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Summary Report

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Contents

Abstract

This report discusses the progress towards the 2020 Energy Efficiency targets and towards the implementation of the provisions of the Energy Efficiency Directive 2012/27/EU (EED), providing an overview of the main energy trends in the European Union with special focus on the period 2005-2016. It is based on the last EUROSTAT data available and on the analysis provided by Member States within their Annual Reports 2018, under the EED.

1 Introduction

The Energy Efficiency Directive 2012/27/EU (the EED or the Directive), adopted in 2012, forms a key part of the EU's overall climate and energy legislative package, laying down the foundation for actions to be taken in order to help realise the energy efficiency potential of the European economy. All EU Member States are required to implement policy measures that improve energy efficiency at all stages of the energy chain from production to final consumption. This effort is aimed at achieving the EU energy efficiency target in 2020. In particular, the EU target corresponds to a 20% reduction in the EU primary energy consumption by 2020 compared to 2007 primary energy consumption projections in 2020 (based on the model PRIMES 2007). In terms of primary energy, this target results in a reduction of 370 Mtoe and consumption levels of 1483 Mtoe in 2020 (to be compared with 2007 projections of 1853 Mtoe in 2020).

In accordance with Article 3, Member States have to set indicative energy efficiency targets – based on either primary or final energy savings, primary or final energy consumption or energy intensity – in view of the overall target of 20% reduction in EU primary energy consumption by 2020. In accordance with Article 24, Member States are also requested to submit National Energy Efficiency Action Plans (NEEAPs) every three years as well as reports on the progress achieved towards their national energy efficiency targets by 30 April each year as from 2013 in the form of the so-called Annual Reports (ARs). For the latter, Member States are required to specifically report on their recent consumption trends as well as report on policy updates and progress towards implementing Articles 5 and 7 of the Directive.

As per the Directive's requirements, the European Commission's responsibilities include the assessment of the annual progress made by Member States towards achieving the national indicative energy efficiency targets and implementing the various provisions of the Directive. The Joint Research Centre has undertaken the task of evaluating the submitted annual reports and the results of the analysis of the Annual Reports of 2018 (AR2018) are presented in this Report.

2 Background

The annual reports referred to in Article 24(1) of the EED provide a basis for the monitoring of the progress towards national 2020 targets.

For the Annual Reports 2018, the following minimum information had to be provided by each Member State:

(a) an estimate of various energy-related indicators (listed in **Table 1**) for the year 2016, including a discussion of the reasons if stable and growing energy consumptions were observed;

(b) updates on major legislative and non-legislative measures implemented in 2017 which contribute towards the overall national energy efficiency targets for 2020;

(c) the total building floor area of the buildings with a total useful floor area over 500 m^2 and as of 9 July 2015 over 250 m^2 owned and occupied by the Member States' central government that, on 1 January 2018, did not meet the energy performance requirements referred to in Article 5(1);

(d) the total building floor area of heated and/or cooled buildings owned and occupied by the Member States' central government that was renovated in 2017 referred to in Article 5(1) or the amount of energy savings in eligible buildings owned and occupied by their central government as referred to in Article 5(6);

(e) energy savings achieved in 2016 through the national energy efficiency obligation schemes referred to in Article 7(1) or the alternative measures adopted in application of Article 7(9).

Table 1. Indicators to be included in the Annual Reports, as required by Annex XIV of EED.

(i) primary energy consumption (PEC)
(ii) total final energy consumption (FEC)
(iii) final energy consumption (FEC) of industry sector
(iii) final energy consumption (FEC) of transport sector
(iii) final energy consumption (FEC) of households sector
(iii) final energy consumption (FEC) of services sector
(iv) gross value added (GVA) of industry sector
(iv) gross value added (GVA) of services sector
(v) disposable income for households (DIH)
(vi) gross domestic product (GDP)
(vii) electricity generation from thermal power generation (thPG)
(viii) electricity generation from combined heat and power plants (CHPP)
(ix) heat generation from thermal power generation (thPG)
(x) heat generation from combined heat and power plants (CHPP), including industrial waste heat
(xi) fuel input for thermal power generation (thPG)
(xii) passenger kilometres (pkm)
(xiii) tonnes kilometres (tkm)
(xiv) combined transport kilometres (pkm + tkm), in case (xii) and (xiii) are not available
(xv) population

In the framework of the Administrative Agreement TSSEED[1] between DG Energy and JRC, in 2015 the European Commission has developed a reporting template in order to ensure a harmonised reporting approach and facilitate the data analysis. In 2018 14 Member States (Austria, Belgium, Cyprus, Denmark, Estonia, Greece, Spain, Hungary, Ireland, Italy, Malta, the Netherlands, Portugal and Slovenia) filled out the template (see **Table 2**). This number is increased by 2 compared to 2017, and the ability of this tool to avoid misunderstandings was confirmed by the analysis of the Annual Reports 2017 and the Annual Reports 2018.

Table 2. Reporting overview of Annual Reports 2018 (T: Template, R: Report).

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
T	✓	✓		✓			✓	✓	✓	✓				✓	✓	✓				✓	✓		✓			✓		
R	✓		✓		✓	✓					✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓

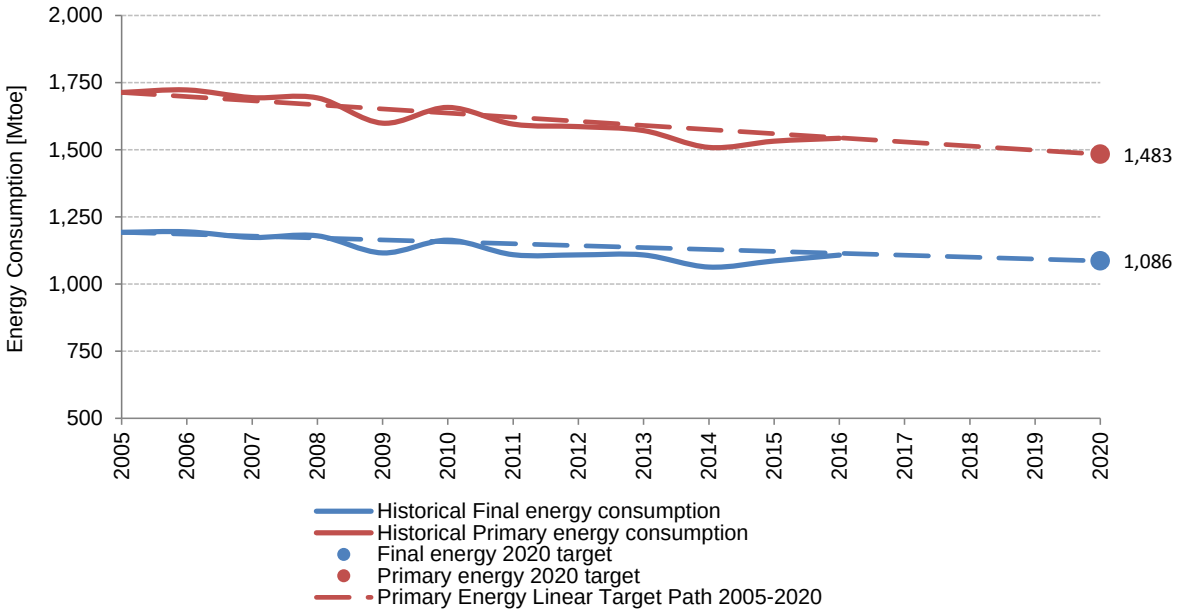
[1] Technical and Scientific Support to the implementation of the EED and the EPBD, as well as contribution to the development of concepts for the strengthening of the overall EU legislative framework for energy saving.

3 Progress towards the 2020 Energy Efficiency targets

Unless otherwise stated, the source of the data presented in this chapter is EUROSTAT. The indicators used are listed in **Annex 1**.

In the period from 2005 to 2016, the European Union has reduced its energy consumption. This decrease has allowed reducing energy indicators such as energy intensity and energy consumption per capita, turning into a sign of higher competitiveness as global actor. In 2014, the EU had already met the target values set in the EED for 2020 in terms of final energy consumption (1063 Mtoe in 2014 vs 1086 Mtoe of the target) and it was on track to reach the target value for primary energy consumption (1509 Mtoe in 2014 vs 1483 Mtoe of the target; corresponding to a gap of 1.7%). As shown in **Figure 1**, in 2015 final energy consumption increases (1086 Mtoe) compared to the previous year. In 2016 final energy consumption increases even more (1108 Mtoe) compared to 2015 and slightly exceeds the 2020 target (corresponding to a gap of 2%). Primary energy consumption increases as well as of 2014. In this year the decreasing trend started in 2010 has been interrupted: in 2015 it is worth 1532 Mtoe, corresponding to a gap of 3.3% with the EU target, in 2016 increases as well (1543 Mtoe), corresponding to a gap of 4%). Over the 2005-2016 period, the financial and economic crisis has caused remarkable change in the dynamics and growth rates of the different economic sectors and in the EU Member States, and it has contributed to get the energy consumption back on track towards the EU energy and environmental targets for 2020. Distinguishing by economic sectors, only the tertiary sector has increased their final energy consumption over the analysed period (by 4%); whilst in the others (i.e. residential, industry and transport sectors) the final energy consumption has declined. The increasing trend in the tertiary sector is expected to continue as per the on-going tertiarization process in the EU. On the other hand, the decreasing trend in the industry sector has been highly influenced, among others, by the financial and economic crisis and by the delocalisation of industry in emerging countries. In the residential sector, the energy demand is decreasing. At the national level observed variations strongly depend on weather and climate conditions, although there are multiple factors affecting the energy consumption, such as building characteristics (i.e. building envelope, insulation level, location, etc.) or social and cultural reasons (lifestyle, habits, etc.).

Figure 1. Final and Primary Energy Consumption trends of the EU28 (the dotted line represent a linear trajectory between the 2005 actual consumption and the 2020 target consumption).



Source: Eurostat, JRC, 2018.

It has to be noted that, after the last updates by some Member States, the sum of national 2020 absolute consumption targets is 1532.6 Mtoe in terms of primary energy and 1084.9 Mtoe in terms of final energy (**Table 3**). While the latter value is below the EU target (1086 Mtoe), there is a negative mismatch regarding the primary energy objective: the sum of the indicative national targets is 3.3% above the EU target (1483 Mtoe) and it corresponds to 17.3% savings (instead of 20%) compared to the PRIMES baseline projections.

Table 3. Indicative national energy efficiency targets for 2020. Latest updates provided by Member States are pointed up with a darker background.

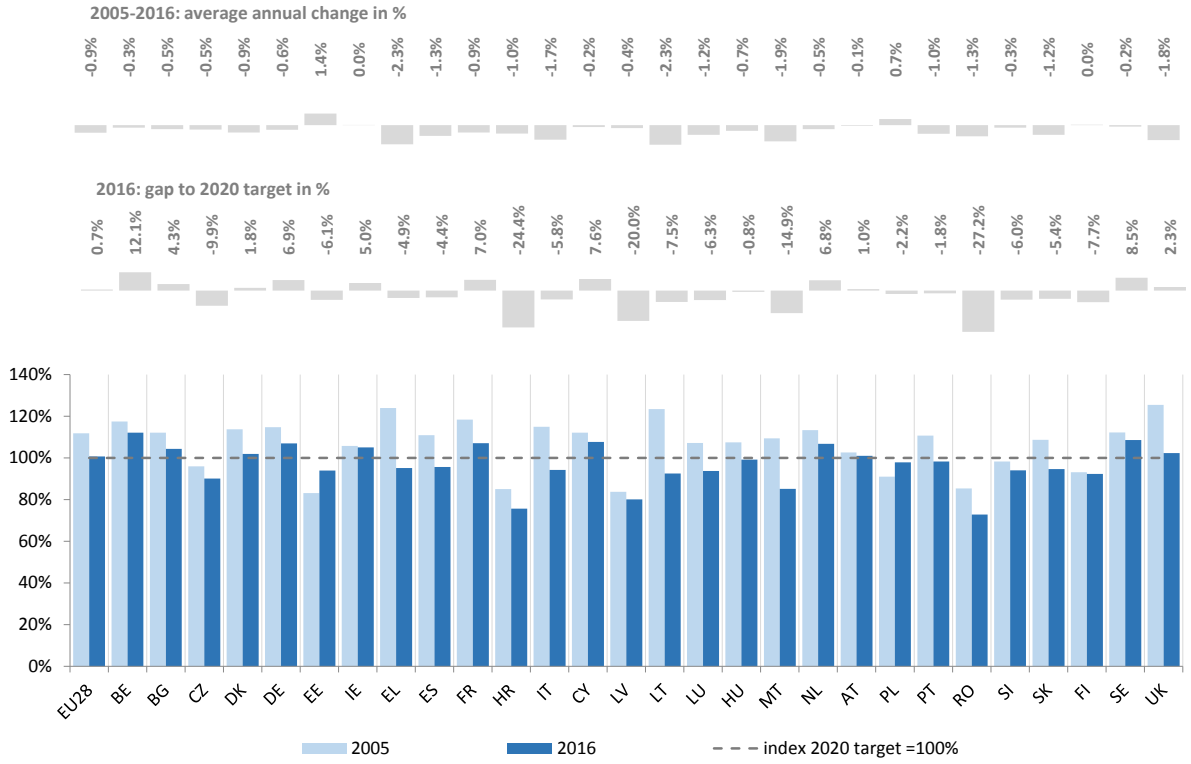
MS	PEC Target [Mtoe]		FEC Target [Mtoe]	
	Up to 2016	Latest value (from NEEAP 2017 or latest value)	Up to 2016	Latest value (from NEEAP 2017 or latest value)
BE	43.70	43.70	32.50	32.50
BG	16.87	16.87	8.64	8.64
CZ	39.60	44.31	25.32	25.32
DK	17.40	16.89	14.43	14.70
DE	276.60	276.60	194.30	194.30
EE	6.50	6.50	2.80	2.80
IE	13.90	13.90	11.70	11.70
EL	24.70	24.70	18.40	18.40
ES	119.80	122.58	80.10	87.24
FR	219.90	219.90	131.40	131.40
HR	11.15	10.71	7.00	6.96
IT	158.00	158.00	124.00	124.00
CY	2.20	2.23	1.85	1.91
LV	5.37	5.37	4.47	4.47
LT	6.49	6.49	4.28	4.28
LU	4.48	4.48	4.20	4.20
HU	24.10	24.10	14.40	14.40
MT	0.70	0.82	0.50	0.63
NL	60.70	60.70	52.20	52.20
AT	31.50	31.50	25.07	25.07
PL	96.40	96.40	71.60	71.60
PT	22.50	22.50	17.40	17.40
RO	43.00	43.00	30.30	30.30
SI	7.30	7.13	5.10	5.10
SK	16.38	16.38	9.24	9.24
FI	35.86	35.86	26.66	26.66
SE	43.40	43.40	30.30	30.30
UK	177.60	177.60	129.20	129.20
Sum of indicative targets EU28	**1526.09**	**1532.61**	**1077.36**	**1084.92**
EU28 target 2020	**1483**		**1086**	

Source: DG ENERGY, 2018.

