ASviS Alleanza Italiana per lo Sviluppo Sostenibile

# Monitoring the SDGs at EU level with composite indicators

July 2018

# 1. SDG Composite indicators for EU countries

With this Report, the Italian Alliance for Sustainable Development (ASviS) releases a unique set of composite indicators synthesizing the elementary indicators of each EU28 Member State on the Sustainable Development Goals (SDGs), the first experiment of this kind in the international panorama. Complexity is the biggest challenge in monitoring the 2030 Agenda. In this perspective, composite indicators do not represent a simplification of the problem, but an instrument that allows for a quick and concise view of performances related to each Goal.

The results of this project[1] provide stakeholders and the media with synthetic, clear and easy-to-read evaluations of both the EU's and countries' progress vis-à-vis each Goal. Moreover, they prove the usefulness of a tool that allows to monitor the overall situation of EU28 countries, offering an insight on their progress in relation to the achievement of the SDGs. Starting from this work, each Member State will be able to further develop its own composite indicators using additional elementary indicators. Finally, this research could be an important step for data monitoring and reporting on the SDGs in the international context, encouraging more in-depth analyses of indicators.

The elementary indicators provided by Eurostat's database have been summarized using the AMPI methodology[2], the same methodology utilized to create the Italian composite indicators released in the 2017 ASviS Report. AMPI possesses all the desired properties of a composite index[3], while remaining sufficiently simple to be understood by the general public. Starting with Eurostat's database on SDGs, an overall analysis of the countries' and of the EU28 average trends of composite indicators has been produced for each Goal from 2010 to, at least, 2015, according to the available data.

## *1.1 Indicator selection: the criteria*

The selection of the elementary indicators to be used in a composite indicator (henceforth, "composite") necessarily reflects the values and priorities of the institutions that select them. For this reason, in order to obtain a legitimacy at different levels (political, civil society, etc.), the selection of the elementary indicators (especially at the national level) should follow a process that aims to promote a debate and a dialogue between different stakeholders, in order to achieve a broad consensus, as was done in Italy with the project "Equitable and Sustainable Wellbeing"[4].

In our analysis, the selection of the indicators for each Goal took into account the following methodological and technical aspects:

- *number of indicators*: the number of indicators was limited, giving priority to those that contribute the most to each Goal;
- *conceptual orientation of indicators*: indicators were positively or negatively "linked" to the Goal and indicators liable of ambiguous interpretations were avoided;

[1] The project was carried out by Filomena Maggino, Adolfo Morrone, Andrea Stefani, Federico Olivieri, Balint Cocchioni.

[2] Mazziotta M. &A. Pareto. 2016. "On a Generalized Non-Compensatory Composite Index for Measuring Socio-economic Phenomena". Social Indicators Research 127 (3): 983-1003.

[3] Composite indicators and composite index are used as synonymous.

[4] https://www.istat.it/it/benessere-e-sostenibilit%C3%A0/misure-del-benessere

Moreover, the selection gave preference to indicators which:

- are *made available on a regular basis*, with reference to the past (time series) and to the future (planned surveys);
- can be *broken down at territorial* (e.g., national comparison) *and social level* (e.g., comparison by age groups, gender, etc.);
- have a *high-quality*, being produced by official sources or by unofficial sources that adopt the same quality criteria of the former (relevance, accuracy, accessibility, comparability, consistency and timeliness).

Indicators were selected in light of what has been established at the international level on the monitoring of the SDGs, taking into account the relevance and adequacy of the indicators. The analysis was carried out using exclusively indicators available in Eurostat's dataset "Sustainable Development indicators"[5]. Eurostat has adopted a partially overlapping approach among indicators of different Goals. Eurostat's methodology involved the use of some indicators across more than one Goal. Therefore, the choice to select only the elementary indicators belonging to Eurostat dataset determines the presence, in some cases, of the same elementary indicators within composites of different Goals. The work that was conducted represent a first step to implement the monitoring of SDGs across EU Countries. Further research will be needed to investigate which new elementary indicators can be introduced in the analysis.

## *1.2 How to interpret composite indicators for SDGs*

This analysis aims to monitor the trends of each Goal from 2010 to the most recent year (2015-2016 or 2017). The AMPI methodology allows to measure the progress in all Goals against a base year (in our case, 2010), even though different indicators may have time series of different length. Therefore, it is important to underline that the composite indicators do not measure the distance from the UN's 2030 targets. However, for Goal 13 one experimental composite indicator was produced using the EU 2020 targets as a reference (see chapter 4).

For each of the Goals, this analysis provides the following information:

- the indicators excluded from composite indicators and the reasons why they were not considered;
- the list of selected indicators, their polarity, minimum and maximum observed values as well as their average values and standard deviation;
- a correlation matrix of the elementary indicators used for each composite indicator;
- an analysis of the EU28 composite indicators, explaining which elementary indicator most influenced the composite's trend, as well as a commentary on the results of EU Member States;
- an influence analysis in order to assess the effect of specific elementary indicators on each composite (the weight of an elementary indicator is measured in terms of the changes in the ranking of countries caused by its removal);

[5] http://ec.europa.eu/eurostat/web/sdi/indicators

- an appendix with the list of all elementary indicators used, their units of measure, the estimates made in case of missing data, and elaborations made on each indicator's units.

The research resulted in an analysis at both national and EU28 levels for all 17 Goals except for Goal 6 and Goal 14. For Goal 14, due to the absence of indicators with national detail, it was only possible to create a composite indicator at the European level. Regarding Goal 6, it is important to underline the absence, within the Eurostat database, of reliable indicators, of time series and country disaggregation. This analysis is an opportunity to raise awareness on the necessity to produce better data regarding one of the most important themes for the well-being of European citizens.

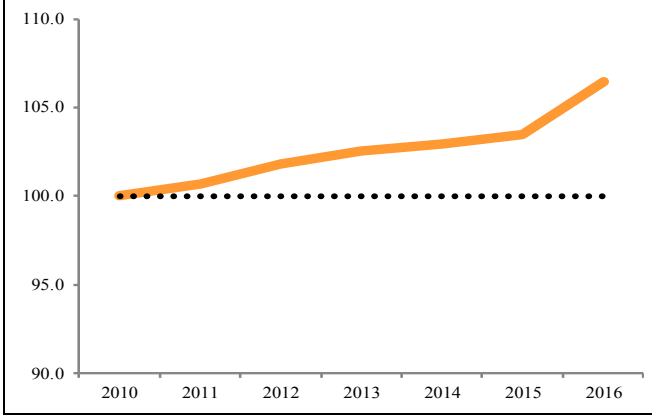
# 2. Trends of composite indicators for the EU-28

This chapter presents an overview of the trends for each Goal for the EU28 average according to their direction. In the first section, the Goals with an increasing trend are described, followed by the Goals with a stable trend and finally those with a decreasing trend. Both Goals with stable and decreasing trends are matter of concern because they highlight situations where Europe is not heading in the right direction for the achievement of the 2030 Agenda.

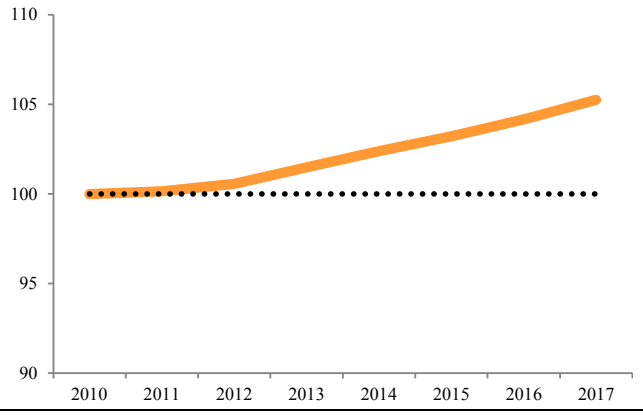
For nine Goals, the EU28 composite indicators show a positive trend. While the composite for Goal 3 (health) shows a slight increase between 2010 and 2015, the indicators for Goal 4 (education), Goal 5 (gender equality), Goal 7 (energy), Goal 9 (infrastructures and innovation), Goal 12 (responsible production and consumption) and Goal 13 (climate change) show a remarkable positive development, exceeding in all cases the 105 point mark in the last observed year. The composite indicator for Goal 8 (growth and employment) is stable until 2014, while in the last two years the situation improves thanks to the slight improvement of the employment indicators.

At the same time, it is important to underline the stability over the last few years of the composite indicators for Goal 7, Goal 12 and Goal 13, due to the raise of the indicators related to energy consumption and GHG emissions during the economic recovery. These trends prove that a lot more progress is needed for the implementation of the Paris Agreement and the achievement of the related SDGs.

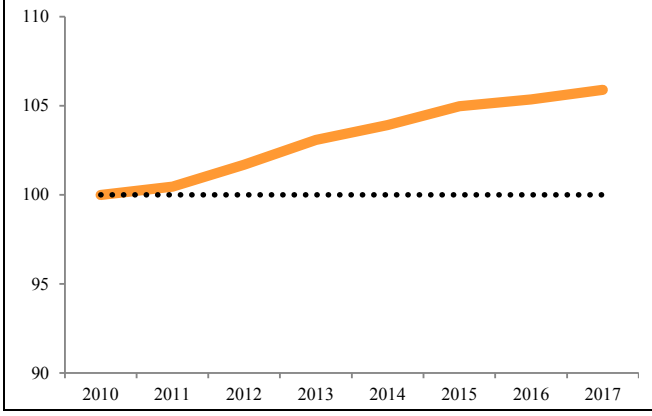
**Goal 3 - Ensure healthy lives and promote well-being for all at all ages.**



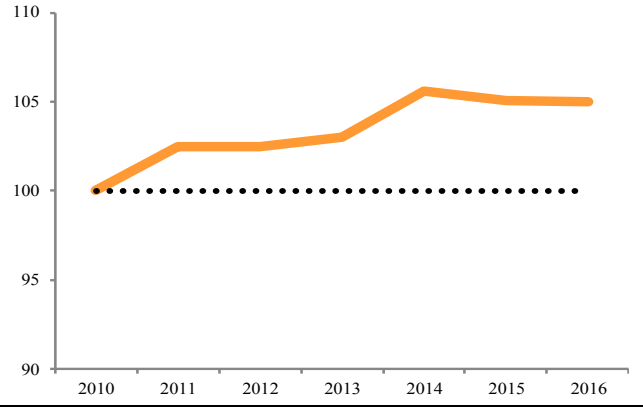

**Goal 4 - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.**



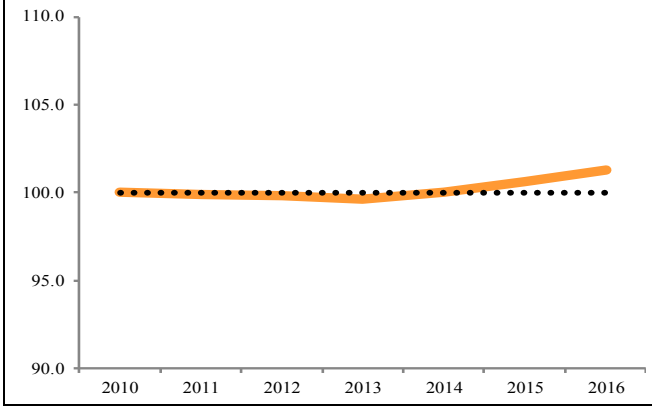

**Goal 5 - Achieve gender equality and empower all women and girls.**



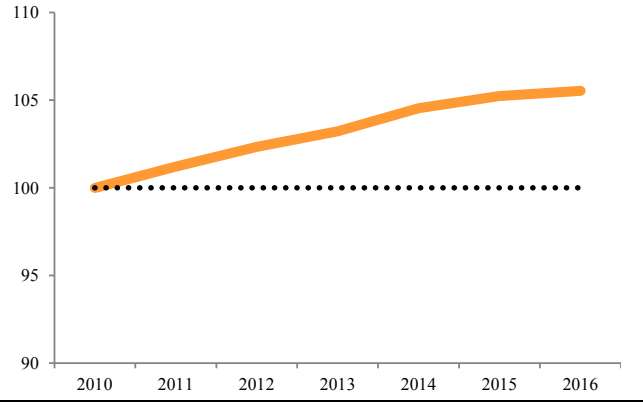

**Goal 7 - Ensure access to affordable, reliable, sustainable and modern energy for all.**



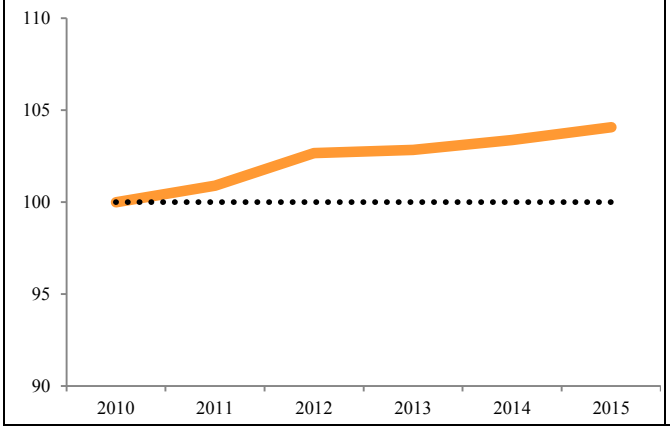

**Goal 8 - Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.**



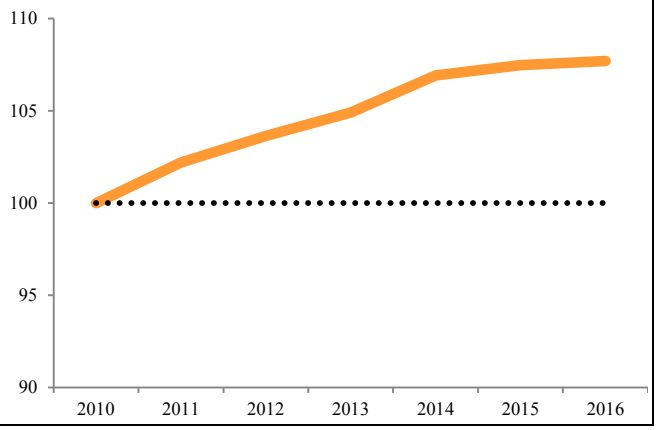

**Goal 9 - Build resilient infrastructure, promote sustainable industrialization and foster innovation.**



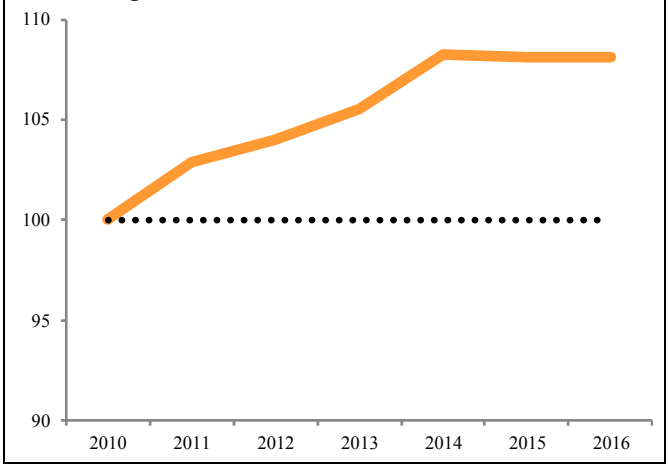
**Goal 11 - Make cities and human settlements inclusive, safe, resilient and sustainable.**




**Goal 12 - Ensure sustainable consumption and production patterns.**

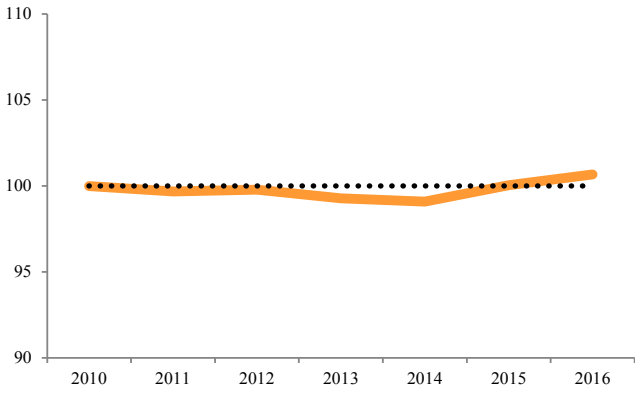



**Goal 13 - Take urgent action to combat climate change and its impacts.**

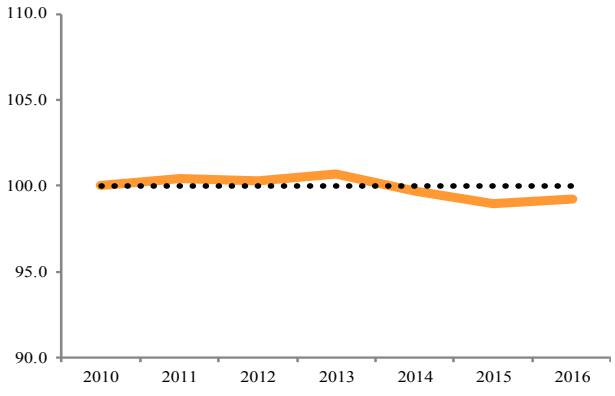


Goal 1 (poverty), Goal 2 (food) and Goal 17 (partnerships) do not show any remarkable trend. For Goal 1 and Goal 17 the stability is mainly explained by an overall compensation of the small variations of the elementary indicators included in the composite indicators, while for Goal 2, it is caused by the compensation between the positive increase of the "Area under organic farming" indicator and the negative trend of the "Ammonia emissions from agriculture".
Although the graph on Goal 16 shows a fluctuation, the situation in 2016 is the same as the one in 2010 and can therefore be described as stable. The fluctuating evolution of Goal 16 is mainly due to the variations of the indicator on the level of confidence in the EU Parliament.

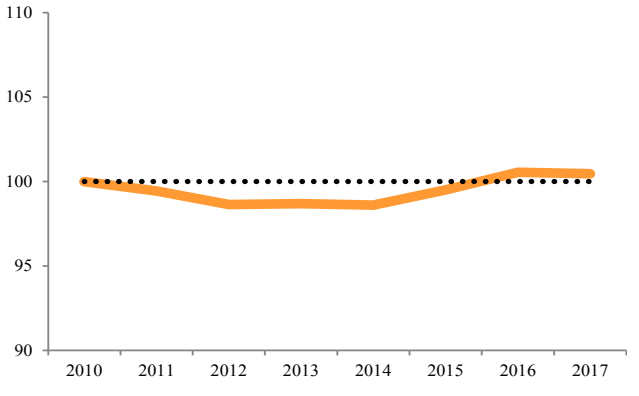
**Goal 1- End poverty in all its forms everywhere.**



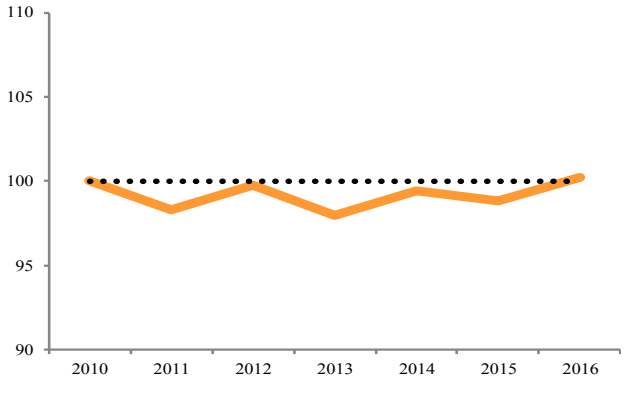

**Goal 2 - End hunger, achieve food security and improved nutrition and promote sustainable agriculture.**




**Goal 17 - Strengthen the means of implementation and revitalize the global partnership for sustainable development**

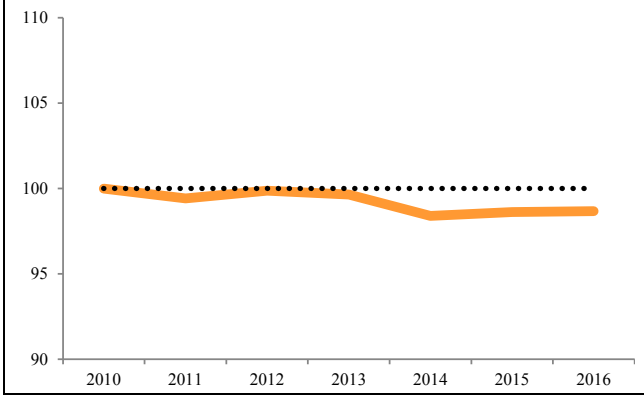



**Goal 16 - Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.**

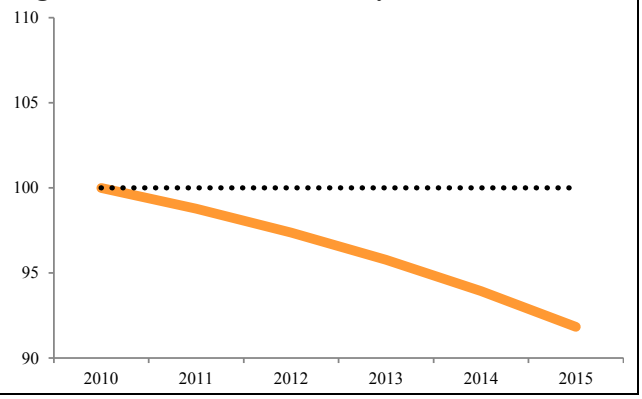


Finally, Goal 10 (inequalities) and Goal 15 (life on land) show a negative trend. For Goal 10, the deterioration happens in 2013 and 2014, notwithstanding the economic recovery, due to the worsening of the indicators related to poverty and inequalities. After 2014, the stability is the result of the raise of disposable income and the decline of the other indicators, especially the increase of the distance from the poverty threshold. The negative trend of Goal 15 is attributable to a significant increase of the "Change in artificial land cover" indicator, which is by far the worst among all the analyzed trends.

