	958230	638040	20970	32715	69	55843	210592
Distribution losses	25789	47	2997	48	24	4434	18238
Available for final consumption	**1187228**	**519791**	**251737**	**46074**	**84580**	**49480**	**235566**
Final non-energy consumption	98009	82004	14511	1494	0	0	0
Final energy consumption	**1083675**	**430473**	**238448**	**45434**	**84807**	**49153**	**235361**
Industry	276625	27081	88374	34503	21526	18309	86832
Transport	358617	336250	3025	9	13962	0	5372
Residential	274288	35211	98700	8792	42145	20539	68902
Services	143495	15500	43430	952	4647	9476	69490
Others	30650	16431	4919	1179	2528	829	4765

Table 3-12: 2015 total energy consumption for the European Union

Total all products	2013	2014	2015 ktoe	2015/2014 Growth rate	Confidence index
Production	**803763**	**785001**	**774364**	-1.4%	*
Imports	1444665	1411681	1463912	*3.7%*	*
Exports	536149	530788	557750	*5.1%*	*
Stock Changes	5791	-9349	-1846	*-80.3%*	*
Bunkers	42993	41622	41571		*
Other	-8378	-8991	-9718	*8.1%*	*
Gross Inland Consumption	**1666699**	**1605931**	**1627389**	1.3%	*
Transformation input	**1303911**	**1277176**	**1297662**	1.6%	*
Power plants	607123	583142	581885	*-0.2%*	*
Refineries	615085	613159	637349	*3.9%*	*
Other	81703	80876	78444	*-3.0%*	*
Transformation output	**947606**	**932177**	**958230**	2.8%	*
Power plants	261744	249154	250368	*0.5%*	*
Refineries	614663	612716	638040	*4.1%*	*
Other	71199	70307	69822	*-0.7%*	*
Exchanges and transfers, returns	**2922**	**2428**	**-61821**	-2646.4%	*
Consumption of the energy branch	**80181**	**77518**	**13126**	-83.1%	*
Distribution losses	**25915**	**24960**	**25789**	3.3%	*
Available for Final Consumption	**1207220**	**1160881**	**1187228**	2.3%	*
Final non-energy consumption	**97509**	**99387**	**98009**	-1.4%	*
Final energy consumption	**1106618**	**1061685**	**1083675**	2.1%	*
Industry	278691	274769	276625	*0.7%*	*
Transport	348236	352936	358617	*1.6%*	*
Other Sectors	479692	433979	448433	*3.3%*	*
Residential	298209	263223	274288	*4.2%*	*
Services	150880	141224	143495	*1.6%*	*
Other	30603	29533	30650	*3.8%*	*
Statistical differences	3093	-190	5112	*-2786.5%*	*

3.2.14 Replicability

Eurostat products and series ID have been specified in the Excel file for each series as well as the name of primary and secondary sources. In addition, all the calculations clearly appear in the Excel file. Based on the methodology developed and presented in this report and the delivered Excel files, the work done in the framework of this contract can be easily replicated in future years for each country, by following four steps:

* FC: Final consumption

Once early estimates have been calculated for all the countries, the EU series can be then calculated as the sum of the early estimates of each country.

3.3 Calculation of early estimates for the share of renewable energy

The aim of this sub-task was to calculate early estimates for two renewable energy indicators:

- Renewable energy share in gross final energy consumption;
- Renewable energy share in gross electricity generation.

These indicators have been estimated according to the methodology defined by the Renewable Energy Directive (RED), Directive 2009/28/EC as far as possible. The estimate involved the following 2 steps:

1. Initial calculation of the indicators based on a bottom-up approach.
2. Calculation of the final indicator based on the variation of the interim indicator.

The two steps are described below:

3.3.1 Interim calculation of the indicators based on a bottom-up approach

An early estimate has been calculated for each of the variables in the calculation. The tables below show these variables and the source of the data for the estimate, for both renewables share of electricity generation and renewables share of gross final energy consumption.

Table 2-12 Renewable energy share in gross electricity generation

List of variables	Method and data used
Gross electricity production from:	
• Wind	Eurostat
• Solar	National source or Eurobserv'er
• Hydro	Eurostat
• Solid fuels and renewable wastes	National source or IEA
• Biofuels	Eurostat
• Geothermal energy	Eurostat
Wind installed capacity	National source or ENTSO-E
Hydro installed capacity	National source or ENTSO-E
Thermal gross electricity production	Eurostat
Nuclear gross electricity production	Eurostat

Table 2-13 Renewable energy share in gross final energy consumption

List of variables	Method and used data
Biofuel consumption of transport;	Trend change on biofuel GIC[45] from Eurostat
Biomass and waste consumption of industry;	National source or extrapolation (cf. industry paragraph, methodology 1)
Biomass and waste energy consumption of households and services;	National source or extrapolation (cf. households and services paragraph, methodology 1)
Gross heat production from renewables and wastes;	Linear trend extrapolation if $R^2 \geq 0.8$ otherwise previous year values

[45] Gross Inland Consumption

Energy captured by heat pumps	Linear trend extrapolation if $R^2 \geq 0.8$ otherwise previous year values
Final energy consumption;	Sum of the final energy consumption by product
Electricity distribution losses;	National source, linear trend extrapolation if $R^2 \geq 0.8$ or previous year values
Derived heat distribution losses;	National source, linear trend extrapolation if $R^2 \geq 0.8$ or previous year values
Electricity consumption of the power sector;	National source, linear trend extrapolation if $R^2 \geq 0.8$ or previous year values
Derived heat consumption of the power sector;	National source, linear trend extrapolation if $R^2 \geq 0.8$ or previous year values

3.3.2 *Calculation of the final indicator based on the variation of the interim indicator*

Our methodology has been tested for all countries by comparing an estimate produced by the methodology for 2014 with the actual 2014 indicators. This test revealed some minor differences. These differences are mainly due to some minor changes in the RED methodology due to lack of data and data revisions made in the database after the calculation of the actual indicators. We consider that the methodology is robust for a country if the gap between estimated and actual indicators is ≤ 10%. The tables below show the results of the methodology test for the Czech Republic, Greece and Germany.

Table 2-14 Comparison of the estimated and actual RES shares for the Czech Republic, Greece and Germany

CZECH REPUBLIC	2014 Estimated	2014 Actual	Gap
Estimated RES share in gross electricity consumption	14.0%	13.9%	0.7%
Estimated RES share in gross final energy consumption	13.3%	13.4%	0.7%
GREECE	**2014 Estimated**	**2014 Actual**	**Gap**
Estimated RES share in gross electricity consumption	22.6%	21.9%	3.2%
Estimated RES share in gross final energy consumption	16.6%	15.3%	8.5%
GERMANY	**2014 Estimated**	**2014 Actual**	**Gap**
Estimated RES share in gross electricity consumption	28.5%	28.2%	1%
Estimated RES share in gross final energy consumption	14.3%	13.8%	3.6%

To remove the impact of this minor gap between the 2014 initial indicator and the actual one the 2015 data calculation has been adjusted by applying the 2015/2014 variation of the interim indicator to the 2014 actual indicator.

The early estimates are calculated in the "RES Share'' sheet of each country Excel file and results are provided in Annex B of this report.

3.4 Calculation of early estimates of the energy import bill

The early estimates of the energy import bill come from the Eurostat International trade database (Comext)[46], which provides an early estimate of energy import bills for all EU member countries.

The product considered were:
Oil:

- 27090010 / Petroleum oil from natural gas condensates
- 27090090: Petroleum oil and oil obtained from bituminous minerals crude

Natural Gas:

- 27111100: Natural gas liquefied
- 27112100: Natural gas in gaseous state

Coal, Lignite: 2701 (Coal), 2702 (Lignite), 2703 (Peat) and 2704 (Coke)

Some countries consider that some of the import bill data is confidential, which leads to some of the data being withheld from publication which in turn leads to an incorrect split of the bill by energy. The information published in the Comext database is in line with the one of the Eurostat publication ''EU imports of energy products'', providing data corrected from confidential data, except for natural gas. Early estimates have then been adjusted to include confidential data only for natural gas and only when the early estimates natural gas import quantity was higher than in the Comext database.
The adjustment was made by applying the following equation:
Confidential trade = (Natural gas import quantity from early estimates - Natural gas import quantity from Comext) * EU average natural gas price calculated from Comext data
With average EU natural gas price calculated from Comext data = EU natural gas value in Euro / EU natural gas supplementary quantity.

For Poland the natural gas import bill in the Comext database is null, although the country imports gas. In addition, for Malta, Luxembourg and Cyprus oil import bill in the Comext database is null, although the countries import oil. We have therefore estimated the natural gas or oil import bill and changed the total import bill accordingly.
For Poland natural gas import bill was estimates as: Natural gas import quantity from early estimates *EU average natural gas price calculated from Comext data
For Malta, Luxembourg and Cyprus oil import bill was estimated as oil import price of a close country * oil import quantity from early estimates.
Oil import price = oil value in Euro / oil quantity from Comext data
The close country considered are Belgium for Luxembourg, Italy for Malta and Greece for Cyprus.

The import bill data are provided in the ''Import bill'' sheet of each country Excel file and results are provided in Annex B of this report.

[46] International trade detailed data, EU trade since 1988 by SITC (DS-018995)

4 Conclusions

This report presents a detailed review of the available data sources and the statistical methods available and develops and demonstrates a robust methodology to produce early estimates.

Our work began with a literature and data review into sources of data that could be used to produce early estimates. In terms of data coverage and the differences between Eurostat and national data coverage our literature review shows that:

- All countries except 6 (Greece, Hungary, Luxembourg, Malta, Poland and Slovakia) provide some form of early estimates (i.e. monthly data or annual data released before the consolidated Eurostat annual figures).
- 7 countries (Austria, France, Germany, Italy, Finland, the Netherlands and the UK) provide a full energy balance (supply + final consumption split by sector) covering total energy consumption and almost all the energy types / sources with varying degrees of detail. Among these countries 1 country (Germany) uses a methodology very close to that of Eurostat, 1 country (Italy) provides at least 1 data item where the variation between it and Eurostat data is 5-10% and the other 5 countries use different methodologies. For the 6 countries with the gaps caused by the differences in definition described above we have corrected the data where possible.
- 15 countries provide partial early estimate data. Of these, 5 countries use a methodology very close to that of Eurostat. The results generated differ from that of Eurostat by 5-10% for 2 countries with a larger variation than this for 7 countries. Because of a lack of 2014 data from the source providing early estimates it was not possible to compare Czech Republic National data with those of Eurostat.