At national level, the absolute primary energy consumption of all Member States, excepting Estonia and Poland, has declined since 2005 (**Figure 2**). Estonia experienced the largest primary energy consumption increase, which was equivalent to an average annual 1.4% rise in the period 2005-2016. The average annual reduction during 2005-2016 was more pronounced compared to EU28 in 11 Member States (Croatia, Greece, Spain, Italy, Lithuania, Luxembourg, Malta, Portugal, Romania, Slovakia and the United Kingdom). Eleven countries (Belgium, Bulgaria, Denmark, Germany, France, Cyprus, Ireland, Austria, the Netherlands, Sweden and the United Kingdom) still have a positive gap towards their national indicative targets for 2020. This means that efforts to further reduce the energy consumption in these countries are necessary in the remaining period up to 2020.

The absolute final energy consumption of all Member States has declined since 2005 except in Lithuania, Malta, Austria, Finland and Poland (**Figure 3**). 17 Member States achieved already in 2016 a final energy consumption which is below their indicative final energy target for 2020 (Czech Republic, Denmark, Ireland, Greece, Spain, Croatia, Italy, Cyprus, Latvia, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia and Finland).

Figure 2. Primary energy consumption trends (2005-2016), average annual change in 2005-2016 and comparison of current efforts with EU 2020 target.



Source: Eurostat, JRC, 2018.

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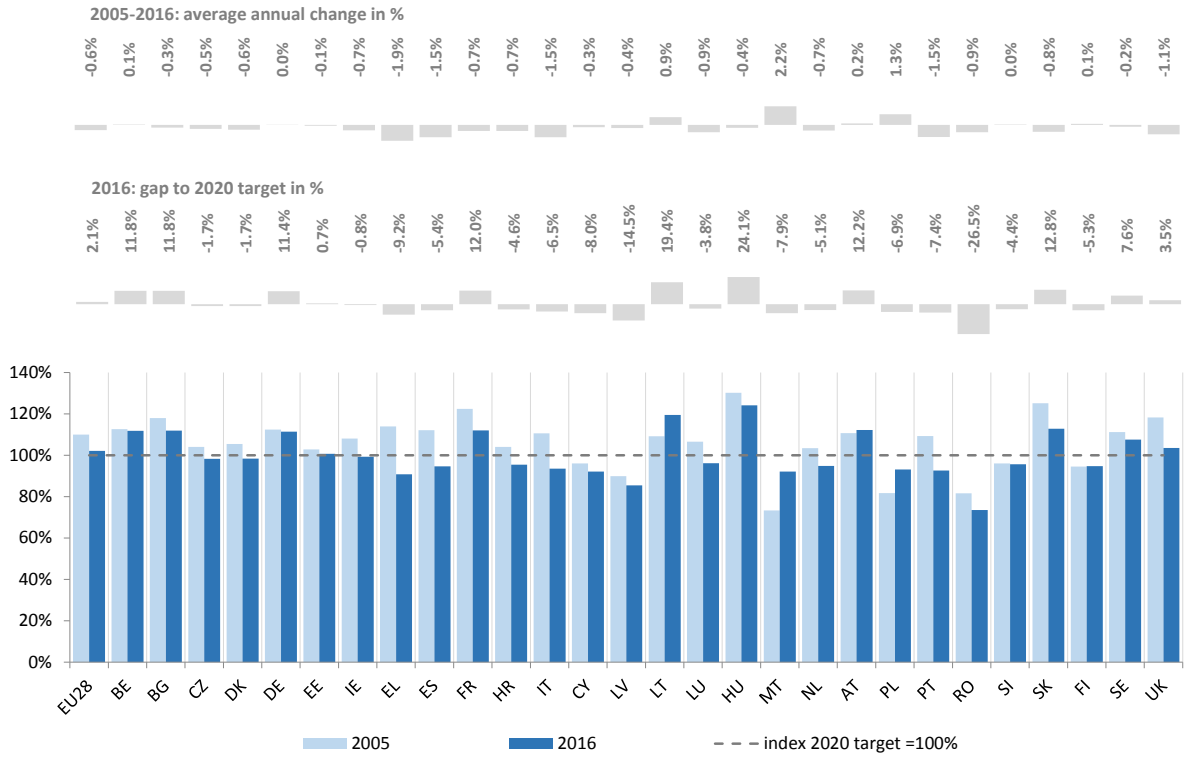


Source: Eurostat, JRC, 2018.

A quick overview of main energy trends is shown in **Table 4** and **Table 5**, where the green colour is used to indicate a decrease in energy consumption.

Table 4. Overview of variations of main energy indicators (part 1).

MS	Trend to reach the 2020 target		Short-term trend		Energy Intensity whole economy	Industry	Residential	
	PEC 2005-2016 trend compared to PEC 2005-2020 trend to reach the 2020 target	FEC 2005-2016 trend compared to FEC 2005-2020 trend to reach the 2020 target	Change of PEC 2016 compared to PEC 2015 [%]	Change of FEC 2016 compared to FEC 2015 [%]	2005-2016 average annual change of PEC energy intensity [%]	2005-2016 average change of FEC energy intensity in industry [%]	2005-2016 average annual change of FEC in residential per capita with climatic corrections [%]	2005-2016 average annual change of FEC in residential per dwelling with climatic corrections [%]
EU28	+	+	0.7%	2.0%	-2.0%	-2.0%	-0.5%	-1.2%
BE	-	-	7.2%	1.3%	-1.7%	-0.8%	-2.4%	-1.6%
BG	-	-	-1.7%	1.6%	-3.0%	-5.7%	2.3%	0.4%
CZ	+	+	-0.3%	2.6%	-2.9%	-4.8%	1.1%	0.0%
DK	+	+	3.6%	3.1%	-2.0%	-2.1%	0.1%	-0.5%
DE	-	-	1.1%	2.0%	-2.0%	-1.4%	-0.4%	-0.8%
EE	+	+	-1.6%	1.9%	-1.0%	-5.7%	1.2%	0.0%
IE	-	+	4.3%	3.5%	-4.2%	-5.6%	-2.6%	-3.1%
EL	+	+	-0.8%	1.2%	-0.2%	1.7%	-0.5%	-0.9%
ES	+	+	0.1%	2.6%	-1.9%	-2.4%	1.2%	-1.2%
FR	-	-	-1.6%	1.3%	-1.7%	-1.6%	-0.6%	-1.8%
HR	+	+	1.3%	0.8%	-1.5%	-2.3%	0.4%	-0.9%
IT	+	+	-0.5%	-0.3%	-1.2%	-2.4%	1.0%	-0.3%
CY	-	+	9.1%	5.9%	-1.1%	1.8%	2.0%	-1.9%
LV	+	+	0.0%	0.9%	-2.3%	1.9%	-0.6%	-1.5%
LT	+	-	3.4%	4.9%	-5.2%	-2.4%	1.7%	-0.8%
LU	+	+	2.4%	1.2%	-3.6%	-0.7%	-2.1%	-3.8%
HU	+	-	2.6%	2.8%	-1.5%	1.9%	0.2%	-0.3%
MT	+	+	-12.5%	2.0%	-5.5%	n.a.	13.4%	0.0%
NL	-	+	0.6%	2.1%	-1.9%	-1.4%	-1.1%	-1.8%
AT	-	-	1.0%	2.4%	-1.2%	0.1%	1.1%	0.4%
PL	-	+	4.8%	6.9%	-2.9%	-4.3%	1.0%	-0.5%
PT	+	+	1.8%	0.5%	-0.8%	-1.3%	-0.2%	-1.7%
RO	+	+	0.0%	1.8%	-4.3%	-6.3%	1.1%	-0.8%
SI	+	+	4.7%	4.1%	-1.6%	-3.1%	0.9%	0.1%
SK	+	-	0.6%	3.4%	-4.4%	-5.3%	-1.0%	-1.8%
FI	+	+	4.1%	4.1%	-1.4%	0.1%	0.0%	-0.7%
SE	-	-	7.5%	2.8%	-2.4%	-1.0%	-0.5%	-1.0%
UK	+	+	-1.5%	1.0%	-3.1%	-2.4%	-2.2%	-2.2%
Source and extraction data	Eurostat 08/2018	Eurostat 08/2018	Eurostat 08/2018	Eurostat 08/2018	Eurostat 08/2018	Eurostat 08/2018	Eurostat 08/2018	Odyssee 11/2018

Source: Eurostat, Odyssee, JRC, 2018.

Table 5. Overview of variations of main energy indicators (part 2).

MS	Services	Transport			Generation	
	2005-2016 average change of FEC energy intensity in the service sector [%]	2005-2016 average change of total FEC in the transport sector [%]	2016 vs. 2005 change of share of trains, motor coaches, buses and trolley buses for passenger transport [%]	2016 vs. 2005 change of share of railway and inland waterways for freight transport [%]	2005-2016 average annual change of heat generation from CHP [%]	2005-2016 average annual change of ratio Transformation output/Fuel input of thermal power generation [%]
EU28	-0.9%	0.0%	0.1%	0.3%	-1.0%	0.2%
BE	0.3%	0.5%	-2.0%	-1.2%	6.8%	0.7%
BG	-0.5%	1.9%	-11.9%	14.1%	0.6%	0.4%
CZ	-1.9%	1.0%	0.9%	1.2%	-0.8%	0.4%
DK	-1.2%	-0.3%	-2.4%	n.a	-1.7%	1.3%
DE	-0.8%	0.4%	0.1%	-6.0%	-1.0%	0.5%
EE	1.0%	0.6%	-3.2%	n.a.	2.6%	0.0%
IE	-5.0%	-0.1%	2.2%	n.a.	0.0%	0.9%
EL	2.2%	-1.4%	-3.5%	n.a.	1.3%	1.4%
ES	0.6%	-1.1%	0.3%	n.a.	0.0%	-0.9%
FR	-0.3%	-0.1%	2.6%	-4.8%	-6.1%	-0.1%
HR	-0.1%	1.1%	-1.1%	1.0%	-0.8%	0.5%
IT	0.3%	-1.2%	-0.2%	4.5%	1.2%	0.6%
CY	1.5%	-0.4%	n.a.	n.a.	0.0%	1.0%
LV	-1.4%	1.0%	-6.9%	n.a.	3.1%	-0.3%
LT	-1.8%	3.3%	-0.1%	25.7%	-4.1%	8.0%
LU	-1.2%	-1.2%	2.4%	4.4%	-2.5%	1.0%
HU	-4.7%	0.7%	-5.0%	3.2%	-6.6%	-0.5%
MT	n.a.	2.3%	n.a.	n.a.	0.0%	1.5%
NL	-1.6%	-0.4%	2.2%	13.2%	-0.7%	-0.1%
AT	-3.9%	0.2%	1.7%	-0.6%	2.8%	1.0%
PL	-1.0%	4.1%	-8.8%	-4.5%	-1.5%	0.1%
PT	-1.7%	-0.5%	0.1%	n.a.	4.6%	-0.1%
RO	-1.2%	3.3%	-4.0%	26.4%	-4.3%	-0.5%
SI	-0.5%	2.6%	-0.6%	n.a.	0.2%	0.9%
SK	-4.5%	0.7%	-4.0%	5.1%	0.1%	0.2%
FI	0.2%	0.6%	2.4%	3.6%	-0.7%	0.0%
SE	-2.4%	0.5%	2.0%	-6.5%	2.2%	0.7%
UK	-1.6%	-0.5%	1.6%	-3.1%	0.0%	0.5%
Source and extraction data	Eurostat 08/2018	Eurostat 08/2018	DG MOVE Pocketbook 2018	DG MOVE Pocketbook 2018	Eurostat 08/2018	Eurostat 08/2018

Source: Eurostat, DG MOVE, JRC, 2018.

More details are provided and discussed in the following sub-chapters, and further elaborations will be published with the annual JRC Report "Energy Consumption and Energy Efficiency Trends in the EU-28" that will be available in early 2019.

[2] Symbol "+" is used if Member States decreased their primary and final energy consumption between 2005 to 2016 at a rate which is higher than the rate of decrease which would be needed in the period 2005 to 2020 to meet the 2020 primary and final energy consumption targets. Symbol "-" was used for the other cases.

3.1 Primary energy consumption

Primary energy consumption (PEC) in the EU-28 in 2016 was 1543 Mtoe, i.e. 0.7% higher than in 2015. During the period 1990-2005 it increased by 9% and it decreased by 10% over the period 2005-2016. There was however consumption increase during 2010, when primary energy consumption increased by nearly 4% in one year, that was followed by another relevant and constant decrease in the period 2011-2014. After several years, PEC returns to increase in 2015 and continued increasing in 2016.

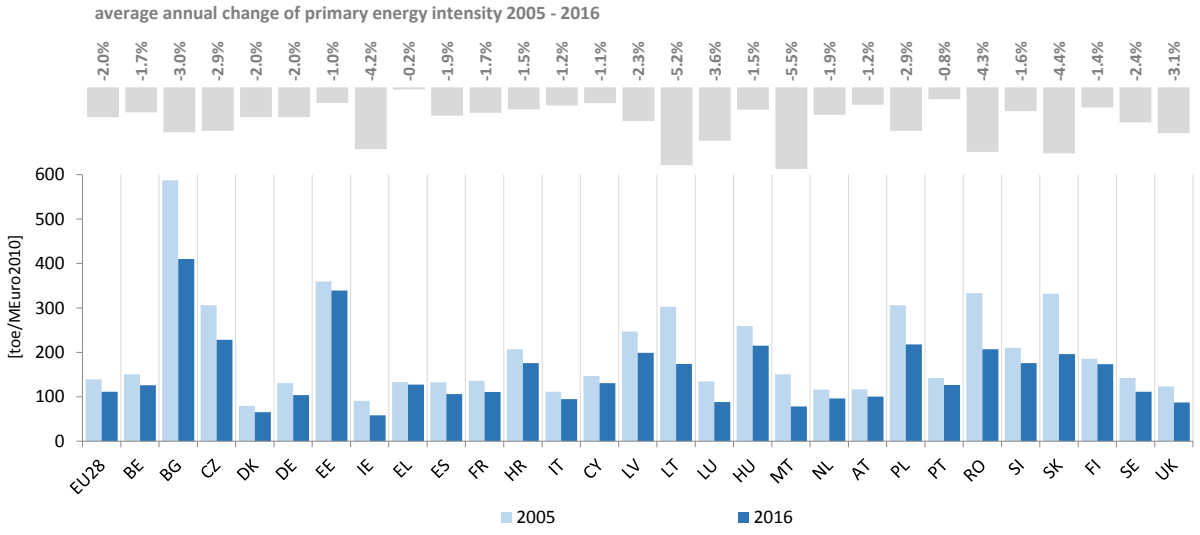
In 2016, 5 Member States (Belgium, Estonia, Finland, Luxembourg, and Sweden) had primary energy consumption over 4 toe per capita. In Croatia, Malta and Romania consumptions was under 2 toe per capita, while the EU average stood at 3 toe per capita.

The biggest increase in primary energy consumption per capita between 2005 and 2016 was observed in Estonia (+17%), followed by Latvia (+10%), while the biggest decrease (under -20%) was observed in Malta, Luxembourg, the United Kingdom, Greece and Italy.