**Goal 10 -Reduce inequality within and among countries**




**Goal 15 -Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.**



# 3. Results by Goal

## *Goal 1 - End poverty in all its forms everywhere*

### Descriptive analysis of elementary indicators

The composite indicator for SDG 1 was built using the indicators listed in Table 1.1. The indicator "Population having neither a bath, nor a shower, nor indoor flushing toilet in their household" (sdg_6_10) has been excluded from the composite indicator because, on the one hand, there is a lack of available data and, on the other hand, the value of the indicator is frequently 0 for most countries. The indicators "People at risk of income poverty after social transfers" (sdg_01_20), "Severely materially deprived people" (sdg_01_30) and "Population unable to keep home adequately warm by poverty status" (sdg_7_60) have been excluded from the composite indicator because they are already included inside the indicator "People at risk of poverty or social exclusion" (sdg_01_10).

**Table 1.1 – List of the elementary indicators used for the composite indicator of SDG 1**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_01_10 | People at risk of poverty or social exclusion | - | 13.3 | 49.3 | 23.8 | 6.9 |
| sdg_01_40 | People living in households with very low work intensity | - | 4.9 | 24.2 | 10.0 | 3.3 |
| sdg_01_50 | Housing cost overburden rate | - | 1.1 | 40.9 | 9.9 | 7.3 |
| sdg_01_60 | Population living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames or floor | - | 4.4 | 34.7 | 15.6 | 6.4 |
| sdg_03_60 | Self-reported unmet need for medical care | - | 0.0 | 16.1 | 3.1 | 3.8 |
| sdg_11_10 | Overcrowding rate by poverty status | - | 1.4 | 55.7 | 18.9 | 15.5 |

Correlation does not affect the composite indicator. Indicators always have a correlation lower than 0,75.

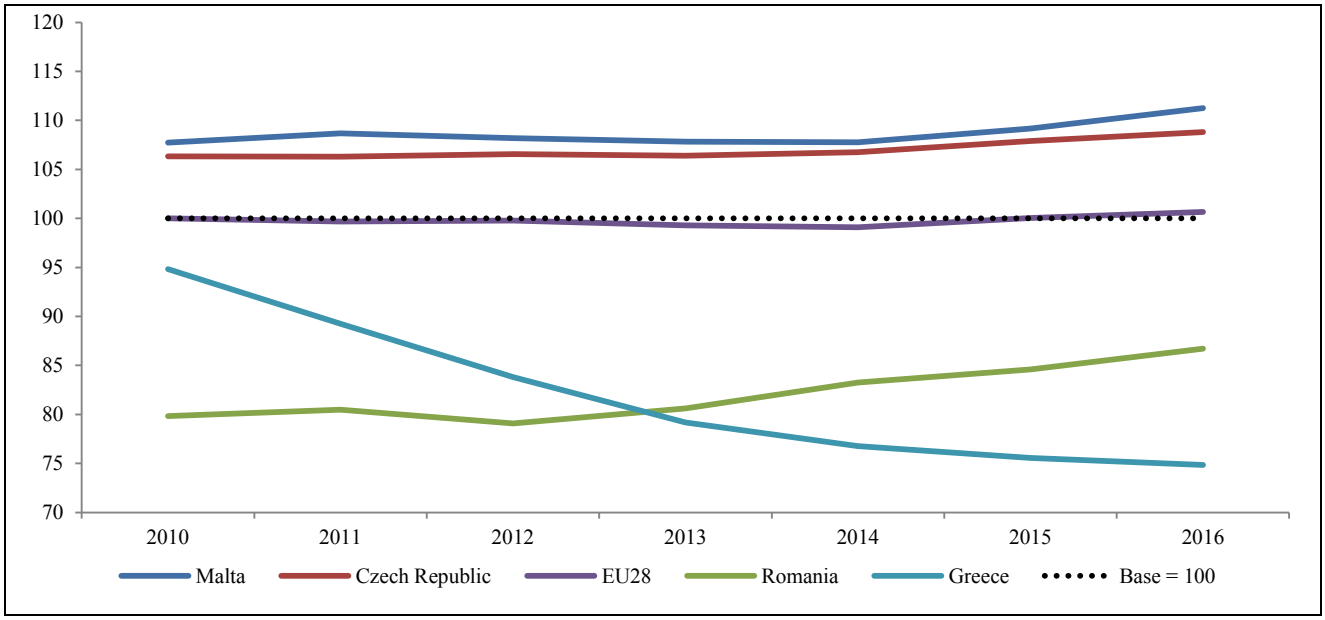
**Table 1.2 – Correlation matrix of elementary indicators of SDG 1**

| | sdg_01_10 | sdg_01_40 | sdg_01_50 | sdg_01_60 | sdg_03_60 | sdg_11_10 |
|---|---|---|---|---|---|---|
| sdg_01_10 | 1.00 | 0.39 | 0.45 | 0.26 | 0.44 | 0.55 |
| sdg_01_40 | 0.39 | 1.00 | 0.41 | 0.05 | 0.04 | -0.18 |
| sdg_01_50 | 0.45 | 0.41 | 1.00 | -0.06 | 0.37 | 0.27 |
| sdg_01_60 | 0.26 | 0.05 | -0.06 | 1.00 | -0.05 | -0.07 |
| sdg_03_60 | 0.44 | 0.04 | 0.37 | -0.05 | 1 | 0.37 |
| sdg_11_10 | 0.55 | -0.18 | 0.27 | -0.07 | 0.37 | 1.00 |

## Composite indicator

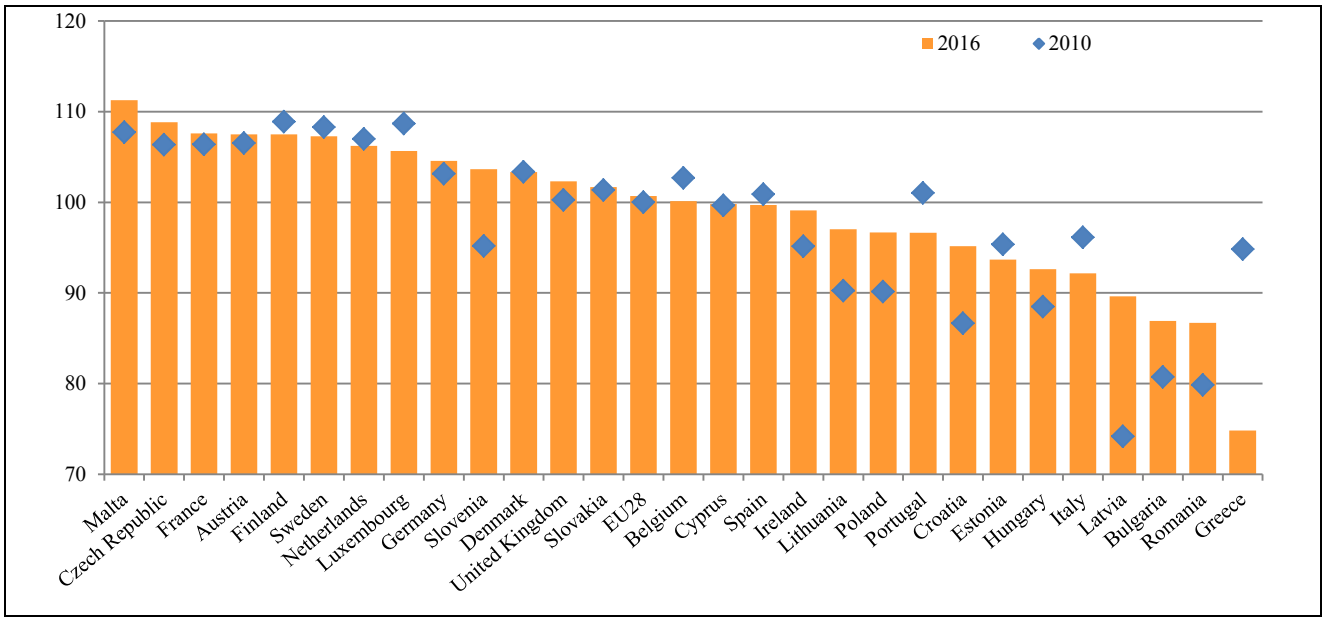
The overall EU28 composite indicator for SDG 1 shows a stable trend in the observed period (2010-2016), staying close to the 100 point mark. The composite indicator decreases until 2014 reaching the 99,1 point mark, due to the slight increase of indicators sdg_01_10 and sdg_01_40. However, in 2016 the composite indicator goes back to the 2010 value=100 because of the decrease of indicators sdg_03_60 and sdg_01_10 that go back to the 2010 values.
There are substantial differences between member states. In fact, while the best performers (Malta and the Czech Republic) have slightly increasing trends, remaining in the last year well above the value of 100, the worst performer (Greece) has seen its situation decrease dramatically from an already low value of 93 in 2010 to 77 in 2016.

**Fig. 1.1 – Composite indicators of SDG 1. EU28 average, best performers (Malta, Czech Republic) and worst performers in 2016 (Romania, Greece). Base EU28 2010=100**




Comparing the composite indicator for all EU28 countries, we can see that the situation has changed in different ways all around Europe. The countries that improved the most are Latvia, Slovenia and Croatia. On the other hand, Portugal, Italy and Greece's composite indicators decreased significantly. Greece's situation worsened drastically due to the dramatic increase of the "People at risk of poverty and social exclusion" (sdg_01_10) indicator from 27.7% in 2010 to 35.6% in 2016. Moreover, the "population living in households that spend 40% or more of the household disposable income on housing" (sdg_01_50) indicator grew from 18.1% in 2010 to 40.5% in 2016.

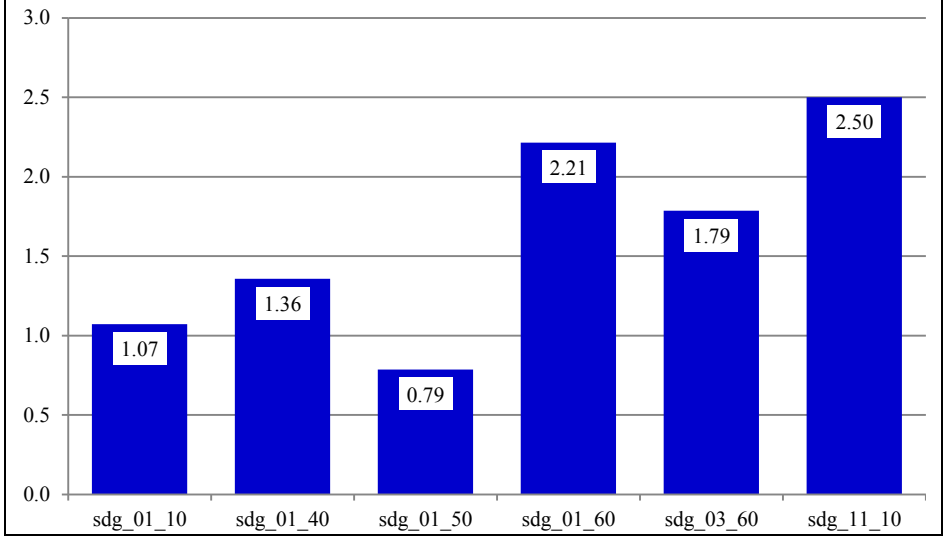
**Fig. 1.2 – SDG 1 composite indicator scores for EU28 countries, years 2010 and 2016. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking due to the removal of each elementary indicator. The indicator "Overcrowding rate by poverty status" (sdg_11_10) has a higher impact on the composite indicator because removing this indicator will change the ranking of the countries on an average of 2.5 positions, while other elementary indicators, such as sdg_01_50 "housing cost overburden rate" have a smaller influence on the composite indicator.

**Fig. 1.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2016**



# Appendix

**Table 1.3 – Results of the composite indicator for SDG 1. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 102.7 | 100.3 | 100.9 | 101.5 | 100.6 | 100.5 | 100.1 |
| Bulgaria | 80.7 | 80.1 | 80.4 | 80.7 | 87.0 | 87.4 | 86.9 |
| Czech Republic | 106.3 | 106.3 | 106.6 | 106.4 | 106.7 | 107.9 | 108.8 |
| Denmark | 103.3 | 102.3 | 102.4 | 101.1 | 102.2 | 102.4 | 103.3 |
| Germany | 103.1 | 102.6 | 103.4 | 103.4 | 103.7 | 104.4 | 104.6 |
| Estonia | 95.4 | 97.7 | 97.1 | 96.9 | 95.4 | 96.1 | 93.7 |
| Ireland | 95.1 | 93.4 | 92.6 | 92.3 | 94.9 | 98.1 | 99.1 |
| Greece | 94.8 | 89.2 | 83.8 | 79.2 | 76.8 | 75.6 | 74.8 |
| Spain | 100.9 | 100.8 | 101.3 | 98.9 | 97.1 | 99.3 | 99.7 |
| France | 106.4 | 107.1 | 107.1 | 107.4 | 106.2 | 108.1 | 107.6 |
| Croatia | 86.6 | 88.0 | 89.0 | 91.4 | 92.3 | 93.7 | 95.2 |
| Italy | 96.1 | 93.5 | 93.6 | 91.9 | 90.8 | 91.0 | 92.1 |
| Cyprus | 99.6 | 99.6 | 98.7 | 96.7 | 98.4 | 99.0 | 99.8 |
| Latvia | 74.2 | 74.8 | 80.9 | 80.4 | 82.4 | 88.0 | 89.6 |
| Lithuania | 90.2 | 94.7 | 96.9 | 94.8 | 97.1 | 97.4 | 97.0 |
| Luxembourg | 108.7 | 109.6 | 108.1 | 108.2 | 108.2 | 108.9 | 105.6 |
| Hungary | 88.5 | 88.0 | 85.8 | 85.1 | 87.2 | 91.4 | 92.6 |
| Malta | 107.7 | 108.7 | 108.2 | 107.8 | 107.7 | 109.2 | 111.3 |
| Netherlands | 107.0 | 106.7 | 106.1 | 105.5 | 104.7 | 105.2 | 106.2 |
| Austria | 106.5 | 106.3 | 107.6 | 107.0 | 107.2 | 107.5 | 107.5 |
| Poland | 90.1 | 91.6 | 91.3 | 92.2 | 93.8 | 94.5 | 96.7 |
| Portugal | 101.0 | 102.0 | 99.3 | 93.0 | 92.2 | 95.8 | 96.6 |
| Romania | 79.8 | 80.5 | 79.1 | 80.6 | 83.3 | 84.6 | 86.7 |
| Slovenia | 95.2 | 97.2 | 99.0 | 100.9 | 99.1 | 101.8 | 103.6 |
| Slovakia | 101.3 | 100.6 | 100.9 | 101.1 | 101.8 | 102.2 | 101.7 |
| Finland | 108.9 | 107.5 | 107.9 | 108.6 | 108.4 | 107.6 | 107.5 |
| Sweden | 108.3 | 107.1 | 108.5 | 107.1 | 107.7 | 107.2 | 107.3 |
| United Kingdom | 100.3 | 101.1 | 101.7 | 101.4 | 100.5 | 101.2 | 102.3 |
| **EU28** | **100.0** | **99.7** | **99.8** | **99.3** | **99.1** | **100.0** | **100.7** |

## *Goal 2 - End hunger, achieve food security and improved nutrition and promote sustainable agriculture*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 2 was built using the indicators listed in Table 2.1. Four elementary indicators were excluded from the composite indicator: "Obesity rate by body mass index" (sdg_02_10), "Nitrate in groundwater" (sdg_06_40), "Estimated soil erosion" (sdg_15_50) and "Common bird index by type of species" (sdg_15_60). All four indicators were excluded for a lack of available data in their time series.

**Table 2.1 – List of the elementary indicators used for the composite indicator of SDG 2**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_02_20 | Agricultural factor income per annual work unit (AWU) | + | 3026.0 | 60716.0 | 17852.0 | 11843.4 |
| sdg_02_30_nt | Government support to agricultural research and development | + | 0.000003 | 0.0009 | 0.0002 | 0.0001 |
| sdg_02_40 | Area under organic farming | + | 0.1 | 21.3 | 6.7 | 4.8 |
| sdg_02_50 | Gross nutrient balance on agricultural land | - | -11.0 | 199.0 | 65.6 | 47.2 |
| sdg_02_60 | Ammonia emissions from agriculture | - | 78.8 | 114.6 | 98.1 | 6.2 |

Correlation does not affect the composite indicator. The highest correlation coefficient is lower than 0.75 in absolute terms for every pair of indicators (Table 2.2).

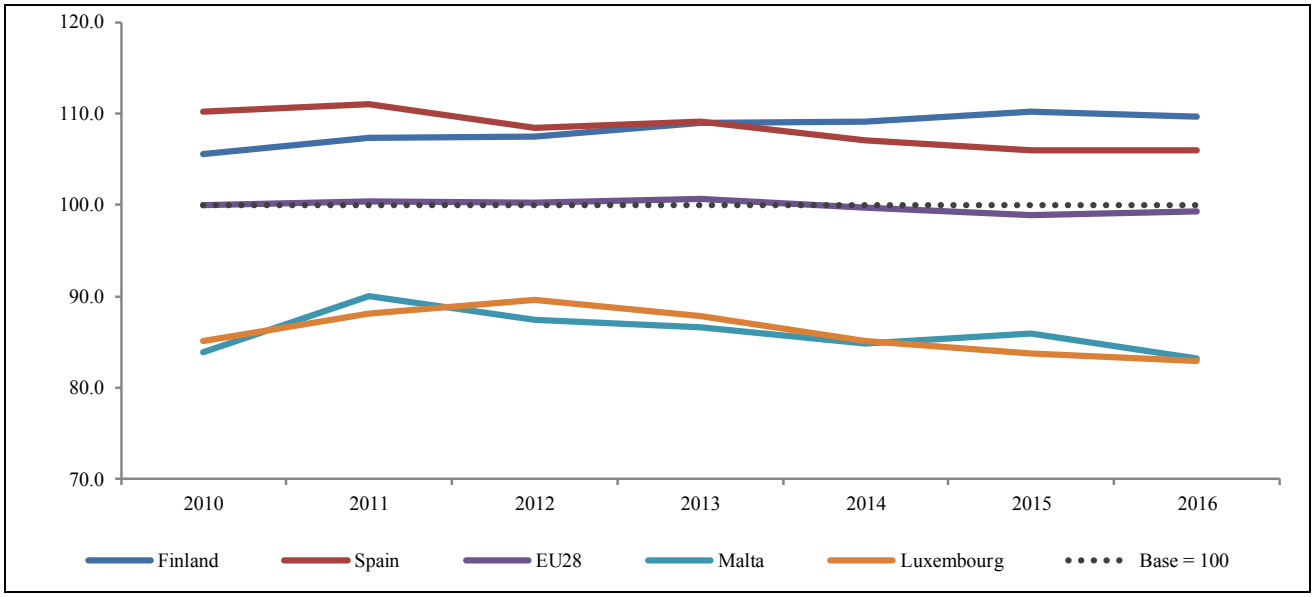
**Table 2.2 – Correlation matrix of elementary indicators of SDG 2**

| | sdg_02_20 | sdg_02_30_nt | sdg_02_40 | sdg_02_50 | sdg_02_60 |
|---|---|---|---|---|---|
| **sdg_02_20** | 1.00 | -0.01 | 0.02 | 0.45 | 0.07 |
| **sdg_02_30_nt** | -0.01 | 1.00 | 0.08 | -0.22 | 0.22 |
| **sdg_02_40** | 0.02 | 0.08 | 1.00 | -0.33 | 0.33 |
| **sdg_02_50** | 0.45 | -0.22 | -0.33 | 1.00 | -0.32 |
| **sdg_02_60** | 0.07 | 0.22 | 0.33 | -0.32 | 1 |

## Composite indicator

The overall EU28 composite indicator for SDG 2 shows a stable trend in the observed period (2010-2016), staying close to the 100 point mark. This trend is explained by weak fluctuations of the indicators and by the compensation between the increase of the "Area under organic farming" (sdg_02_40) indicator and the increment of "Ammonia emissions from agriculture" (sdg_02_60) indicator.

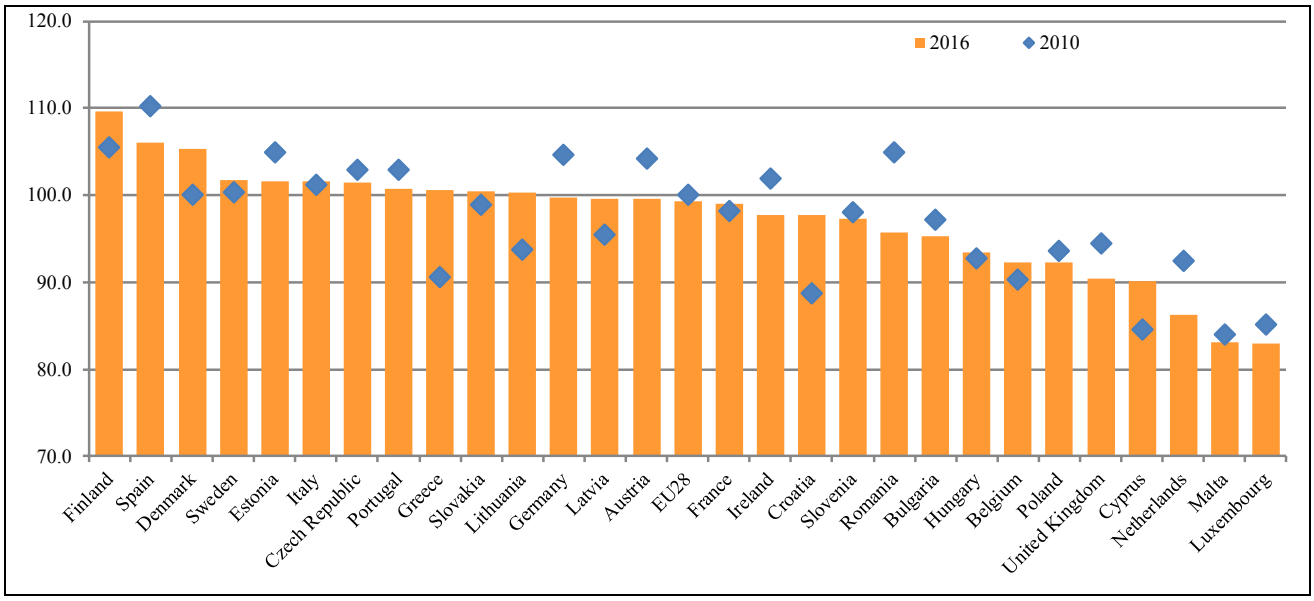
**Fig. 2.1 – Composite indicators of SDG 2. EU28 average, best performers (Finland, Spain) and worst performers in 2016 (Luxembourg, Malta). Base EU28 2010=100**




However, there are substantial differences between the performances of individual countries. In fact, while the best performer (Finland) moved from 105.5 to 109.6 in 6 years, the worst performer (Luxembourg) has seen its situation worsen from 85.1 in 2010 to 83.0 in 2015.