The main findings of our literature review in terms of the data coverage from sources other than national statistics are:

- BP, Cedigaz, JODI and Eurogas do not provide any additional information in comparison to the Eurostat monthly data.
- Enerdata provides a full energy balance with detailed data but it is not a primary source of information. The methodology used, although very close to Eurostat, has some differences and in order to make the data comparable some adjustments would need to be made (e.g. aviation bunkers excluded from the consumption, coking coal consumption made compatible for industry, etc.).
- ENTSO-E provides power generation data from oil, gas, coal, biomass and solar including CSP, but only covers large installations, meaning that the data is not completely in line with Eurostat data.
- Eurobserv'ER covers wind and PV electricity production and biofuels consumption for transport, and the data are almost in line with Eurostat data.
- The EEA publishes data on the share of renewable energies (RES) in gross electricity production and gross final consumption in August of each year. These data could allow for the estimates of RES shares to be validated.
- Eurostat monthly data are not sufficient to calculate detailed early estimates of energy balances; they only cover the supply part of the balance and are not available for some important variables, such as:
    - Power production from thermal and solar energy

- Manufactured gas
- Derived heat
- Solid biofuels and municipal wastes
- Non-renewable wastes

The analyses of the data sources lead us to recommend the following principles to calculate early estimates:

1. To favour the use of annual data, rather than monthly data (i.e. the use of IEA, Eurobserv'er or national annual data is prioritised over Eurostat monthly data[47]).
2. To minimise the number sources of data used to prevent the introduction of statistical inconsistencies (i.e. if a national source provides the full energy balance for a country, national data will be used for the supply and consumption data even if the IEA provides supply data). In this respect, using IEA data for the supply and national data for the final consumption would induce some statistical inconsistencies.

Based on the literature review and the principles mentioned above we have calculated early estimates by using a combination of three different primary sources for energy supply and transformation data and three different methodologies for the final consumption data, with the choice of source and methodology varying by Member State depending on the availability of national and IEA data. In total 6 different approaches were applied, each corresponding to the most accurate method for each country based on the availability of data. They are summarised in the table below:

Summary of the primary data sources used to calculate early estimates for each country

Supply and transformation data source	Final consumption data source		
	National data	National data and extrapolations	Extrapolations
National data	AT, DE, FI, FR, IT, NL, UK	HR, IE, SI, ES, LV, LT, PT, SE[48]	
IEA		BE, CZ, DK, EE	EL, HU[49], LU, PL, SK[50]
Eurostat data		BG, CY, RO	MT

The calculation of early estimates was based on a bottom-up approach (i.e. the total consumption is the sum of the consumption by product) and was split into 4 stages, as follows:

1. Calculation of early estimates for physical data (e.g. GWh for electricity, Mm^3 for gas, etc.) at the energy carrier and product level.
2. Calculation of early estimates at the energy unit level. The conversion of data from physical units to harmonised energy units (toe) is made on the basis of the same conversion coefficients as for the year 2014.
3. Calculation of the total energy consumption by adding all energy carriers.
4. Match the sum of the estimates by sector and by fuel with the total final consumption published by national statistics when available.

[47] In practice, to take into account the time constraint of the project (need to provide estimations for all the EU countries by 15 September 2016), and as the IEA published their early estimates on 8th August 2016, for several series and several countries Eurostat monthly data have been used even if IEA data were available but we checked that the Eurostat monthly data 2015/2014 variation for the main series was in line with the IEA yearly data variation.

[48] Early estimates available for all data except residential, services and other sector energy consumption

[49] 2015 early estimates available only for total primary consumption

[50] Early estimates available only for electricity production by source

We ensured that our approach was robust by:

- Using the most appropriate source of available data.
- Using the most accurate methodology to make extrapolations.
- Validating our estimates with data quality checks.
- Benchmarking our calculations against other 2015 available data (National preliminary or final data, sum of Eurostat monthly data, the IEA preliminary statistics, Eurobserv'er preliminary data, ENTSO-E data and the EEA preliminary data)

This gives us a high level of confidence in the quality of our calculations. However, our approach has two other relevant constraints:

- For a number of the countries, much of the data, mainly on final consumption, were extrapolated.
- Due to the time-constraints, we have often used Eurostat monthly data as the basis, rather than annual IEA preliminary data. The reason for this is that the IEA annual preliminary data were published too late to allow their inclusion for all the countries and all the series.

We have a high level of confidence in the proposed methodology because it is based on the most credible sources of data available, to mitigate against potential statistical mismatches, the data gaps are filled by solid econometric regressions and we have followed a consistent validation and quality control process. A confidence index reflecting the quality of each estimate is provided in the Excel files.

The proposed methodology is replicable, although the process could be improved in terms of the timeliness and accuracy of the estimates by automating the data collection process from major sources (e.g. IEA preliminary data, ENTSO-E etc.).

Over the longer-term, the accuracy and timeliness of early estimates for the energy balances could be improved by adjusting the European energy statistics. These adjustments could include addressing the issues in consistency between monthly data and annual data, adding new enquiries to their monthly data collection questionnaires and/or using data from the IEA annual mini questionnaires.

Annexes

Annexe A: Early estimates benchmark for each country and the EU as a whole

Annexe B: Main results for each country

Annex A: Early estimates benchmark for each country and the EU as a whole

European Union

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 IEA World energy statistics (%)*	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	1.3%	-	1.3%	-	1.2%
Oil GIC	1.3%	0.8%	0.9%	-	-
Gas GIC	4.7%	4.3%	5.0%	-	-
Solid fuel GIC	-0.9%	-3.4%	-2.1%	-	-
Final electricity consumption	1.2%	-	-	-	-
Hydro electricity generation	-9.7%	-8.7%	-9.9%	-	-0.4%
Wind electricity generation	23.4%	25.0%	23.0%	20.6%	13.4%
Solar electricity generation	12.3%	-	-	9.2%	8.6%
Solar thermal heat generation	3.1%	-	4.3%	-	-
Biogasoline consumption for transport Biodiesel consumption for transport	-1.5%	-	-	-1.7%	-0.7%
Share RES electricity 2015	28.7%	-	-	-	29.6%
Share RES energy 2015	16.6%	-	-	-	16.7%

Austria

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	2.7%	-	2.6%	2.1%	-	3.4%
Oil GIC	1.2%	1.2%	1.3%	2.0%	-	-
Gas GIC	6.5%	6.5%	6.7%	6.7%	-	-
Solid fuel GIC	9.5%	9.5%	7.5%	4.9%	-	-
Final electricity consumption	2.0%	-	2.0%	-	-	-
Hydro electricity generation	-9.7%	-9.8%	-	-9.7%	-	-0.8%
Wind electricity generation	33.1%	33.1%	-	25.7%	-	24.6%
Solar electricity generation	19.1%	-	-	19.1%	19.1%	19.1%
Solar thermal heat generation	1.1%	-	-	1.1%	-	-
Biogasoline consumption	-12.0%	-44.4%	-	-1.6%	2.0%	-
Biodiesel consumption	1.3%	-3.9%	-	-29.2%	-15.0%	-
Share RES electricity 2015	72.4%	-	-	-	-	70.0%
Share RES energy 2015	32.8%	-	-	-	-	33.6%

Belgium

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	0.3%	-	-	0.5%	-	-0.9%
Oil GIC	3.4%	3.4%	-	3.4%	-	-
Gas GIC	9.8%	9.8%	-	9.8%	-	-
Solid fuel GIC	-5.2%	-1.2%	-	-5.2%	-	-
Final electricity consumption	1.3%	-	1.3%	-	-	-
Hydro electricity generation	8.4%	-4.4%	-	8.3%	-	-4.4%
Wind electricity generation	18.4%	21.1%	-	18.4%	24.7%	20.2%
Solar electricity generation	6.0%	-	-	6.1%	-0.6%	-0.6%
Solar thermal heat generation	-	-	-	-	-	-
Biogasoline consumption of transport	3.3%	-	-	2.7%	3.3%	-
Biodiesel consumption of transport	-38.5%	-	-	-35.2%	-38.5%	-
Share RES electricity 2015	15.0%	-		-	-	12.8%
Share RES energy 2015	7.3%	-		-	-	7.3%

Bulgaria

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	6.0%	-	-	-	-	2.9%
Oil GIC	6.7%	6.0%	-	-	-	-
Gas GIC	9.4%	10.4%	8.6%	-	-	-
Solid fuel GIC	11.4%	11.4%	9.6%	-	-	-
Final electricity consumption	0.0%	-	0.0%	-	-	-
Hydro electricity generation	18.5%	18.5%	-	-	-	0.0%
Wind electricity generation	0.7%	4.3%	-	-	0.7%	3.2%
Solar electricity generation	4.9%	-	-	-	4.9%	4.9%
Biogasoline consumption	0.0%	33.3%	-	-	0.0%	-
Biodiesel consumption	0.0%	150.0%	-	-	0.0%	-
Share RES electricity 2015	19.2%	-	-	-	-	19.3%
Share RES energy 2015	17.9%	-	-	-	-	18.4%

Cyprus

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	1.4%	-	-	-	-	1.4%
Oil GIC	0.6%	0.6%	-	-	-	-
Gas GIC	-	-	-	-	-	-
Solid fuel GIC	50.0%	50.0%	-	-	-	-
Final electricity consumption	3.1%	-	3.1%	-	-	-
Hydro electricity generation	-	-	-	-	-	-
Wind electricity generation	20.2%	20.2%	-	-	26.4%	10.4%
Solar electricity generation	42.6%	3.2%	-	-	42.6%	42.6%
Solar thermal heat generation	0.0%	-	-	-	-	
Biogasoline consumption	-	-	-	-	-	-
Biodiesel consumption	-29.7%	-14.3%	-	-	-29.7%	-
Share RES electricity 2015	8.1%	-	-	-	-	8.3%
Share RES energy 2015	8.6%	-	-	-	-	9.1%

Croatia

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	3.7%	-	2.6%	-	-	6.0%
Oil GIC	3.4%	3.4%	1.3%	-	-	-
Gas GIC	12.2%	11.9%	12.2%	-	-	-
Solid fuel GIC	-9.0%	-8.3%	-9.0%	-	-	-
Final electricity consumption	2.1%	-	2.1%	-	-	-
Hydro electricity generation	-29.6%	-	-29.6%	-	-	-0.3%
Wind electricity generation	22.8%	-	22.8%	-	7.7%	25.9%
Solar electricity generation	50.0%	-	-	-	50.0%	50.0%
Solar thermal generation	15.3%	-	-		-	
Biogasoline consumption	-	-		-	-	-
Biodiesel consumption	0.0%			-	0.0%	-
Share RES electricity 2015	45.8%	-	-	-	-	40.0%
Share RES energy 2015	26.6%	-	-	-	-	27.5%