In many countries, primary energy consumption per capita increased between 1990 and 2005 and then decreased between 2005 and 2016. The biggest difference was seen in Malta and Spain, where the consumption per capita increased by 45-46% between 1990 and 2005, then decreased by 20-35% in the period up until 2016. In other countries, the picture was reversed: there was indeed a decrease in consumption per capita from 1990 to 2005, then rose until 2016 in Estonia, Latvia and Poland. The biggest difference in absolute terms was seen in Estonia, where the consumption per capita decreased by 36% between 1990 and 2005 and then rose by 17% in the period up until 2016.

As shown in **Figure 4**, the EU primary energy intensity (PEC divided by GDP) has dropped by an average rate of 2% per year in the period 2005-2016. On average, all Member States significantly reduced their primary energy intensity in this period. Bulgaria, Czech Republic, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Romania, Slovakia, Sweden and the United Kingdom reduced their intensity on average by more than 2% per year. The highest annual average decrease of primary energy intensity over this period has been recorded in Malta, Lithuania, and Slovakia (between -4.4 and -5%/ year). In 2016 the highest decreases compared to the previous year were observed in Malta (-17%) and Bulgaria (-5%).

Figure 4. Primary energy intensity trends and average annual change in 2005-2016.



Source: Eurostat, JRC, 2018.

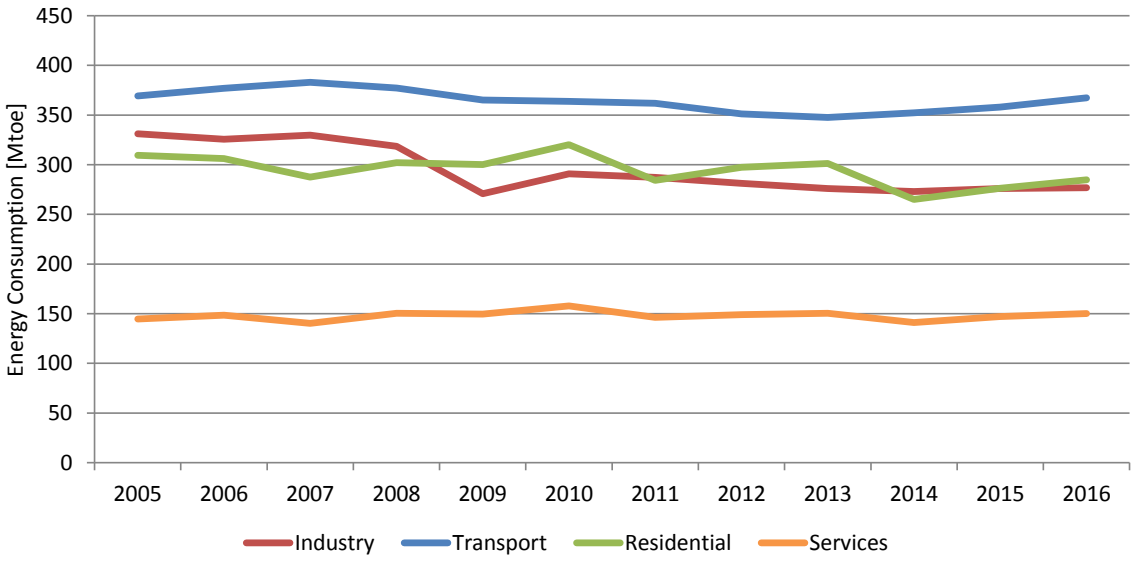
3.2 Final Energy consumption

Final energy consumption (FEC) in EU-28 was 1108 Mtoe in 2016, slightly higher than in 2015 (+2.0%). Final energy consumption has increased slowly since 1994, reaching its highest value, 1194 Mtoe, in 2006. After that, the level remained relatively steady, until the first strong decrease, by 5% (with respect to the previous year), in 2009. The sharpest decrease in the final energy mix in 2009 was in the use of solid fuels, by 18%, followed by gas (7%), petroleum products and electricity (5% for both of them). Overall, there was an increase in 2010, when the final energy consumption increased by 4%, though in 2011, there was a decrease of nearly 5%, whilst final energy consumption remained almost at the same level in the period 2012-2016 (with the exception of the year 2014, when the final energy consumption decreased by 4% compared to the previous year). The final energy consumption in 2016 resulted slightly below the 2011 level.

Figure 5 shows final energy consumption values per sector from 2005 to 2016. It can be observed how final energy consumption values in industry and residential sector have oscillated more markedly throughout the different years, while energy consumption of the transport and services sector has changed more gradually.

The structure of final energy consumption in 2016 by sector shows that transport accounted for the largest share (33.2%), followed by residential and industry (25.7% and 25.0% respectively). The service sector accounted for 13.5% whilst the other sectors were responsible for the remaining 2.6%.

Figure 5. Final energy consumption dynamics through main sectors in the EU-28, 2000-2016.



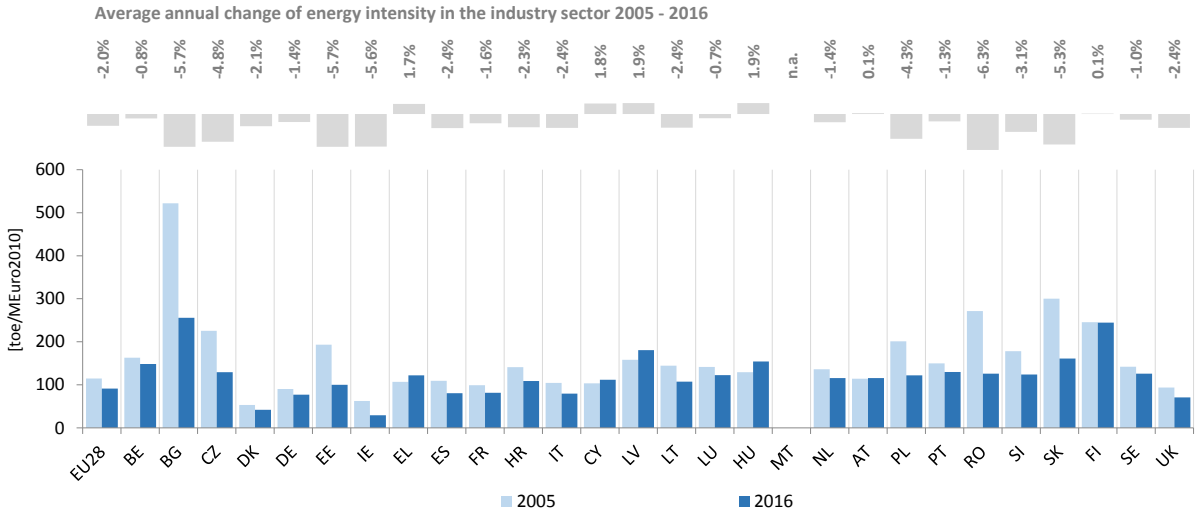
Source: Eurostat, JRC, 2018.

3.2.1 Industry

The previously mentioned final energy consumption decrease of 2009 was sharpest in industry (-15%), which was partially compensated in 2010 (+7%). After the decrease in the period 2011-2014 (-4%), the final energy consumption slightly increased in 2015 and in 2016 (+0.09% and +0.25% respectively compared to the previous years).

In terms of industry final energy intensity of industry sector (FEC divided by GVA[3]) (**Figure 6**), in 2016 there is still a significant difference between the most energy intensive Member State, Bulgaria (256 toe/M€), and the least energy intensive one: Ireland (29 toe/M€). Most Member States however decreased energy intensity in industry in 2016 compared to 2005, the exceptions being Cyprus, Greece, Hungary, and Latvia, Austria and Finland.

Figure 6. Final energy intensity trends in industry and average annual change in 2005-2016.



Source: Eurostat, JRC, 2018.

3.2.2 Residential

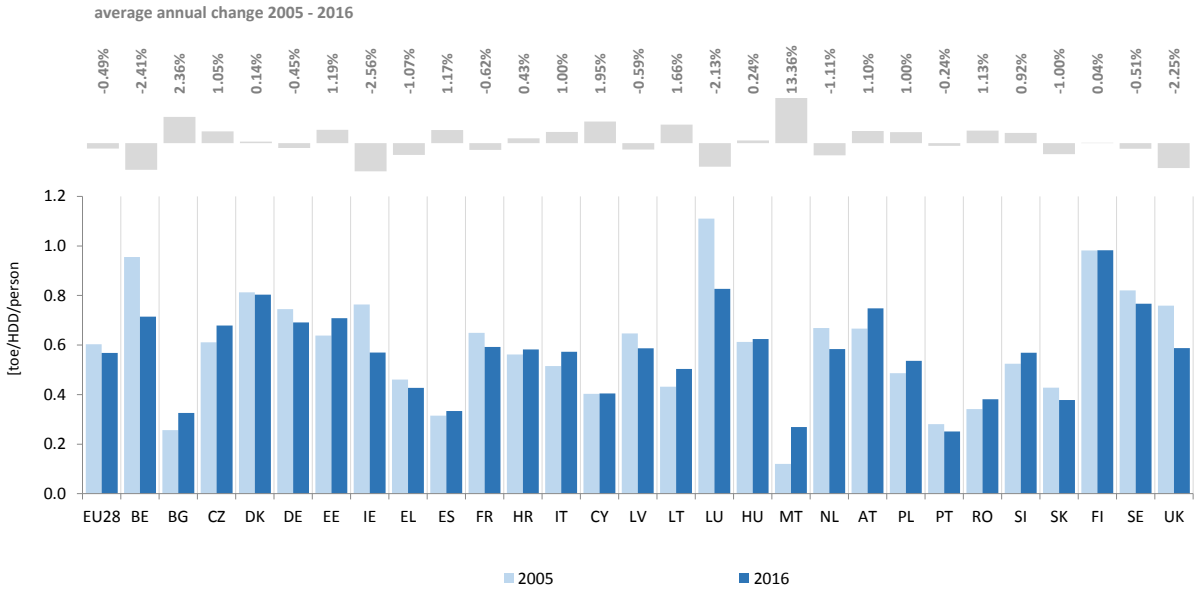
The final energy consumption of the EU28 residential sector decreased slightly in 2009, increased by nearly 7% in 2010, and decreased substantially in 2011 (-11%). In the period 2011-2013 a small recovery was registered (+6%), while in 2014 another significant decrease was recorded (-12%). 2015 data show an increase of 4% while the last data for 2016 show an increase of 3% compared to the previous year. However, residential final energy consumption remains abundantly below the figure of 2005 (285 Mtoe vs 309 Mtoe, representing a decrease of -8%). This might reflect the efficiency improvements occurred in the last decade, but also the influence of the annual climatic variations on this indicator. In fact, the reduction in the HDD normalised final energy consumption[4] over the period 2005-2016 is -2.8%.

Taking also population into account, it can be seen that EU28 decreased its final energy consumption per capita on annual average by 0.5% (see **Figure 7**). The biggest improvements (under -2%) are in Ireland, United Kingdom, Luxembourg and Belgium.

[3] Gross Value Added

[4] For this calculation the average heating degree days of the reference period 2005-2016 are taken into account.

Figure 7. Climate-normalised residential final energy consumption per capita and average annual change in 2005-2016.



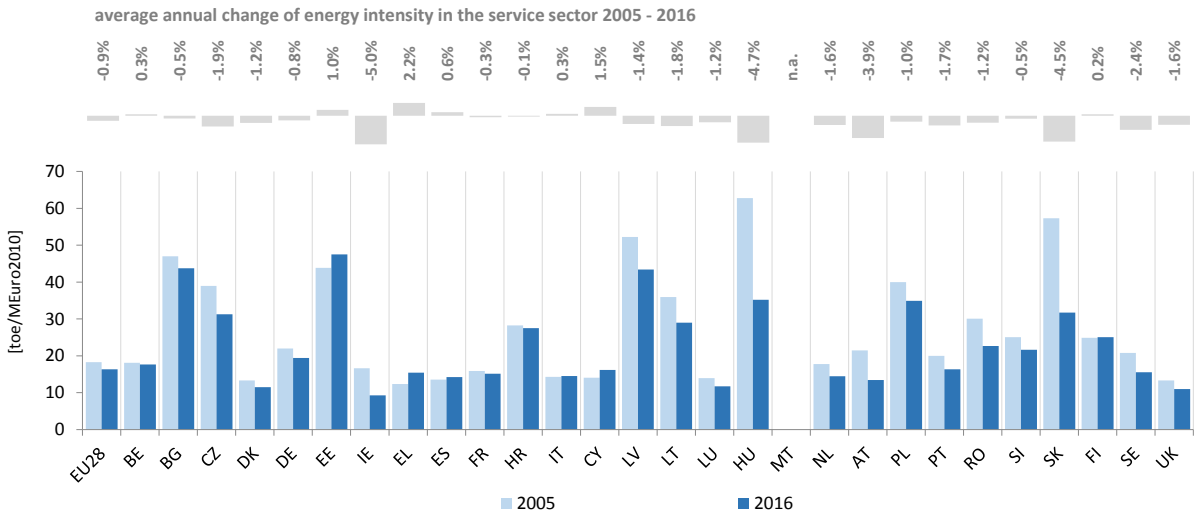
Source: Eurostat, JRC, 2018.

3.2.3 Services

Similarly to residential, the FEC of the EU28 service sector decreased in 2009, increased by 5% in 2010, and then decreased again by 7%. In the period 2011-2013 a small increase was registered (+3%), while in 2014 another decrease was recorded (-6%). Data of 2015 and 2016 show increases of 4% and 2% respectively.

As shown in **Figure 8**, EU28 has improved the energy intensity of its service sector (FEC divided by GVA[5]) annually on average by 0.9 % over the period 2005-2016. The highest improvements (between -5.0% and – 3.9%) happened in Ireland, Hungary, Austria and Slovakia, in this period.

Figure 8. Final energy intensity in the services sector and average annual change in 2005-2016.



Source: Eurostat, JRC, 2018.

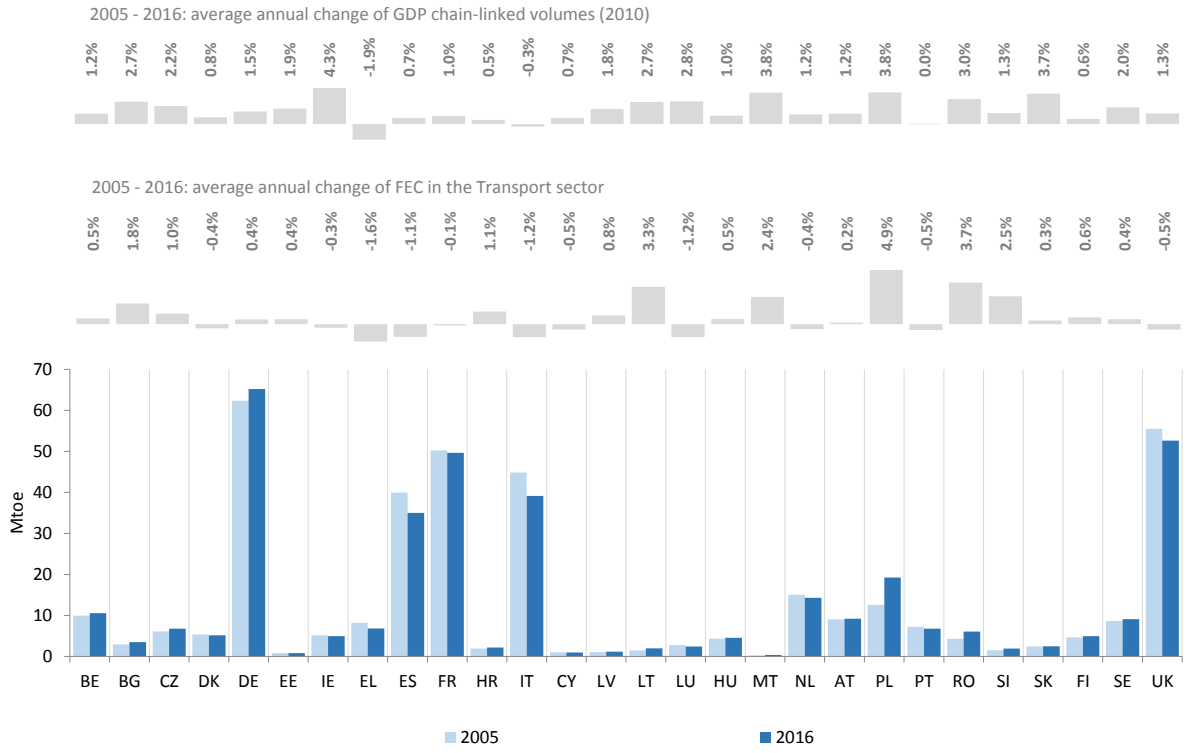
[5] Gross Value Added

3.2.4 Transport

In the last year a slight increase in the FEC of the transport sector has been registered (+2.6%). However FEC declined slightly from 369 Mtoe in 2005 to 367 Mtoe in 2016 (on average the annual decrease was 0.5% in the period 2005-2016).