Fig. 2.2 compares the composite indicator for all EU28 countries, showing that the situation has changed for the majority of member states. Among the countries that have shown an increase, the ones that have improved the most are Greece, Croatia, Lithuania and Cyprus. Among those that have declined Romania, the Netherlands and Spain show the steepest decrease. In particular, the decrease in Germany and Austria can be explained by a worsening of the "Agricultural factor income per annual work unit" (sgd_02_20) indicator and by the increase of the "Ammonia emissions from agriculture" (sdg_02_60) indicator.

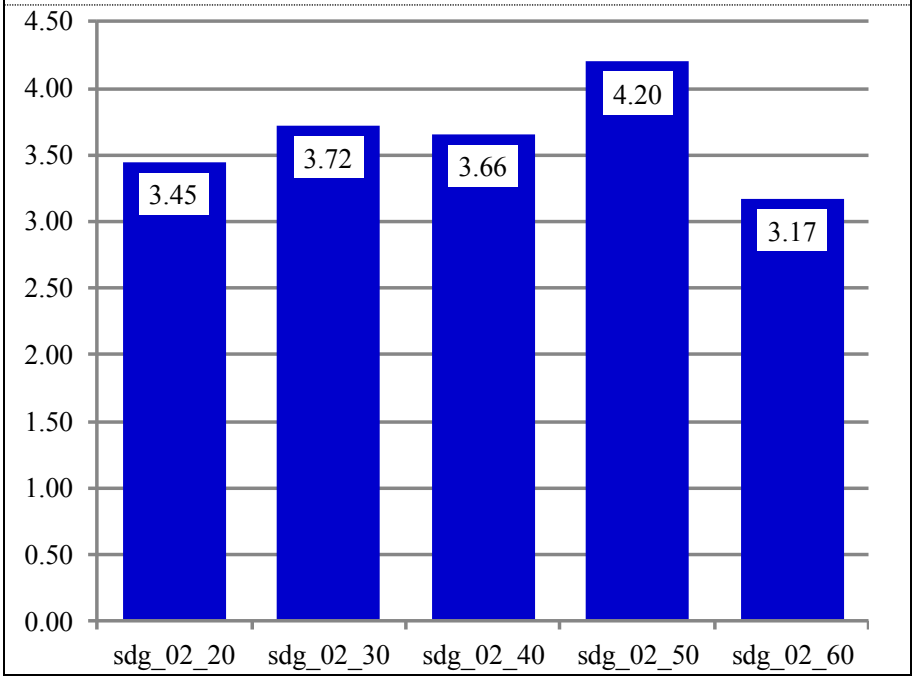
**Fig. 2.2 – SDG 2 composite indicator scores for EU28 countries, years 2010 and 2016. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking of the countries caused by the removal of each elementary indicator. The indicator "Gross nutrient balance on agricultural land" (sdg_02_50) has the highest impact, affecting the ranking of the countries' average by 4.5 positions, whereas the indicator "Ammonia emissions from agriculture" (sdg_02_60) has less of an influence on the composite indicator.

**Fig. 2.3 – Influence analysis: shifts in the ranking of the EU countries by elementary indicator removed. Year 2016**



# Appendix

**Table 2.3 – Results of the composite indicator for SDG 2. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 90.3 | 93.4 | 91.5 | 91.6 | 92.3 | 92.0 | 92.3 |
| Bulgaria | 97.1 | 98.9 | 99.0 | 99.7 | 94.9 | 95.0 | 95.2 |
| Czech Republic | 102.9 | 104.9 | 102.6 | 103.0 | 104.8 | 100.3 | 101.5 |
| Denmark | 100.0 | 103.4 | 104.3 | 106.3 | 105.4 | 105.6 | 105.3 |
| Germany | 104.6 | 100.3 | 100.5 | 99.8 | 101.1 | 98.0 | 99.7 |
| Estonia | 104.8 | 107.0 | 106.7 | 106.8 | 104.0 | 100.5 | 101.6 |
| Ireland | 101.9 | 105.4 | 102.4 | 101.1 | 102.3 | 99.5 | 97.8 |
| Greece | 90.6 | 95.6 | 98.7 | 97.4 | 96.8 | 98.4 | 100.6 |
| Spain | 110.2 | 111.1 | 108.4 | 109.1 | 107.0 | 105.9 | 106.0 |
| France | 98.2 | 100.3 | 100.3 | 100.0 | 99.2 | 100.4 | 99.0 |
| Croatia | 88.7 | 88.4 | 89.7 | 94.5 | 95.9 | 93.5 | 97.7 |
| Italy | 101.1 | 101.2 | 98.2 | 103.5 | 102.9 | 102.1 | 101.5 |
| Cyprus | 84.5 | 86.9 | 87.4 | 90.3 | 89.9 | 89.5 | 90.2 |
| Latvia | 95.5 | 95.6 | 98.2 | 94.3 | 94.7 | 97.0 | 99.7 |
| Lithuania | 93.7 | 96.6 | 99.9 | 100.0 | 99.1 | 100.3 | 100.3 |
| Luxembourg | 85.1 | 88.1 | 89.6 | 87.8 | 85.1 | 83.7 | 83.0 |
| Hungary | 92.7 | 92.7 | 95.5 | 97.1 | 91.6 | 88.4 | 93.5 |
| Malta | 83.9 | 90.0 | 87.5 | 86.6 | 84.9 | 85.9 | 83.2 |
| Netherlands | 92.5 | 94.6 | 91.7 | 93.5 | 95.4 | 86.8 | 86.3 |
| Austria | 104.1 | 106.4 | 105.7 | 104.4 | 101.0 | 99.3 | 99.6 |
| Poland | 93.6 | 94.9 | 98.0 | 97.2 | 95.5 | 94.8 | 92.2 |
| Portugal | 102.8 | 101.5 | 101.6 | 103.0 | 101.9 | 102.4 | 100.8 |
| Romania | 104.9 | 100.9 | 99.9 | 97.2 | 95.4 | 95.5 | 95.7 |
| Slovenia | 98.0 | 100.2 | 100.1 | 98.9 | 98.9 | 97.3 | 97.2 |
| Slovakia | 98.9 | 104.0 | 100.4 | 100.8 | 98.6 | 98.2 | 100.5 |
| Finland | 105.5 | 107.3 | 107.5 | 109.0 | 109.2 | 110.2 | 109.6 |
| Sweden | 100.3 | 102.9 | 105.3 | 102.8 | 101.5 | 101.1 | 101.8 |
| United Kingdom | 94.4 | 97.0 | 96.3 | 97.4 | 93.3 | 92.2 | 90.4 |
| **EU28** | **100.0** | **100.4** | **100.3** | **100.7** | **99.7** | **99.0** | **99.3** |

## *Goal 3 – Ensure healthy lives and promote well-being for all at all ages*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 3 was built using the indicators listed in Table 3.1. The elementary indicators "Smoking prevalence by sex" (sdg_03_30) and "Obesity rate by body mass index" (sdg_02_10) have been excluded from the composite indicator because of the lack of available data in their time series, while the indicator "Exposure to air pollution by particulate matter" (sdg_11_50) was excluded because of a lack of available data for some countries. Moreover, the indicator "Death rate due to chronic diseases" (sdg_03_40) was excluded since it is already taken in consideration in the indicator "Life expectancy at birth" (sdg_03_10).

**Table 3.1 – List of the elementary indicators used for the composite indicator of SDG 3**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_03_10 | Life expectancy at birth | + | 73.1 | 83.5 | 79.5 | 2.8 |
| sdg_03_20 | Self-perceived health | + | 42.8 | 83.3 | 66.0 | 10.0 |
| sdg_03_50 | Suicide rate | - | 3.4 | 36.7 | 13.2 | 6.0 |
| sdg_03_60 | Self-reported unmet need for medical care | - | 0.0 | 16.1 | 3.6 | 3.6 |
| sdg_08_60 | People killed in accidents at work | - | 0.5 | 6.4 | 2.4 | 1.3 |
| sdg_11_20 | Population living in households considering that they suffer from noise | - | 7.9 | 31.6 | 17.3 | 5.3 |
| sdg_11_40 | People killed in road accidents | - | 2.1 | 11.7 | 6.1 | 2.2 |

With the removal of indicator sdg_03_40, the correlation does not affect the composite indicator. In fact, correlation coefficients are relatively high, in absolute terms, in only two cases (i.e. |-0.61| and |-0.65|) (Table 3.2). In particular, the indicator "Life expectancy at birth" is a measure of the average lifespan and it is the most important indicator when measuring the health of a population. Instead, "People killed in accidents at work" is an indicator of output that shows the exact number of people killed in accidents at work and it is relevant for its policy consequences. Their influence on the composite indicator must be equally considered because they describe two different phenomena.
Similarly, the indicators "Self-perceived health" and "Suicide rate" describe different aspects of the health of a population. "Self-perceived health" is a subjective indicator that describes someone's perception on its own health, while the "Suicide rate" is an objective indicator that describes a phenomenon that affects the overall evaluation of a society's health.

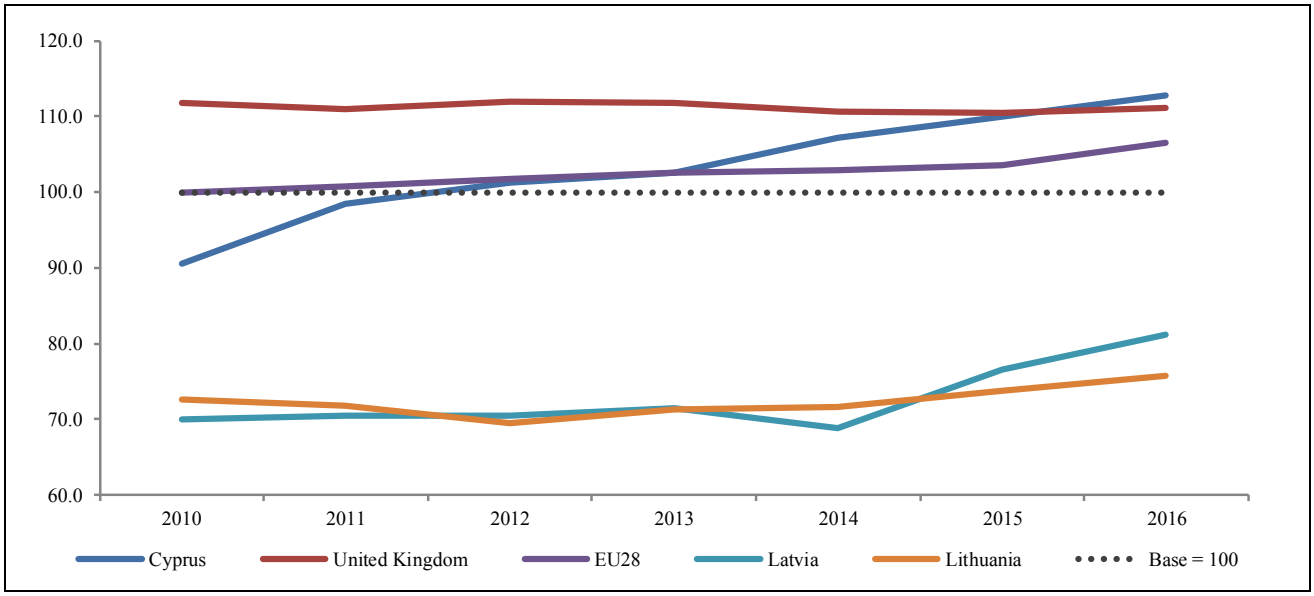
**Table 3.2 – Correlation matrix of elementary indicators of SDG 3**

| | sdg_03_10 | sdg_03_20 | sdg_03_50 | sdg_03_60 | sdg_08_60 | sdg_11_20 | sdg_11_40 |
|---|---|---|---|---|---|---|---|
| **sdg_03_10** | 1.00 | 0.63 | -0.57 | -0.51 | -0.48 | 0.30 | -0.61 |
| **sdg_03_20** | 0.63 | 1.00 | -0.65 | -0.33 | -0.45 | 0.23 | -0.51 |
| **sdg_03_50** | -0.57 | -0.65 | 1.00 | 0.05 | 0.32 | -0.43 | 0.35 |
| **sdg_03_60** | -0.51 | -0.33 | 0.05 | 1.00 | 0.33 | -0.07 | 0.49 |
| **sdg_08_60** | -0.48 | -0.45 | 0.32 | 0.33 | 1.00 | 0.01 | 0.53 |
| **sdg_11_20** | 0.30 | 0.23 | -0.43 | -0.07 | 0.01 | 1.00 | -0.08 |
| **sdg_11_40** | -0.61 | -0.51 | 0.35 | 0.49 | 0.53 | -0.08 | 1.00 |

## Composite indicator

The overall EU28 composite indicator for SDG 3 shows a slight increasing trend in the observed period (2010-2016), reaching the 106.5 point mark in 2016. This trend is explained by the increase of the "Life expectancy at birth" (sdg_03_10) indicator and by the broad decrease of the "Population living in households considering that they suffer from noise" (sdg_11_20) and the "People killed in road accidents" (sdg_11_40) indicators.

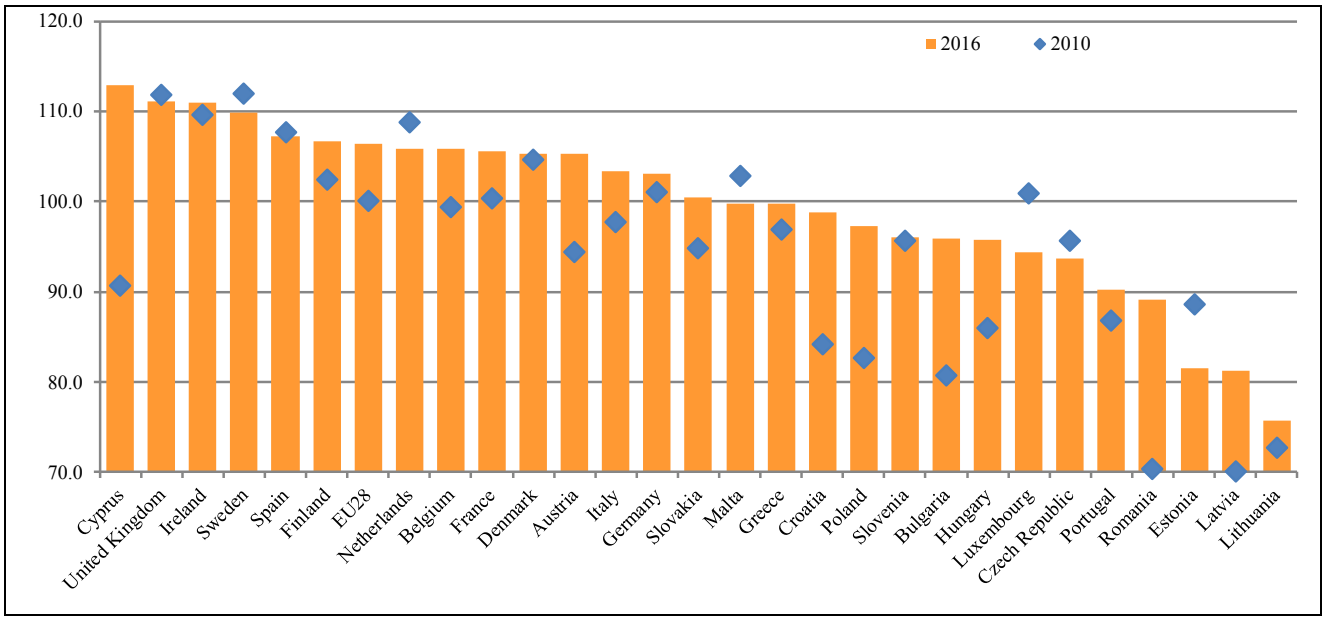
**Fig. 3.1 – Composite indicators of SDG 3. EU28 average, best performers (Sweden, Ireland) and worst performers in 2015 (Latvia, Lithuania). Base EU28 2010=100**




However, Fig. 3.1 shows substantial differences between member states. In fact, while the best performer (Cyprus) moved from 90.6 to 112.8 in 6 years, the worst performer (Lithuania) has shown a stable trend in the period 2010-2014, staying close to the 72 point mark during this time, while it rose to 75.7 over two years. Even though Latvia has seen its situation change with a considerable increase from 70.0 in 2010 to 81.2 in 2016, it is still one of the worst performers among the EU28. The fluctuating trend is explained as follows. The value of the composite indicator of this country slightly decreased between 2013 and 2014 mainly because of the increase in the "People killed in road accidents" (sdg_11_40) and "People killed in accidents at work" (sdg_08_60) indicators. On the other hand, the rising trend between 2014 and 2015 was mainly due to the decrease of the "Self-reported unmet need for medical care by detailed reason" (sdg_03_60) indicator and a recovery in the indicators sdg_11_40 and sdg_08_60.

Comparing the composite indicator for all EU28 countries, we can see differences across member states between 2010 and 2016. The countries that improved the most are Cyprus, Romania, Bulgaria, Croatia and Poland. The substantial increase of Cyprus's composite indicator is explained by the huge decrease of the "People killed in accidents at work" (sdg_08_60) indicator as well as the fall of the "Self-reported unmet need for medical care by detailed reason" (sdg_03_60) indicator that declined from 4.1% in 2010 to 0.6% in 2016. On the other hand, Estonia's situation declined, moving from the 88.6 point mark in 2010 to the 81.4 point mark in 2016. This is explained by the increase of the "Self-reported unmet need for medical care by detailed reason" (sdg_03_60) indicator.

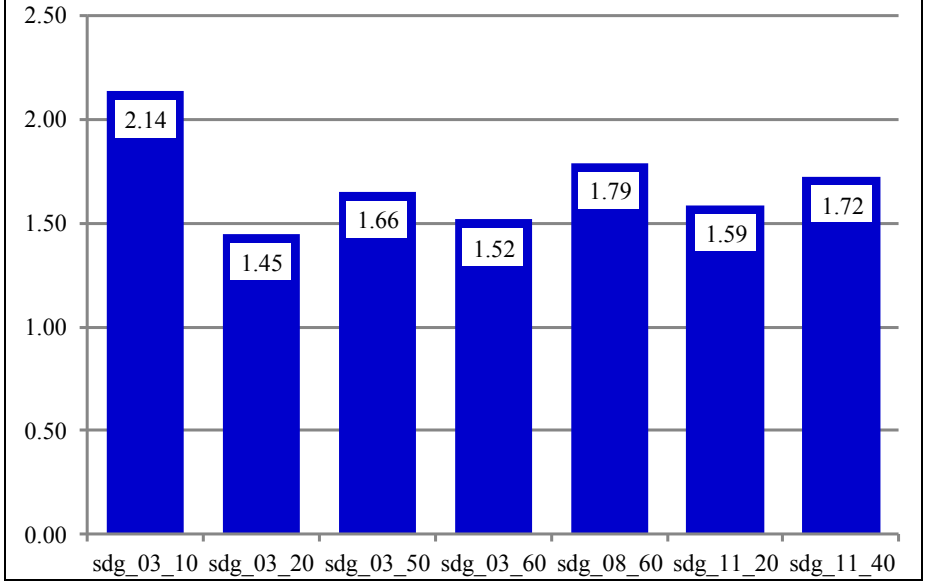
**Fig. 3.2 – SDG 3 composite indicator scores for EU28 countries, years 2010 and 2015. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average shift in the ranking of the countries caused by the removal of each elementary indicator. The indicator "Life expectancy at birth" (sdg_03_10) has a high impact on the composite indicator, while the indicator "Self-perceived health" (sdg_03_20) has little influence on the composite indicator.

**Fig. 3.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2015**



# Appendix

**Table 3.3 – Results of the composite indicator for SDG 3. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 99.3 | 97.6 | 101.2 | 101.3 | 103.3 | 103.0 | 105.8 |
| Bulgaria | 80.7 | 84.7 | 84.3 | 86.4 | 84.5 | 85.9 | 95.9 |
| Czech Republic | 95.6 | 94.4 | 96.4 | 97.2 | 98.9 | 97.1 | 93.7 |
| Denmark | 104.6 | 106.0 | 107.1 | 109.0 | 108.6 | 110.4 | 105.3 |
| Germany | 101.1 | 100.2 | 101.2 | 101.8 | 102.0 | 101.9 | 103.1 |
| Estonia | 88.6 | 87.3 | 86.8 | 88.5 | 84.4 | 84.4 | 81.4 |
| Ireland | 109.6 | 109.2 | 109.6 | 110.2 | 109.2 | 112.2 | 111.0 |
| Greece | 96.9 | 94.7 | 95.9 | 97.0 | 97.6 | 95.2 | 99.7 |
| Spain | 107.6 | 110.0 | 111.2 | 110.4 | 111.5 | 111.6 | 107.3 |
| France | 100.3 | 100.1 | 101.6 | 102.6 | 103.2 | 104.8 | 105.6 |
| Croatia | 84.1 | 85.2 | 83.9 | 88.4 | 95.0 | 93.2 | 98.8 |
| Italy | 97.7 | 99.4 | 101.4 | 101.4 | 101.9 | 101.0 | 103.4 |
| Cyprus | 90.6 | 98.5 | 101.3 | 102.6 | 107.1 | 110.0 | 112.8 |
| Latvia | 70.0 | 70.5 | 70.6 | 71.5 | 68.9 | 76.5 | 81.2 |
| Lithuania | 72.6 | 71.8 | 69.5 | 71.3 | 71.6 | 73.8 | 75.7 |
| Luxembourg | 100.8 | 104.5 | 103.5 | 103.1 | 104.0 | 101.4 | 94.4 |
| Hungary | 86.0 | 88.3 | 89.4 | 92.6 | 91.6 | 90.7 | 95.7 |
| Malta | 102.9 | 103.1 | 97.1 | 101.8 | 103.6 | 104.9 | 99.8 |
| Netherlands | 108.8 | 108.5 | 108.3 | 109.2 | 109.0 | 108.5 | 105.9 |
| Austria | 94.4 | 100.5 | 99.8 | 100.8 | 102.7 | 102.4 | 105.2 |
| Poland | 82.7 | 84.6 | 85.0 | 87.4 | 90.1 | 91.3 | 97.3 |
| Portugal | 86.7 | 87.8 | 87.7 | 90.7 | 90.0 | 91.8 | 90.3 |
| Romania | 70.3 | 72.2 | 71.4 | 75.1 | 77.1 | 76.7 | 89.1 |
| Slovenia | 95.6 | 96.4 | 98.2 | 100.1 | 100.6 | 99.9 | 96.0 |
| Slovakia | 94.8 | 97.4 | 96.8 | 99.4 | 100.3 | 99.7 | 100.5 |
| Finland | 102.4 | 102.9 | 102.5 | 104.0 | 106.2 | 106.4 | 106.7 |
| Sweden | 111.9 | 111.5 | 113.0 | 113.8 | 113.7 | 115.0 | 109.8 |
| United Kingdom | 111.7 | 111.0 | 112.0 | 111.8 | 110.6 | 110.6 | 111.2 |
| **EU28** | **100.0** | **100.7** | **101.8** | **102.6** | **103.0** | **103.5** | **106.5** |

## *Goal 4 - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 4 was built using the indicators listed in Table 4.1. The indicator "Underachievement in reading, math or science" (sdg_4_40) was excluded from the composite indicator because it has several breaks in the time series.