Czech Republic

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	-1.5%	-		-1.2%		-0.8%
Oil GIC	-2.0%	-2.4%		-2.8%		-
Gas GIC	4.9%	4.9%		4.9%		-
Solid fuel GIC	-0.7%	-0.7%		0.5%		-
Final electricity consumption	0.9%	-		-		-
Hydro electricity generation	-58.4%	0.8%	-6.0%	-58.5%		-0.2%
Wind electricity generation	23.1%	23.1%	20.2%	19.5%	27.8%	10.1%
Solar electricity generation	6.6%	-	6.6%	6.6%	6.5%	6.5%
Solar thermal heat generation	12.5%	-		12.5%	-	-
Biogasoline consumption	-3.9%			-4.6%	0.0%	-
Biodiesel consumption	-7.2%			-7.5%	0.0%	-
Share RES electricity 2015	14.4%	-		-	-	13.6%
Share RES energy 2015	13.7%	-		-	-	14.0%

Denmark

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	-1.2%	-	-1.0%	-1.0%	-	-1.6%
Oil GIC	1.1%	-0.8%	-	1.1%	-	-
Gas GIC	0.6%	1.7%	-	0.6%	-	-
Solid fuel GIC	-27.0%	-32.7%	-	-26.7%	-	-
Final electricity consumption	3.5%	-	-	-	-	-
Hydro electricity generation	20.0%	20.0%	-	100.0%	-	-2.2%
Wind electricity generation	8.6%	8.6%	-	8.0%	7.8%	7.6%
Solar electricity generation	1.3%	-	-	2.0%	21.5%	21.5%
Solar thermal heat generation	17.2%	-	-	17.2%	-	-
Biogasoline consumption	-	-	-	-	-	-
Biodiesel consumption	-15.1%	-	-	-14.7%	-10.0%	-
Share RES electricity 2015	47.5%	-	-	-	-	50.8%
Share RES energy 2015	29.5%	-	-	-	-	30.6%

Estonia

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	-7.5%	-	-	-9.1%	-	-11.5%
Oil GIC	-0.4%	-11.7%	-	-0.4%	-	-
Gas GIC	-10.4%	-10.4%	-	-10.3%	-	-
Solid fuel GIC	-13.7%	-	-	-13.7%	-	-
Final electricity consumption	0.9%	-	-	-	-	-
Hydro electricity generation	7.4%	7.4%	-	-	-	5.3%
Wind electricity generation	18.4%	24.6%	-	17.3%	14.7%	11.9%
Solar electricity generation	-	-	-	-	100.0%	0.0%
Solar thermal heat generation	-	-	-	-	-	-
Biogasoline consumption	-	-	-	-	-	-
Biodiesel consumption	-	-	-	-	-	-
Share RES electricity 2015	16.0%	-	-	-	-	16.8%
Share RES energy 2015	28.1%	-	-	-	-	27.9%

Finland

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	-2.3%	-	-3.0%	-4.3%	-	-3.2%
Oil GIC	0.5%	0.5%	0.5%	-7.6%	-	-
Gas GIC	-11.4%	-11.4%	-16.0%	-11.5%	-	-
Solid fuel GIC	-15.6%	-	-15.6%	-13.6%	-	-
Hydro electricity generation	25.2%	-	25.2%	25.2%	-	0.9%
Wind electricity generation	110.0%	-	111.0%	111.6%	110.4%	74.0%
Solar electricity generation	0.00%	-	-	0.0%	25.0%	25.0%
Solar thermal heat generation	0.00%	-	-	0.0%	-	-
Biogasoline consumption	-8.0%	-	-	-8.1%	-	-
Biodiesel consumption	18.1%	-	-	18.1%	-	-
Final electricity consumption	-0.7%	-	-1.0%	-	-	-
Share RES electricity 2015	31.4%	-	-	-	-	32.6%
Share RES energy 2015	40.5%	-	-	-	-	39.5%

France

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	1.2%	-	1.6%	1.2%	-	1.7%
Oil GIC	0.9%	0.6%	1.0%	0.3%	-	-
Gas GIC	8.3%	8.3%	7.5%	8.0%	-	-
Solid fuel GIC	-3.0%	-4.7%	-3.0%	-4.0%	-	-
Final electricity consumption	1.8%	-	1.8%	-	-	-
Hydro electricity generation	-12.6%	-13.2%		-13.0%	-	-1.3%
Wind electricity generation	22.5%	22.6%		22.8%	22.3%	14.2%
Solar electricity generation	25.2%	-		25.2%	13.5%	13.5%
Solar thermal heat generation	3.0%	-		3.0%	-	-
Biogasoline consumption	0.5%	-8.3%		0.7%	4.8%	-
Biodiesel consumption	0.8%	1.0%		0.6%	0.8%	-
Share RES electricity 2015	18.6%	-		-	-	18.5%
Share RES energy 2015	14.8%	-		-	-	14.5%

Germany

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	1.3%	-	1.1%	1.9%	-	0.0%
Oil GIC	-0.1%		-0.1%	0.3%	-	-
Gas GIC	5.2%	3.1%	5.0%	7.2%	-	-
Solid fuel GIC	-0.5%	-2.0%	-0.5%	0.1%	-	-
Final electricity consumption	1.3%	-	1.3%	-	-	-
Hydro electricity generation	-3.1%	-1.7%	-1.5%	-3.1%	-	0.0%
Wind electricity generation	53.4%	57.2%	53.6%	53.4%	-	24.6%
Solar electricity generation	6.4%	-	6.4%	6.6%		6.6%
Solar thermal heat generation	6.9%	-	-	6.9%	-	-
Biogasoline consumption	-4.6%	-44.4%	-4.6%	-5.1%	-4.6%	-
Biodiesel consumption	-7.3%	-3.9%	-7.3%	-7.3%	-6.9%	-
Share RES electricity 2015	14.5%	-	-	-	-	14.5%
Share RES energy 2015	29.2%	-	-	-	-	30.0%

Greece

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	1.6%	-	-	2.1%	-	-1.5%
Oil GIC	4.3%	4.3%	-	4.5%	-	-
Gas GIC	7.8%	7.8%	-	7.7%	-	-
Solid fuel GIC	-7.2%	-15.9%	-	-7.3%	-	-
Final electricity consumption	-3.8%	-	-		-	-
Hydro electricity generation	23.7%	-	-	23.6%	-	2.9%
Wind electricity generation	25.5%	-	-	23.3%	12.0%	6.7%
Solar electricity generation	-1.8%	-	-	-1.8%	0.7%	0.7%
Solar thermal heat generation	2.1%	-	-	2.1%	-	-
Biodiesel consumption in transport	-	-	-	-	-	-
Biogasoline consumption in transport	7.6%	-	-	-	7.6%	-
Share RES electricity 2015	22.8%	-	-	-	-	22.5%
Share RES energy 2015	15.9%	-	-	-	-	15.5%

Hungary

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	5.1%	-	4.6%	5.0%	-	5.5%
Oil GIC	7.5%	8.6%	-	7.0%	-	-
Gas GIC	6.8%	6.8%	-	7.0%	-	-
Solid fuel GIC	4.9%	-0.1%	-	4.9%	-	-
Final electricity consumption	3.0%	-	-	-	-	-
Hydro electricity generation	-22.7%	-22.7%	-	-23.0%	-	1.9%
Wind electricity generation	5.6%	5.6%	-	5.3%	10.2%	0.5%
Solar electricity generation	100.0%		-	100.0%	92.9%	92.9%
Solar thermal heat generation	83.3%		-	83.3%	-	-
Biogasoline consumption	-24.2%	84.8%	-	-26.7%	3.0%	-
Biodiesel consumption	2.3%	-	-	2.3%	11.0%	-
Share RES electricity 2015	7.3%	-	-	-	-	7.1%
Share RES energy 2015	8.5%	-	-	-	-	9.4%

Italy

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	4.4%	-	4.8%	4.0%	-	2.5%
Oil GIC	6.6%	-	6.6%	6.0%	-	-
Gas GIC	1.1%	0.8%	1.1%	0.8%	-	-
Solid fuel GIC	8.2%	26.3%	8.2%	7.8%	-	-
Final electricity consumption	5.2%	-	5.2%	-	-	-
Hydro electricity generation	13.1%	15.4%		13.1%	-	0.0%
Wind electricity generation	27.8%	36.0%		27.8%	7.0%	12.8%
Solar electricity generation	-			-	0.0%	42.9%
Solar thermal heat generation	8.3%			8.3%	-	-
Biogasoline consumption	-4.0%	43.6%		-4.0%	12.2%	-
Biodiesel consumption	-6.3%			-3.1%	9.8%	-
Share RES electricity 2015	25.1%	-	-	-	-	24.0%
Share RES energy 2015	8.9%	-	-	-	-	9.0%

Latvia

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	2.5%	-	-	-	-	1.2%
Oil GIC	4.0%	1.8%	4.0%	-	-	-
Gas GIC	0.8%	1.6%	0.8%	-	-	-
Solid fuel GIC	-28.9%	-	-28.9%	-	-	-
Final electricity consumption	0.5%	-	0.5%	-	-	-
Hydro electricity generation	-6.3%	-6.3%	-	-	-	-2.1%
Wind electricity generation	45.5%	45.5%	-	-	22.2%	4.1%
Solar electricity generation	-	-	-	-	0.0%	0.0%
Solar thermal heat generation	-	-	-	-	-	-
Biogasoline consumption	5.1%	83.3%	-	-	5.1%	-
Biodiesel consumption	11.7%	-17.1%	-	-	11.1%	-
Share RES electricity 2015	51.70%	-	-	-	-	52.4%
Share RES energy 2015	40.72%	-	-	-	-	39.2%

Lithuania

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	1.8%	-	1.6%	-	-	0.6%
Oil GIC	3.4%	3.9%	3.0%	-	-	-
Gas GIC	0.1%	0.4%	0.1%	-	-	-
Solid fuel GIC	-21.8%	-23.4%	-19.8%	-	-	-
Final electricity consumption	1.1%	-	1.1%	-	-	-
Hydro electricity generation	-12.0%	30.8%	-5.8%	-	-	-2.1%
Wind electricity generation	26.2%	26.2%	26.7%	-	-	4.1%
Solar electricity generation	0.0%	-	0.0%	-	-	0.0%
Solar thermal heat generation	-	-	-	-	-	-
Biogasoline consumption	22.1%	83.3%	22.1%	-	74.5%	-
Biodiesel consumption	0.5%	-7.6%	0.5%	-	0.5%	-
Share RES electricity 2015	15.9%	-	-	-	-	15.2%
Share RES energy 2015	25.7%	-	-	-	-	24.3%