Comparison between Member States should be undertaken with caution because final energy consumption is based on the fuels sold rather than on the fuel used on the territory of a country. Therefore, factors other than energy efficiency come into play (e.g. the degree to which a given Member State is a 'transit country' for road transport or a hub for aviation). As shown in **Figure 9**, 16 Member States increased their consumption in this sector on average in 2005-2016. The rest of the countries managed to slightly decrease their consumption. With a parallel increase in GDP and passenger and freight transport activity, a decrease in energy consumption could be a sign of increased energy efficiency. This is the case of 8 countries (Denmark, Ireland, Spain, France, Cyprus, Luxembourg, the Netherlands, Portugal and the UK).

Figure 9. Final energy consumption in the transport sector and average annual change in 2005-2016.



Source: Eurostat, JRC, 2018.

4 Evolution in the short-term

Despite the positive trend over the period 2005-2016, in 2016 a general increase of energy consumption compared to the previous year was observed. **Table 6** shows the short-term trend of the energy consumption in 2016 with respect to 2015. A colour-code system was used to define these trends: red for an increase of at least 1% with respect to 2015, green for a decrease of at least 1% and light pink for stable trend (a change within the range of ±1%). For comparability reasons, the data used to assess these trends are derived from EUROSTAT. It can be noted that this year no country has experienced a reduction in total final energy consumption and all countries have observed at least one increasing trend in one of the economic sectors reported in Table 6. All Member States excepting Croatia, Italy, Latvia and Portugal experienced increases in total final energy consumption. The largest increase was observed in Poland (+7%), Cyprus (+6%) and Lithuania (+5%).

Only 5 Member States recorded instead a reduction in primary energy consumption (Bulgaria, Estonia, France, Malta, and United Kingdom). The largest increases are in Cyprus (+9%), Sweden (+8%) and Belgium (+7%).

Table 6. Trends in consumption in key sectors at national level in the period 2015-2016.

MS	Primary Energy	Final Energy				
		Total	Industry	Transport	Households	Services
BE	↗	↗	↗	→	→	↗
BG	↘	↗	↘	↗	↗	↗
CZ	→	↗	→	↗	↗	↗
DK	↗	↗	↗	↗	↗	↗
DE	↗	↗	→	↗	↗	↘
EE	↘	↗	↘	↗	↗	↗
IE	↗	↗	↗	↗	↘	↗
EL	→	↗	↘	↗	↘	↗
ES	→	↗	→	↗	↗	↗
FR	↘	↗	→	→	↗	↗
HR	↗	→	→	↗	→	↗
IT	→	→	↗	↘	→	→
CY	↗	↗	↗	↗	↗	↗
LV	→	→	↘	→	↗	↗
LT	↗	↗	→	↗	↗	↗
LU	↗	↗	↗	→	↘	↗
HU	↗	↗	→	↗	↗	↗
MT	↘	↗	↘	↗	↗	↘
NL	→	↗	↗	→	↗	↗
AT	→	↗	↗	↗	↗	→
PL	↗	↗	↗	↗	↗	↗
PT	↗	→	↘	↗	↗	↘
RO	→	↗	↘	↗	→	↗
SI	↗	↗	↗	↗	↗	↗
SK	→	↗	→	↗	↗	→
FI	↗	↗	↗	↗	↗	↗
SE	↗	↗	→	↗	↗	↗
UK	↘	↗	↘	↗	↗	↗

Source: Eurostat, JRC, 2018.

The sector with the most significant final energy consumption growing trend is noted as the residential sector with a 3% increase at the EU level. Only Ireland, Luxemburg and Greece reported a drop in the final energy consumption of the residential sector. An 8% increase was noted in Estonia and in Finland, followed by 6% in Lithuania and by 5% in Germany, France and Czech Republic. When corrected for climate variations, the picture improves overall, but a worsening is observed for 6 Member States: in Greece, Ireland and Italy the variation over the 2015-2016 period goes from negative (without climatic correction) to positive (with climatic correction). Larger increases with climatic corrections applied are observed in Cyprus, Malta and the United Kingdom observed.

Energy consumption in the transport sector experienced the second largest growth after the residential sector, with the EU average increase of 2.6% in 2016 compared to 2015. All countries experienced a growth except Belgium, France, Italy, Latvia, Luxembourg and the Netherlands. Only Italy has experienced a drop. The most significant growth rates are observed in Slovakia and Poland (+12%), followed by Romania (+8%) and Cyprus, Lithuania and Ireland (+7%).

Also the services and the industry sectors have experienced a rising trend this year (respectively +2.0% and +0.3% at EU level) with 22 countries reporting an increase of the final consumption of service sector and 12 countries reporting an increase of final consumption of industry sector and. The highest growths were observed in Cyprus, Greece and Poland for services (around +9%), and in Luxembourg and Poland for industry (around 5% and 4% respectively).

As requested by Annex XIV of EED, Member States must analyse sectors where energy consumption remains stable or is growing year by year, and provide possible explanations for that. This has been done by almost all countries, but often without the support of in-depth analyses. The reasons manly indicated for growing or stable consumptions are summarised in **Table 7** and **Annex 2** shows all the explanations provided in the Annual Reports 2018.

Table 7. Main reasons provided by Member States (sorted from high to low recurrences) to justify growing or stable final energy consumptions over the period 2015-2016.

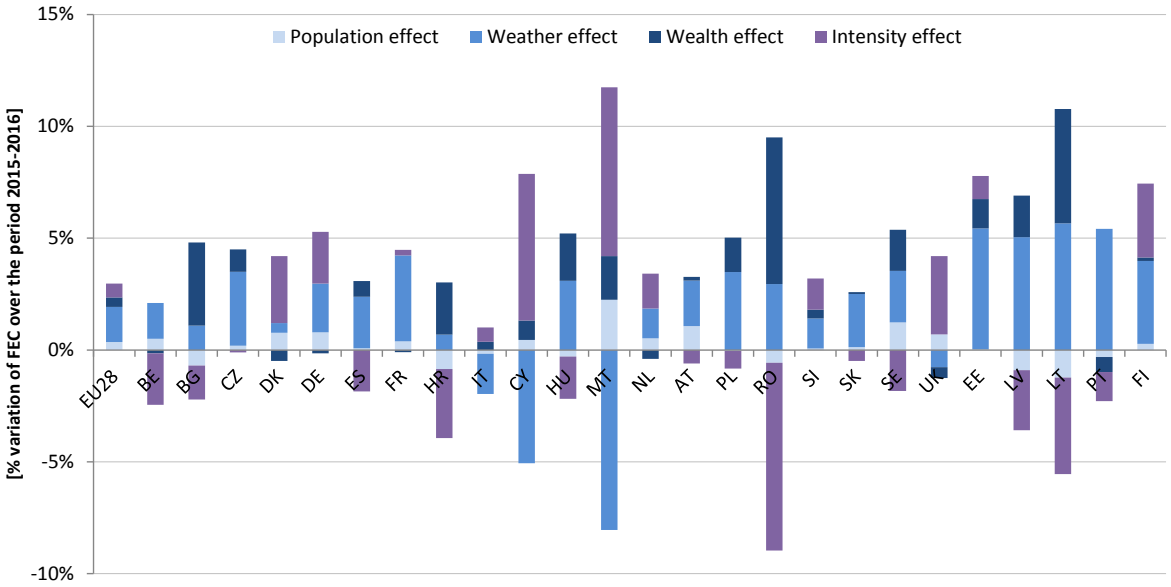
Sector	Reasons
Industry	Economic growth. Increase of value added. Increase of production.
Transport	Increase of transport of passengers. Increase of transport of goods. Economic growth. Decline of fuel prices.
Residential	Worsening of winter climatic conditions. Increase of the population or the number of households. Economic growth. Increase of the disposable income of households. Increase of electric appliances and electronic equipment of households.
Services	Increase of value added. Worsening of winter climatic conditions. Economic growth. Increase of employment.

Source: AR2018, JRC, 2018.

To contextualise the explanations provided by Member States, JRC C.2 developed a decomposition analysis, which identifies possible driving factors of and their contributions to the latest energy consumption trends in the EU.

For instance in **Figure 10** a breakdown is shown for all Member States who increased or maintained stable their residential consumption in 2016 with respect to the year before. As indicated by large part of these countries, the weather (colder winter) was a significant cause of increase mostly in colder climates, whilst wealth effects linked to growth of floor area and of disposable income of households have also played a role in this increase in some countries. These two contributions have typically overcome the energy consumption reduction impact of other factors that include also the possible improvement of energy efficiency that can be reflected in the intensity effect.

Figure 10. Contribution of different effects on the variation of the residential FEC, in the countries where increased or stable consumption was observed over the period 2015-2016.



Source: JRC, 2018.

For general information related to decomposition analysis, please refer to decomposition report "Assessing the progress towards the EU energy efficiency targets using index decomposition analysis" (Economidou 2017).

5 Progress towards implementation of EED provisions

5.1 Overview of policy updates in year 2017

In compliance with the general framework for annual reports Annex XIV Part 1, Member States were required to report updates on major legislative and non-legislative measures implemented in the previous year which contribute towards the overall national energy efficiency targets for 2020.

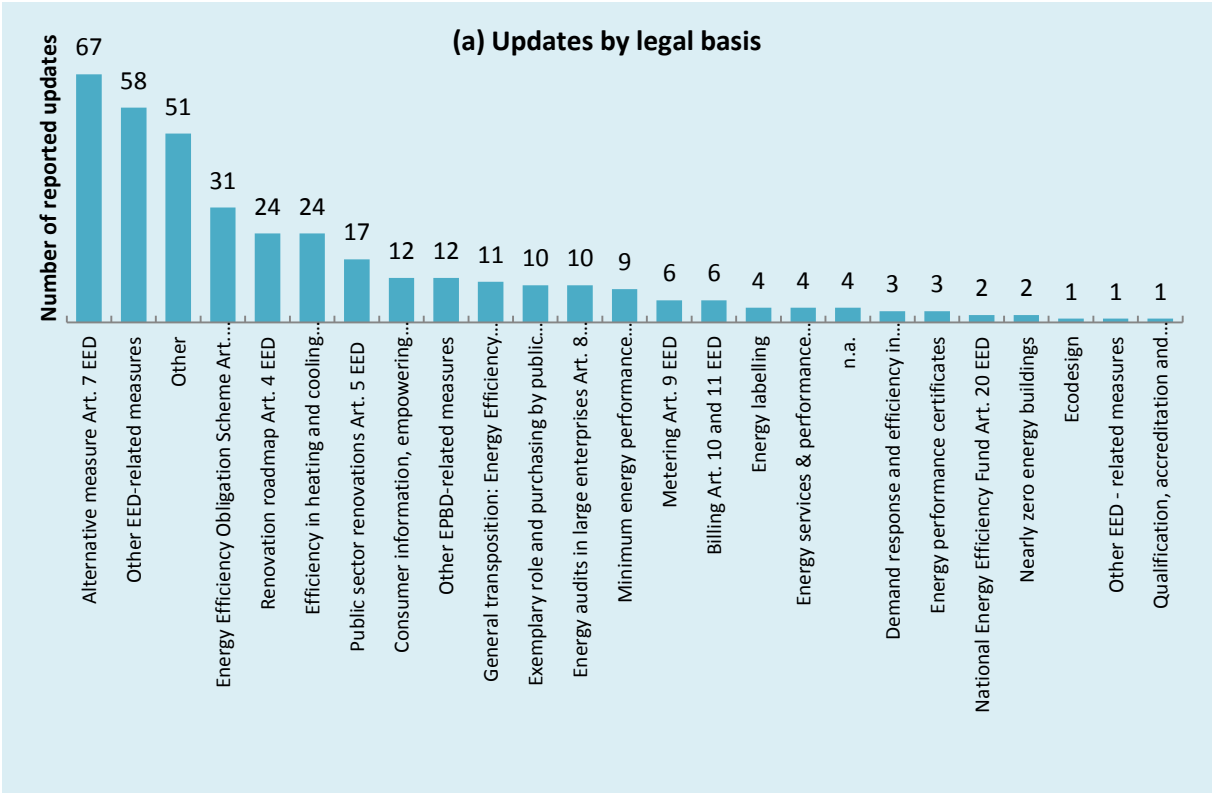
In 2018, all the Member States except Sweden[6] communicated their updates in the Annual Reports.

In total 374 updates were reported, i.e. 75 more than the previous year. To be noted that in the previous year the updates of 6 Member States were missing. The majority of them concerned measures claimed under Article 7 (see **Figure 11**).

In terms of policy types, the vast majority of policies were "Regulations, supporting legal & other legislative measures" (45.5%) and "Funds, financial & fiscal measures" (around 24%). These were followed by updates in "Plans & strategies" (around 9%), "Market-based instruments (e.g. EEOS)" and "Information, knowledge & advice" (around 8% both of them). **Figure 12** provides more details.

As shown in **Figure 13**, the major part of the measure updates (around 39%) concerned amendments, implementation or design changes and extension of on-going measures. Adoption of new measures, conclusion of agreements, publication of legislations, and commencement or enforcement of measures and programmes represented around one third of all updates (around 34%).