**Table 4.1 – List of the elementary indicators used for the composite indicator of SDG 4**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_04_10 | Early leavers from education and training | - | 2.8 | 28.3 | 9.5 | 4.1 |
| sdg_04_20 | Tertiary educational attainment | + | 18.3 | 58.7 | 41.9 | 9.1 |
| sdg_04_30 | Participation in early childhood education | + | 70.4 | 100.0 | 91.9 | 7.5 |
| sdg_04_50 | Employment rates of recent graduates | + | 40.0 | 96.6 | 80.1 | 10.0 |
| sdg_04_60 | Adult participation in learning | + | 1.1 | 32.6 | 11.3 | 7.8 |
| sdg_08_20 | Young people neither in employment nor in education and training | - | 5.7 | 28.5 | 12.7 | 4.6 |

Correlation does not affect the composite indicator. Correlation coefficients are high, in absolute terms, in only one case (i.e. |-0.88|). Although the two indicators "Employment rates of recent graduates" (sdg_04_50) and "Young people neither in employment nor in education and training (sdg_08_20) are highly correlated, they describe two different phenomena.

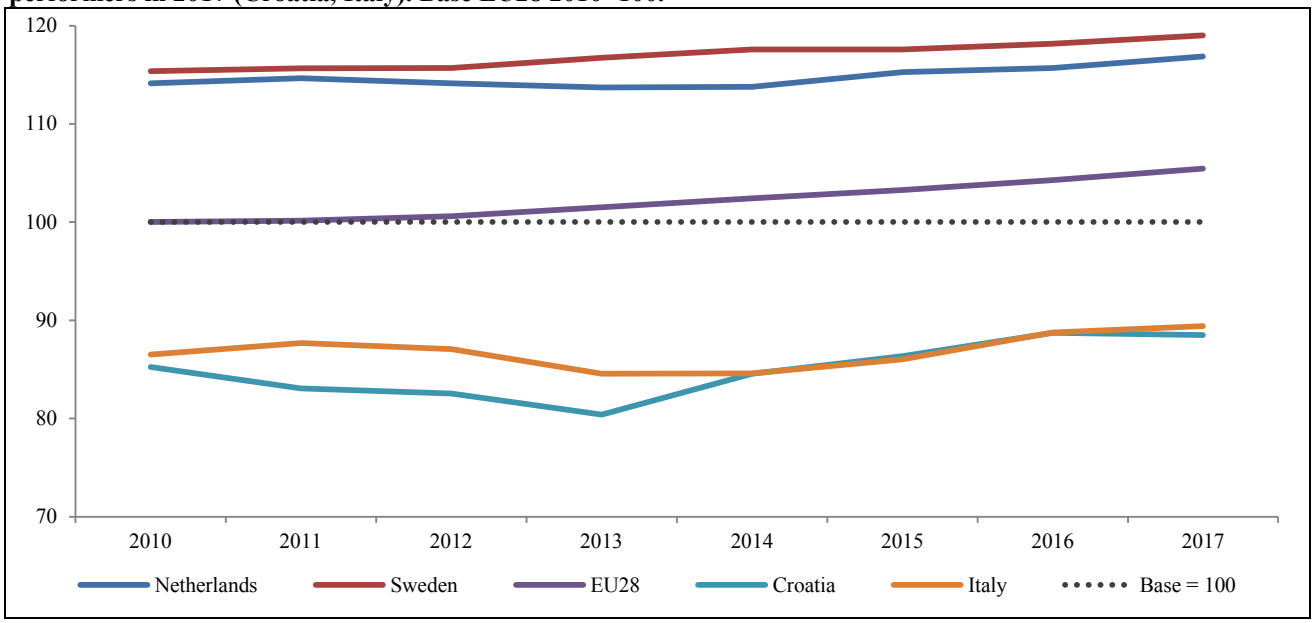
**Table 4.2 – Correlation matrix of elementary indicators of SDG 4**

| | sdg_04_10 | sdg_04_20 | sdg_04_30 | sdg_04_50 | sdg_04_60 | sdg_08_20 |
|---|---|---|---|---|---|---|
| **sdg_04_10** | 1.00 | -0.52 | 0.30 | -0.01 | -0.14 | 0.22 |
| **sdg_04_20** | -0.52 | 1.00 | 0.21 | 0.19 | 0.45 | -0.40 |
| **sdg_04_30** | 0.30 | 0.21 | 1.00 | 0.55 | 0.41 | -0.51 |
| **sdg_04_50** | -0.01 | 0.19 | 0.55 | 1.00 | 0.33 | -0.88 |
| **sdg_04_60** | -0.14 | 0.45 | 0.41 | 0.33 | 1.00 | -0.60 |
| **sdg_08_20** | 0.22 | -0.40 | -0.51 | -0.88 | -0.60 | 1.00 |

## Composite indicator

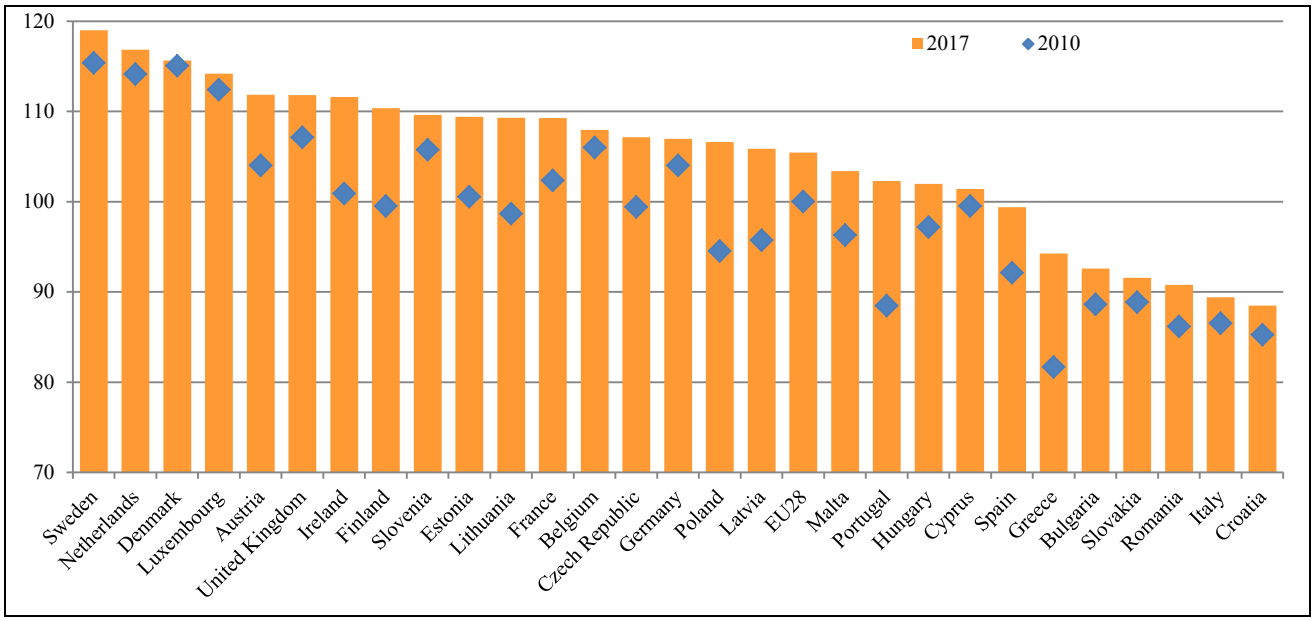
The overall EU28 composite indicator for SDG 4 shows an increasing trend in the observed period (2010-2017), reaching 105.5 points. This tendency is explained by the raise of the "Tertiary educational attainment" (sdg_4_20) indicator that in 2017 reached 39.9% of the population between 30-34 years old, almost achieving the EU 2020 target (40%), as well as the decrease of the indicator "Early leavers from education and training" (sdg_4_10) that grew to 10.6% in 2017, exceeding the EU 2020 target (10%).
There are no differences between member states' trends. In fact, while the best performer (Sweden) moved from 115.4 to 119.9 improving its composite indicator by 3.6 points in 7 years, the worst performer (Croatia) has seen its situation increase by 3.2 during the same period.

**Fig. 4.1 – Composite indicators, SDG 4. EU28 average, best performers (Sweden, Netherlands) and worst performers in 2017 (Croatia, Italy). Base EU28 2010=100.**




Comparing the composite indicator for all EU28 countries (Fig 4.2), we can see that the situation improved for all member states. The countries that improved the most are Portugal, Greece and Poland. All these highlighted countries had a promising reduction regarding the indicator (sdg_4_10) halving the percentage of early leavers from school. Croatia and Greece both exceeded the EU 2020 national Target in 2017 (Croatia 4%, Greece 10%), reaching 3.1% for Croatia and 6% for Greece. Furthermore, these countries registered a broad increase in terms of "Tertiary educational attainment" (sdg_4_20). Greece is the only country among the highlighted ones to exceed the EU 2020 national target (32%) reaching 43.7% of Tertiary educational attainment.
Analyzing the Italian situation, a slight improvement of its composite indicator is noticeable during the observed period. Looking at the Italian elementary indicators, it is important to highlight the improvement of indicators sdg_4_10 and sdg_4_20, both of which exceed the EU 2020 national Targets (16% 4_10, 26% 4_20). However, as shown in Figure 4.1, the Italian situation is still far behind the EU28 average, with the country representing the second worst performer among the EU28.

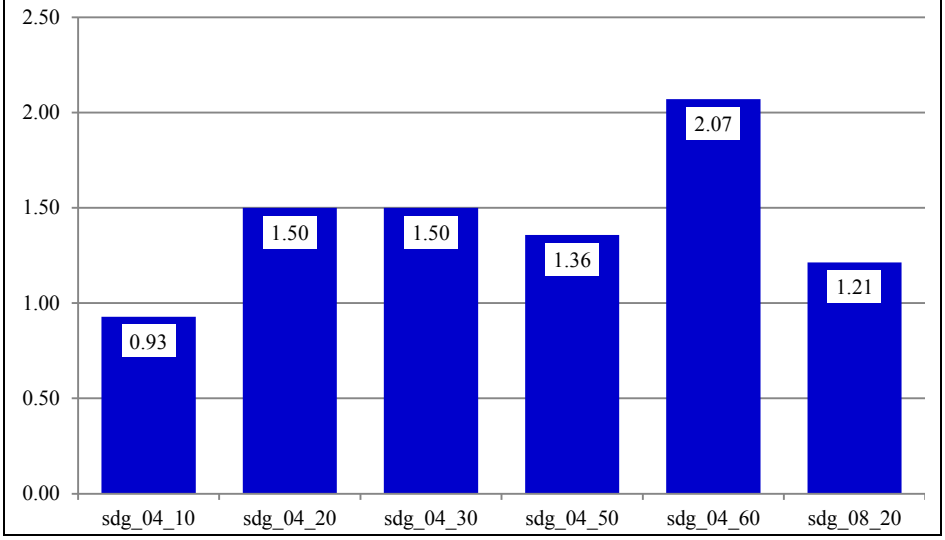
**Fig. 4.2 – SDG 4 composite indicator scores for EU28 countries, years 2010 and 2017. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shift in the ranking caused by the removal of each elementary indicator. Data shows that in this analysis the elementary indicators have a balanced influence on the composite indicator with small differences. The indicator "Adult participation in learning" (sdg_04_60) has the highest impact on the composite indicator, while the indicator "Young people neither in employment nor in education and training" (sdg_08_20) has less of an influence on the composite indicator.

**Fig. 4.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2017**



# Appendix

**Table 4.3 – Results of the composite indicator for SDG 4. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|
| Belgium | 106.0 | 104.7 | 104.6 | 104.2 | 105.5 | 104.9 | 107.0 | 107.9 |
| Bulgaria | 88.6 | 86.1 | 87.6 | 88.0 | 89.3 | 92.0 | 90.8 | 92.6 |
| Czech Republic | 99.4 | 100.4 | 100.0 | 99.5 | 100.6 | 101.5 | 104.4 | 107.1 |
| Denmark | 115.1 | 115.2 | 115.8 | 116.3 | 117.3 | 117.4 | 117.4 | 115.6 |
| Germany | 104.0 | 104.6 | 105.6 | 106.7 | 106.6 | 106.8 | 106.7 | 107.0 |
| Estonia | 100.6 | 102.0 | 102.1 | 103.8 | 104.2 | 105.3 | 106.0 | 109.4 |
| Ireland | 100.9 | 100.3 | 101.2 | 103.8 | 104.4 | 104.0 | 105.5 | 111.6 |
| Greece | 81.7 | 81.2 | 77.7 | 77.4 | 79.9 | 84.0 | 90.1 | 94.3 |
| Spain | 92.1 | 92.7 | 91.9 | 91.6 | 94.3 | 95.9 | 97.2 | 99.4 |
| France | 102.3 | 103.6 | 103.5 | 109.1 | 109.1 | 108.4 | 108.6 | 109.3 |
| Croatia | 85.3 | 83.1 | 82.6 | 80.4 | 84.6 | 86.3 | 88.7 | 88.5 |
| Italy | 86.5 | 87.7 | 87.1 | 84.6 | 84.6 | 86.0 | 88.7 | 89.4 |
| Cyprus | 99.5 | 99.0 | 97.8 | 94.4 | 96.8 | 101.3 | 101.5 | 101.4 |
| Latvia | 95.7 | 96.9 | 99.8 | 102.4 | 102.3 | 103.4 | 105.1 | 105.9 |
| Lithuania | 98.7 | 98.5 | 100.9 | 102.4 | 105.0 | 107.6 | 108.9 | 109.3 |
| Luxembourg | 112.4 | 113.7 | 113.5 | 114.6 | 115.5 | 114.4 | 115.4 | 114.2 |
| Hungary | 97.2 | 95.8 | 95.5 | 96.6 | 99.0 | 101.5 | 101.9 | 102.0 |
| Malta | 96.3 | 97.2 | 99.1 | 100.0 | 99.6 | 101.2 | 103.1 | 103.4 |
| Netherlands | 114.1 | 114.6 | 114.1 | 113.7 | 113.8 | 115.3 | 115.7 | 116.9 |
| Austria | 104.0 | 105.4 | 106.7 | 106.8 | 110.2 | 110.3 | 111.0 | 111.8 |
| Poland | 94.5 | 94.7 | 97.6 | 97.8 | 99.8 | 101.9 | 104.3 | 106.6 |
| Portugal | 88.5 | 94.9 | 94.4 | 94.9 | 96.8 | 99.6 | 100.3 | 102.3 |
| Romania | 86.2 | 87.0 | 87.1 | 87.5 | 87.3 | 87.3 | 88.2 | 90.8 |
| Slovenia | 105.7 | 107.1 | 105.6 | 104.7 | 103.7 | 105.0 | 107.0 | 109.6 |
| Slovakia | 88.9 | 88.1 | 87.7 | 88.8 | 89.4 | 91.2 | 92.0 | 91.6 |
| Finland | 99.5 | 100.9 | 102.3 | 106.7 | 105.6 | 105.2 | 108.6 | 110.4 |
| Sweden | 115.4 | 115.7 | 115.7 | 116.7 | 117.6 | 117.6 | 118.2 | 119.0 |
| United Kingdom | 107.1 | 105.6 | 107.2 | 108.1 | 109.6 | 111.3 | 110.7 | 111.8 |
| **EU28** | **100.0** | **100.2** | **100.6** | **101.5** | **102.4** | **103.3** | **104.3** | **105.5** |

## *Goal 5 – Achieve gender equality and empower all women and girls*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 5 was built using the indicators listed in Table 5.1. The indicator "Physical and sexual violence to women experienced within 12 months prior to the interview by age group" (sdg_05_10) has been excluded from the composite indicator because of the lack of available data in its time series. The indicators "Early leavers from education and training by sex" (sdg_04_10), "Tertiary educational attainment by sex" (sdg_04_20) and "Employment rates of recent graduates by sex" (sdg_04_50) were excluded, despite being used in the analysis of SDG 4. For these indicators to be included in SDG 5, they would need to be elaborated so as to extrapolate the differences between sexes, yet the polarity of these differences cannot be explained.

**Table 5.1 – List of elementary indicators used for the composite indicator of SDG 5**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| SDG_05_20 | Gender pay gap in unadjusted form | - | 0.9 | 29.9 | 14.4 | 5.7 |
| SDG_05_30 | Gender employment gap | - | -1.5 | 36.6 | 10.3 | 5.5 |
| SDG_05_40_FM | Female/male ratio of inactive population due to caring responsibilities | - | 2.5 | 65.8 | 8.1 | 4.7 |
| SDG_05_50 | Seats held by women in national parliaments and governments | + | 8.7 | 46.1 | 28.0 | 9.0 |
| SDG_05_60 | Positions held by women in senior management positions | + | 2.1 | 43.4 | 21.8 | 9.7 |

Correlation does not affect the composite indicator. The correlation coefficient is lower than 0.75 in absolute terms for every pair of indicators (Table 5.2).

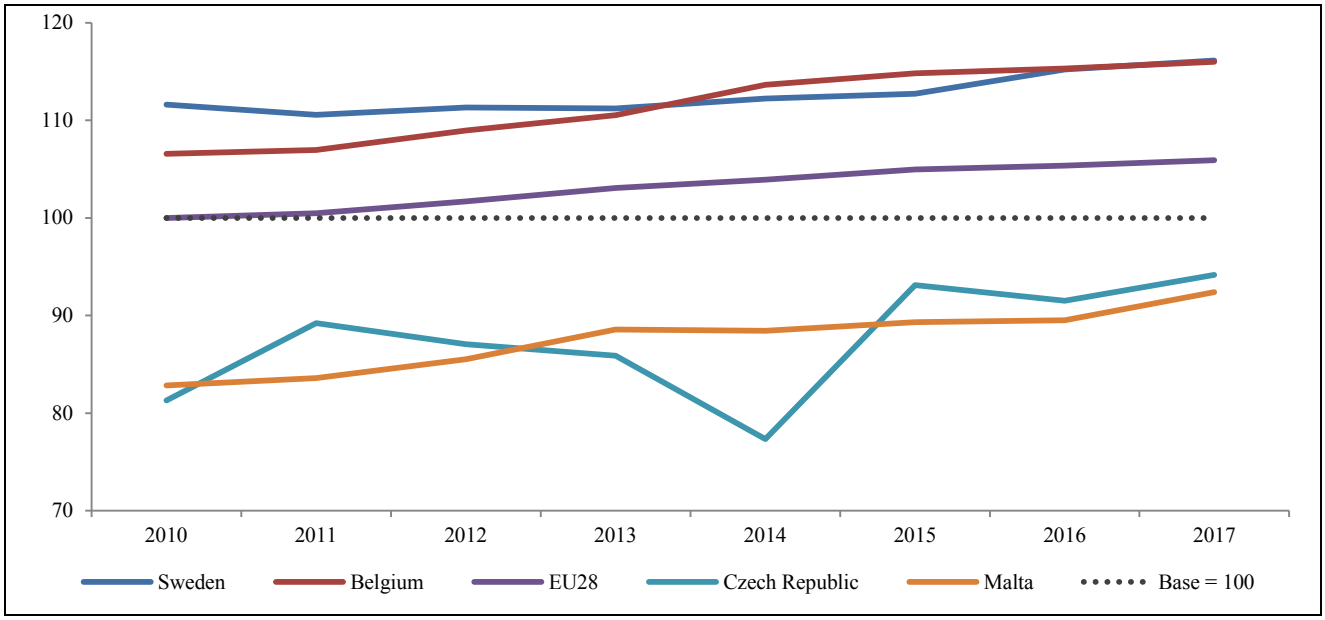
**Table 5.2 – Correlation matrix of elementary indicators of SDG 5**

| | sdg_05_20 | sdg_05_30 | sdg_05_40_FM | sdg_05_50 | sdg_05_60 |
|---|---|---|---|---|---|
| **sdg_05_20** | 1.00 | -0.28 | 0.03 | 0.01 | -0.05 |
| **sdg_05_30** | -0.28 | 1.00 | 0.41 | -0.43 | -0.31 |
| **sdg_05_40_FM** | 0.03 | 0.41 | 1.00 | -0.13 | -0.01 |
| **sdg_05_50** | 0.01 | -0.43 | -0.13 | 1.00 | 0.61 |
| **sdg_05_60** | -0.05 | -0.31 | -0.01 | 0.61 | 1.00 |

## Composite indicator

The overall EU28 composite indicator for SDG 5 shows an increasing trend in the observed period (2010-2017), reaching the 105.9 point mark in 2017. This trend is explained by the increase of the "Seats held by women in national parliaments and governments" (sdg_05_50) and a broad growth in the "Positions held by women in senior management positions" (sdg_0 5_60).
However, there are substantial differences among member states. While the best performer (Sweden) moved from 111.6 to 116.1 in 7 years, the worst performer in 2017 (Malta) has seen its situation change with a significant increase from 82.8 point mark in 2010 to 92.4 point mark in 2017, but it is still well below the 100 point that represents the situation of the EU average in 2010.