Luxembourg

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	-0.9%	-	-	-2.3%	-	
Oil GIC	-1.1%	-1.1%	-	-3.4%	-	-
Gas GIC	-8.8%	-8.8%	-	-8.8%	-	-
Solid fuel GIC	-6.1%	-	-	-7.5%	-	-
Final electricity consumption	6.1%	-	-	-	-	-
Hydro electricity generation	-11.1%	30.8%	-	-11.1%	-	-2.2%
Wind electricity generation	12.5%	12.5%	-	14.3%	1.3%	4.7%
Solar electricity generation	0.0%	-	-	0.0%	13.7%	13.7%
Solar thermal heat generation	33.3%	-	-	33.3%	-	-
Biogasoline consumption	133.3%	0.0%	-	133.3%	131.2%	-
Biodiesel consumption	13.2%	3.9%		13.2%	12.7%	-
Share RES electricity 2015	6.2%	-	-	-	-	6.1%
Share RES energy 2015	4.6%	-	-	-	-	5.0%

Malta

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	-21.3%	-	-	-	-	0.2%
Oil GIC	-22.2%	-23.4%	-	-	-	-
Gas GIC	-	-	-	-	-	-
Solid fuel GIC	-	-	-	-	-	-
Final electricity consumption	-45.4%	-	-	-	-	-
Hydro electricity generation	-	0.0%	-	-	-	0.0%
Wind electricity generation	-	0.0%	-	-	0.0%	0.0%
Solar electricity generation	41.2%	-	-	-	41.2%	41.2%
Solar thermal heat generation	0.0%	-	-	-	-	-
Biogasoline consumption	-	-	-	-	-	-
Biodiesel consumption	36.6%	-	-	-	10.1%	-
Share RES electricity 2015	7.7%	-	-	-	-	4.5%
Share RES energy 2015	6.2%	-	-	-	-	5.3%

Netherlands

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	-0.3%	-	-0.2%	-1.1%	-	-3.2%
Oil GIC	-4.9%	-7.0%	-4.9%	-4.3%	-	-
Gas GIC	-0.7%	-1.1%	-0.7%	-2.6%	-	-
Solid fuel GIC	21.9%	6.2%	21.9%	22.1%	-	-
Hydro electricity generation	25.0%	-21.7%	-25.0%	-20.0%	-	-3.6%
Wind electricity generation	28.7%	29.2%	28.7%	29.1%	24.8%	17.8%
Solar electricity generation	32.1%	-	32.1%	39.7%	-34.0%	34.0%
Solar thermal heat generation	0.0%	-	0.0%	-		-
Biogasoline consumption	10.9%	-20.5%	-	10.9%	10.6%	-
Biodiesel consumption	-27.5%	-	-	-27.5%	-27.6%	-
Final electricity consumption	0.9%	-	1.1%	-	-	-
Share RES electricity 2015	10.6%	-	-	-	-	10.2%
Share RES energy 2015	5.8%	-	-	-	-	6.0%

Poland

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	1.8%	-	-	0.6%	-	2.3%
Oil GIC	5.6%	5.6%	-	5.3%	-	-
Gas GIC	1.8%	1.8%	-	2.8%	-	-
Solid fuel GIC	-0.2%	-0.2%	-	-2.5%	-	-
Final electricity consumption	0.5%	-	-	-	-	-
Hydro electricity generation	-2.8%	-2.0%	-	-16.0%	-	-0.8%
Wind electricity generation	41.5%	41.5%	-	40.9%	-0.8%	26.0%
Solar electricity generation	400.0%	-	-	400.0%	26.0%	194.7%
Solar thermal heat generation	11.8%	-	-	11.8%	-	-
Biogasoline consumption	21.1%	5.3%	-	21.5%	19.3%	-
Biodiesel consumption	-9.6%	-5.0%	-	-9.6%	5.3%	-
Share RES electricity 2015	12.4%	-	-	-	-	13.3%
Share RES energy 2015	12.2%	-	-	-	-	11.8%

Portugal

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	3.8%	-	4.9%	4.8%	-	7.1%
Oil GIC	2.8%	2.9%	2.8%	5.8%	-	-
Gas GIC	18.8%	11.8%	18.9%	16.4%	-	-
Solid fuel GIC	21.6%	-	21.5%	21.9%	-	-
Final electricity consumption	0.3%	-	0.3%	-	-	-
Hydro electricity generation	-46.2%	-40.8%	-	-44.7%	-	-
Wind electricity generation	-2.9%	-3.0%	-	-4.2%	-	-
Solar electricity generation	27.8%	-	-	27.8%	-	-
Solar thermal heat generation	3.9%	-	-	3.9%	-	-
Biogasoline consumption	1033.3%	0.0%	-	1000.0%		-
Biodiesel consumption	19.1%	0.0%	-	21.2%		-
Share RES electricity 2015	53.4%	-	-	-	-	50.4%
Share RES energy 2015	25.61%	-	-	-	-	27.8%

Romania

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	1.5%	-	-	-	-	1.7%
Oil GIC	4.0%	4.1%	-	-	-	-
Gas GIC	-3.7%	-3.7%	-	-	-	-
Solid fuel GIC	5.2%	5.9%	-	-	-	-
Final electricity consumption	6.0%	-	-	-	-	-
Hydro electricity generation	-12.3%	-12.3%	-	-	-	0.9%
Wind electricity generation	19.8%	19.8%	-	-	19.2%	13.6%
Solar electricity generation	2.6%	-	-	-	2.6%	2.5%
Solar thermal heat generation	0.0%	-	-	-	-	-
Biogasoline consumption	-		-	-	-	-
Biodiesel consumption	-		-	-	-	-
Share RES electricity 2015	42.6%		-	-	-	39.7%
Share RES energy 2015	25.6%	-	-	-	-	24.7%

Slovakia

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	2.0%	-	-	2.1%	-	6.7%
Oil GIC	11.6%	-	-	13.0%	-	-
Gas GIC	2.8%	2.8%	-	2.8%	-	-
Solid fuel GIC	-4.9%	-2.6%	-	-4.8%	-	-
Final electricity consumption	-1.0%	-	-	-	-	-
Hydro electricity generation	-5.2%	-5.3%	-	-5.2%	-	-0.7%
Wind electricity generation	0.0%	-	-	0.0%	0.0%	-25.0%
Solar electricity generation	0.2%	-	-	0.0%	0.2%	0.0%
Solar thermal heat generation	0.0%	-	-	0.0%	-	-
Biogasoline consumption	0.0%	43.5%	-	0.0%	-	-
Biodiesel consumption	13.5%	51.9%	-	12.8%	-	-
Share RES electricity 2015	22.3%	-	-	-	-	23.3%
Share RES energy 2015	11.7%	-	-	-	-	11.9%

Slovenia

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	0.8%	-	-2.0%	-1.7%	-	1.1%
Oil GIC	-1.6%	-1.7%	-0.4%	-1.0%	-	-
Gas GIC	6.3%	6.3%	6.1%	6.0%	-	-
Solid fuel GIC	16.6%	1.5%	-3.4%	-0.2%	-	-
Final electricity consumption	2.6%	-	-	-	-	-
Hydro electricity generation	-37.0%	-34.6%	-	-37.6%	-	-0.7%
Wind electricity generation	-	-	-	-	75.0%	12.5%
Solar electricity generation	9.1%	-	-	9.1%	10.5%	10.5%
Solar thermal heat generation	0.0%	-	-	0.0%	-	-
Biogasoline consumption	0.0%	-	-	0.0%	-	-
Biodiesel consumption	-33.9%	-33.3%	-	-32.4%	-	-
Share RES electricity 2015	32.4%	-	-	-	-	33.0%
Share RES energy 2015	20.8%	-	-	-	-	21.8%

Spain

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	4.5%	-	4.6%	3.7%	-	2.1%
Oil GIC	3.2%	3.3%	3.9%	4.3%	-	-
Gas GIC	3.7%	3.7%	3.9%	3.9%	-	-
Solid fuel GIC	23.9%	-	23.9%	13.7%	-	-
Final electricity consumption	2.5%	-	2.5%	-	-	-
Hydro electricity generation	-26.4%	-9.8%	-	-28.9%	-	-0.4%
Wind electricity generation	-3.6%	33.1%	-	-5.1%	-	-1.0%
Solar electricity generation	0.6%	-	-	1.4%	-	0.3%
Solar thermal heat generation	1.7%	-	-	1.7%	-	-
Biogasoline consumption	-4.2%	0.4%	-	-4.2%	-4.0%	-
Biodiesel consumption	1.2%	6.0%	-	1.2%	-1.9%	-
Share RES electricity 2015	38.0%	-		-	-	36.0%
Share RES energy 2015	16.2%	-		-	-	15.6%

Sweden

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	-5.9%	-	-2.3%	-3.9%	-	-8.4%
Oil GIC	-17.4%	-7.3%	-0.8%	-5.6%	-	-
Gas GIC	-8.9%	-8.9%	-4.3%	-8.9%	-	-
Solid fuel GIC	1.3%	-4.1%	1.3%	1.2%	-	-
Final electricity consumption	0.0%	-	0.0%		-	-
Hydro electricity generation	15.9%	16.0%	-	16.8%	-	-0.2%
Wind electricity generation	44.8%	44.8%	-	47.9%	46.9%	26.5%
Solar electricity generation	125.0%	-	-	125.0%	62.5%	62.5%
Solar thermal heat generation	0.0%	-	-	0.0%	-	-
Biogasoline consumption	60.4%	-	-	-19.3%	-	-
Biodiesel consumption	14.0%	-	-	40.2%	-	-
Share RES electricity 2015	64.1%	-	-	-	-	65.2%
Share RES energy 2015	56.7%	-	-	-	-	54.1%

United Kingdom

	2015/2014 Early Estimates (%)	2015/2014 Eurostat Monthly (%)	2015/2014 National source (%)	2015/2014 IEA World energy statistics (%)	2015/2014 Eurobserv'er (%)	2015/2014 EEA (%)
Total GIC	0.6%	-	0.8%	0.3%	-	1.3%
Oil GIC	2.8%	1.5%	2.8%	2.2%	-	-
Gas GIC	2.2%	2.2%	2.6%	2.6%	-	-
Solid fuel GIC	-20.7%	-21.7%	-20.7%	-19.6%	-	-
Final electricity consumption	0.1%	-	0.0%	-	-	-
Hydro electricity generation	7.8%	-1.1%	-	7.5%	-	0.4%
Wind electricity generation	26.8%	30.7%	-	26.3%	18.7%	15.7%
Solar electricity generation	86.8%	-	-	86.8%	86.6%	86.6%
Solar thermal heat generation	0.0%	-	-	0.0%	-	-
Biogasoline consumption	-2.2%	2.3%	-2.2%	0.0%	-2.6%	-
Biodiesel consumption	-26.7%	-25.3%	-	-26.6%	-30.7%	-
Share RES electricity 2015	21.4%	-	-	-	-	24.6%
Share RES energy 2015	8.1%	-	-	-	-	8.5%