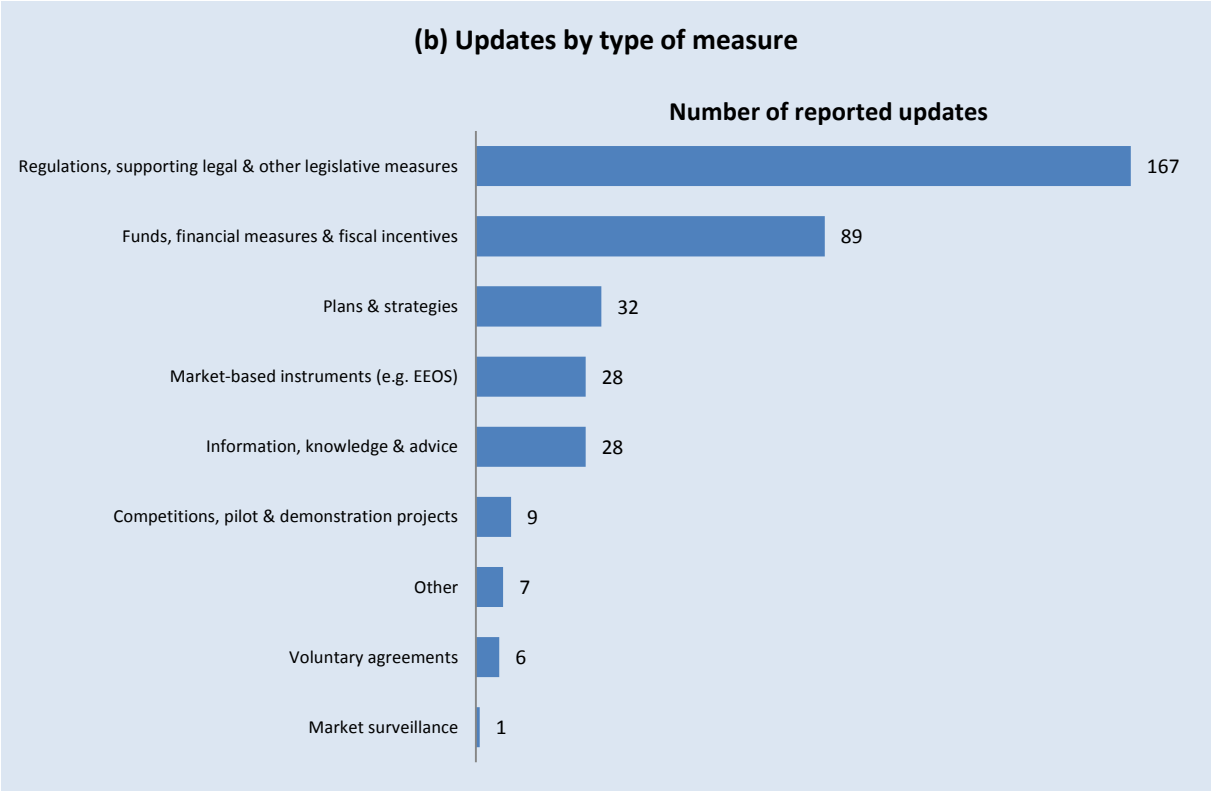
Figure 11. Summary of policy updates reported in Annual Reports 2018 by type of legal basis.



Source: AR2018, JRC, 2018.

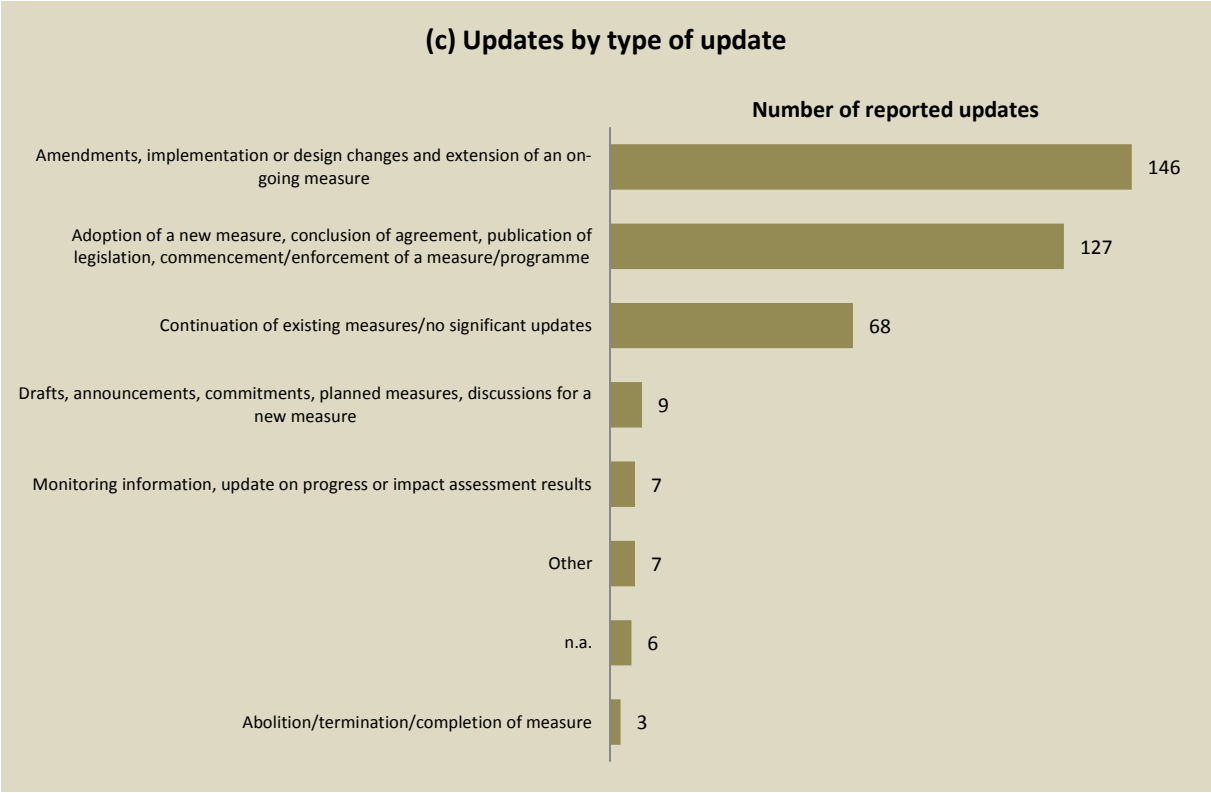
[6] No data are available in the Annual Report of Sweden in relation to updates on legislative and non-legislative measures.

Figure 12. Summary of policy updates reported in Annual Reports 2018 by type of measure.



Source: AR2018, JRC, 2018.

Figure 13. Summary of policy updates reported in Annual Reports 2018 by type of update.



Source: AR2018, JRC, 2018.

5.2 Progress towards Article 5 in 2017

In accordance with Article 5(1) of Directive 2012/27/EU, Member States were required to ensure that, as from 1 January 2014, 3% of the total floor area of heated and/or cooled buildings owned and occupied by their central government which does not meet minimum energy requirements is renovated each year, to meet at least the minimum energy performance requirements (MEPS) that has been set in application of Article 4 of Directive 2010/31/EU. Alternatively, Member States may opt for an alternative approach (Article 5(6)), and achieve by 2020, energy savings which are equivalent or greater than those which would be achieved through the application of the provisions of Article 5(1) in the same building stock.

A summary of the latest progresses made by Member States in connection with Article 5 are presented in **Table 8** (default approach) and **Table 9** (alternative approach). This is based on the latest data[7] reported by Member States on the central government building stock and the obligations calculated by Member States to comply with the Article 5 provisions in terms of annual floor area to be renovated or annual energy savings to be reached. The actual progress made in 2017 (in terms of renovated floor area or energy savings) is currently under review. Moreover, in the penultimate column it is displayed (if available) the actual obligation achievement for the year 2017, which is expressed as the:

- ratio of renovated floor area in 2017 to the respective annual renovation obligation for countries opting for the default approach (Article 5(1));
- ratio of achieved annual energy savings in 2017 compared to the annual energy saving obligation for countries opting for the alternative approach (Article 5(6)).

The last column, reports (in percentage and when provided data allow to calculate this value) the ratio of cumulated savings generated in the period 2014-2017 by renovation actions implemented up to 2017 and expected energy savings over this time period.

The following colour-code system was used to depict the level of obligation achievement: green circles indicate countries which fully reached or exceeded their obligation in 2016, while the yellow and red circles show countries which fell short of their 2017 obligation by up to 0-50% and 50-99%, respectively. The ratios were calculated based only on information declared by Member States in their Annual Reports 2018. Table cells coloured in yellow refer to data that Member States have provided to the European Commission in documents other than the Annual Reports. Table cells coloured in green include instead values that have been calculated by the JRC based on these additional data.

[7] Where an updated target figure was not made available by Member States, we considered the value provided in previous annual reports.

Table 8. Implementation status of Article 5 of Member States which chosen the default approach (Art. 5(1)), based on the reports of the Member States[8] (data currently under review).

MS	Central government buildings with floor area > 250 m2		Article 5. annual requirement	Article 5 progress in 2017		
	All [m2]	Non-compliant with MEPS [m2]	Floor area renovation obligation [m2]	Renovated floor area [m2]	Obligation achieved in terms of floor area [%]	Cumulated savings over required savings for the period 2014-2017[%]
BG	n.a.	2,146,459	66,585	28,101	42%	n.a.
EE	1,354,752	782,492	30,606	40,701	133%	n.a.
EL	310,000	n.a.	n.a.	n.a.	n.a.	n.a.
ES	11,057,324	9,283,618	275,094	302,209	110%	n.a.
HU	n.a.	413,072	12,392	0	0%	n.a.
IT	15,190,344	13,775,372	413,261	459,045	111%	n.a.
LT	n.a.	1,608,124	48,244	77,610	161%	n.a.
LU	126,253	72,910	2,264	16,043	709%	n.a.
LV	n.a.	1,910,441	59,980	136,155	227%	n.a.
RO	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SI	788,652	753,831	23,126	23,514	102%	n.a.

Source: AR2016, AR2017, NEEAP2017, AR2018, JRC, 2018.

[8] LU: In NEEAP 2017 is stated that in the period 2014-2016 13846 m2 were renovated and 16043 m2 are foreseen to be renovated in 2017

Table 9. Implementation status of Article 5 of Member States which chosen the alternative approach (Art. 5(6)), based on the reports of the Member States[9] [10] [11] [12] (data currently under review).

MS	Central government buildings with floor area > 250 m2		Article 5. annual requirement	Article 5 progress in 2017		
	All [m2]	Non-compliant with MEPS [m2]	Annual energy savings obligation [ktoe]	Savings achieved [ktoe]	Obligation achieved in terms of energy savings [%]	Cumulated savings over required savings for the period 2014-2017[%]
AT	n.a.	n.a.	0.59	n.a.	n.a.	n.a.
BE	2,456,759	642,402	0.02	n.a.	n.a.	n.a.
CY	585,502	582,282	0.29	0.27	94%	101%
CZ	2431918	1593682	0.34	0.59	176%	71%
DE	n.a.	2,900,000	0.65	0.40	62%	124%
DK	n.a	n.a	0.38	0	0%	n.a.
FI	884,000	n.a.	0.11	n.a.	n.a.	382%
FR	n.a.	22,200,000	35.55	120.38	339%	n.a.
HR	n.a.	n.a.	0.12	0.79	675%	654%
IE	335,175	335,175	0.11	0.15	133%	305%
MT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
NL	6.211.000	n.a.	4.18	n.a	n.a.	n.a.
PL	n.a.	1,087,964	0.37	0.58	154%	112%
PT	7,329,150	82,284	n.a.	0.01	n.a.	n.a.
SE	n.a.	n.a.	0.25	n.a.	n.a.	n.a.
SK	n.a.	n.a.	4.49	4.15	92%	50%
UK	14,000,000	14,000,000	3.52	2.09	59%	370%

Source: AR2016, AR2017, NEEAP2017, AR2018 JRC, 2018.

Compared to the last year, a higher level of compliance with reporting obligations can be observed. In fact, only 8 Member States didn't provide the requested update regarding Article 5, whilst 13 Member States did not comply with their reporting obligation in the previous year. Among these, Sweden, Finland, Belgium, Greece, the Netherlands, Romania and Malta didn't notify their achievements for the last two years.

As shown in **Table 8**, from the Member States that have chosen the default approach, there are 6 Member States that achieved their annual targets in terms of renovated floor area. These are Estonia, Spain, Italy, Lithuania, Latvia, Luxembourg and Slovenia.

As displayed in **Table 9**, from the Member States that have implemented the alternative approach 6 Member States achieved their annual energy saving targets. These are the Czech Republic, France, Croatia, Ireland, the Netherlands and Poland. At the same time, 7 countries have provided data allowing to establish that they have fulfilled their cumulative targets for the period 2014-2017. These are Cyprus, Germany, Ireland, Croatia, Finland, Poland and UK.

[9] Information recently provided by Romania indicates that RO might have decided to use the default implementation approach.

[10] Unless otherwise stated in the annual reports and in other documents possibly provided by Member States, it has been assumed that the annual saving target is identical for all the years

[11] CZ, FR, NL: savings achieved and included in the annual reports refer to 2016 instead of 2017. In case of France, it is not clear whether m2 not compliant with MEPS actually refer to 2018

[12] DE: Primary energy savings and annual target for each year have been provided recently by the Member State. Required savings are calculated by JRC based on data related to energy savings and annual targets expressed in primary energy as provided by Germany.

In addition, it should be noted that almost one half of the Member States updated within the AR2018 their figures for the floor area which is non-compliant with the minimal energy performance standards. These are Czech Republic, Belgium, Spain, Estonia, Bulgaria, Germany, Ireland, the United Kingdom, Poland, Latvia, Luxembourg, Slovenia and Lithuania. Six Countries notified a larger non-compliant total floor area with respect to the previous year: Lithuania (+52%), Poland (+27%), Belgium (+11%), the UK (+5%), the Czech Republic (+2%) and Spain (+1%).

5.3 Progress towards Article 7 in 2016

With regards to EED Article 7, a number of Member States notified updates on their Energy Efficiency Obligations Schemes (EEOSs)(Article 7(1)) and alternative policy measures (Article 7(9)) in their Annual Reports.

Table 10 provides a summary of the latest Article 7 implementation status. It provides an overview on the approach used by each Member State (i.e. obligation scheme and/or alternative measures) and the total amount of cumulative savings required by the end of 2020 per each Member State. The actual progress made is presented in terms of:

A. savings achieved from new actions implemented in 2016;

B. savings achieved in 2016, from new actions implemented in 2016 and from actions implemented in 2014 and in 2015 that continue delivering savings in 2016;

C. cumulative savings achieved over the period 2014-2016.

Where applicable the progress is also expressed as a ratio of savings achieved from new actions implemented in 2016 (A) and of the cumulative savings achieved over the period 2014-2016 (C) against the expected annual savings on the basis of a linear delivery. In addition the last column provides the share of cumulative savings (C) against the national cumulative savings requirement due by the end of 2020. As represented in **Figure 14**, the linear delivery (taken as reference) assumes that the new actions implemented every year (from 2014) achieve 1/28 of the total savings requirements to be achieved by the end of 2020.