**Fig. 5.1 – Composite indicators of SDG 5. EU28 average, best performers (Sweden, Belgium) and worst performers in 2017 (Czech Republic, Malta). Base EU28 2010=100**



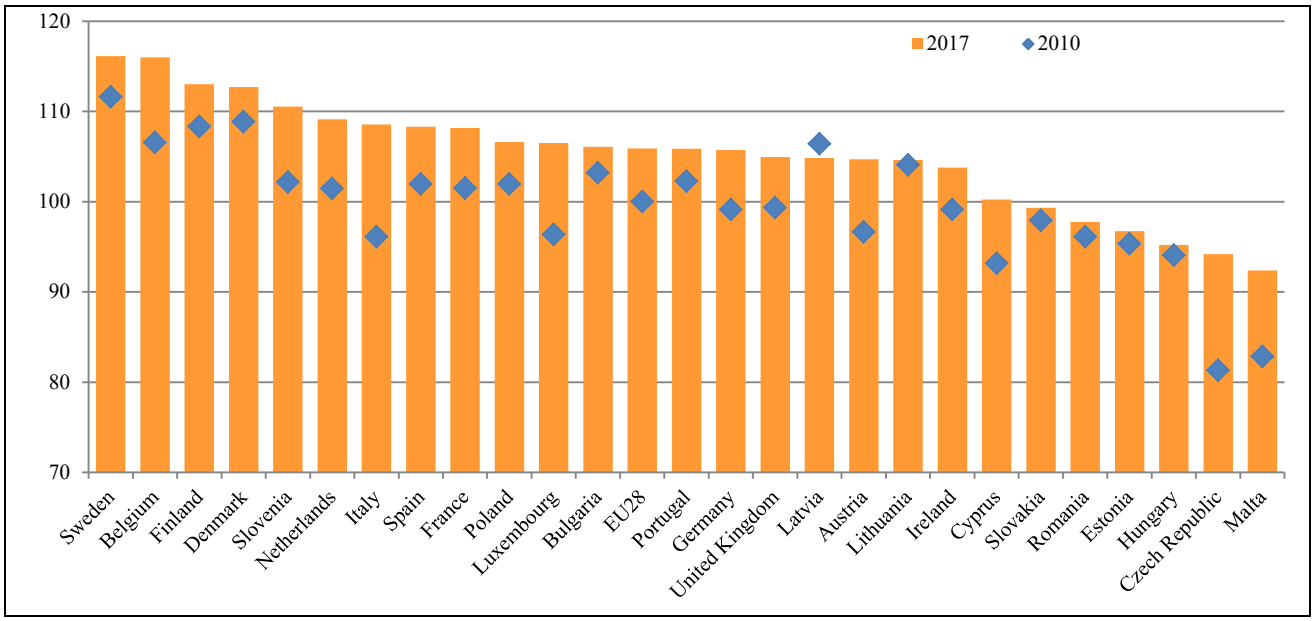

The countries that improved the most are respectively the Czech Republic, Italy, Malta, Luxembourg and Belgium. It is remarkable that the two worst performers comparing to 2010's EU28 levels are at the same time two of the four states that have had the greatest improvement.

Comparing the composite indicator for all EU28 countries, we can see that the situation has improved for the majority of member states. Particularly, the greatest improvement between 2010 and 2017, reached by the Czech Republic, is attributable to the improvement in its "Gender employment gap" (sdg_05_30) and its overall "Female/male ratio of inactive population due to caring responsibilities" (sdg_05_40). On the other hand, the progress towards the composite indicators for Italy between 2010 and 2017 is mainly caused by the increase in the indicators "Positions held by women in senior management positions" (sdg_05_60) and "Seats held by women in national parliaments and governments" (sdg_05_50).

Malta has seen an improvement in all the indicators used for the composite indicator, except for the indicator "Gender pay gap in unadjusted form" that, on the contrary, has suffered a slight increase over time.

The only member state that saw a decline is Latvia, that went from 106.4 to 104.8 in 7 years, although it is still above the 2010 EU28 level.

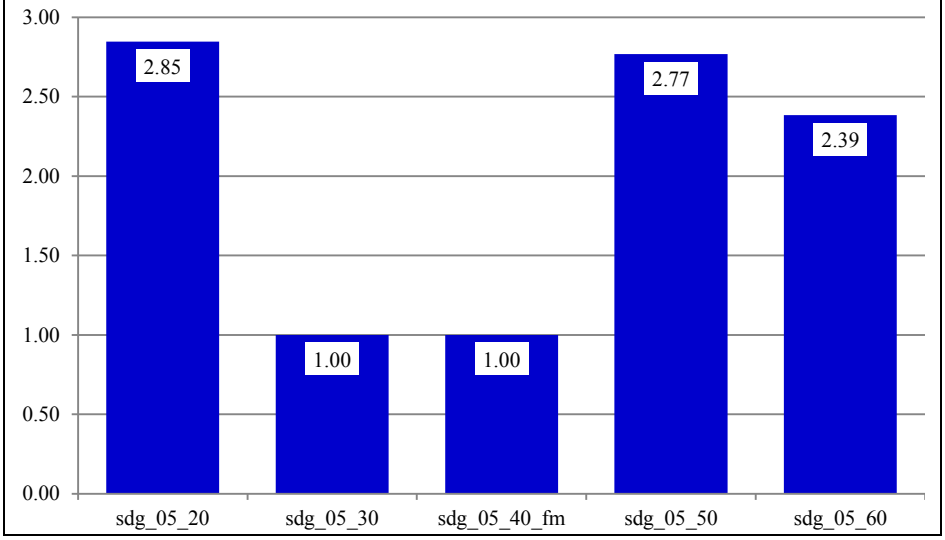
**Fig. 5.2 – SDG 5 composite indicator scores for EU28 countries, years 2010 and 2017. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator. The indicator "Gender pay gap in unadjusted form" (sdg_05_20) and "Seats held by women in national parliaments and governments" (sdg_05_50) have a high impact on the composite indicator. On the other hand, the indicator "Gender employment gap" (sdg_05_30) and "Female/male ratio of inactive population due to caring responsibilities" (sdg_05_40) have less of an influence on the composite indicator.

**Fig. 5.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2017**



# Appendix

**Table 5.3 – Results of the composite indicator for SDG 5. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|
| Belgium | 106.6 | 107.0 | 109.0 | 110.5 | 113.6 | 114.8 | 115.3 | 116.0 |
| Bulgaria | 103.2 | 104.8 | 103.4 | 105.9 | 104.5 | 103.9 | 103.0 | 106.1 |
| Czech Republic | 81.3 | 89.2 | 87.1 | 85.9 | 77.3 | 93.1 | 91.5 | 94.2 |
| Denmark | 108.9 | 108.1 | 109.8 | 110.2 | 110.4 | 110.8 | 111.6 | 112.7 |
| Germany | 99.1 | 100.7 | 101.0 | 103.4 | 104.2 | 104.9 | 106.5 | 105.7 |
| Estonia | 95.3 | 93.4 | 92.9 | 91.2 | 92.6 | 95.8 | 96.5 | 96.7 |
| Ireland | 99.1 | 101.1 | 100.4 | 100.7 | 100.2 | 101.4 | 103.3 | 103.8 |
| Greece | Not present due to lack of data | | | | | | | |
| Spain | 102.0 | 100.6 | 103.4 | 104.8 | 106.8 | 107.5 | 107.8 | 108.3 |
| France | 101.5 | 103.8 | 106.3 | 104.5 | 105.6 | 104.9 | 107.4 | 108.2 |
| Croatia | Not present due to lack of data | | | | | | | |
| Italy | 96.1 | 97.1 | 99.4 | 104.5 | 107.0 | 107.9 | 108.3 | 108.5 |
| Cyprus | 93.2 | 93.4 | 94.7 | 96.6 | 98.4 | 97.5 | 100.1 | 100.2 |
| Latvia | 106.4 | 108.1 | 108.3 | 108.6 | 105.6 | 105.3 | 104.9 | 104.8 |
| Lithuania | 104.1 | 105.1 | 107.8 | 106.7 | 106.4 | 105.8 | 104.9 | 104.6 |
| Luxembourg | 96.4 | 98.9 | 101.3 | 102.7 | 103.5 | 105.3 | 106.2 | 106.5 |
| Hungary | 94.1 | 91.5 | 91.6 | 93.4 | 95.0 | 96.7 | 95.5 | 95.2 |
| Malta | 82.8 | 83.6 | 85.5 | 88.6 | 88.4 | 89.3 | 89.5 | 92.4 |
| Netherlands | 101.5 | 103.6 | 104.4 | 107.1 | 107.5 | 108.1 | 108.5 | 109.1 |
| Austria | 96.7 | 97.4 | 98.3 | 100.0 | 101.4 | 102.1 | 103.1 | 104.7 |
| Poland | 101.9 | 103.2 | 103.1 | 103.2 | 103.6 | 106.4 | 106.4 | 106.6 |
| Portugal | 102.3 | 101.7 | 102.1 | 103.9 | 103.1 | 104.5 | 105.2 | 105.9 |
| Romania | 96.1 | 93.3 | 93.5 | 93.6 | 94.1 | 95.2 | 94.0 | 97.8 |
| Slovenia | 102.2 | 103.4 | 110.2 | 109.6 | 110.1 | 109.1 | 111.2 | 110.6 |
| Slovakia | 97.9 | 96.2 | 96.5 | 99.8 | 98.6 | 97.3 | 98.2 | 99.3 |
| Finland | 108.3 | 110.3 | 111.3 | 111.5 | 111.8 | 111.5 | 112.7 | 113.0 |
| Sweden | 111.6 | 110.6 | 111.3 | 111.2 | 112.2 | 112.7 | 115.2 | 116.1 |
| United Kingdom | 99.3 | 100.2 | 100.2 | 101.6 | 102.2 | 104.1 | 104.2 | 104.9 |
| **EU28** | **100.0** | **100.5** | **101.7** | **103.1** | **103.9** | **105.0** | **105.4** | **105.9** |

## *Goal 7 – Ensure access to affordable, reliable, sustainable and modern energy for all*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 7 was built using the indicators listed in Table 7.1. Only the indicator "Energy dependence by product" (sdg_07_50) was excluded from the composite indicator because its polarity cannot be clearly explained.

**Table 7.1 – List of the elementary indicators used for the composite indicator of SDG 7**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_07_10 | Primary energy consumption | - | 0.7 | 1.3 | 1.0 | 0.1 |
| sdg_07_11 | Final energy consumption | - | 0.8 | 1.2 | 1.0 | 0.1 |
| sdg_07_20 | Final energy consumption in households per capita | - | 164.0 | 1,084.0 | 558.5 | 184.1 |
| sdg_07_30 | Energy productivity | + | 2.0 | 16.9 | 7.6 | 3.5 |
| sdg_07_40 | Share of renewable energy in gross final energy consumption by sector | + | 1.0 | 53.8 | 20.0 | 11.8 |
| sdg_07_60 | Population unable to keep home adequately warm by poverty status | - | 0.5 | 66.5 | 10.1 | 9.9 |
| sdg_13_20 | Greenhouse gas emissions intensity of energy consumption | - | 61.0 | 123.9 | 86.7 | 9.4 |

Correlation does not affect the composite indicator. All the indicators have a correlation lower than 0.75 in absolute terms. The highest correlation observed is between the indicators "Final energy consumption in households per capita" (sdg_07_20) and "Population unable to keep home adequately warm by poverty status" (sdg_07_60). The two indicators have a negative correlation and show two different phenomena that have to be considered separately inside the composite indicator.

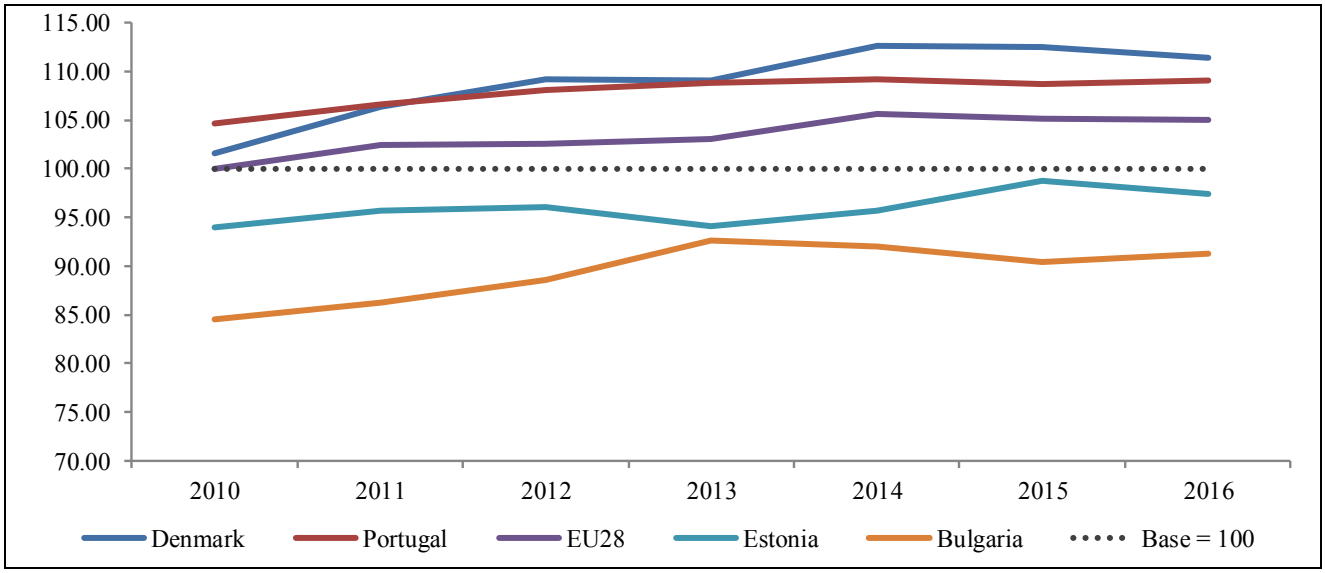
**Table 7.2 – Correlation matrix of elementary indicators of SDG 7**

| | sdg_07_10 | sdg_07_11 | sdg_07_20 | sdg_07_30 | sdg_07_40 | sdg_07_60 | sdg_13_20 |
|---|---|---|---|---|---|---|---|
| **sdg_07_10** | 1.00 | 0.16 | 0.48 | -0.26 | 0.29 | -0.44 | 0.12 |
| **sdg_07_11** | 0.16 | 1.00 | 0.05 | -0.13 | -0.01 | -0.11 | -0.06 |
| **sdg_07_20** | 0.48 | 0.05 | 1.00 | 0.09 | 0.34 | -0.61 | -0.05 |
| **sdg_07_30** | -0.26 | -0.13 | 0.09 | 1.00 | -0.19 | -0.30 | -0.37 |
| **sdg_07_40** | 0.29 | -0.01 | 0.34 | -0.19 | 1.00 | -0.05 | -0.15 |
| **sdg_07_60** | -0.44 | -0.11 | -0.61 | -0.30 | -0.05 | 1.00 | 0.47 |
| **sdg_13_20** | 0.12 | -0.06 | -0.05 | -0.37 | -0.15 | 0.47 | 1 |

## Composite indicator

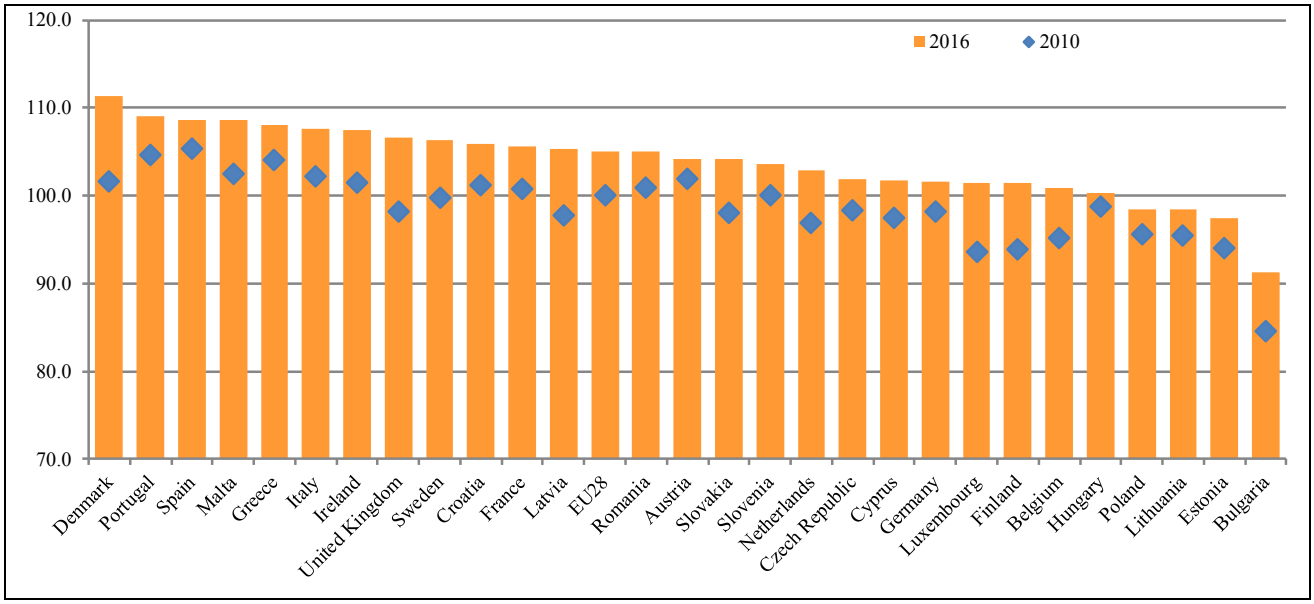
The overall EU28 composite indicator for SDG 7 shows an increasing trend in the observed period (2010-2016), reaching 105.2 points. This trend is explained by the steady increase of the indicators "Share of renewable energy in gross final energy consumption" (sdg_07_40) and "Energy productivity" (sdg_07_30) and by the decrease of the "Final energy consumption in households per capita" one (sdg_07_20). It is important to remark that the composite indicator shows a stable trend from 2014 to 2015, caused by the rise of the indicators related to the energy consumption (sdg_07_10, sdg_07_11, sdg_07_20).
Differences between member states are considerable. While the best performer (Denmark) moved from 101.6 to 111.4 in 6 years with an unstable increase, the worst performer (Bulgaria), after three years of promising performance, saw its situation decrease from 92.6 in 2013 to 91.2 in 2016. Other member states, such as Sweden and United Kingdom, saw a constant increase, whereas member states such as Germany and Netherlands have been subject to fluctuating trends.

**Fig. 7.1 – Composite indicators, SDG 7. EU28 average, best performers (Denmark, Portugal) and worst performers in 2016 (Estonia, Bulgaria). Base EU28 2010=100.**




Comparing the composite indicator for all EU28 countries, the situation improved for the majority of member states. The countries that improved the most are Denmark and United Kingdom. The increasing trend of Denmark's composite indicator can be explained by the broad rise of the "Share of renewable energy in gross final energy consumption" (sdg_07_40) indicator - that exceeds (31%) the EU 2020 Target of 30% - and by an overall improvement in all the elementary indicators of the composite indicator.
Instead, the positive spread between 2010 and 2015 for Finland is explained mainly by a huge decrease of the indicator "Final energy consumption in households per capita" (sdg_07_20).
Although Bulgaria is the worst performer, it has been subject to a positive trend especially due to a consistent drop in the "Population unable to keep home adequately warm" (sdg_07_60) indicator.

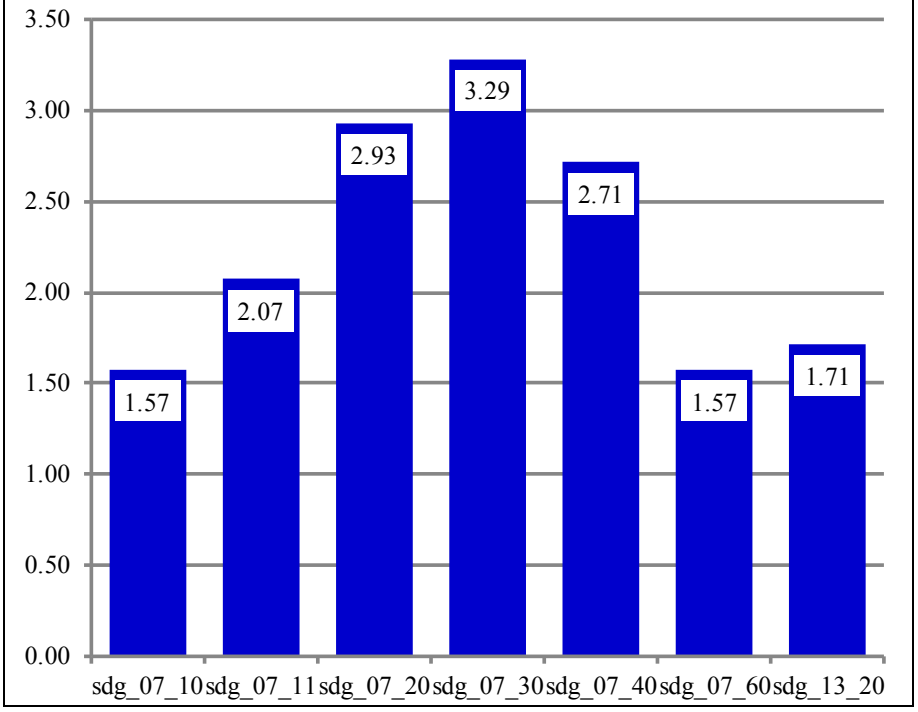
**Fig. 7.2 – SDG 7 composite indicator scores for EU28 countries, years 2010 and 2016. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking by the removal of each elementary indicator. The indicator "Energy productivity" (sdg_07_30) has the highest impact on the composite indicator, whereas "Primary energy consumption" (sdg_07_10) and "Population unable to keep home adequately warm by poverty status" (sdg_07_60) have less of an influence on the composite indicator.