Annex B: Main results for the EU28 and each country

Early estimates 2015	European Union						September 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**774364**	**86304**	**107006**	**145462**	**201859**	**233733**	**0**
Imports	1463912	925990	338136	148860	15300	271	35355
Exports	557750	393497	85519	34711	9921	35	34066
Net imports (imports-exports)	906161	532493	252617	114149	5378	236	1289
Gross inland consumption	**1627389**	**560442**	**358879**	**265427**	**207368**	**233974**	**1299**
Transformation input	1297662	**652321**	104671	251340	57610	231719	0
Transformation output	958230	638040	20970	32715	69	55843	210592
Distribution losses	25789	47	2997	48	24	4434	18238
Available for final consumption	**1187228**	**519791**	**251737**	**46074**	**84580**	**49480**	**235566**
Final non-energy consumption	98009	82004	14511	1494	0	0	0
Final energy consumption	**1083675**	**430473**	**238448**	**45434**	**84807**	**49153**	**235361**
Industry	276625	27081	88374	34503	21526	18309	86832
Transport	358617	336250	3025	9	13962	0	5372
Residential	274288	35211	98700	8792	42145	20539	68902
Services	143495	15500	43430	952	4647	9476	69490
Others	30650	16431	4919	1179	2528	829	4765
Electricity generation (gross or net) [GW	3210203	57331	484405	830839	761996	217866	857765
Heat generation [PJ-GCV]	2339						

Renewable energy share in gross final energy consumption	
Overall RES with Aviation Cap [%]	16.6%
RES-E - Electricity Generation [%]	28.7%

Energy import bill [€] Extra_EU	**€m**	**%GDP**
Total	260540	1.8%
Coal	12849	0.1%
Oil	182569	1.3%
Natural gas	65122	0.5%

Early estimates 2015	Austria						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**12058**	**879**	**1071**	**0**	**9403**	**705**	**0**
Imports	28666	13913	8395	2906	927	0	2525
Exports	6953	2557	2205	11	519	0	1660
Net imports (imports-exports)	21714	11356	6190	2896	407	0	865
Gross inland consumption	**33561**	**12039**	**6866**	**3338**	**9749**	**705**	**865**
Transformation input	17152	**9339**	2318	2963	2115	417	0
Transformation output	14734	9166	988	927	1	2022	1630
Distribution losses	504	0	21	0	0	176	306
Available for final consumption	**29440**	**11559**	**5213**	**1302**	**3932**	**2133**	**5302**
Final non-energy consumption	1987	1618	334	35	0	0	0
Final energy consumption	**27446**	**9940**	**4879**	**1261**	**3932**	**2133**	**5302**
Industry	9178	686	3004	1232	1371	555	2329
Transport	8887	7827	206	0	589	0	265
Residential	5964	958	1098	24	1643	718	1522
Services	2861	248	549	3	123	850	1090
Others	556	221	22	1	206	10	96
Electricity generation (gross or net) [GW	62051	865	7803	5104	43100	5179	0
Heat generation [PJ-GCV]	85						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	32.8%
RES-E - Electricity Generation [%]	72.4%

Energy import bill [€]	**€m**	**%GDP**
Total	9839	2.9%
Coal	476	0.1%
Oil	3097	0.9%
Natural gas	3133	0.9%

Early estimates 2015	Belgium						
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**11055**	**812**	**0**	**4**	**2829**	**7410**	**0**
Imports	81419	60278	15182	3287	633	0	2039
Exports	31890	30021	1445	58	133	0	233
Net imports (imports-exports)	49528	30256	13737	3229	500	0	1806
Gross inland consumption	**53536**	**24050**	**13831**	**3118**	**3321**	**7410**	**1806**
Transformation input	50194	35217	4000	2354	1199	7424	0
Transformation output	43228	35243	826	1256	0	871	5032
Distribution losses	342	0	2	4	0	11	325
Available for final consumption	**44369**	**22878**	**10337**	**2017**	**1364**	**754**	**7020**
Final non-energy consumption	9049	7792	1049	208	0	0	0
Final energy consumption	**35543**	**15310**	**9293**	**1830**	**1355**	**741**	**7014**
Industry	12221	1928	3955	1754	686	595	3304
Transport	10053	9613	48	0	260	0	131
Residential	7858	2528	3317	69	284	16	1645
Services	4651	839	1755	0	61	129	1867
Others	760	402	218	8	64	1	67
Electricity generation (gross or net) [GWh]	67342	106	21295	4219	8819	6750	26153
Heat generation [PJ-GCV]	36						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	7.3%
RES-E - Electricity Generation [%]	15.0%

Energy import bill [€]	**€m**	**%GDP**
Total	25416	6.2%
Coal	663	0.2%
Oil	13329	3.3%
Natural gas	5759	1.4%

Early estimates 2015	Bulgaria						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**11938**	**83**	**75**	**5858**	**1919**	**4003**	**0**
Imports	12427	8742	2519	739	62	0	365
Exports	5925	4515	1	24	121	0	1264
Net imports (imports-exports)	6503	4227	2518	716	-59	0	-898
Gross inland consumption	**18796**	**4119**	**2584**	**7123**	**1865**	**4003**	**-898**
Transformation input	19919	6850	825	8184	71	3988	0
Transformation output	12365	6747	0	852	4	1306	3456
Distribution losses	502	1	10	8	0	136	346
Available for final consumption	**9478**	**3554**	**1724**	**-219**	**1100**	**934**	**2385**
Final non-energy consumption	532	232	241	59	0	0	0
Final energy consumption	**9219**	**3179**	**1291**	**334**	**1102**	**933**	**2380**
Industry	2766	211	833	191	222	526	784
Transport	3232	2804	292	0	111	0	26
Residential	2084	24	46	134	721	296	864
Services	941	13	97	2	40	102	687
Others	195	128	24	6	9	9	20
Electricity generation (gross or net) [GWh]	48344	181	1816	22479	8150	340	15377
Heat generation [PJ-GCV]	55						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	17.9%
RES-E - Electricity Generation [%]	19.2%

Energy import bill [€]	**€m**	**%GDP**
Total	2937	6.7%
Coal	115	0.3%
Oil	2026	4.6%
Natural gas	796	1.8%

Early estimates 2015	Croatia						September 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**4412**	**774**	**1542**	**0**	**2086**	**10**	**0**
Imports	7036	4521	943	618	12	0	942
Exports	2992	1997	307	13	286	0	387
Net imports (imports-exports)	4044	2524	635	605	-275	0	555
Gross inland consumption	**8502**	**3282**	**2266**	**588**	**1801**	**10**	**555**
Transformation input	4440	3369	505	492	74	0	0
Transformation output	4021	3458	1	0	5	226	332
Distribution losses	216	0	20	0	3	34	160
Available for final consumption	**7158**	**2919**	**1548**	**96**	**1107**	**187**	**1302**
Final non-energy consumption	605	110	495	0	0	0	0
Final energy consumption	**6416**	**2672**	**1054**	**96**	**1107**	**187**	**1302**
Industry	1144	272	395	93	39	47	298
Transport	2058	2007	4	0	30	0	18
Residential	2274	129	486	3	1023	106	527
Services	695	55	149	0	11	28	453
Others	244	209	20	0	4	5	6
Electricity generation (gross or net) [GWh]	11231	72	1055	2142	7373	589	0
Heat generation [PJ-GCV]	9						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	26.6%
RES-E - Electricity Generation [%]	45.8%

Energy import bill [€]	**€m**	**%GDP**
Total	1275	2.9%
Coal	82	0.2%
Oil	841	1.9%
Natural gas	267	0.6%

Early estimates 2015	Cyprus						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**126**	**1**	**0**	**0**	**118**	**8**	**0**
Imports	2461	2438	0	3	19	1	0
Exports	0	0	0	0	0	0	0
Net imports (imports-exports)	2461	2438	0	3	19	1	0
Gross inland consumption	**2255**	**2106**	**0**	**3**	**137**	**9**	**0**
Transformation input	936	928	0	0	8	0	0
Transformation output	368	0	0	0	1	1	366
Distribution losses	14	0	0	0	0	0	14
Available for final consumption	**1641**	**1176**	**0**	**3**	**100**	**10**	**351**
Final non-energy consumption	28	28	0	0	0	0	0
Final energy consumption	**1734**	**1270**	**0**	**3**	**100**	**10**	**351**
Industry	244	181	0	3	10	9	42
Transport	916	910	0	0	7	0	0
Residential	243	107	0	0	7	0	128
Services	199	39	0	0	5	0	155
Others	132	34	0	0	71	1	26
Electricity generation (gross or net) [GWh]	4601	4211	0	0	339	50	0
Heat generation [PJ-GCV]	0						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	8.6%
RES-E - Electricity Generation [%]	8.1%

Energy import bill [€]	**€m**	**%GDP**
Total	837	2.2%
Coal	2	0.1%
Oil	835	1.5%
Natural gas	0	0.4%

Early estimates 2015 — Czech Republic — September 2016

Energy balance - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity
Production	**27744**	**256**	**215**	**16511**	**3564**	**7199**	**0**
Imports	21981	11139	6161	2837	342	0	1502
Exports	8705	2460	1	3344	339	2	2560
Net imports (imports-exports)	13276	8679	6160	-507	3	-2	-1058
Gross inland consumption	40842	8888	6483	15758	3573	7197	-1058
Transformation input	32998	7693	2128	15120	1054	7003	0
Transformation output	21062	7667	1758	1928	0	2918	6791
Distribution losses	896	0	126	34	0	386	350
Available for final consumption	**26176**	**8635**	**5788**	**2277**	**2206**	**2396**	**4875**
Final non-energy consumption	2495	1976	119	400	0	0	0
Final energy consumption	**23573**	**6708**	**5692**	**1699**	**2204**	**2396**	**4875**
Industry	7399	287	2688	1179	471	822	1952
Transport	6522	6023	61	1	296	0	142
Residential	5868	4	1782	495	1249	1101	1237
Services	2888	13	1040	17	66	461	1292
Others	896	381	121	7	122	12	253
Gross electricity generation [GWh]	79778	66	2264	44575	795	5235	26843
Heat generation [PJ-GCV]	122						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	13.7%
RES-E - Electricity Generation [%]	14.4%

Energy import bill [€]	€m	%GDP
Total	5649	3.5%
Coal	115	0.1%
Oil	2026	1.2%
Natural gas	2152	1.3%