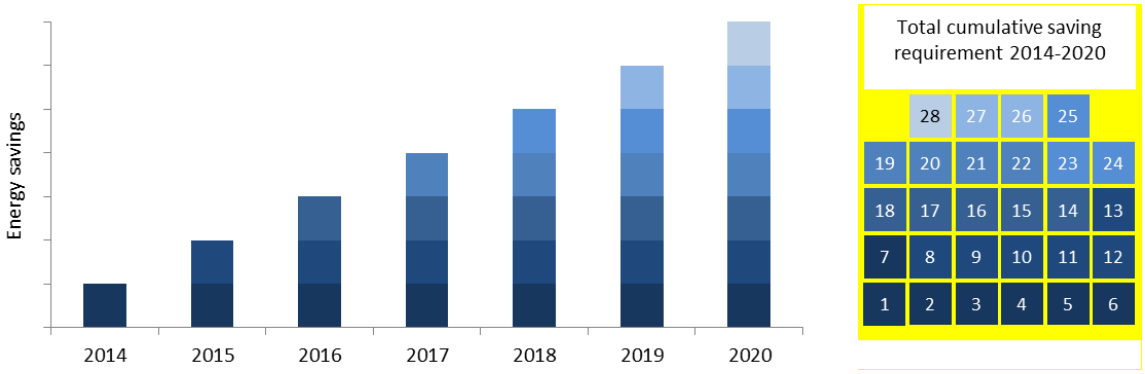
The same colour-code system as above was used to highlight the level of the achievement in 2016: green indicates countries which fully reached or exceeded their expected savings for 2016, yellow denotes countries which fell short of their 2016 expected savings by up to 50% and red indicate countries which fell short by more than half.

Table 10. Article 7 implementation status based on latest information available (reported values are in final energy).

MS	Implementation approach		Total cumulative savings requirement in 2014-2020 under Article 7 [ktoe]	Progress made in 2016					
	Obligation schemes	Alternative measures		Savings achieved from new actions implemented in 2016 [ktoe]	Savings achieved from new actions implemented in 2016 against expected annual average savings on the basis of linear delivery [%]	Savings achieved in 2016, from new actions implemented in 2016 and from actions implemented in 2014 and 2015 that continue delivering savings in 2016	Cumulative savings achieved over the period 2014-2016 [ktoe]	Cumulative savings achieved over the period 2014-2016 against expected average savings on the basis of linear delivery [%]	Share of savings achieved until 2016 against total cumulative savings requirement in 2014-2020 [%]
EU28			230486	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
BE		✓	6911	226	92%	779	1654	112%	24%
BG	✓		1942	50	71%	99	178	43%	9%
CZ		✓	4882	150	86%	310	521	50%	11%
DK	✓		3841	262	191%	758	1473	179%	38%
DE		✓	41989	2637	176%	4085	9943	111%	24%
EE		✓	610	77	352%	184	284	217%	47%
IE	✓	✓	2164	116	150%	330	609	131%	28%
EL	✓	✓	3333	40	33%	174	382	54%	11%
ES	✓	✓	15979	514	90%	1536	3180	93%	20%
FR	✓	✓	31384	943	84%	2887	6489	96%	21%
HR		✓	1296	15	33%	n.a.	62	22%	5%
IT	✓	✓	25502	2850	313%	4565	7262	133%	28%
CY		✓	242	2	26%	6	12	24%	5%
LV	✓	✓	851	15	49%	32	57	31%	7%
LT		✓	1004	23	64%	86	184	86%	18%
LU	✓		515	n.a.	n.a.	14	24	22%	5%
HU		✓	3680	72	55%	292	641	81%	17%
MT	✓	✓	67	1	61%	8	19	129%	28%
NL		✓	11512	586	143%	3416	5211	211%	45%
AT	✓	✓	5200	389	209%	1026	1908	171%	37%
PL	✓		14818	1608	304%	3268	5142	162%	35%
PT		✓	2532	29	32%	94	206	38%	8%
RO		✓	5817	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SI	✓	✓	945	37	109%	180	285	141%	30%
SK		✓	2284	70	86%	n.a.	n.a.	n.a.	n.a.
FI		✓	4213	562	374%	n.a.	4775	529%	113%
SE		✓	9114	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
UK	✓	✓	27859	954	96%	2984	6208	104%	22%

Source: AR2016, AR2017, AR2018, JRC, 2018.

Figure 14. Example of linear delivery of the total cumulative savings requirement under Article 7.



At EU level almost half of the Member states have overachieved their cumulated target over the period 2014-2016 (C)[13]. Good partial results achieved by Finland, Austria, Poland, Estonia, Denmark and the Netherlands are to be emphasised. On the other side, 7 Member States (Bulgaria, Czech Republic, Croatia, Cyprus, Latvia, Luxembourg and Portugal) seem to be far away from their savings requirements.

A variety of policy measures were used by Member States to generate the energy savings claimed under Article 7 in 2016. The breakdowns of the savings achieved from new actions in 2014, 2015 AND 2016 per type of policy measure is shown in **Figure 15**. Here the measures have been grouped into the following 6 categories:

- energy efficiency obligation schemes (EEOS);
- regulations;
- taxation;
- funds, fiscal and financial incentives;
- information, training and education;
- other measures.

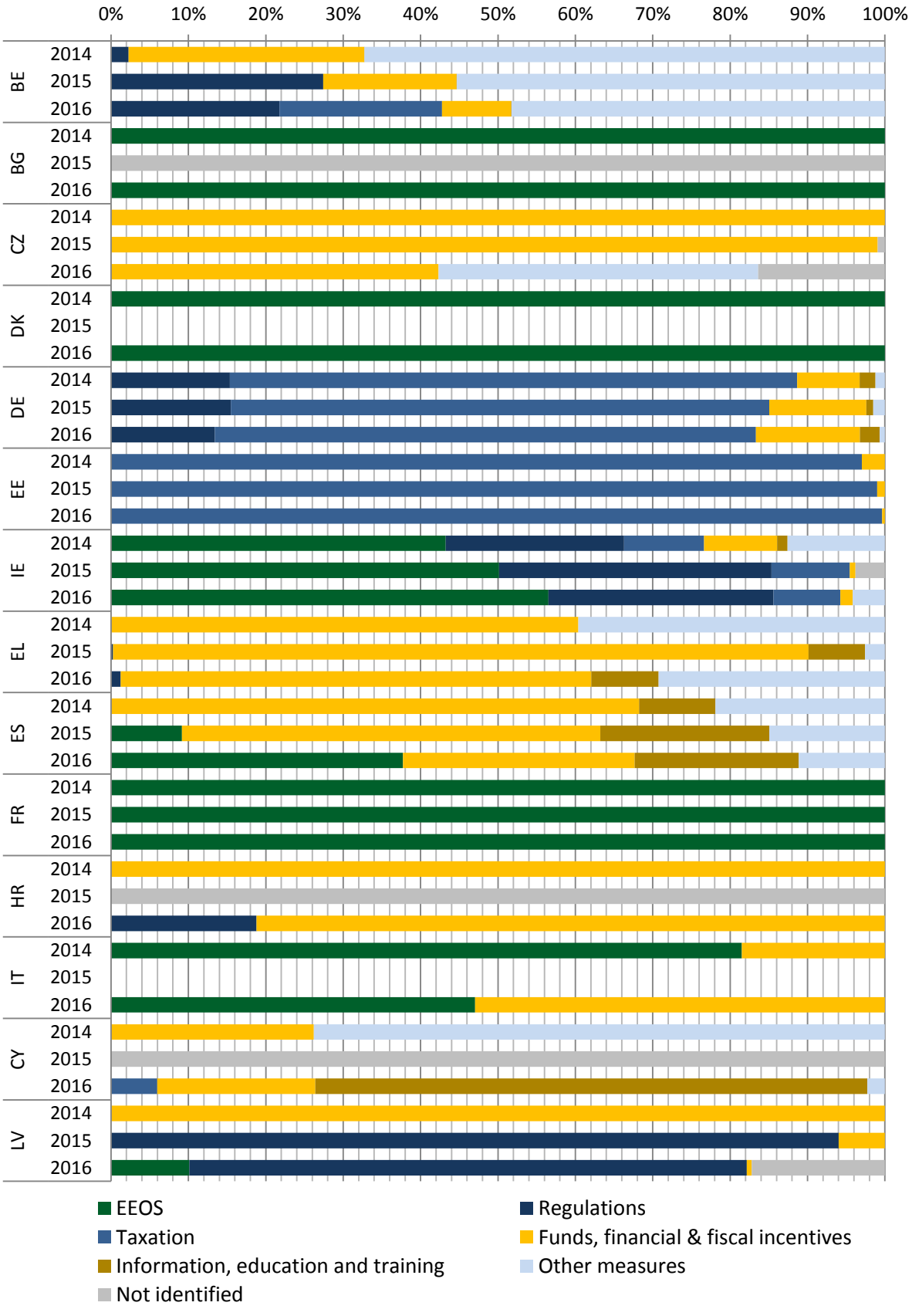
The figure about the savings achieved from new actions implemented in 2016 (A) is not available for 3 Member States (Luxembourg, Romania and Sweden) and it is not possible to identify the policies' contributions to Slovakia target in the related AR2018. Of the remaining 24 ones, 12 Member States either partially or fully generated their 2016 savings through the implementation of EEOS (EED Article 7(1)): Bulgaria, Denmark, Ireland, Spain, France, Italy, Latvia, Malta, Austria, Poland, Slovenia and UK. In absolute terms, the savings generated by the EEOSs represent almost 41% of the Article 7 savings at the EU level.

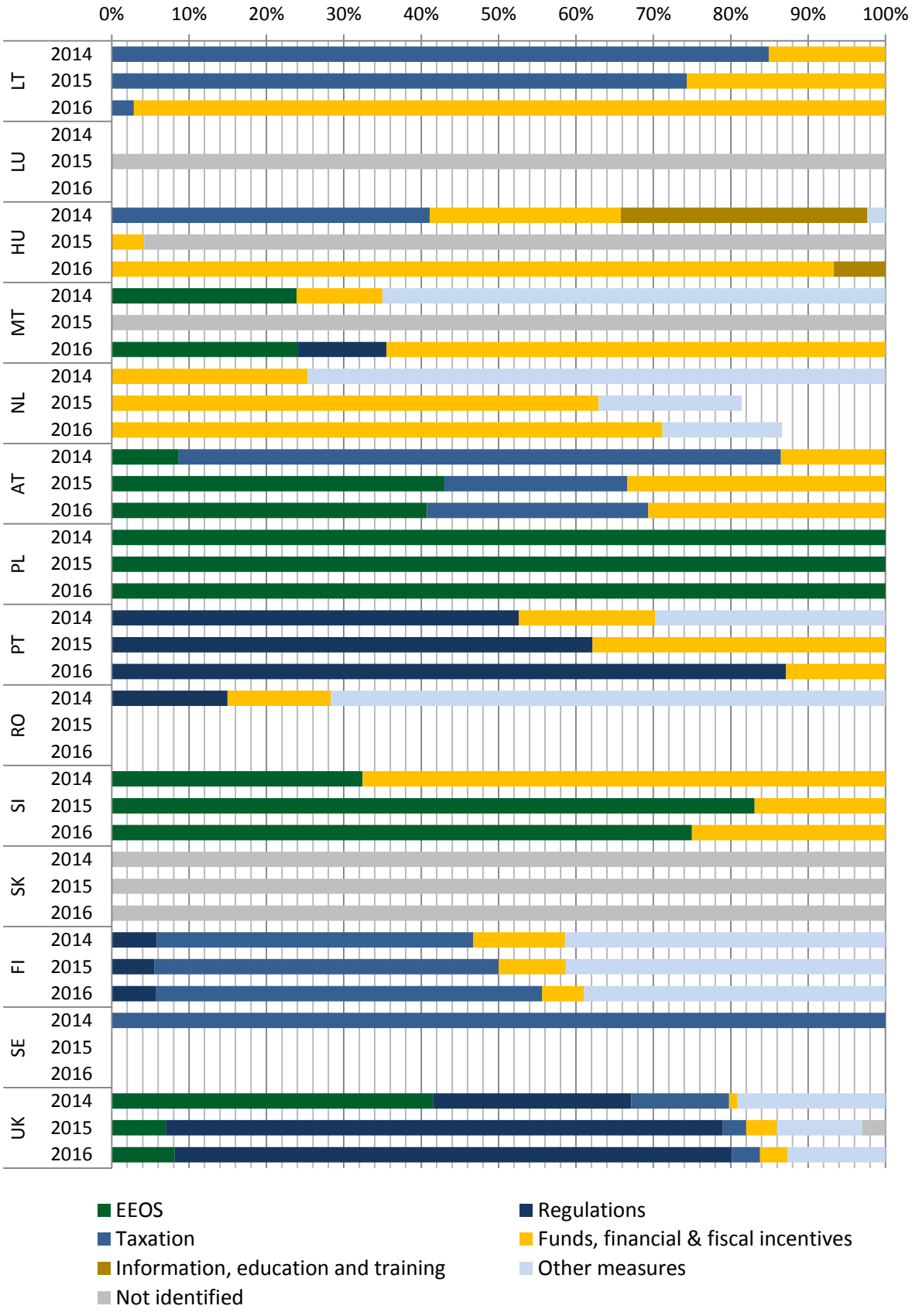
Looking at the current (not exhaustive) picture[14], savings through alternative measures (EED Article 7(9)) play a relevant role for generating the new energy savings under Article 7 in 2016. The measures falling under the category "Funds, fiscal and financial incentives" covered a substantial share (almost 21%) of the total achieved savings in 2016, as happening with "Taxation" measures. New regulatory measures were adopted by 9 Member States (Belgium, Germany, Ireland, Croatia, Malta, Latvia, Portugal, Finland and UK) generating around 10% of the total savings reported for 2016. "Information, education and training" measures used by Belgium, Germany, Greece, Spain and Austria, Cyprus and Hungary generated 1.6% of the total saving achieved by new actions that were implemented in 2016. Instead, around 5% was achieved through other measures, as voluntary agreements, public transport public development programmes, etc. The remaining 0.8% could not be associated with any specific measure type.

[13] Considering as reference an average annual saving rate equal to the total cumulative saving requirement divided by 28.

[14] Netherlands was excluded from the calculations detailed in this paragraph as the distribution of the totally generated energy savings over the different measures considered under Article 7 is provided in the related 2018AR without excluding energy savings double counting among different measures.

Figure 15. Share of energy savings achieved in 2014, 2015 and 2016 from new actions that were implemented in these years, by type of policy measure.





Source: AR2016, AR2017, AR2018, DG ENERGY, JRC, 2018.

6 Conclusions

Given that the latest energy consumption data provided by Member States through Eurostat refer to 2016, only four years remain before the milestone of 2020. Energy consumption trends of EU can now hence be viewed alongside the overall targets. Both primary and final energy consumption levels are still below the theoretical linear target path 2005-2020, despite the reversal of the downward consumption trend in 2015 and the further consumption increase in 2016. As explained by the Member States in their latest Annual Reports, several contextual factors justify this 2016 increasing trend: the climatic conditions (colder winter), the economic growth and the increase if value added, the increase of the population and of the number of households, the increase of passengers and goods transport are some of the reported reasons for observed energy consumption increases. Cold weather and increase of population and households primarily affected the residential sector, while economic growth and increase of value added had an impact on industry and services. The increase in transport of passengers and goods influenced instead the transport sector consumption negatively.

While the aforementioned factors are generally expected to drive up energy demand, continued commitment can ensure that the EU remains on track towards its 2020 targets. To this end, some Member States should evaluate the latest trends and take actions with a view to introducing new policy measures or strengthening existing ones in the coming years.