**Fig. 7.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2015**



# Appendix

**Table 7.3 – Results of the composite indicator for SDG 7. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 95.1 | 99.7 | 100.2 | 98.8 | 103.2 | 101.1 | 100.8 |
| Bulgaria | 84.6 | 86.3 | 88.6 | 92.6 | 92.0 | 90.4 | 91.2 |
| Czech Republic | 98.3 | 99.8 | 100.3 | 101.0 | 103.0 | 102.6 | 101.9 |
| Denmark | 101.6 | 106.3 | 109.1 | 109.0 | 112.7 | 112.5 | 111.4 |
| Germany | 98.1 | 101.2 | 100.6 | 99.1 | 102.3 | 102.2 | 101.5 |
| Estonia | 93.9 | 95.6 | 96.0 | 94.0 | 95.7 | 98.7 | 97.4 |
| Ireland | 101.4 | 106.2 | 106.5 | 106.7 | 108.3 | 107.9 | 107.5 |
| Greece | 104.1 | 103.0 | 103.8 | 107.0 | 107.0 | 107.4 | 108.1 |
| Spain | 105.3 | 105.8 | 106.3 | 108.9 | 109.2 | 107.9 | 108.6 |
| France | 100.8 | 103.7 | 103.0 | 102.5 | 106.6 | 105.6 | 105.6 |
| Croatia | 101.1 | 101.9 | 104.1 | 105.3 | 107.5 | 106.0 | 105.9 |
| Italy | 102.2 | 103.2 | 103.5 | 105.6 | 108.2 | 107.2 | 107.7 |
| Cyprus | 97.4 | 98.5 | 99.5 | 103.5 | 103.9 | 103.0 | 101.8 |
| Latvia | 97.8 | 100.8 | 101.4 | 102.2 | 103.5 | 104.9 | 105.3 |
| Lithuania | 95.4 | 96.1 | 96.6 | 98.6 | 99.8 | 99.9 | 98.4 |
| Luxembourg | 93.5 | 95.4 | 95.9 | 97.3 | 100.0 | 100.6 | 101.4 |
| Hungary | 98.7 | 99.2 | 101.2 | 102.2 | 103.9 | 101.6 | 100.3 |
| Malta | 102.4 | 101.9 | 99.1 | 102.0 | 103.0 | 104.2 | 108.6 |
| Netherlands | 96.8 | 101.2 | 101.1 | 100.7 | 104.6 | 103.2 | 102.9 |
| Austria | 101.9 | 103.9 | 104.3 | 102.9 | 106.6 | 105.0 | 104.2 |
| Poland | 95.5 | 97.1 | 97.7 | 98.5 | 100.7 | 100.7 | 98.4 |
| Portugal | 104.7 | 106.6 | 108.0 | 108.8 | 109.2 | 108.7 | 109.1 |
| Romania | 100.9 | 100.4 | 101.3 | 104.0 | 105.0 | 104.6 | 105.0 |
| Slovenia | 100.0 | 100.1 | 101.3 | 102.9 | 106.1 | 105.4 | 103.6 |
| Slovakia | 98.0 | 100.4 | 102.2 | 101.7 | 104.6 | 104.6 | 104.1 |
| Finland | 93.8 | 98.8 | 99.7 | 101.0 | 102.0 | 104.3 | 101.4 |
| Sweden | 99.8 | 103.4 | 103.6 | 105.6 | 107.4 | 108.0 | 106.3 |
| United Kingdom | 98.2 | 102.5 | 101.0 | 101.1 | 105.0 | 105.6 | 106.6 |
| **EU28** | **100.0** | **102.5** | **102.5** | **103.0** | **105.6** | **105.1** | **105.0** |

## *Goal 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 8 was built using the indicators listed in Table 8.1. No indicator was excluded from the composite indicator.

**Table 8.1 – List of the elementary indicators used for the composite indicator of SDG 8**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_08_10 | Real GDP per capita | + | 5,100.0 | 81,700.0 | 24723.0 | 15575.6 |
| sdg_08_20 | Young people neither in employment nor in education and training | - | 5.7 | 28.5 | 14.8 | 5.2 |
| sdg_08_30 | Employment rate | + | 52.9 | 81.2 | 68.9 | 5.9 |
| sdg_08_40 | Long-term unemployment rate | - | 1.2 | 19.5 | 4.8 | 3.4 |
| sdg_08_50 | Involuntary temporary employment | - | 0.7 | 22.7 | 7.1 | 5.4 |
| sdg_08_60 | People killed in accidents at work | - | 0.5 | 6.4 | 2.4 | 1.3 |
| sdg_05_40 | Inactive population due to caring responsibilities | - | 1.5 | 45.4 | 20.1 | 9.0 |
| sdg_12_20 | Resource productivity and domestic material consumption (DMC) | + | 0.3 | 4.1 | 1.6 | 1.0 |

Even though there are four cases where there is a correlation higher or equal than 0.75 in absolute terms (highlighted in red in Table 8.2), the indicators "Young people neither in employment nor in education and training" (sdg_08_20), "Employment rate (sdg_08_30), "Long-term unemployment rate" (sdg_08_40) and "Resource productivity and domestic material consumption (DMC)" (sdg_12_20) show different phenomena. Therefore, they all have to be considered inside the composite indicator.

**Table 8.2 – Correlation matrix of elementary indicators of SDG 8**

| | sdg_08_10 | sdg_08_20 | sdg_08_30 | sdg_08_40 | sdg_08_50 | sdg_08_60 | sdg_05_40 | sdg_12_20 |
|---|---|---|---|---|---|---|---|---|
| **sdg_08_10** | 1.00 | -0.57 | 0.45 | -0.38 | -0.13 | -0.29 | -0.11 | 0.75 |
| **sdg_08_20** | -0.57 | 1.00 | -0.83 | 0.75 | 0.21 | 0.18 | 0.24 | -0.33 |
| **sdg_08_30** | 0.45 | -0.83 | 1.00 | -0.77 | -0.29 | -0.20 | -0.23 | 0.22 |
| **sdg_08_40** | -0.38 | 0.75 | -0.77 | 1.00 | 0.31 | 0.00 | 0.09 | -0.18 |
| **sdg_08_50** | -0.13 | 0.21 | -0.29 | 0.31 | 1.00 | -0.15 | 0.06 | -0.01 |
| **sdg_08_60** | -0.29 | 0.18 | -0.20 | 0.00 | -0.15 | 1.00 | 0.06 | -0.46 |
| **sdg_05_40** | -0.11 | 0.24 | -0.23 | 0.09 | 0.06 | 0.06 | 1.00 | -0.01 |
| **sdg_12_20** | 0.75 | -0.33 | 0.22 | -0.18 | -0.01 | -0.46 | -0.01 | 1.00 |

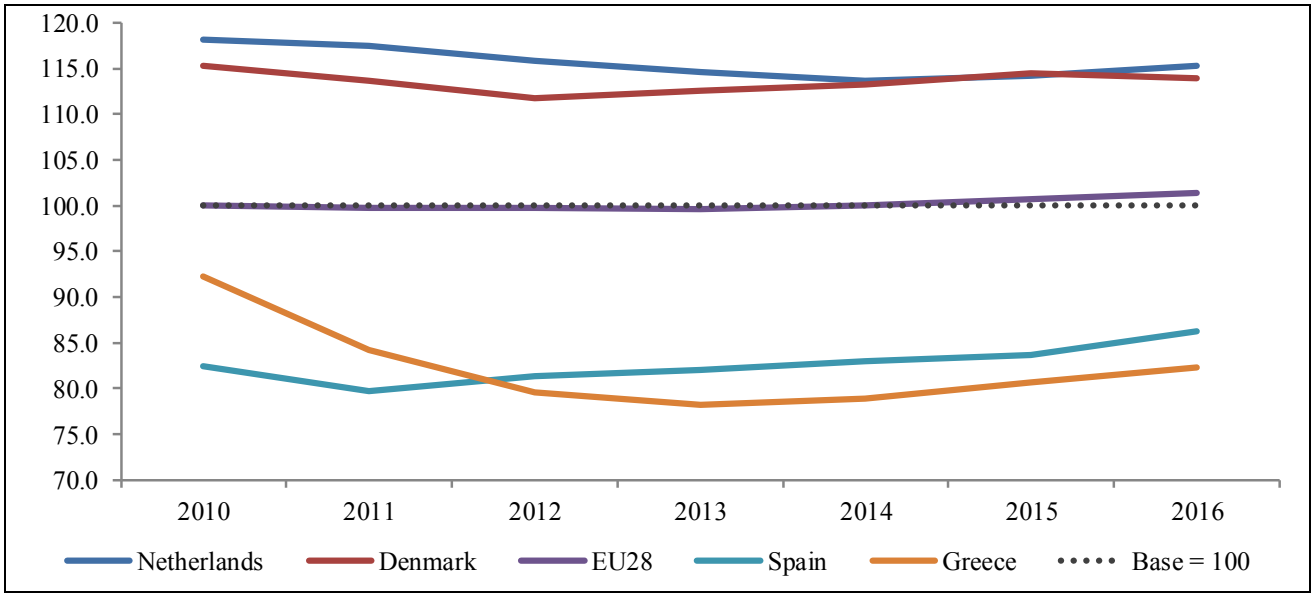
## Composite indicator

The overall EU28 composite indicator for SDG 8 shows a stable trend from 2010 to 2014 staying near the level of 2010 =100. From 2014 to 2016 it starts to slightly increase reaching the 101.4 point mark in the last observed year. The rising trend observed in the last two years is a consequence of the reduction of the "Long-term unemployment rate" (sdg_08_40) and "Young people neither in employment nor in education and training" (sdg_08_20) indicators, as well as the growth of the "Employment rate" (sdg_08_30) indicator, that reaches 71.1%, inching towards the EU 2020 target of 75%.

There are significant differences between member states. In fact, while the best performer (Netherlands) reached the 115.3 point mark in 2016, the worst performer (Greece) moved from 92.3 to 82.3 points in six years.

Comparing the composite indicator for all EU28 countries, we can see that the situation changed in different ways all around Europe (Fig. 8.2). While there are countries that improved their situation like Lithuania, Latvia, Slovakia, Hungary and Poland, there are countries like Greece, Luxembourg, Netherlands and Croatia that have seen their situation worsen.

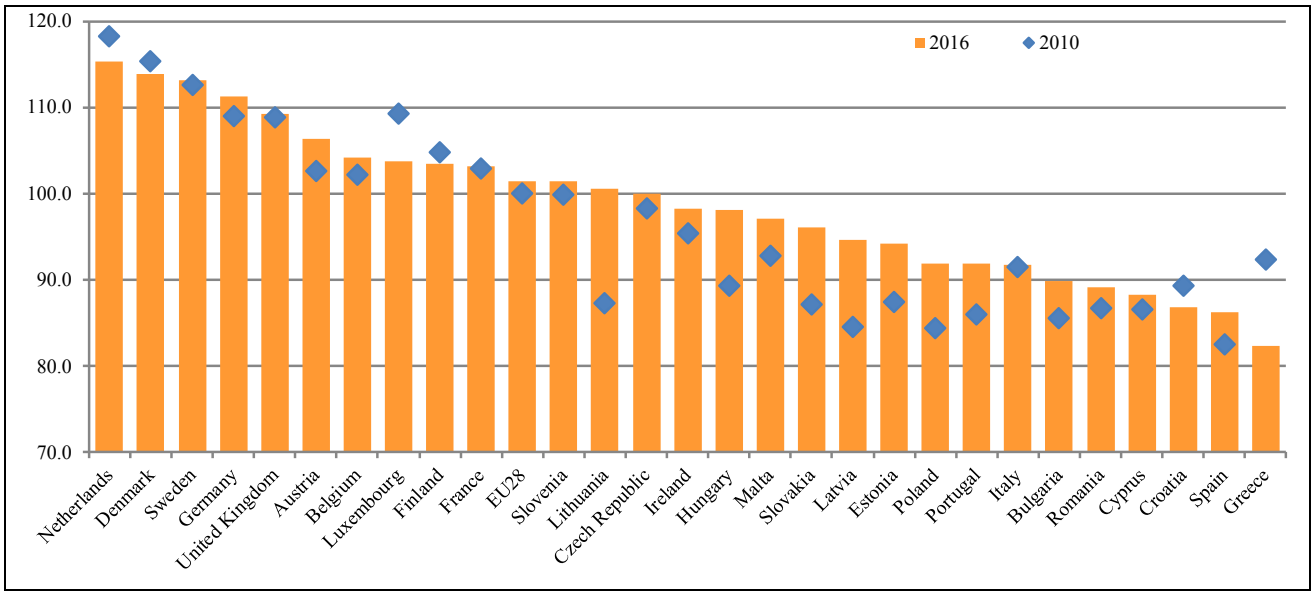
**Fig. 8.1 – Composite indicators, SDG 8. EU28 average, best performers (Netherlands, Denmark) and worst performers in 2016 (Spain, Greece). Base EU28 2010=100.**




Analyzing the Greek situation, the composite indicator drastically falls until 2013 and then slightly rises until 2016. This descending trend can be explained by the dramatic increase in the "Young people neither in employment nor in education and training" (sdg_08_20) indicator, that reaches its peak in 2013 (28.5%) and then slightly falls until 2016, reaching 22.2%. Another indicator that can explain this tendency is the "Long-term unemployment rate" (sdg_08_40), which rose from 5.7 % in 2010 to 17% in 2016.

Moreover, the indicator "Real GDP per capita" (sdg_08_10) has been subject to a severe fall from 2010 to 2013, and then started to rise until it reached 17100 euro per capita, still far from 2010's value of 20300 euro per capita.

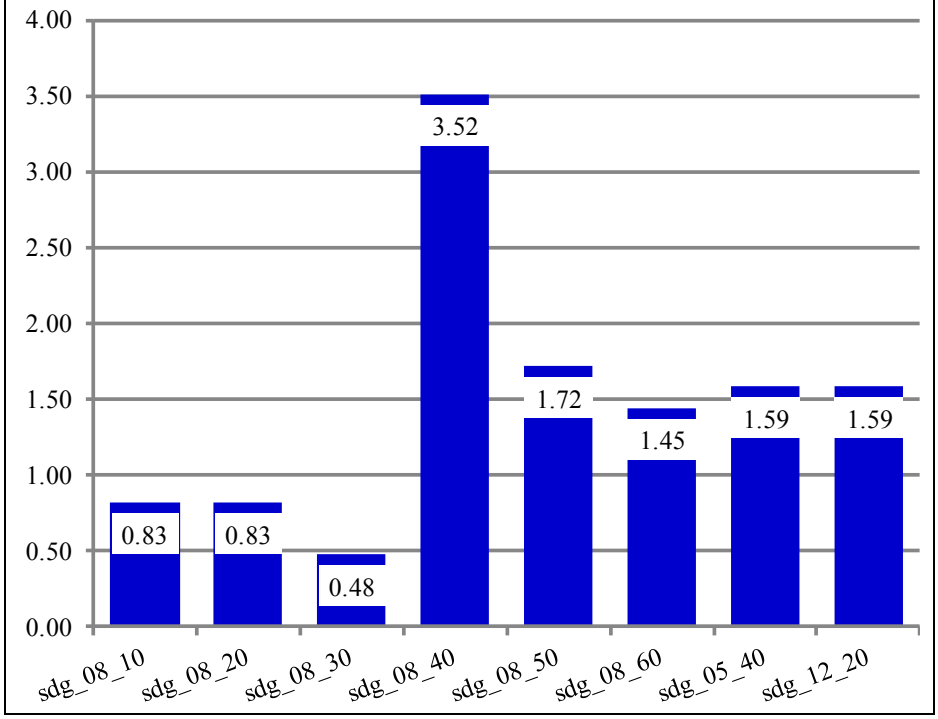
**Fig. 8.2 – SDG 8 composite indicator scores for EU28 countries, years 2010 and 2016. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator. The indicator "Long-term unemployment rate" (sdg_08_40) has the highest impact on the composite indicator, whereas the indicator "Employment rate" (sdg_08_30) has less of an influence on the composite indicator.

**Fig. 8.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2016**



# Appendix

**Table 8.3 – Results of the composite indicator for SDG 8. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 102.2 | 101.5 | 103.1 | 101.9 | 104.0 | 103.7 | 104.1 |
| Bulgaria | 85.5 | 84.0 | 85.0 | 85.6 | 84.4 | 87.5 | 89.8 |
| Czech Republic | 98.3 | 98.0 | 98.1 | 97.7 | 98.4 | 96.8 | 100.0 |
| Denmark | 115.3 | 113.7 | 111.7 | 112.6 | 113.3 | 114.5 | 113.9 |
| Germany | 109.0 | 109.5 | 109.2 | 109.8 | 110.0 | 111.1 | 111.2 |
| Estonia | 87.4 | 91.9 | 95.5 | 95.1 | 96.8 | 97.2 | 94.3 |
| Ireland | 95.4 | 92.0 | 92.2 | 93.4 | 93.5 | 96.1 | 98.2 |
| Greece | 92.3 | 84.2 | 79.6 | 78.2 | 78.8 | 80.6 | 82.3 |
| Spain | 82.5 | 79.8 | 81.3 | 82.0 | 83.0 | 83.7 | 86.3 |
| France | 102.9 | 102.5 | 102.4 | 101.9 | 102.3 | 102.7 | 103.2 |
| Croatia | 89.3 | 85.2 | 84.7 | 86.6 | 88.6 | 88.5 | 86.9 |
| Italy | 91.4 | 92.2 | 92.1 | 91.2 | 90.4 | 90.5 | 91.7 |
| Cyprus | 86.5 | 93.3 | 89.1 | 86.8 | 87.1 | 88.3 | 88.3 |
| Latvia | 84.4 | 84.4 | 89.4 | 92.9 | 91.5 | 94.4 | 94.6 |
| Lithuania | 87.2 | 89.8 | 91.7 | 93.9 | 94.1 | 97.3 | 100.6 |
| Luxembourg | 109.2 | 111.7 | 108.8 | 112.7 | 111.1 | 110.3 | 103.7 |
| Hungary | 89.2 | 91.0 | 93.5 | 94.2 | 95.1 | 95.7 | 98.0 |
| Malta | 92.7 | 94.3 | 89.0 | 94.0 | 94.3 | 96.1 | 97.1 |
| Netherlands | 118.2 | 117.6 | 115.9 | 114.6 | 113.7 | 114.2 | 115.3 |
| Austria | 102.6 | 107.4 | 105.6 | 104.9 | 105.5 | 105.8 | 106.4 |
| Poland | 84.4 | 88.7 | 88.4 | 88.3 | 88.8 | 89.9 | 91.9 |
| Portugal | 85.9 | 85.7 | 85.3 | 86.6 | 88.9 | 90.2 | 91.8 |
| Romania | 86.6 | 84.9 | 85.9 | 85.9 | 85.8 | 84.9 | 89.2 |
| Slovenia | 99.9 | 99.5 | 99.1 | 98.2 | 96.6 | 98.2 | 101.4 |
| Slovakia | 87.2 | 87.6 | 90.8 | 91.3 | 92.5 | 92.3 | 96.1 |
| Finland | 104.8 | 105.5 | 104.4 | 103.8 | 103.2 | 102.6 | 103.4 |
| Sweden | 112.5 | 112.3 | 111.2 | 111.1 | 111.4 | 112.4 | 113.2 |
| United Kingdom | 108.9 | 107.0 | 106.9 | 106.7 | 107.6 | 108.7 | 109.3 |
| **EU28** | **100.0** | **99.7** | **99.7** | **99.7** | **100.0** | **100.7** | **101.4** |

## *Goal 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 9 was built using the indicators listed in Table 9.1. The indicators "Patent applications to the European Patent Office" (sdg_09_40) and "Share of rail and inland waterways activity in total freight transport" (sdg_09_60) were excluded from the composite indicator because of lack of available data.

**Table 9.1 – List of the elementary indicators used for the composite indicator of SDG 9**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_09_10 | Gross domestic expenditure on R&D | + | 0.4 | 3.7 | 1.6 | 0.8 |
| sdg_09_20 | Employment in high- and medium-high technology manufacturing sectors and knowledge-intensive service sectors | + | 24.2 | 59.6 | 44.2 | 7.2 |
| sdg_09_30 | R&D personnel | + | 0.3 | 2.2 | 1.2 | 0.5 |
| sdg_09_50 | Share of collective transport modes in total passenger land transport | + | 8.0 | 32.5 | 18.1 | 4.7 |
| sdg_12_30 | Average CO2 emissions per km from new passenger cars | - | 101.2 | 162.0 | 118.8 | 8.1 |

The composite indicator synthetizes five indicators. Among them, three indicators have a correlation higher than 0.75 (highlighted in red in Table 9.2). Nevertheless, the elementary indicators "Gross domestic expenditure on R&D" (sdg_09_10), "Employment in high- and medium-high technology manufacturing sectors and knowledge-intensive service sectors" (sdg_09_20) and "R&D personnel" (sdg_09_30) represent three different phenomena. Therefore, they have to be considered inside the composite indicator.