Early estimates 2015 — Denmark

Energy balance - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity
Production	**15381**	**7647**	**4139**	**0**	**3180**	**416**	**0**
Imports	18942	13974	591	1633	1331	3	1411
Exports	12369	13393	-1967	52	36	0	854
Net imports (imports-exports)	6574	581	2558	1581	1295	3	557
Gross inland consumption	**16705**	**6661**	**2847**	**1742**	**4479**	**420**	**557**
Transformation input	12296	7394	747	1783	1970	403	0
Transformation output	10795	6849	0	0	0	2762	1185
Distribution losses	709	0	4	0	0	545	160
Available for final consumption	**13500**	**5811**	**1568**	**-40**	**1234**	**2200**	**2726**
Final non-energy consumption	242	242	0	0	0	0	0
Final energy consumption	**13483**	**5774**	**1453**	**93**	**1236**	**2200**	**2726**
Industry	2019	339	693	74	117	92	704
Transport	4939	4697	0	0	208	0	34
Residential	3900	202	567	0	811	1410	911
Services	1830	53	151	0	46	663	917
Others	795	483	42	19	54	36	161
Electricity generation (gross or net) [GWh]	28607	236	1562	8245	14825	3738	0
Heat generation [PJ-GCV]	116						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	29.5%
RES-E - Electricity Generation [%]	47.5%

Energy import bill [€]	€m	%GDP
Total	2937	1.1%
Coal	115	0.0%
Oil	2026	0.8%
Natural gas	796	0.3%

Early estimates 2015	Estonia						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**6414**	**859**	**0**	**4239**	**1272**	**44**	**0**
Imports	2644	**1679**	390	89	36	0	450
Exports	2025	**1077**	0	9	387	0	552
Net imports (imports-exports)	619	602	390	79	-351	0	-102
Gross inland consumption	**6220**	**1095**	**390**	**3882**	**911**	**44**	**-102**
Transformation input	4058	**27**	305	3364	340	22	0
Transformation output	1574	0	155	50	0	543	826
Distribution losses	137	0	0	0	0	77	60
Available for final consumption	**3397**	**1050**	**201**	**563**	**506**	**477**	**599**
Final non-energy consumption	102	84	0	18	0	0	0
Final energy consumption	**2830**	**966**	**201**	**80**	**506**	**477**	**599**
Industry	534	64	88	68	87	46	181
Transport	786	773	3	0	6	0	4
Residential	924	8	46	9	392	325	143
Services	466	30	59	2	15	105	254
Others	121	91	5	0	6	1	18
Electricity generation (gross or net) [GWh]	10355	57	62	8666	743	828	0
Heat generation [PJ-GCV]	23						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	28.1%
RES-E - Electricity Generation [%]	16.0%

Energy import bill [€]	**€m**	**%GDP**
Total	246	1.2%
Coal	1	0.0%
Oil	3	0.0%
Natural gas	192	0.9%

Early estimates 2015	Finland						September 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**18719**	**674**	**3**	**1425**	**10402**	**6216**	**0**
Imports	23691	16894	2227	2363	362	0	1845
Exports	7796	6967	0	50	339	0	440
Net imports (imports-exports)	15895	9927	2227	2313	23	0	1405
Gross inland consumption	**33789**	**9628**	**2229**	**3824**	**10487**	**6216**	**1405**
Transformation input	28070	13156	1632	3619	3472	6191	0
Transformation output	22098	12926	471	542	0	3910	4249
Distribution losses	625	43	49	0	0	319	213
Available for final consumption	**25824**	**8724**	**704**	**747**	**5296**	**3606**	**6746**
Final non-energy consumption	1160	1142	19	0	0	0	0
Final energy consumption	**23680**	**6744**	**719**	**554**	**5305**	**3604**	**6754**
Industry	10183	1315	661	519	3354	1127	3208
Transport	4777	4209	9	0	498	0	62
Residential	4958	362	24	4	1224	1547	1797
Services	2711	251	25	2	86	781	1567
Others	1052	608	1	28	144	150	121
Electricity generation (gross or net) [GWh]	68507	205	5516	9155	19097	11281	23253
Heat generation [PJ-GCV]	164						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	40.5%
RES-E - Electricity Generation [%]	31.4%

Energy import bill [€]	**€m**	**%GDP**
Total	5543	1.3%
Coal	278	0.1%
Oil	3603	0.8%
Natural gas	831	0.2%

Early estimates 2015	France						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**136646**	**1903**	**23**	**0**	**20707**	**114014**	**0**
Imports	149375	99369	39744	8834	561	0	868
Exports	33287	21691	4905	112	211	0	6368
Net imports (imports-exports)	116089	77677	34838	8722	351	0	-5500
Gross inland consumption	**251471**	**77607**	**35293**	**9012**	**21044**	**114014**	**-5500**
Transformation input	189301	**59739**	5186	7017	3180	114178	0
Transformation output	107371	59155	1750	2320	0	2915	41232
Distribution losses	3703	0	386	0	0	160	3157
Available for final consumption	**160133**	**75461**	**30152**	**4315**	**11249**	**2591**	**36365**
Final non-energy consumption	13053	12022	898	132	0	0	0
Final energy consumption	**144168**	**60852**	**29257**	**3982**	**11415**	**2297**	**36365**
Industry	27291	2114	10629	3712	1304	0	9532
Transport	50042	45905	95	0	2946	0	1096
Residential	40132	6594	12180	157	6593	1168	13441
Services	20901	2194	6010	112	421	774	11390
Others	5801	4044	343	0	151	356	907
Electricity generation (gross or net) [GWh]	556996	1903	19718	12373	77470	7818	437714
Heat generation [PJ-GCV]	122						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	14.8%
RES-E - Electricity Generation [%]	18.6%

Energy import bill [€]	**€m**	**%GDP**
Total	51618	2.4%
Coal	1383	0.1%
Oil	20560	1.0%
Natural gas	14844	0.7%

Early estimates 2015	Germany						August 2016
Energy balances - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**124124**	**7905**	**5883**	**42996**	**39424**	**27915**	**0**
Imports	256652	128890	85200	38371	1009	0	3182
Exports	57804	22586	25231	1190	1458	5	7334
Net imports (imports-exports)	198848	106305	59969	37181	-450	-5	-4152
Gross inland consumption	**316892**	**108601**	**66364**	**79204**	**38965**	**27911**	**-4152**
Transformation input	235154	102103	15948	78224	12006	26874	0
Transformation output	170269	101193	5935	9210	0	11050	42882
Distribution losses	3871	0	549	0	22	1085	2215
Available for final consumption	**239434**	**106446**	**53702**	**9959**	**13950**	**10727**	**44651**
Final non-energy consumption	21987	18972	2659	356	0	0	0
Final energy consumption	**213834**	**82453**	**52288**	**9766**	**13950**	**10727**	**44651**
Industry	62308	2886	22081	9136	3001	5446	19759
Transport	63651	59564	472	0	2610	0	1005
Residential	54197	12563	19247	577	6077	3877	11857
Services	33552	7316	10487	53	2262	1404	12030
Others	125	125	0	0	0	0	0
Gross electricity generation [GWh]	644291	5361	60741	283251	145572	57538	91827
Heat generation [PJ-GCV]	463						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	14.5%
RES-E - Electricity Generation [%]	27.9%

Energy import bill [€]	**€m**	**%GDP**
Total	100783	3.4%
Coal	4314	0.1%
Oil	32878	1.1%
Natural gas	31796	1.1%

Early estimates 2015 — Greece

Energy balance - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity
Production	**8467**	**64**	**6**	**5807**	**2569**	**21**	**0**
Imports	35432	31520	2674	170	116	0	953
Exports	16523	16383	0	0	13	0	127
Net imports (imports-exports)	18909	15137	2674	170	103	0	826
Gross inland consumption	24813	12427	2678	6197	2664	21	826
Transformation input	36969	29862	1437	5567	86	16	0
Transformation output	31716	28732	0	0	1	53	2932
Distribution losses	343	0	0	0	0	0	343
Available for final consumption	**16832**	**9424**	**1226**	**631**	**1398**	**57**	**4096**
Final non-energy consumption	523	209	314	0	0	0	0
Final energy consumption	**15847**	**9191**	**905**	**203**	**1399**	**53**	**4096**
Industry	2948	1019	496	198	170	0	1065
Transport	6720	6528	17	0	145	0	30
Residential	3955	1206	255	3	1021	53	1419
Services	1732	114	137	0	37	0	1444
Others	492	324	0	2	26	0	139
Electricity generation (gross or net) [GWh]	47996	5192	6535	22107	13902	260	0
Heat generation [PJ-GCV]	2						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	15.9%
RES-E - Electricity Generation [%]	22.8%

Energy import bill [€]	€m	%GDP
Total	8133	1.9%
Coal	29	0.0%
Oil	7271	1.7%
Natural gas	781	0.2%

Early estimates 2015 — Hungary — August 2016

Energy balance - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity
Production	**10045**	**820**	**1363**	**1540**	**2137**	**4185**	**0**
Imports	18316	9241	6115	1042	199	5	1714
Exports	4637	2718	643	312	427	0	537
Net imports (imports-exports)	13680	6524	5472	730	-228	5	1177
Gross inland consumption	**23943**	**6890**	**7459**	**2321**	**1906**	**4190**	**1177**
Transformation input	16410	**7281**	1726	2504	753	4146	0
Transformation output	11776	7191	309	695	0	1073	2508
Distribution losses	483	0	62	0	0	96	325
Available for final consumption	**17969**	**6430**	**5817**	**511**	**1055**	**994**	**3162**
Final non-energy consumption	1683	1061	622	0	0	0	0
Final energy consumption	**16268**	**5209**	**5194**	**733**	**1067**	**994**	**3072**
Industry	4692	716	1522	455	138	475	1386
Transport	4296	3982	40	0	176	0	98
Residential	4410	68	2225	258	538	378	943
Services	2258	45	1306	20	170	140	576
Others	612	398	102	0	44	0	68
Electricity generation (gross or net) [GWh]	30366	50	5070	5896	1196	2320	15834
Heat generation [PJ-GCV]	45						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	8.5%
RES-E - Electricity Generation [%]	7.3%

Energy import bill [€]	€m	%GDP
Total	5472	5.1%
Coal	173	0.2%
Oil	1970	1.8%
Natural gas	2627	2.5%

Early estimates 2015 — Ireland — August 2016

Energy balances - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity
Production	**2029**	**85**	**107**	**762**	**1013**	**62**	**0**
Imports	14337	9024	3631	1455	76	0	151
Exports	1790	1678	0	19	0	0	93
Net imports (imports-exports)	12547	7346	3631	1436	76	0	59
Gross inland consumption	**14164**	**7021**	**3763**	**2170**	**1089**	**62**	**59**
Transformation input	7263	**3422**	1947	1756	113	25	0
Transformation output	5191	3373	0	109	0	0	1710
Distribution losses	257	0	61	0	0	0	196
Available for final consumption	**11731**	**6850**	**1754**	**509**	**343**	**37**	**2238**
Final non-energy consumption	235	235	0	0	0	0	0
Final energy consumption	**11402**	**6615**	**1754**	**486**	**326**	**37**	**2183**
Industry	2256	369	741	101	159	37	850
Transport	4736	4648	0	0	85	0	4
Residential	2780	1147	559	385	43	0	645
Services	1400	270	455	0	39	0	637
Others	229	181	0	0	0	0	48
Electricity generation (gross or net) [GWh]	27263	225	12429	6742	7373	493	0
Heat generation [PJ-GCV]	0						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	8.9%
RES-E - Electricity Generation [%]	25.1%