In this context, the EED energy savings obligation related to Article 5 ("Exemplary role of public bodies' buildings") and Article 7 ("Energy efficiency obligation schemes") of the Energy Efficiency Directive are crucial. The first one has an important symbolic value, since it demonstrates public commitment on government properties and therefore lead-by-example approach. The second one is associated with a significant energy saving potential and represents one of the most important articles of the Directive in terms of measurable/verifiable energy savings.

The assessment of the Annual Reports submitted by Member States in 2018 has confirmed good progress with regards to the implementation of Article 7 and of Article 5. However, a lack of information provided in the Annual Reports is observed which does not enable to have a complete picture at EU level. Beyond the various information gaps, our analysis suggests that achieving the Article 5 requirements may be challenging and accelerated efforts are crucial in ensuring that sufficient progress is made in the coming years.

On the update process, it is important to emphasize the importance of using a common reporting format. The template introduced in 2015 and fine-tuned in 2016/2017 allowed Member States to harmonise the collection of main information and well-defined indicators, avoiding serious misinterpretations and subsequent need of requests for clarification. This aspect should be taken into account in the future reporting framework related to the requirements of the new Energy Union Governance.

References

DIRECTIVE 2012/27/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC.

Eurostat Database, available at: http://ec.europa.eu/eurostat/data/database

Annual Reports and National Energy Efficiency Action Plans, available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive/national-energy-efficiency-action-plans

Economidou M. (2017), Assessing the progress towards the EU energy efficiency targets using index decomposition analysis, EUR 28710 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-71299-9, doi:10.2760/675791, JRC106782.

List of abbreviations and definitions

AR	Annual Report
CHPP	Combined Heat and Power Plants
EE	Energy Efficiency
EED	Energy Efficiency Directive
EPBD	Energy Performance of Buildings Directive
FEC	Final Energy Consumption
GDP	Gross Domestic Product
GVA	Gross Value Added
HDD	Heating Degree Days
MS	Member State
NEEAP	National Energy Efficiency Action Plan
PEC	Primary Energy Consumption
thPG	Thermal Power Generation
TSSEED	Technical and Scientific Support to the implementation of the EED and the EPBD, as well as contribution to the development of concepts for the strengthening of the overall EU legislative framework for energy saving

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Annex 1: EUROSTAT indicators

The table below lists the EUROSTAT indicators (and related information) associated to the indicators required by Annex XIV of the EED.

Annual Report Indicator	EUROSTAT Indicator(s)	EUROSTAT database table	EUROSTAT Code	Field/ product(s)	Unit(s)	Period (EU28)
(i) primary energy consumption	Primary Energy Consumption	Energy saving - annual data [nrg_ind_334a]	B_100910	-	Mtoe	2005-2016
(ii) total final energy consumption	Final Energy Consumption	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101700	All products	ktoe	2005-2016
(iii) final energy consumption - industry	Final Energy Consumption - Industry	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101800	All products	ktoe	2005-2016
(iii) final energy consumption - transport	Final Energy Consumption - Transport	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101900	All products	ktoe	2005-2016
final energy consumption in pipeline transport	Consumption in Pipeline transport	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101945	All products	ktoe	2005-2016
(iii) final energy consumption - households	Residential	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_102010	All products	ktoe	2005-2016
(iii) final energy consumption - services	Services	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_102035	All products	ktoe	2005-2016
final energy consumption - agriculture	Agriculture/Forestry	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_102030	All products	ktoe	2005-2016
final energy consumption – other sectors	Other sectors	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_102000	All products	ktoe	2005-2016
(iv) gross value added - industry	- Industry (except construction) - Construction	Gross value added and income by A*10 industry breakdowns [nama_10_a10]	- B-E - F	Value added, gross	Million euro, chain-linked volumes, reference year 2010 (at 2010 exchange rates)	2005-2016
(iv) gross value added - services	- Wholesale and retail trade, transport, accomodation and food service activities - Information and communication - Financial and insurance activities - Real estate activities - Professional, scientific and technical activities; administrative and support service activities - Public administration, defence, education, human health and social work activities - Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	Gross value added and income by A*10 industry breakdowns [nama_10_a10]	- G-I - J - K - L - M_N - O-Q - R-U	Value added, gross	Million euro, chain-linked volumes, reference year 2010 (at 2010 exchange rates)	2005-2016
(v) disposable income for households	Gross disposable income	Non-financial transactions [nasa_nf_tr]	- S14 (if available) or S14_S15	Households (if available) or Households; non-profit institutions serving households	Million euro (current prices)	2005 - 2016
(vi) gross domestic product (GDP)	Gross domestic product at market prices	GDP and main components - volumes [nama_10_gdp]	B1GQ - Gross domestic product at market prices	-	Million euro, chain-linked volumes, reference year 2010(at 2010 exchange rates)	2005 - 2016

Annual Report Indicator	EUROSTAT Indicator(s)	EUROSTAT database table	EUROSTAT Code	Field/ product(s)	Unit(s)	Period (EU28)
(vii) electricity generation from thPG	- Gross electricity generation Main activity electricity only - Nuclear - Gross electricity generation Main activity CHP plants - Nuclear - Gross electricity generation Autoproducer electricity only - Nuclear - Gross electricity generation Autoproducer CHP plants - Nuclear - Gross electricity generation Main activity electricity only - Geothermal - Gross electricity generation Main activity electricity only - CombustibleFuels - Gross electricity generation Main activity electricity only - Other Sources - Gross electricity generation Main activity CHP plants - Geothermal - Gross electricity generation Main activity CHP plants - Combustible Fuels - Gross electricity generation Main activity CHP plants - Other Sources - Gross electricity generation Main activity electricity only - Solar Thermal - Gross electricity generation Autoproducer electricity only - Geothermal - Gross electricity generation Autoproducer electricity only - Combustiblefuels - Gross electricity generation Autoproducer electricity only - Heat from Chemicalsources - Gross electricity generation Autoproducer electricity only - Other Sources - Gross electricity generation Autoproducer CHP plants - Geothermal - Gross electricity generation Autoproducer CHP plants - Combustible Fuels - Gross electricity generation Autoproducer CHP plants - Heat from Chemical Sources - Gross electricity generation Autoproducer CHP plants - Other Sources - Gross electricity generation Autoproducer electricity only - Solar Thermal	Supply, transformation, consumption - electricity - annual data [nrg_105a]	- 15_107030 - 15_107031 - 15_107032 - 15_107033 - 15_107038 - 15_107048 - 15_107054 - 15_107039 - 15_107049 - 15_107055 - 14_1070422 - 15_107040 - 15_107050 - 15_107052 - 15_107056 - 15_107041 - 15_107051 - 15_107053 - 15_107057 - 14_1070432	Electrical energy	ktep	2005 - 2016
(viii) electricity generation from CHPP	- Gross electricity generation Main activity CHP plants - Nuclear - Gross electricity generation Autoproducer CHP plants - Nuclear - Gross electricity generation Main activity CHP plants - Geothermal - Gross electricity generation Main activity CHP plants - Combustible Fuels - Gross electricity generation Main activity CHP plants - Other Sources - Gross electricity generation Autoproducer CHP plants - Geothermal - Gross electricity generation Autoproducer CHP plants - Combustible Fuels - Gross electricity generation Autoproducer CHP plants - Heat from Chemical Sources - Gross electricity generation Autoproducer CHP plants - Other Sources	Supply, transformation, consumption - electricity - annual data [nrg_105a]	- 15_107031 - 15_107033 - 15_107039 - 15_107049 - 15_107055 - 15_107041 - 15_107051 - 15_107053 - 15_107057	Electrical energy	ktep	2005 - 2016
(ix) heat generation from thPG	- Gross heat production Main activity CHP plants - Nuclear - Gross heat production Main activity heat only plants - Nuclear - Gross heat production Autoproducer CHP plants - Nuclear - Gross heat production Autoproducer heat only plants - Nuclear - Gross heat production Main activity CHP plants - Geothermal - Gross heat production Main activity CHP plants - Combustible Fuels - Gross heat production Main activity CHP plants - Heat Pumps - Gross heat production Main activity CHP plants - Electric Boilers - Gross heat production Main activity CHP plants - Other Sources - Gross heat production Main activity CHP plants - Solar - Gross heat production Autoproducer CHP plants - Geothermal - Gross heat production Autoproducer CHP plants - Combustible Fuels - Gross heat production Autoproducer CHP plants - Heat Pumps - Gross heat production Autoproducer CHP plants - Electric Boilers - Gross heat production Autoproducer CHP plants - Heat from Chemical Sources - Gross heat production Autoproducer CHP plants - Other Sources - Gross heat production Autoproducer CHP plants - Solar - Gross heat production Main activity heat only plants - Geothermal - Gross heat production Main activity heat only plants - Solar - Gross heat production Main activity heat only plants - Combustible Fuels - Gross heat production Main activity heat only plants - Heat Pumps - Gross heat production Main activity heat only plants - Electric Boilers - Gross heat production Main activity heat only plants - Other Sources - Gross heat production Autoproducer heat only plants - Geothermal - Gross heat production Autoproducer heat only plants - Solar - Gross heat production Autoproducer heat only plants - Combustible Fuels - Gross heat production Autoproducer heat only plants - Heat Pumps - Gross heat production Autoproducer heat only plants - Electric Boilers - Gross heat production Autoproducer heat only plants - Heat from Chemical Sources - Gross heat production Autoproducer heat only plants - Other Sources	Supply, transformation, consumption - heat - annual data [nrg_106a]	- 15_107060 - 15_107061 - 15_107062 - 15_107063 - 15_107064 - 15_107072 - 15_107076 - 15_107080 - 15_107086 - 15_107068 - 15_107066 - 15_107074 - 15_107078 - 15_107082 - 15_107084 - 15_107088 - 15_107070 - 15_107065 - 15_107069 - 15_107073 - 15_107077 - 15_107081 - 15_107087 - 15_107067 - 15_107071 - 15_107075 - 15_107079 - 15_107083 - 15_107085 - 15_107089	Derived heat	ktep	2005 - 2016
(x) heat generation from CHPP	- Gross heat production Main activity CHP plants - Nuclear - Gross heat production Autoproducer CHP plants - Nuclear - Gross heat production Main activity CHP plants - Geothermal - Gross heat production Main activity CHP plants - Combustible Fuels - Gross heat production Main activity CHP plants - Heat Pumps - Gross heat production Main activity CHP plants - Electric Boilers - Gross heat production Main activity CHP plants - Other Sources - Gross heat production Main activity CHP plants - Solar - Gross heat production Autoproducer CHP plants - Geothermal - Gross heat production Autoproducer CHP plants - Combustible Fuels - Gross heat production Autoproducer CHP plants - Heat Pumps - Gross heat production Autoproducer CHP plants - Electric Boilers - Gross heat production Autoproducer CHP plants - Heat from Chemical Sources - Gross heat production Autoproducer CHP plants - Other Sources - Gross heat production Autoproducer CHP plants - Solar	Supply, transformation, consumption - heat - annual data [nrg_106a]	- 15_107060 - 15_107062 - 15_107064 - 15_107072 - 15_107076 - 15_107080 - 15_107086 - 15_107068 - 15_107066 - 15_107074 - 15_107078 - 15_107082 - 15_107084 - 15_107088 - 15_107070	Derived heat	ktep	2005 - 2016
(xi) fuel input for thPG	- Transformation input - Nuclear Power Stations - Transformation input - Conventional Thermal Power Stations - Transformation input - District Heating Plants	Simplified energy balances - annual data [nrg_100a]	- B_101002 - B_101001 - B_101009	All products	ktoe	2005 - 2016
(xii) passenger kilometres (pkm)	Railway TRA_COV: Total transport	Railway transport - Total annual passenger transport (1 000 pass., million pkm) [rail_pa_total]	- TOTAL	-	Millions of passenger-kilometres	2005 - 2016

Annual Report Indicator	EUROSTAT Indicator(s)	EUROSTAT database table	EUROSTAT Code	Field/ product(s)	Unit(s)	Period (EU28)
	Road VEHICLE: Total	Passenger road transport on national territory, by type of vehicles registered in the reporting country [road_pa_mov]	- TOTAL	-	Millions of passenger-kilometres	2005 – 2015
(xiii) tonnes kilometres (tkm)	Railway TRA_COV: Total transport	Railway transport - Goods transported, by type of transport (1 000 t, million tkm) [rail_go_typeall]	- TOTAL	-	Millions of Tonne-kilometre	2005 - 2015
	Road TRA_OPER: Total - Total transport	Summary of annual road freight transport by type of operation and type of transport (1 000 t, Mio Tkm, Mio Veh-km) [road_go_ta_tot]	- TOTAL	Total	Millions of Tonne-kilometre	2005-2015
	Waterway TRA_COV: Total transport	Transport by type of good (from 2007 onwards with NST2007) [iww_go_atygo]	- TOTAL	Total	Millions of Tonne-kilometre	2007-2016
(xv) population	Population on 1 January - total	Demographic balance and crude rates [demo_gind]	JAN	-	Persons	2005-2016
Energy transmission and distribution losses (all fuels)	Distribution Losses	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101400	All products	ktoe	2005-2016
Heat generation from district heating plants	Transformation output - District Heating Plants	Supply, transformation, consumption - heat - annual data [nrg_106a]	B_101109	Derived heat	ktoe	2005-2016
Fuel input in district heating plants	Transformation input - District Heating Plants	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101009	All products	ktoe	2005-2016

Annex 2: Explanations provided by Member States

The table below collects all of the reasons provided by Member States in their Annual Reports 2018 to explain growth or stable final energy consumption in 2016. The indicator shown in the "Trend" column refers to EUROSTAT data. Eventual disagreements between this indication and the reason provided are due to the fact that some Member States refer to national statistics which can be different respect the EUROSTAT ones.