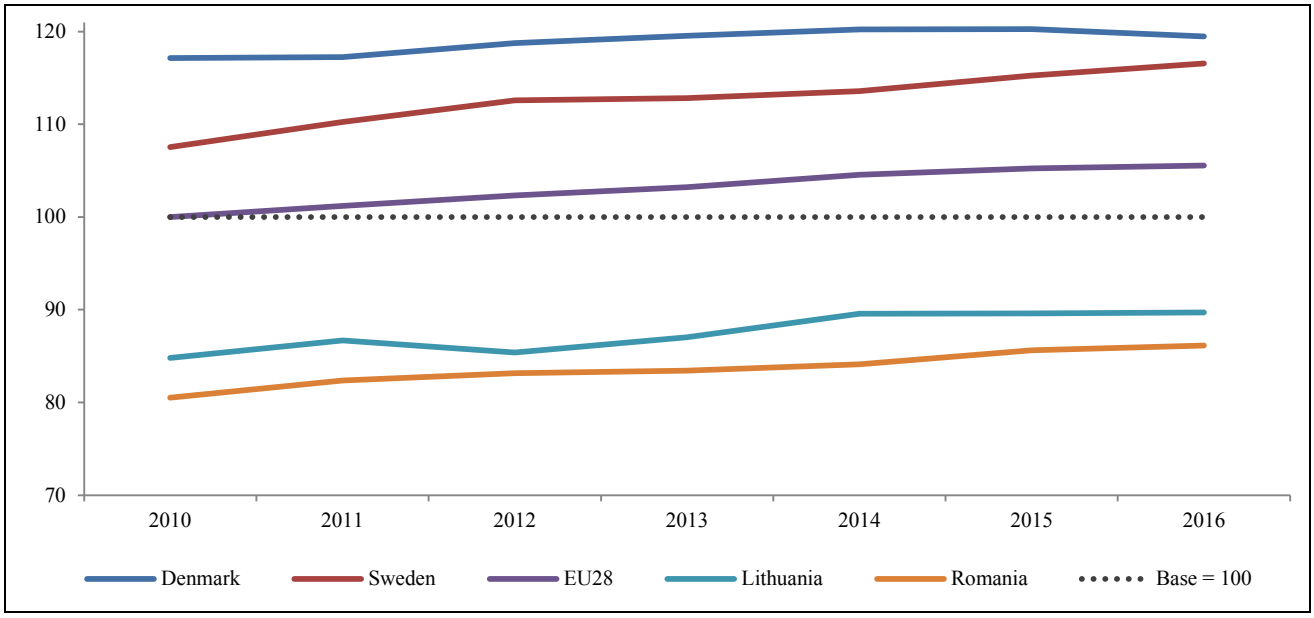
**Table 9.2 – Correlation matrix of elementary indicators of SDG 9**

| | sdg_09_10 | sdg_09_20 | sdg_09_30 | sdg_09_50 | sdg_12_30 |
|---|---|---|---|---|---|
| **sdg_09_10** | 1.00 | 0.75 | 0.84 | -0.12 | -0.18 |
| **sdg_09_20** | 0.75 | 1.00 | 0.86 | -0.06 | -0.14 |
| **sdg_09_30** | 0.84 | 0.86 | 1.00 | -0.20 | -0.27 |
| **sdg_09_50** | -0.12 | -0.06 | -0.20 | 1.00 | 0.32 |
| **sdg_12_30** | -0.18 | -0.14 | -0.27 | 0.32 | 1.00 |

## Composite indicator

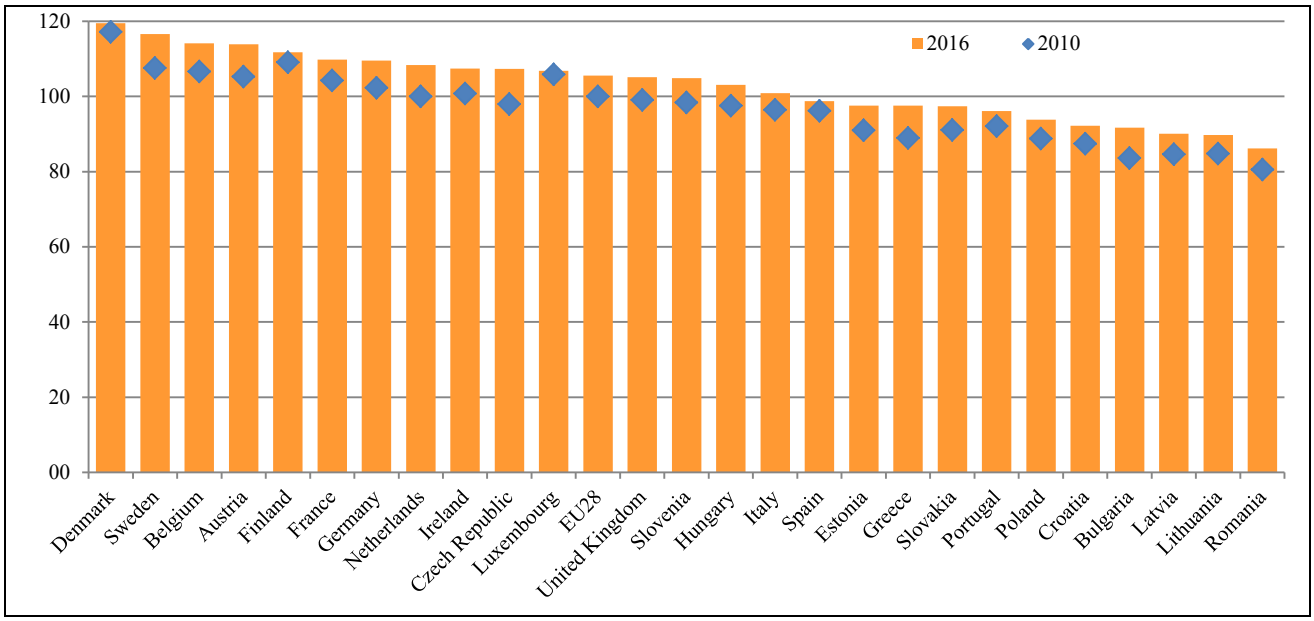
The overall EU28 composite indicator for SDG 9 shows an increasing trend in the observed period (2010-2016), reaching the 105.5 point mark. This growing trend is explained by the fall of the "Average CO2 emissions per km from new passenger cars" (sdg_12_30) indicator, and the rise of that on "R&D personnel" (sdg_09_30). Moreover, the "Gross domestic expenditure on R&D" (sdg_09_10) indicator, shows a slightly growing trend reaching in 2016 2.03% of GDP, although it is still far from the EU 2020 Target (3%).
There are differences between the trends of member states. While the best performer (Denmark) increased its composite indicator by 2.4 points, that of the worst performer (Romania) increased by 5.7 during the observed period.

**Fig. 9.1 – Composite indicators, SDG 9. EU28 average, best performers (Denmark, Sweden) and worst performers in 2016(Lithuania, Romania). Base EU28 2010=100.**




Comparing the composite indicator for all EU28 countries, we can see that the situation improved for the majority of member states. The countries that improved the most are Sweden, the Czech Republic and Greece. The improvement of Greece's composite indicator is a consequence of the decrease of the "Average CO2 emissions per km from new passenger cars" (sdg_12_30) indicator and of the growth of the "Gross domestic expenditure on R&D" (sdg_09_10) indicator, which achieved in 2016 1.01% of GDP, almost reaching its EU 2020 Target (1.2%). No country shows a descending trend.

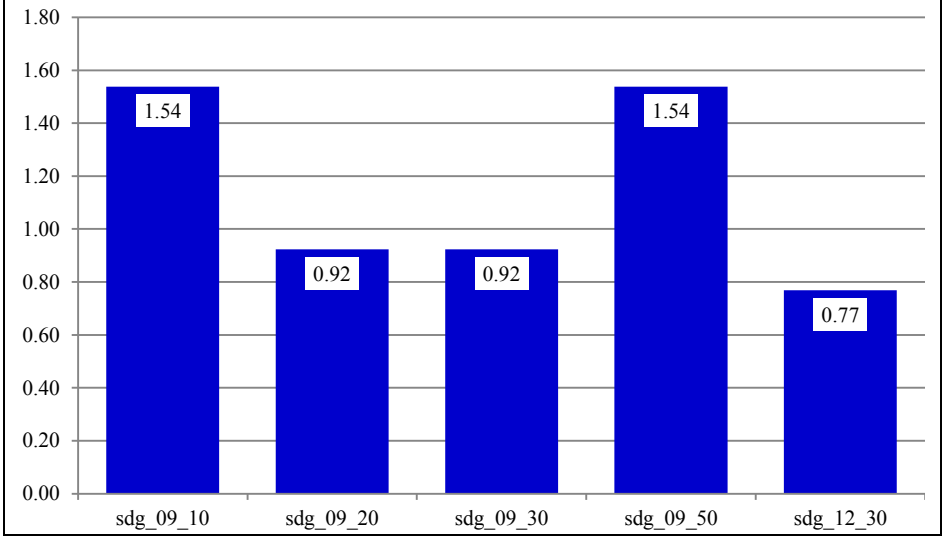
**Fig. 9.2 – SDG 9 composite indicator scores for EU28 countries, years 2010 and 2016. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator. The indicators "Gross domestic expenditure on R&D" (sdg_09_10) and "Share of collective transport modes in total passenger land transport" (sdg_09_50) have the highest influence on the composite indicator. Whereas "Employment in high and medium-high technology manufacturing sectors and knowledge-intensive service sectors" (sdg_09_20), "R&D personnel" (sdg_09_30) and "Average CO2 emissions per km from new passenger cars" (sdg_12_30) have less of an influence on the composite indicator.

**Fig. 9.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2016**



# Appendix

**Table 9.3 – Results of the composite indicator for SDG 9. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 106.6 | 108.9 | 110.3 | 110.8 | 112.1 | 113.2 | 114.1 |
| Bulgaria | 83.6 | 85.1 | 85.6 | 87.0 | 89.6 | 91.8 | 91.7 |
| Czech Republic | 97.9 | 100.2 | 103.1 | 105.3 | 106.6 | 107.5 | 107.4 |
| Denmark | 117.1 | 117.2 | 118.8 | 119.6 | 120.2 | 120.3 | 119.5 |
| Germany | 102.3 | 104.0 | 106.0 | 105.9 | 107.5 | 109.3 | 109.5 |
| Estonia | 90.9 | 95.0 | 96.3 | 96.0 | 96.0 | 98.0 | 97.6 |
| Ireland | 100.7 | 102.3 | 102.8 | 103.9 | 107.3 | 107.7 | 107.4 |
| Greece | 89.0 | 91.9 | 94.0 | 96.5 | 96.6 | 98.1 | 97.6 |
| Spain | 96.1 | 96.9 | 97.8 | 98.7 | 98.1 | 98.9 | 98.8 |
| France | 104.3 | 105.2 | 106.3 | 107.6 | 108.4 | 110.0 | 109.8 |
| Croatia | 87.4 | 88.1 | 88.9 | 90.3 | 90.7 | 91.6 | 92.2 |
| Italy | 96.4 | 97.2 | 99.5 | 100.2 | 100.7 | 100.7 | 100.8 |
| Cyprus | Not present due to lack of data | | | | | | |
| Latvia | 84.6 | 87.3 | 88.6 | 88.5 | 90.1 | 89.9 | 90.0 |
| Lithuania | 84.8 | 86.7 | 85.4 | 87.0 | 89.6 | 89.6 | 89.7 |
| Luxembourg | 105.8 | 106.8 | 106.3 | 107.9 | 108.4 | 106.9 | 106.8 |
| Hungary | 97.6 | 99.1 | 99.8 | 103.0 | 102.3 | 103.0 | 103.1 |
| Malta | Not present due to lack of data | | | | | | |
| Netherlands | 100.0 | 103.7 | 105.3 | 107.2 | 107.9 | 108.6 | 108.3 |
| Austria | 105.3 | 106.7 | 108.6 | 110.7 | 111.8 | 113.5 | 113.8 |
| Poland | 88.8 | 89.2 | 90.6 | 91.0 | 93.0 | 93.7 | 93.8 |
| Portugal | 92.0 | 93.6 | 93.3 | 93.9 | 94.4 | 95.7 | 96.1 |
| Romania | 80.5 | 82.4 | 83.2 | 83.4 | 84.1 | 85.6 | 86.2 |
| Slovenia | 98.3 | 101.7 | 103.6 | 105.1 | 105.3 | 105.0 | 104.8 |
| Slovakia | 91.0 | 92.6 | 94.1 | 94.4 | 95.6 | 98.6 | 97.4 |
| Finland | 109.0 | 110.4 | 110.8 | 112.1 | 112.7 | 112.3 | 111.8 |
| Sweden | 107.5 | 110.3 | 112.6 | 112.8 | 113.6 | 115.2 | 116.6 |
| United Kingdom | 99.1 | 101.0 | 101.1 | 102.8 | 104.1 | 104.7 | 105.1 |
| **EU28** | **100.0** | **101.2** | **102.3** | **103.2** | **104.5** | **105.2** | **105.5** |

## *Goal 10 - Reduce inequality within and among countries*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 10 was built using the indicators listed in Table 10.1. The indicators "Asylum applications by state of procedure" (sdg_10_60) and "EU imports from developing countries by country income groups" (sdg_17_30) were excluded because their polarity could not be clearly explained. The indicator "EU financing to developing countries" (sdg_17_20) was excluded because its negative values could not be used in the analysis. The indicator "Purchasing power adjusted GDP per capita" (sdg_10_10) was also excluded because it is already taken in consideration inside the indicator "Adjusted gross disposable income of households per capita" (sdg_10_20).

**Table 10.1 – List of the elementary indicators used for the composite indicator of SDG 10**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_01_20 | People at risk of income poverty after social transfers | - | 8.6 | 25.4 | 17.1 | 4.1 |
| sdg_10_20 | Adjusted gross disposable income of households per capita | + | 7760 | 32106 | 19584.9 | 5222.8 |
| sdg_10_30 | Relative median at-risk-of-poverty gap | - | 13.2 | 38.2 | 23.3 | 5.6 |
| sdg_10_40 | Gini coefficient of equivalised disposable income | - | 23.7 | 38.3 | 30.3 | 3.9 |
| sdg_10_50 | Income share of the bottom 40 % of the population | + | 16.8 | 25.1 | 21.2 | 2.3 |

In this composite indicator, there are at least three indicators with high correlation (highlighted in red in Table 10.2). Although it can be argued the high correlation could affect the composite indicator, the indicators (sdg_01_20), (sdg_10_50) and (sdg_10_40) describe correlated but different phenomena. Moreover, since Goal 10 focuses on income inequalities, in order to have a complete framework, it is crucial to consider all of its different dimensions.

**Table 10.2 – Correlation matrix of elementary indicators of SDG 10**

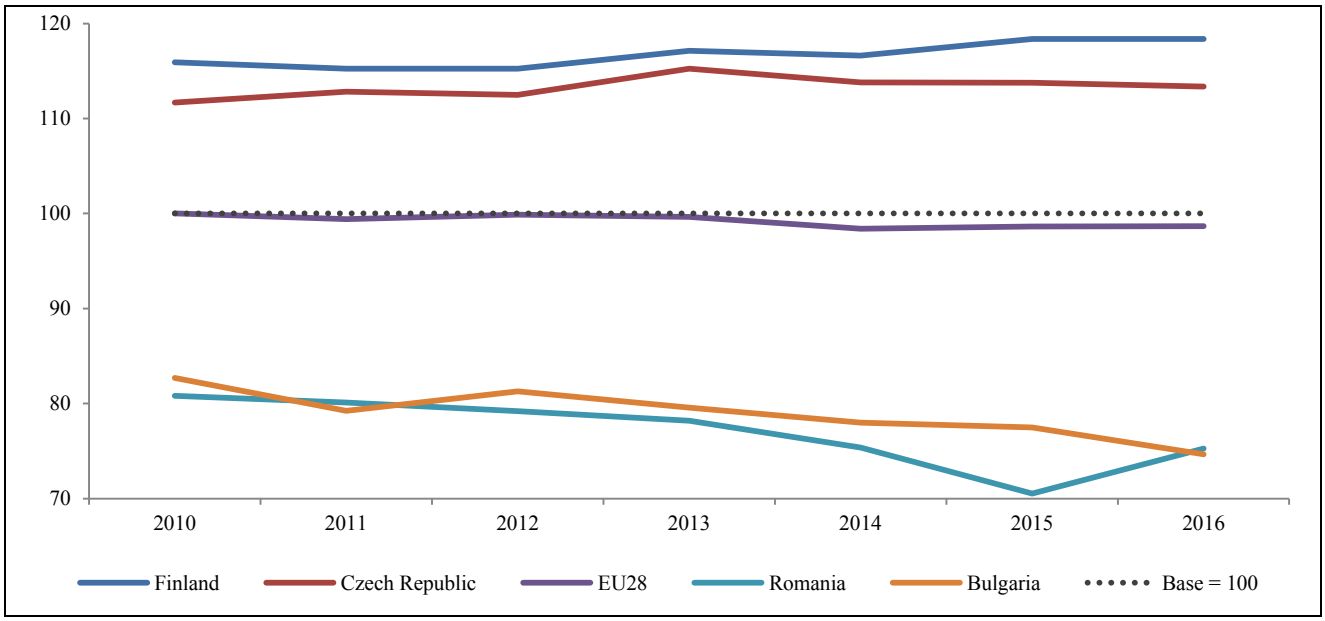
| | sdg_01_20 | sdg_10_20 | sdg_10_30 | sdg_10_40 | sdg_10_50 |
|---|---|---|---|---|---|
| **sdg_01_20** | 1.00 | -0.47 | 0.79 | 0.89 | -0.95 |
| **sdg_10_20** | -0.47 | 1.00 | -0.46 | -0.39 | 0.42 |
| **sdg_10_30** | 0.79 | -0.46 | 1.00 | 0.67 | -0.74 |
| **sdg_10_40** | 0.89 | -0.39 | 0.67 | 1.00 | -0.98 |
| **sdg_10_50** | -0.95 | 0.42 | -0.74 | -0.98 | 1.00 |

## Composite indicator

The overall EU28 composite indicator for SDG 10 shows a decreasing trend in the observed period (2010-2016), reaching the 98.7 point mark. The decreasing trend is mainly explained by a drop from 2013 to 2014 caused by a consistent worsening of the indicators "People at risk of income poverty after social transfers" (sdg_01_20), "Relative median at-risk-of-poverty gap" (sdg_10_30) and "Gini coefficient of equivalized disposable income" (sdg_10_40).
The stable trend observed from 2014-2016 is mainly attributable to the compensation between the rise of "Adjusted gross disposable income of households per capita" (sdg_10_20) and the overall worsening of the indicators "People at risk of income poverty after social transfers" (sdg_01_20),

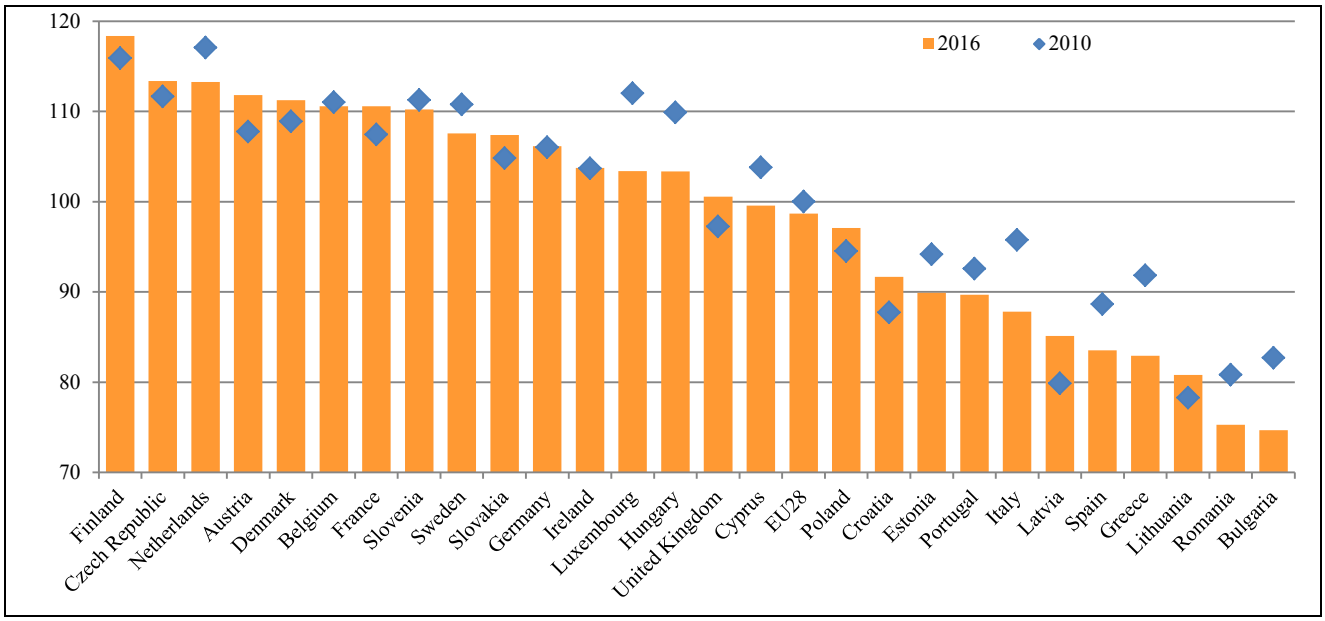
"Relative median at-risk-of-poverty gap" (sdg_10_30) and "Gini coefficient of equivalised disposable income" (sdg_10_40).
As a matter of fact, the percentage of "People at risk of poverty" (sdg_01_20) rose from 16.5 in 2010 to 17.3 in 2016, as well as the percentage of "Distance from poverty threshold" (sdg_10_30) that increased from 22.9% to 25% during the observed period.
There are substantial differences between member states. While the best performer (Finland) moved from 116 to 118.4 in 6 years, the worst performer (Bulgaria) saw its situation decrease from 82.7 in 2010 to 74.7 in 2016.

**Fig. 10.1 – Composite indicators, SDG 10. EU28 average, best performers (Netherlands, Belgium) and worst performers in 2016 (Romania, Bulgaria). Base EU28 2010=100.**




Comparing the composite indicator for all EU28 countries, we can see that the situation has worsened for the majority of member states. The countries that improved the most are Latvia, Austria and Croatia. These countries experienced an average improvement of 4.5% in the "Income share of the bottom 40% of the population" (sdg_10_50) and "Gini coefficient of equalized disposable income" (sdg_10_40) indicators. Austria and Croatia experienced an improvement in the indicator "People at risk of income poverty after social transfers" (sdg_01_20), whereas Latvia has been subject to the strongest improvement on the indicator "Adjusted gross disposable income of households per capita".
On the contrary, the countries that have worsened the most (Greece, Bulgaria and Italy) experienced a broad decline of indicators sdg_01_20, sdg_10_40, sdg_10_50 and sdg_10_30. Particularly, during the observed period, the indicator "Distance to poverty threshold" (sdg_10_30) increased by 8.5% in Greece and by 6.8% in Italy.