Energy import bill [€]	€m	%GDP
Total	2015	2.6%
Coal	0	0.1%
Oil	5315	0.6%
Natural gas	189	1.2%

Early estimates 2015 — Italy — August 2016

Energy balance - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity
Production	**35231**	**5760**	**5549**	**47**	**22774**	**1102**	**0**
Imports	151512	**81640**	50123	12866	2508	0	4374
Exports	29349	**28419**	180	252	112	0	385
Net imports (imports-exports)	122163	53222	49943	12614	2396	0	3989
Gross inland consumption	**155187**	**56622**	**55302**	**12838**	**25335**	**1102**	**3989**
Transformation input	119874	**79108**	18263	11735	9940	828	0
Transformation output	99861	75295	1046	1124	7	5339	17050
Distribution losses	2296	0	455	0	0	20	1821
Available for final consumption	**122823**	**50072**	**33605**	**2199**	**8113**	**4340**	**24494**
Final non-energy consumption	7560	6921	569	69	0	0	0
Final energy consumption	**117399**	**45293**	**33036**	**2124**	**8112**	**4340**	**24494**
Industry	25908	2218	8449	2124	327	2965	9825
Transport	41028	37810	1122	0	1186	0	910
Residential	32234	2371	16938	0	6324	1007	5594
Services	15270	631	6396	0	211	328	7704
Others	2960	2263	131	0	64	41	462
Electricity generation (gross or net) [GWh]	265759	13235	107612	46723	68440	29749	0
Heat generation [PJ-GCV]	224						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	17.5%
RES-E - Electricity Generation [%]	34.1%

Energy import bill [€]	€m	%GDP
Total	44833	2.8%
Coal	1446	0.1%
Oil	21411	1.3%
Natural gas	18125	1.1%

Early estimates 2015	Latvia						September 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**2497**	**0**	**0**	**1**	**2488**	**8**	**0**
Imports	3581	2605	301	41	129	53	451
Exports	2113	961	0	1	857	0	294
Net imports (imports-exports)	1468	1644	301	40	-728	53	157
Gross inland consumption	**4563**	**1488**	**1091**	**42**	**1720**	**65**	**157**
Transformation input	1309	**0**	818	4	487	0	0
Transformation output	924	0	0	0	9	608	307
Distribution losses	130	0	8	0	0	86	36
Available for final consumption	**3950**	**1481**	**247**	**38**	**1064**	**550**	**569**
Final non-energy consumption	114	114	0	0	0	0	0
Final energy consumption	**3822**	**1354**	**247**	**38**	**1064**	**550**	**569**
Industry	815	55	101	23	396	99	142
Transport	1116	1079	0	0	27	0	10
Residential	1148	54	72	9	546	326	141
Services	579	48	64	6	82	119	260
Others	164	118	11	1	14	7	15
Electricity generation (gross or net) [GWh]	5645	0	2747	0	2073	825	0
Heat generation [PJ-GCV]	25						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	40.7%
RES-E - Electricity Generation [%]	51.7%

Energy import bill [€]	**€m**	**%GDP**
Total	325	1.4%
Coal	14	0.1%
Oil	0	0.0%
Natural gas	311	1.3%

Early estimates 2015	Lithuania						September 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**1576**	**74**	**0**	**21**	**1456**	**24**	**0**
Imports	14398	11209	2141	178	187	0	683
Exports	9104	8590	205	4	242	0	63
Net imports (imports-exports)	5294	2620	1936	174	-55	0	620
Gross inland consumption	**6813**	**2509**	**2067**	**184**	**1409**	**24**	**620**
Transformation input	10423	9178	534	5	615	91	0
Transformation output	10415	9156	0	3	1	990	265
Distribution losses	188	1	0	0	0	119	68
Available for final consumption	**5956**	**1980**	**1502**	**183**	**689**	**798**	**803**
Final non-energy consumption	1179	174	1004	0	0	0	0
Final energy consumption	**4804**	**1868**	**456**	**187**	**692**	**798**	**803**
Industry	938	58	221	97	88	190	285
Transport	1779	1678	30	0	65	0	6
Residential	1362	42	123	48	491	430	229
Services	582	5	61	36	37	174	267
Others	145	86	21	6	11	5	16
Electricity generation (gross or net) [GWh]	4316	180	1409	0	1232	1496	0
Heat generation [PJ-GCV]	41						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	25.7%
RES-E - Electricity Generation [%]	15.9%

Energy import bill [€]	**€m**	**%GDP**
Total	3735	10.3%
Coal	30	0.1%
Oil	2896	8.0%
Natural gas	782	2.2%

Early estimates 2015 — Luxembourg — August 2016

Energy balance - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity
Production	**141**	**0**	**4**	**0**	**102**	**35**	**0**
Imports	4199	**2618**	769	50	116	0	646
Exports	188	**0**	0	0	23	0	165
Net imports (imports-exports)	4011	2618	769	50	93	0	481
Gross inland consumption	**4177**	**2643**	**773**	**50**	**195**	**35**	**481**
Transformation input	234	**0**	172	0	42	20	0
Transformation output	183	0	0	0	0	95	88
Distribution losses	10	0	0	0	0	0	10
Available for final consumption	**4079**	**2643**	**601**	**50**	**130**	**110**	**546**
Final non-energy consumption	28	28	0	0	0	0	0
Final energy consumption	**4035**	**2599**	**601**	**50**	**130**	**110**	**546**
Industry	615	11	242	50	15	28	268
Transport	2455	2359	0	0	85	0	11
Residential	514	156	247	0	26	0	86
Services	426	54	112	0	2	81	178
Others	26	19	0	0	3	0	3
Electricity generation (gross or net) [GWh]	1257	0	828	0	234	195	0
Heat generation [PJ-GCV]	4						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	4.6%
RES-E - Electricity Generation [%]	6.2%

Energy import bill [€]	€m	%GDP
Total	1625	3.1%
Coal	7	0.0%
Oil	1044	2.0%
Natural gas	287	0.6%

Early estimates 2015 — Malta — August 2016

Energy balance - ktoe	Total	Oil	Natural gas	Solid fuels	Renewables	Others	Electricity
Production	**7**	**0**	**0**	**0**	**7**	**0**	**0**
Imports	2675	**2669**	0	0	7	0	0
Exports	531	**531**	0	0	0	0	0
Net imports (imports-exports)	2144	2137	0	0	7	0	0
Gross inland consumption	**697**	**684**	**0**	**0**	**14**	**0**	**0**
Transformation input	276	**275**	0	0	1	0	0
Transformation output	104	0	0	0	0	0	104
Distribution losses	5	0	0	0	0	0	5
Available for final consumption	**517**	**408**	**0**	**0**	**13**	**0**	**95**
Final non-energy consumption	4	4	0	0	0	0	0
Final energy consumption	505	397	0	0	13	0	95
Industry	48	12	0	0	0	0	36
Transport	321	314	0	0	7	0	0
Residential	46	13	0	0	5	0	28
Services	82	53	0	0	1	0	28
Others	8	4	0	0	0	0	3
Electricity generation (gross or net) [GWh]	1258	1202	0	0	50	6	0
Heat generation [PJ-GCV]	0						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	6.2%
RES-E - Electricity Generation [%]	7.7%

Energy import bill [€]	€m	%GDP
Total	988	12.7%
Coal	1	0.0%
Oil	987	12.7%
Natural gas	0	0.0%

Early estimates 2015	Netherlands						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**50353**	**4941**	**38902**	**0**	**4781**	**1729**	**0**
Imports	209958	149752	27151	29719	520	172	2644
Exports	164244	**106532**	36522	17651	1620	29	1890
Net imports (imports-exports)	45714	43220	-9370	12069	-1100	143	753
Gross inland consumption	**76608**	**30473**	**28863**	**10989**	**3660**	**1871**	**753**
Transformation input	85115	**61592**	8741	10890	1632	2260	0
Transformation output	75795	60728	1375	1465	0	3370	8858
Distribution losses	523	0	29	0	0	75	419
Available for final consumption	**62793**	**28873**	**19673**	**1564**	**1284**	**2535**	**8863**
Final non-energy consumption	12335	10263	2066	6	0	0	0
Final energy consumption	**48897**	**16990**	**17692**	**1557**	**1339**	**2502**	**8818**
Industry	14442	2544	5272	1556	229	1899	2942
Transport	14143	13661	31	0	311	0	140
Residential	9846	46	7060	1	461	292	1987
Services	6737	84	3202	1	218	166	3067
Others	3729	655	2127	0	119	145	682
Electricity generation (gross or net) [GWh]	111701	1756	46643	43810	8679	6734	4079
Heat generation [PJ-GCV]	141						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	5.8%
RES-E - Electricity Generation [%]	10.6%

Energy import bill [€]	**€m**	**%GDP**
Total	55550	8.2%
Coal	4050	0.6%
Oil	31903	4.7%
Natural gas	10045	1.5%

Early estimates 2015	Poland						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**68208**	**1533**	**3685**	**53702**	**8775**	**513**	**0**
Imports	48344	31421	9488	5132	1060	0	1243
Exports	21134	8369	59	10751	682	0	1272
Net imports (imports-exports)	27211	23052	9428	-5619	378	0	-29
Gross inland consumption	**95983**	**23615**	**13652**	**49157**	**9075**	**513**	**-29**
Transformation input	77661	**27380**	2885	45271	2075	51	0
Transformation output	57023	27608	2586	7139	0	6654	13037
Distribution losses	1571	0	87	0	0	520	964
Available for final consumption	**67252**	**22409**	**11159**	**10955**	**5880**	**5972**	**10877**
Final non-energy consumption	5338	3170	2035	134	0	0	0
Final energy consumption	**62851**	**19278**	**9125**	**11719**	**5880**	**5972**	**10877**
Industry	15421	594	3893	4102	1493	1040	4299
Transport	16958	15670	364	0	679	0	245
Residential	18838	638	3242	5951	2918	3741	2348
Services	7959	437	1590	650	253	1169	3859
Others	3674	1938	35	1016	538	21	127
Electricity generation (gross or net) [GWh]	164848	2118	6306	132925	13231	10268	0
Heat generation [PJ-GCV]	279						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	12.2%
RES-E - Electricity Generation [%]	12.4%