MS	Sector	Trend	Reasons
AT	Industry	↗	**Other - Economic growth - Worsening of winter climatic conditions** - The final energy consumption in the industrial sector increased by 4.1%. This increase can mainly be explained by a structural change in the sector. Energy intensive industries (steel production and chemical industry) raised their production in a higher extent than the rest of the industrial sector, which results in an effect of +2.1% in the final energy consumption. Another reason for the increase in this sector is the growth of the all over production in the industrial sector by 1.9%. The heating degree days (+4.1%) have an increasing effect of approximately 0.5%.
	Transport	↗	**Decline of fuel prices - Increase of transport of goods - Increase of transport of passengers** - The raise of the final energy consumption in the transport sector (+2.2%) can be explained by an increased stock of vehicles and a decline in consumer prices of gasoline and diesel.
	Households	↗	**Worsening of winter climatic conditions - Increase of population and/or households** - The final energy consumption of households increased by 2.8%. The heating degree days (+4.1%), which influence the energy consumption for heating, increased to a higher degree than the final energy consumption. This can mainly be explained by a shift in energy sources use for heating systems from fuel oil (-2.1%) to renewables (+2.9%), district heating (3%) and natural gas (9.3%). Another reason for the increase in the energy consumption of households is the population growth of 1.3%.
	Services	→	Energy consumption is declining.
	Agriculture	→	n.a.
BE	Industry	↗	**Economic growth - Increase of value added** - No further information
	Transport	→	**Increase of transport of passengers - Economic growth** - No further information
	Households	→	**Increase of population and/or households -Worsening of winter climatic conditions** - No further information
	Services	↗	**Economic growth - Increase of value added - Worsening of winter climatic conditions** - No further information
	Agriculture	↗	n.a.
BG	Industry	↘	Energy consumption is declining.
	Transport	↗	**Decline of fuel prices - Other (Increase in consumption in air transport) - Other (Increase in specific consumption in road transport)** - A sharp increase in consumption in air transport, the most energy-inefficient mode of transport, by 22.6 % in just one year - An increase in the specific consumption in road transport due to the rise in the number of personal cars used, the very large (and rising) proportion of old cars, the ever increasing duration and scale of congestions in central urban areas with high concentration of traffic and the decline in the use of rail transport
	Households	↗	**Other (Increased housing space per capita) - Other (Increased diversity of electrical appliances used) - Other (Improved residential temperature conditions both in winter and in summer)**
	Services	↗	**Increase of employment - Increase of value added - Other (Increased floorage of public buildings) - Other (Improved temperature conditions in public buildings both in winter and in summer)**
	Agriculture	→	n.a.
HR	Industry	→	Energy consumption is declining.
	Transport	↗	n.a.
	Households	→	Energy consumption is declining.
	Services	↗	n.a.
	Agriculture	↗	n.a.
CY	Industry	↗	**Increase of value added - Economic growth**
	Transport	↗	**Economic growth - Increase of transport of goods**
	Households	↗	**Economic growth - Increase of population and/or households - Increase of disposable income of households**
	Services	↗	**Increase of value added - Economic growth - Increase of employment**
	Agriculture	↗	n.a.
CZ	Industry	→	Energy consumption is declining.
	Transport	↗	**Increase of transport of passengers** - Despite the year-on-year increase in person-kilometres, year-on-year energy consumption per person-kilometre fell in 2016 (including private car transport and public transport) as well as energy consumption per vehicle (including only private car transport)
	Households	↗	**Worsening of winter climatic conditions - Increase of population and/or households - Increase of disposable income of households** - Increased average floor area in housing units and fall in the number of people living in a single housing unit
	Services	↗	**Increase of employment - Economic growth**
	Agriculture	↗	n.a.
DK	Industry	↗	**Increase of value added -Decline of fuel price** - Decline in energy consumption from 2006 to 2013. Hereafter has the energy consumption been almost stable. There has over the whole period been a strong improvement of energy efficiency. There has also been a structural change, which reduce consumption.
	Transport	↗	**Increase of transport of goods - Increase of transport of passengers** - After some years with constant consumption are the again in increase in energy consumption
	Households	↗	**Increase of population and/or households** - Energy consumption for heating has increased over the last 3 years, and even the consumption per m2 has increased. At this stage can we not explain why.
	Services	↗	**Economic growth** - The energy consumption in the service sector has been almost stable over the last 10 years with a small increase from 2015 to 2016. Over the same period it has been a sustainable economic growth in this sector. This has been outweighed by an increase in energy efficiency
	Agriculture	↘	Energy consumption is declining.
EE	Industry	↘	Energy consumption is declining.
	Transport	↗	**Economic growth - Decline of fuel prices - Increase of transport of passengers**
	Households	↗	**Worsening of winter climatic conditions- Economic growth - Increase of population and/or households** - On average, the number of heating degree days was 16% higher than in 2015.
	Services	↗	**Economic growth - Increase of value added - Increase of population and/or households** - Gross domestic product in services sector grew by 5% (value in current prices)
	Agriculture	↘	Energy consumption is declining.
FI	Industry	↗	**Increase of value added - Other (Increase of industrial production volume industries)** - Industrial production volume indices grew in 2016 in comparison to the previous year and gross value added was 2.1% greater than in 2015.

MS	Sector	Trend	Reasons
	Transport	↗	**Increase of transport of goods - Increase of transport of passengers** - In freight transport, the number of tonne-kilometres increased by 11.9% and the number of vehicle kilometres by 2.8%. Vehicle kilometres for passenger cars have increased by 0.4% since 2015.
	Households	↗	**Worsening of winter climatic condition - Increase of population and/or households - (Other) Additional appliances used** - The population grew by 0.3% and the number of households by 0.8%.
	Services	↗	**Increase of value added - Worsening of winter climatic condition** - Gross value added increased in 2016 by 1.7% in comparison with the previous year.
	Agriculture	↘	
FR	Industry	→	**Worsening of winter climatic conditions** - The temperature corrected data show that industry energy consumption fell by 0.9 % between 2015 and 2016.
	Transport	→	no clear explanation
	Households	↗	**Worsening of winter climatic conditions** - The temperature corrected data show that residential energy consumption fell by 1 % between 2015 and 2016.
	Services	↗	**Worsening of winter climatic conditions** - The temperature corrected data show that tertiary sector energy consumption fell by 2 % between 2015 and 2016.
	Agriculture	→	no clear explanation
DE	Industry	→	**Economic growth - Increase of population and/or households - Worsening of winter climatic conditions**
	Transport	↗	**Economic growth - Increase of population and/or households - Worsening of winter climatic conditions**
	Households	↗	**Economic growth - Increase of population and/or households - Worsening of winter climatic conditions**
	Services	↘	**Economic growth - Increase of population and/or households - Worsening of winter climatic conditions**
	Agriculture	→	n.a.
EL	Industry	↘	
	Transport	↗	**Abolition of the program "Replacing old private passenger vehicles"** - No further information
	Households	↘	
	Services	↗	**Increase of employment**
	Agriculture	↗	n.a.
HU	Industry	→	**Economic growth - Increase of value added - Decline of fuel prices** - No further information
	Transport	↗	**Decline of fuel prices - Increase of transport of goods - Increase of transport of passengers** - No further information
	Households	↗	**Worsening of winter climatic conditions - Increase of disposable income of households - Decline of fuel prices -** Rebound effect because of the energy bill reduction policy in the residential sector
	Services	↗	n.a.
	Agriculture	↗	n.a.
IE	Industry	↗	**Economic growth** - The amount of energy use in industry in Ireland in 2016 at 2.4Mtoe was 3.0% higher than in 2015. This is primarily attributed to increased economic activity. Industry energy intensity in 2016 remained the same as in 2015. More information is available on pages 50-52 in "Energy in Ireland 1990-2016" available at https://www.seai.ie/resources/publications/Energy-in-Ireland-1990-2016-Full-report.pdf
	Transport	↗	**Economic growth** - In 2016 the overall energy used in transport increased by 3.4% compared to the previous year. This was due to an expanding economy. Energy Consumption by HGVs increased by 17.4% in 2016 while consumption by LGVs and private cars both fell. Overall tonnes carried in 2016 grew by 20%. More information is available in "Energy in Ireland 1990-2016" available at https://www.seai.ie/resources/publications/Energy-in-Ireland-1990-2016-Full-report.pdf (see pages 53-62)
	Households	↘	**Increase of population and/or households - Decline of fuel prices** - Residential energy use (households) increased by 1.2% in 2016 compared to 2015. When corrected for weather effects the increase was 4.8%. The main driver for the increase is the increased floor area of the housing stock as space heating is the main driver of energy use. This is as a result of the number of dwellings increasing and increases in size of dwellings. Consumption is also likely to have increased due to reduced fuel price - oil consumption in households increased by 5.1% in 2016 as the price to Irish households fell in the region of 20% in 2015 and remained relatively low in 2016. More information is available in "Energy in Ireland 1990-2016" available at https://www.seai.ie/resources/publications/Energy-in-Ireland-1990-2016-Full-report.pdf (see pages 63-68)
	Services	↗	**Increase of value added** - The energy use of the commercial and public services combined increased by 5% in 2016 compared to 2015. When corrections are made for weather the increase was 8.5%. Economic activity of services, as measured by value added, increased by 6.3%. The Energy Intensity in services fell by 1.2% in 2016. Data on the Public Service shows that energy consumption in the public service remained constant between 2015 and 2016. More information is available in "Energy in Ireland 1990-2016" available at https://www.seai.ie/resources/publications/Energy-in-Ireland-1990-2016-Full-report.pdf (see pages 69-73)
	Agriculture	↘	
IT	Industry	↗	**Economic growth**
	Transport	↘	Energy consumption is declining.
	Households	→	Energy consumption is declining.
	Services	→	**Economic growth**
	Agriculture	→	
LV	Industry	↘	Energy consumption is declining.
	Transport	→	**Increase of transport of passengers - Increase of passenger cars** - The main reason for the increase in fuel consumption in road transport was an almost 3 % increase in the number of passenger cars and a 2.1 % increase in passenger kilometres in 2016 compared with 2015.
	Households	↗	**Worsening of winter climatic conditions** - The above average number of heating degree days in 2016 was the main factor that contributed to the increase of energy consumption in households
	Services	↗	**Worsening of winter climatic conditions** - The main reason for the increase in energy consumption was a significantly higher number of heating degree days in 2016 compared with 2015 (16 %)
	Agriculture	↗	n.a.
LT	Industry	→	**Other** - Development of the sector - According to information held by Statistics Lithuania4, compared with 2015, production of food products and tobacco grew by 1.6 % in 2016, production of chemicals and chemical products by 4.4 %, production of furniture by 1.9 %, manufacture of wood and of products of wood and cork, except furniture [Translator's note - there is a figure missing here); manufacture of articles of straw and plaiting materials by 7.9 %, manufacture of rubber and plastic products by 5.3 %, manufacture of metal products, except machines and equipment, by 17 %, manufacture of wearing apparel by 4.9 %, and the manufacture of beverages likewise increased in 2016 by 6.6 %.
	Transport	↗	**Increase of transport of goods - Increase of transport of passengers - Increase of value added - Other** - The effective policy of State institutions in tackling the influx from third countries of contraband fuel (diesel) - The GDP share of transport and logistics grew by 4.3 % in 2016, the sector employing 5.2 % more workers than in 2015.

MS	Sector	Trend	Reasons
	Households	↗	**Decline of fuel prices - Worsening of winter climate conditions - Increase of disposable income of households - Other (Increase of new users connecting to the natural gas and district heating network) - Other (Increase of electrical and electronic equipment)** - Average monthly disposable income rising by 6.6 % since 2015 - This increase was the result of the falls in the price of natural gas, electricity and heating energy and a lower-than-average January temperature that year (around -7.1 ° C, compared with around -0.5 ° C for January 2015)
	Services	↗	**Increase of value added - Development of the sector**
	Agriculture	↗	n.a.
LU	Industry	↗	n.a.
	Transport	→	n.a.
	Households	↘	Energy consumption is declining.
	Services	↗	n.a.
	Agriculture	↗	n.a.
MT	Industry	↘	Energy consumption is declining.
	Transport	↗	**Increase of transport of passengers - Other (Increase of licensed vehicles) - Other (Increase of tourism)** - Increase is driven by a positive economic turnout led by increase in consumption, production and tourism - At the end of December 2016, the stock of licensed motor vehicles stood at 358,947, recording a growth rate of 3.5% over the end of 2015, mainly driven by the increase in the stock of motorcycles/bicycles (15.6%). This growth was spurred by a number of budget measures introduced in 2016, which served to stimulate the use of motorcycles.
	Households	↗	**Other - Increase in total household expenditure**
	Services	↘	Energy consumption is declining.
	Agriculture	→	n.a.
NL	Industry	↗	**Economic growth** - No further information
	Transport	→	n.a.
	Households	↗	**Worsening of winter climatic conditions** - No further information
	Services	↗	**Worsening of winter climatic conditions** - No further information
	Agriculture	↗	n.a.
PL	Industry	↗	no clear explanation
	Transport	↗	**Increase of transport of goods - Increase of transport of passengers - Other (Increase of economic activities)** - Increased level of prosperity of the population, increased saturation of the passenger cars market - Road transport accounts for by far the greatest share of the increase in consumption. Air transport, both domestic and international, was the second significant factor behind the increase in energy consumption; here, too, there was an increase in transport activity that was very much in line with the increase in energy consumption. -
	Households	↗	**Worsening of winter climatic conditions - Other (Increase of electric equipment) - Other (Changes in consumers' behaviour)** - The general tendency is for a decrease in unit energy consumption for residential heating, linked to the installation of more energy-efficient equipment. Increased thermal modernisation and more restrictive building regulations in terms of thermal protection are also having a marked effect.
	Services	↗	n.a.
	Agriculture	↗	n.a.
PT	Industry	↘	
	Transport	↗	**Economic growth** - No further information
	Households	↗	**Economic growth** - No further information
	Services	↘	
	Agriculture	↘	
RO	Industry	↘	Energy consumption is declining.
	Transport	↗	**Increase of transport of goods - Other - Increase in the amount of activities performed** - The amount of transported goods increased by 13.7 % compared the previous year.
	Households	→	**Worsening of winter climatic conditions** - The 'heating degree days' indicator (for Romania, according to Eurostat) was 2 918 in 2016, compared to the previous year, i.e. 2 786.
	Services	↗	**Worsening of winter climatic conditions - Increase of value added** - Gross Value Added increased by 4.7 %
	Agriculture	↘	
SK	Industry	→	Energy consumption is declining.
	Transport	↗	**Increase of transport of passengers - Increase of transport of goods - Other (Increase of registered motor-vehicles)** - The chief factors fuelling long-term energy consumption growth in transport in the reporting period include the ever-growing numbers of registered motor vehicles and the accompanying rise in the numbers of people travelling by car, along with an expansion in road haulage as the carriage of goods switches from less energy-intensive modes of transport to road transport.
	Households	↗	**Worsening of winter climatic conditions**
	Services	→	Energy consumption id declining - Change in the methodology of measurement or calculation of energy consumptions - Energy consumption in the trade and services sector fell significantly in 2016, by up to 14 % compared to the previous year. This variation can be explained by the break-up and merger of undertakings, changes in their sectoral classification and the resulting changes in terms of where their consumption is classified in the energy balance, and by the calculation method used by the ŠÚ SR for this item.
	Agriculture	↘	Energy consumption is declining.
SI	Industry	↗	**Increase of value added** - No further information
	Transport	↗	**Economic growth** - No further information
	Households	↗	**Economic growth -Increase of employment -** No further information
	Services	↗	Other
	Agriculture	↘	
ES	Industry	→	**Economic growth - Increase of value added** - No further information
	Transport	↗	**Increase of transport of goods** - No further information
	Households	↗	**Increase of population and/or households - Worsening of winter climatic conditions - Increase of disposable income of households** - No further information
	Services	↗	**Increase of value added** - No further information
	Agriculture	↗	n.a.

MS	Sector	Trend	Reasons
SE	Industry	→	Energy consumption is stable
	Transport	↗	Energy consumption is stable - Motor vehicle traffic has increased, meaning that energy use in the sector has become more efficient.
	Households	↗	**Worsening of winter climatic conditions**
	Services	↗	**Worsening of winter climatic conditions**
	Agriculture	↘	
UK	Industry	↘	Energy consumption is declining.
	Transport	↗	**Increase of transport of passengers - Decline of fuel prices** - The fall in petrol and diesel prices of 20% and 22% respectively seen between 2012 and 2016 will have slowed the reduction seen in previous years and passenger kilometres have increased by 4% since 2013.
	Households	↗	**Decline of fuel prices.**
	Services	↗	**Increase of value added** - Real GVA (in national currency) has risen by 15% in this sector since 2007.
	Agriculture	↗	n.a.

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