Energy import bill [€]	**€m**	**%GDP**
Total	11101	2.6%
Coal	684	0.2%
Oil	8811	2.1%
Natural gas	803	0.2%

Early estimates 2015	Portugal						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**5259**	**152**	**0**	**0**	**4986**	**121**	**0**
Imports	26254	**18323**	3892	3179	131	34	695
Exports	7674	**6783**	0	0	392	0	499
Net imports (imports-exports)	18580	11540	3892	3179	-261	34	195
Gross inland consumption	**22931**	**10451**	**4128**	**3257**	**4745**	**155**	**195**
Transformation input	22807	**16024**	2522	3250	906	104	0
Transformation output	19019	15894	0	0	14	503	2608
Distribution losses	575	0	1	0	0	0	574
Available for final consumption	**17483**	**9598**	**1542**	**7**	**2121**	**317**	**3897**
Final non-energy consumption	1442	1442	0	0	0	0	0
Final energy consumption	**15794**	**7910**	**1550**	**10**	**2109**	**317**	**3897**
Industry	4276	613	1096	10	935	291	1332
Transport	6689	6329	12	0	323	0	24
Residential	2412	445	238	0	696	5	1027
Services	1936	124	199	0	148	21	1444
Others	481	398	4	0	7	0	71
Electricity generation (gross or net) [GWh]	51599	1574	10599	14739	21267	3420	0
Heat generation [PJ-GCV]	21						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	25.6%
RES-E - Electricity Generation [%]	53.4%

Energy import bill [€]	**€m**	**%GDP**
Total	8369	4.7%
Coal	272	0.2%
Oil	4930	2.8%
Natural gas	2157	1.2%

Early estimates 2015	Romania						
Energy balance - ktoe	**Total**	**(Crude) oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**26950**	**4228**	**8667**	**4806**	**6154**	**3093**	**0**
Imports	11941	9943	248	1075	229	0	446
Exports	6306	4908	0	88	216	0	1093
Net imports (imports-exports)	5635	5034	248	987	13	0	-647
Gross inland consumption	**32776**	**9103**	**9019**	**6039**	**6166**	**3095**	**-647**
Transformation input	23372	12186	2406	5593	183	3003	0
Transformation output	17350	11925	213	0	0	1754	3459
Distribution losses	1046	2	81	1	0	352	610
Available for final consumption	**23227**	**7796**	**6192**	**399**	**3768**	**1250**	**3823**
Final non-energy consumption	1535	699	823	13	0	0	0
Final energy consumption	**21895**	**6884**	**5510**	**658**	**3756**	**1270**	**3818**
Industry	6483	892	2506	581	265	347	1892
Transport	5608	5371	3	0	143	0	91
Residential	7493	174	2178	70	3277	732	1062
Services	1722	77	763	0	16	170	695
Others	590	369	60	7	54	21	78
Electricity generation (gross or net) [GWh]	65831	709	8897	18456	25608	521	11640
Heat generation [PJ-GCV]	73						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	25.6%
RES-E - Electricity Generation [%]	42.6%

Energy import bill [€]	**€m**	**%GDP**
Total	2619	1.7%
Coal	224	0.1%
Oil	2271	1.5%
Natural gas	89	0.1%

Early estimates 2015	Slovakia						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**6582**	**464**	**78**	**516**	**1397**	**4128**	**0**
Imports	15368	**7372**	3783	2833	87	3	1290
Exports	5378	**4147**	0	56	93	0	1081
Net imports (imports-exports)	9990	3224	3783	2777	-6	3	209
Gross inland consumption	**16511**	**3644**	**3879**	**3257**	**1391**	**4131**	**209**
Transformation input	14847	**6756**	836	2755	510	3990	0
Transformation output	10699	6563	503	1028	0	765	1840
Distribution losses	189	0	14	1	0	119	55
Available for final consumption	**10983**	**2846**	**3314**	**1529**	**537**	**701**	**2056**
Final non-energy consumption	949	627	274	48	0	0	0
Final energy consumption	**9999**	**2220**	**3040**	**1446**	**537**	**701**	**2056**
Industry	4262	81	1235	1300	337	240	1069
Transport	2335	2039	96	0	149	0	51
Residential	1907	5	1086	23	36	407	350
Services	1359	17	594	123	9	54	563
Others	137	77	29	1	6	1	23
Electricity generation (gross or net) [GWh]	25463	274	1550	3091	4062	1458	15029
Heat generation [PJ-GCV]	32						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	11.7%
RES-E - Electricity Generation [%]	22.3%

Energy import bill [€]	**€m**	**%GDP**
Total	4636	5.9%
Coal	432	0.6%
Oil	2201	2.8%
Natural gas	1787	2.3%

Early estimates 2015	Slovenia						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**3362**	**0**	**3**	**834**	**1020**	**1506**	**0**
Imports	5777	**4090**	663	209	34	0	782
Exports	2529	**1738**	0	5	0	0	786
Net imports (imports-exports)	3248	2352	663	204	34	0	-4
Gross inland consumption	**6738**	**2296**	**665**	**1221**	**1054**	**1506**	**-4**
Transformation input	2809	**8**	100	1166	70	1465	0
Transformation output	1116	0	0	0	0	194	922
Distribution losses	100	0	0	0	0	30	70
Available for final consumption	**4826**	**2288**	**562**	**55**	**627**	**195**	**1099**
Final non-energy consumption	148	136	5	7	0	0	0
Final energy consumption	**4705**	**2174**	**558**	**52**	**627**	**195**	**1099**
Industry	1276	106	397	51	83	87	552
Transport	1785	1741	1	0	31	0	11
Residential	1102	156	96	1	497	61	293
Services	446	78	64	0	13	48	243
Others	96	93	0	0	3	0	0
Electricity generation (gross or net) [GWh]	14721	20	399	4384	4000	269	5649
Heat generation [PJ-GCV]	8						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	20.8%
RES-E - Electricity Generation [%]	32.4%

Energy import bill [€]	**€m**	**%GDP**
Total	614	1.6%
Coal	44	0.1%
Oil	0	0.0%
Natural gas	460	1.2%

Early estimates 2015	Spain						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**33858**	**232**	**54**	**1062**	**17475**	**15035**	**0**
Imports	122752	**81065**	28184	11490	785	0	1226
Exports	28451	**21462**	4394	302	1059	0	1234
Net imports (imports-exports)	94301	59604	23791	11188	-274	0	-8
Gross inland consumption	**121948**	**50831**	**24554**	**14237**	**17298**	**15035**	**-8**
Transformation input	111916	68817	8950	14838	4276	15035	0
Transformation output	83715	65226	814	1110	27	0	16539
Distribution losses	2695	0	209	0	0	0	2487
Available for final consumption	**82965**	**42703**	**14535**	**480**	**5245**	**0**	**20002**
Final non-energy consumption	3964	3484	479	0	0	0	0
Final energy consumption	**80303**	**39560**	**14093**	**1369**	**5286**	**0**	**19996**
Industry	20331	2585	9025	1200	1179	0	6343
Transport	32329	30882	82	0	998	0	367
Residential	14607	2837	2828	96	2628	0	6218
Services	8920	1263	1326	0	148	0	6183
Others	4115	1993	833	73	332	0	885
Electricity generation (gross or net) [GWh]	279570	15299	51305	54588	87219	13883	57277
Heat generation [PJ-GCV]	0						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	16.2%
RES-E - Electricity Generation [%]	38.0%

Energy import bill [€]	**€m**	**%GDP**
Total	30991	2.9%
Coal	1216	0.1%
Oil	21013	2.0%
Natural gas	8058	0.8%

Early estimates 2015	Sweden						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**33984**	**0**	**7**	**143**	**18577**	**15257**	**0**
Imports	32378	**28237**	723	1971	648	0	799
Exports	18728	**15887**	0	57	42	0	2742
Net imports (imports-exports)	13650	12350	723	1914	606	0	-1943
Gross inland consumption	**45308**	**9951**	**730**	**2130**	**19183**	**15257**	**-1943**
Transformation input	43462	**21260**	382	1806	4757	15257	0
Transformation output	32860	21161	483	819	0	4322	6075
Distribution losses	748	0	21	0	0	90	637
Available for final consumption	**32094**	**8814**	**749**	**1143**	**6651**	**4232**	**10505**
Final non-energy consumption	1670	1560	97	13	0	0	0
Final energy consumption	**31677**	**8579**	**669**	**1056**	**6636**	**4232**	**10505**
Industry	11453	759	489	1056	4256	444	4449
Transport	8656	7323	36	0	1067	0	230
Residential	6764	27	25	0	1109	2487	3116
Services	4402	358	95	0	46	1294	2609
Others	402	112	24	0	157	7	101
Electricity generation (gross or net) [GWh]	160951	356	432	1072	90300	12084	56707
Heat generation [PJ-GCV]	181						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	56.7%
RES-E - Electricity Generation [%]	64.1%

Energy import bill [€]	**€m**	**%GDP**
Total	7505	1.7%
Coal	302	0.1%
Oil	6503	1.5%
Natural gas	495	0.1%

Early estimates 2015	United Kingdom						August 2016
Energy balance - ktoe	**Total**	**Oil**	**Natural gas**	**Solid fuels**	**Renewables**	**Others**	**Electricity**
Production	**116984**	**46159**	**35631**	**4972**	**11248**	**18974**	**0**
Imports	141395	**83423**	36899	15768	3176	0	2129
Exports	69329	**57127**	11387	350	314	0	151
Net imports (imports-exports)	72066	26296	25513	15418	2861	0	1978
Gross inland consumption	**190490**	**70545**	**61101**	**23744**	**14137**	**18974**	**1988**
Transformation input	128291	**63356**	19359	20976	5674	18926	0
Transformation output	92594	62785	1761	2139	0	1600	24309
Distribution losses	3112	0	802	0	0	0	2310
Available for final consumption	**140048**	**65699**	**38323**	**4907**	**3624**	**1378**	**26117**
Final non-energy consumption	8067	7658	408	0	0	0	0
Final energy consumption	**131675**	**58485**	**37892**	**4179**	**3624**	**1378**	**26117**
Industry	25202	4168	7667	3666	792	903	8006
Transport	51798	50502	0	8	924	0	364
Residential	36485	2346	22735	493	1504	59	9348
Services	16074	792	6744	7	82	416	8032
Others	2116	676	746	5	322	0	367
Electricity generation (gross or net) [GWh]	330256	1879	99812	76097	47547	34538	70384
Heat generation [PJ-GCV]	67						

Renewable energy share in gross final energy consumption (as for RES Directive):	
Overall RES with Aviation Cap [%]	8.1%
RES-E - Electricity Generation [%]	21.4%

Energy import bill [€]	**€m**	**%GDP**
Total	28262	1.1%
Coal	1770	0.1%
Oil	16606	0.7%
Natural gas	9885	0.4%

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