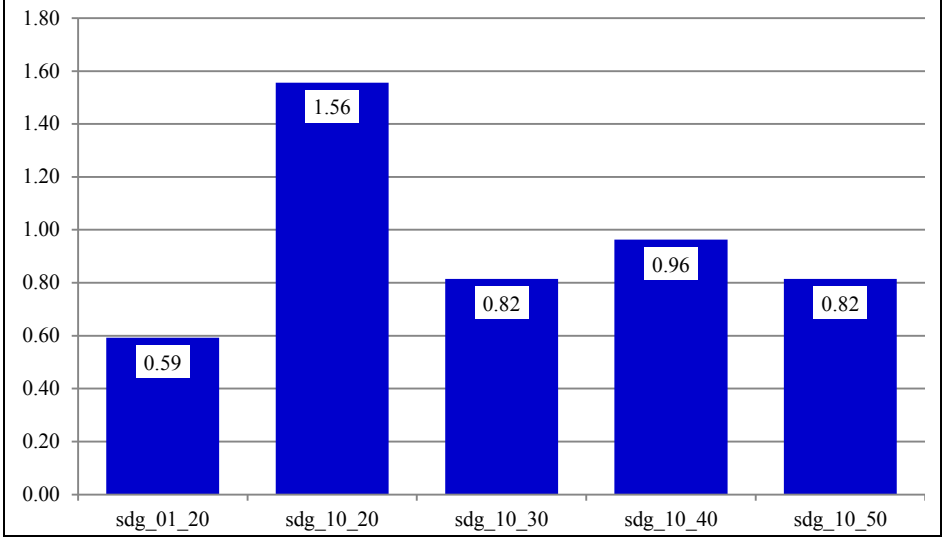
**Fig. 10.2 – SDG 10 composite indicator scores for EU28 countries, years 2010 and 2016. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator. The indicator ”Adjusted gross disposable income of households per capita” (sdg_10_20) has the highest impact on the composite indicator, whereas the indicator “People at risk of income poverty after social transfers” (sdg_01_20) has less of an influence on the composite indicator.

**Fig. 10.3 – Influence analysis: shifts in the ranking of the EU countries by elementary indicator removed. Year 2016**



# Appendix

**Table 10.3 – Results of the composite indicator for SDG 10. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 111.0 | 110.6 | 110.4 | 111.3 | 111.4 | 112.6 | 110.6 |
| Bulgaria | 82.7 | 79.2 | 81.3 | 79.6 | 78.0 | 77.5 | 74.7 |
| Czech Republic | 111.7 | 112.8 | 112.5 | 115.2 | 113.8 | 113.8 | 113.4 |
| Denmark | 108.9 | 111.4 | 112.4 | 110.1 | 111.7 | 110.8 | 111.2 |
| Germany | 106.0 | 106.3 | 107.5 | 106.0 | 102.3 | 104.4 | 106.1 |
| Estonia | 94.2 | 91.3 | 91.7 | 91.5 | 84.2 | 86.7 | 89.9 |
| Ireland | 103.7 | 103.8 | 101.0 | 102.2 | 100.5 | 103.2 | 103.7 |
| Greece | 91.8 | 87.6 | 82.4 | 80.6 | 82.6 | 83.8 | 82.9 |
| Spain | 88.6 | 87.6 | 85.2 | 86.1 | 82.7 | 81.9 | 83.5 |
| France | 107.4 | 106.9 | 107.7 | 108.6 | 110.6 | 111.1 | 110.6 |
| Croatia | 87.7 | 88.1 | 87.4 | 89.9 | 91.0 | 90.9 | 91.7 |
| Italy | 95.7 | 92.9 | 93.3 | 91.6 | 92.0 | 91.1 | 87.8 |
| Cyprus | 103.8 | 105.0 | 102.0 | 99.6 | 95.5 | 96.0 | 99.6 |
| Latvia | 79.9 | 81.2 | 82.4 | 83.5 | 83.6 | 82.3 | 85.1 |
| Lithuania | 78.3 | 87.3 | 92.6 | 86.9 | 88.6 | 79.9 | 80.8 |
| Luxembourg | 112.0 | 115.3 | 113.5 | 108.1 | 111.0 | 112.2 | 103.4 |
| Hungary | 109.9 | 104.7 | 103.1 | 101.3 | 100.7 | 101.4 | 103.3 |
| Malta | | | Not present due to lack of data | | | | |
| Netherlands | 117.1 | 116.6 | 117.4 | 117.8 | 115.3 | 115.1 | 113.3 |
| Austria | 107.8 | 110.5 | 110.4 | 110.6 | 111.1 | 111.8 | 111.8 |
| Poland | 94.5 | 95.1 | 95.9 | 96.1 | 96.1 | 96.8 | 97.1 |
| Portugal | 92.6 | 91.3 | 90.6 | 88.8 | 86.0 | 88.1 | 89.7 |
| Romania | 80.8 | 80.1 | 79.2 | 78.2 | 75.4 | 70.5 | 75.3 |
| Slovenia | 111.3 | 110.8 | 111.4 | 109.1 | 107.7 | 109.8 | 110.2 |
| Slovakia | 104.8 | 106.2 | 107.7 | 107.5 | 103.1 | 106.5 | 107.4 |
| Finland | 115.9 | 115.2 | 115.2 | 117.1 | 116.6 | 118.4 | 118.4 |
| Sweden | 110.8 | 109.8 | 109.1 | 110.2 | 108.4 | 109.3 | 107.6 |
| United Kingdom | 97.2 | 97.9 | 101.3 | 103.3 | 100.7 | 99.6 | 100.6 |
| **EU28** | **100.0** | **99.4** | **99.9** | **99.6** | **98.4** | **98.6** | **98.7** |

## *Goal 11 – Make cities and human settlements inclusive, safe, resilient and sustainable*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 11 was built using the indicators listed in Table 11.1. The indicators "Difficulty in accessing public transport by level of difficulty and degree of urbanization" (sdg_11_30), "Population connected to at least secondary wastewater treatment" (sdg_06_20), "Artificial land cover per capita" (sdg_15_30) and "Change in artificial land cover" (sdg_15_40) were excluded from the composite indicator because of lack of available data.

**Table 11.1 – List of the elementary indicators used for the composite indicator of SDG 11**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_11_10 | Overcrowding rate | - | 1.6 | 55.7 | 18.9 | 15.5 |
| sdg_11_20 | Population living in households considering that they suffer from noise | - | 8.0 | 31.6 | 16.1 | 4.8 |
| sdg_11_40 | People killed in road accidents | - | 2.6 | 11.7 | 5.7 | 2.1 |
| sdg_11_50 | Exposure to air pollution by particulate matter | - | 5.2 | 41.3 | 14.6 | 5.6 |
| sdg_11_60 | Recycling rate of municipal waste | + | 9.1 | 66.7 | 38.6 | 13.7 |
| sdg_01_60 | Population living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames of floor | - | 4.4 | 34.7 | 15.3 | 6.3 |
| sdg_09_50 | Share of collective transport modes in total passenger land transport | + | 10.2 | 32.5 | 18.6 | 4.6 |
| sdg_16_20 | Population reporting occurrence of crime, violence or vandalism in their area | - | 5.8 | 27.7 | 12.6 | 4.4 |

Correlation does not affect the composite indicator. Indicators have a correlation equal to 0.75 in only one case (highlighted in red in Table 11.2). Indicators "Overcrowding rate" (sdg_11_10) and "People killed in road accidents" (sdg_11_40) show two different phenomena. Therefore, they both have to be considered inside the composite indicators.

**Table 11.2 – Correlation matrix of elementary indicators of SDG 11**

| | sdg_11_10 | sdg_11_20 | sdg_11_40 | sdg_11_50 | sdg_11_60 | sdg_01_60 | sdg_09_50 | sdg_16_20 |
|---|---|---|---|---|---|---|---|---|
| **sdg_11_10** | 1.00 | -0.18 | 0.75 | 0.69 | -0.60 | 0.08 | 0.48 | 0.02 |
| **sdg_11_20** | -0.18 | 1.00 | -0.06 | -0.02 | 0.23 | 0.24 | -0.37 | 0.20 |
| **sdg_11_40** | 0.75 | -0.06 | 1.00 | 0.65 | -0.47 | 0.18 | 0.24 | 0.24 |
| **sdg_11_50** | 0.69 | -0.02 | 0.65 | 1.00 | -0.21 | 0.32 | 0.30 | 0.25 |
| **sdg_11_60** | -0.60 | 0.23 | -0.47 | -0.21 | 1.00 | 0.06 | -0.33 | 0.10 |
| **sdg_01_60** | 0.08 | 0.24 | 0.18 | 0.32 | 0.06 | 1.00 | -0.12 | 0.12 |
| **sdg_09_50** | 0.48 | -0.37 | 0.24 | 0.30 | -0.33 | -0.12 | 1.00 | -0.22 |
| **sdg_16_20** | 0.02 | 0.20 | 0.24 | 0.25 | 0.10 | 0.12 | -0.22 | 1.00 |

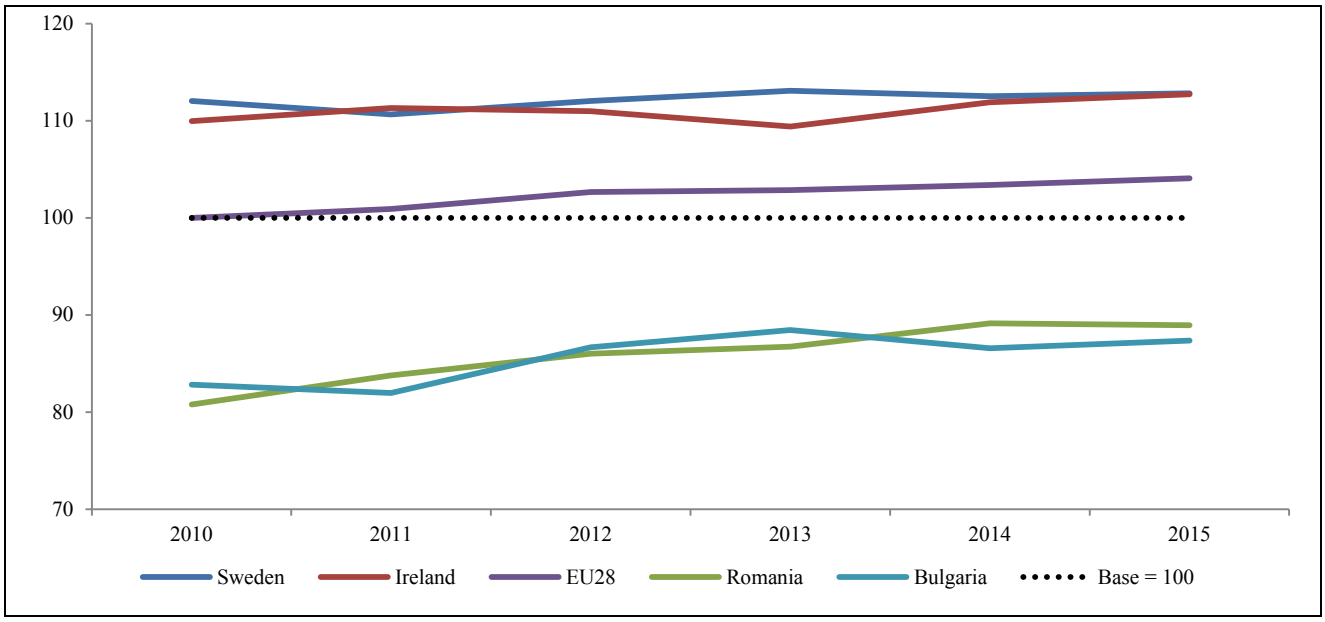
## Composite indicator

The overall EU28 composite indicator for SDG 11 shows an increasing trend in the observed period (2010-2015), reaching 104.1 points. This growth can be explained by the growth of the indicator "Recycling rate of municipal waste" (sdg_11_60), that reaches the 45% of total waste generated, as well as the decline of the indicator "Exposure to air pollution by particulate matter" (sdg_11_50). Moreover, there is a slight decrease of the indicators "People killed in road accidents" (sdg_11_40), "Population living in households considering that they suffer from noise" (sdg_11_20) and "Overcrowding rate" (sdg_11_10).

There are substantial differences between member states. In fact, while the best performer (Sweden) scored 112.8 in 2016, the worst performer (Bulgaria) scored 87.4 in the last observed year.

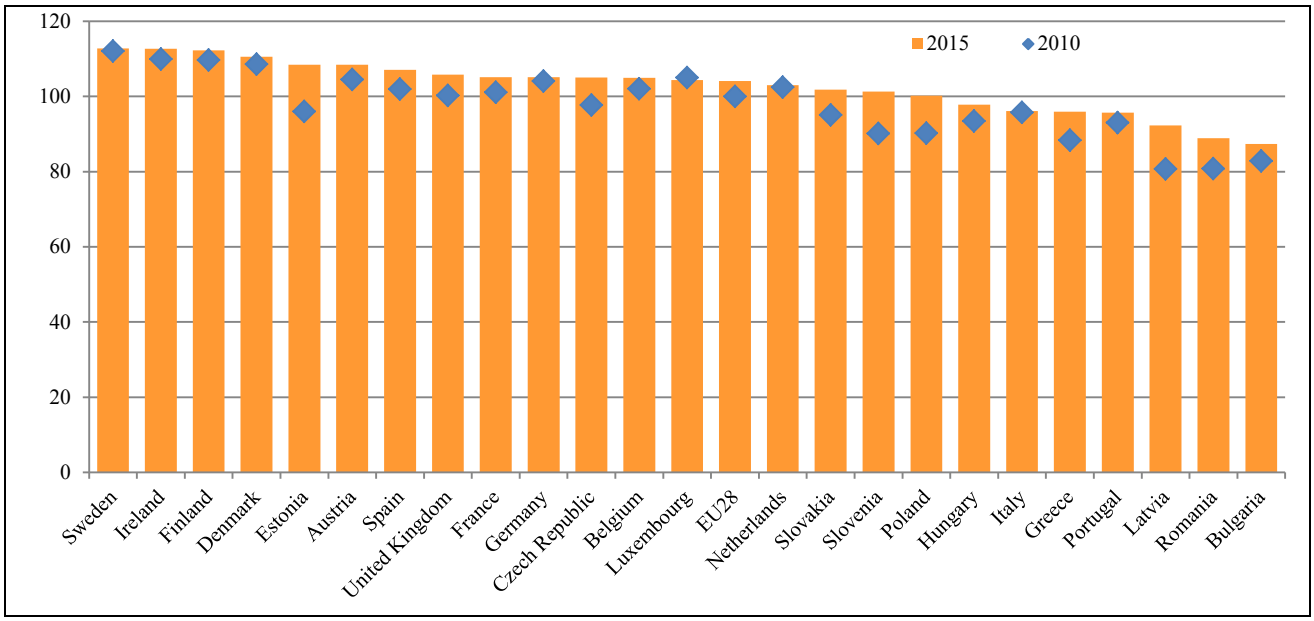
Comparing the composite indicator for all EU28 countries, we can see that the situation improved for the majority of member states. The countries that improved the most are Estonia, Slovenia and Latvia. The promising growth of Estonia's composite indicator can be explained by the broad increase in the "Recycling rate of municipal waste" (sdg_11_60) indicator, that went from 18% in 2010 to 28% in 2015 and the huge decrease of the percentage of "People living in overcrowded conditions" (sdg_11_10), that fell from 39.7% in 2010 to 13.4% in 2015.

**Fig. 11.1 – Composite indicators of SDG 11. EU28 average, best performers (Sweden, Ireland) and worst performers in 2015 (Romania, Bulgaria). Base EU28 2010=100**




The only country that slightly worsened its situation in the observed period is Luxemburg. The descending trend from 2010 to 2015 is mainly due to a worrying increase of the indicator "Population reporting occurrence of crime, violence or vandalism in their area", which rose from 10.2% in 2010 to 14.9% in 2015, and to an increase of the indicator "Population living in households considering that they suffer from noise".

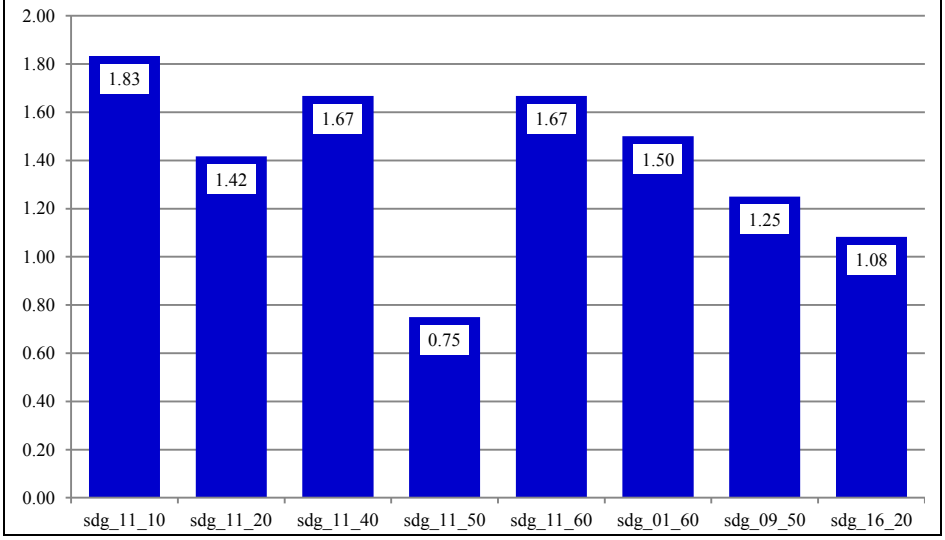
**Fig. 11.2 – SDG 11 composite indicator scores for EU28 countries, years 2010 and 2015. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the mean of shifts in the ranking by the removal of each elementary indicator. The indicator "Overcrowding rate by poverty status" (sdg_11_10) has the highest impact on the composite indicator, and the indicator "Exposure to air pollution by particulate matter" (sdg_11_50) has less of an influence on the composite indicator.

**Fig. 11.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2015**



# Appendix

**Table 11.3 – Results of the composite indicator for SDG 11. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Belgium | 102.0 | 102.0 | 105.2 | 103.2 | 105.1 | 105.0 |
| Bulgaria | 82.8 | 82.0 | 86.7 | 88.5 | 86.6 | 87.4 |
| Czech Republic | 97.6 | 99.0 | 102.1 | 102.7 | 103.9 | 105.0 |
| Denmark | 108.6 | 105.1 | 109.1 | 110.1 | 110.2 | 110.6 |
| Germany | 104.0 | 103.4 | 104.9 | 104.5 | 105.0 | 105.1 |
| Estonia | 96.0 | 100.6 | 100.3 | 101.8 | 105.6 | 108.5 |
| Ireland | 109.9 | 111.3 | 111.0 | 109.4 | 111.9 | 112.7 |
| Greece | 88.4 | 89.2 | 90.4 | 93.1 | 95.8 | 96.0 |
| Spain | 101.9 | 105.6 | 108.0 | 105.7 | 106.0 | 107.1 |
| France | 101.1 | 102.2 | 103.3 | 103.4 | 104.4 | 105.1 |
| Croatia | | | Not present due to lack of data | | | |
| Italy | 95.7 | 95.3 | 98.1 | 98.2 | 97.6 | 96.1 |
| Cyprus | | | Not present due to lack of data | | | |
| Latvia | 80.7 | 87.2 | 89.4 | 92.7 | 89.6 | 92.3 |
| Lithuania | | | Not present due to lack of data | | | |
| Luxembourg | 105.0 | 106.5 | 104.5 | 102.5 | 103.6 | 104.3 |
| Hungary | 93.5 | 95.3 | 96.4 | 96.5 | 96.0 | 97.8 |
| Malta | | | Not present due to lack of data | | | |
| Netherlands | 102.5 | 102.0 | 102.2 | 102.8 | 102.5 | 103.0 |
| Austria | 104.5 | 106.1 | 107.3 | 107.9 | 108.8 | 108.4 |
| Poland | 90.2 | 90.6 | 93.6 | 95.6 | 97.6 | 100.2 |
| Portugal | 93.0 | 94.3 | 96.3 | 93.0 | 93.4 | 95.7 |
| Romania | 80.8 | 83.8 | 86.0 | 86.7 | 89.1 | 88.9 |
| Slovenia | 90.1 | 93.1 | 97.5 | 98.8 | 98.8 | 101.3 |
| Slovakia | 95.1 | 95.6 | 97.1 | 99.6 | 99.1 | 101.8 |
| Finland | 109.6 | 109.6 | 109.8 | 109.9 | 110.6 | 112.3 |
| Sweden | 112.0 | 110.7 | 112.0 | 113.1 | 112.5 | 112.8 |
| United Kingdom | 100.2 | 101.3 | 102.5 | 104.4 | 104.5 | 105.8 |
| **EU28** | **100.0** | **100.9** | **102.7** | **102.8** | **103.4** | **104.1** |

## *Goal 12 – Ensure sustainable consumption and production patterns*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 12 was built using the indicators listed in Table 12.1. The indicator "Consumption of toxic chemicals by hazardousness" (sdg_12_10) was excluded from the composite indicator because the only data available is for the EU28 on the whole. The indicators, "Generation of waste excluding major mineral wastes by hazardousness" (sdg_12_50) and "Recycling and landfill rate of waste excluding major mineral wastes" (sdg_12_60) were excluded from the composite indicator because there is a lack of available data both for the countries and the time series. In order to maintain one indicator regarding waste and recycling, the indicator "Recycling rate of municipal waste" (sdg_11_60) was introduced inside this composite indicator. The indicator, "Volume of freight transport relative to GDP" (sdg_12_40) was excluded since its polarity cannot be clearly explained.

**Table 12.1 – List of the elementary indicators used for the composite indicator of SDG 12**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_12_20 | Resource productivity and domestic material consumption | + | 0.27 | 4.07 | 1.7 | 1.0 |
| sdg_12_30 | Average CO2 emissions per km from new passenger cars | - | 101.2 | 162 | 118.8 | 8.0 |
| sdg_11_60 | Recycling rate of municipal waste | + | 4 | 66.7 | 37.6 | 14.9 |
| sdg_07_10 | Primary energy consumption | - | 73.08 | 125 | 96.1 | 8.8 |
| sdg_07_11 | Final energy consumption | - | 74.6 | 120.0 | 100.0 | 7.8 |
| sdg_07_30 | Energy productivity | + | 2.0 | 16.9 | 7.6 | 3.5 |
| sdg_07_40 | Share of renewable energy in gross final energy consumption | + | 1.0 | 53.8 | 20.0 | 11.8 |

Correlation does not affect the composite indicator. The highest observed correlation is 0.64 between indicators "Resource productivity and domestic material consumption (DMC)" (sdg_12_20) and "Energy productivity" (sdg_07_30).

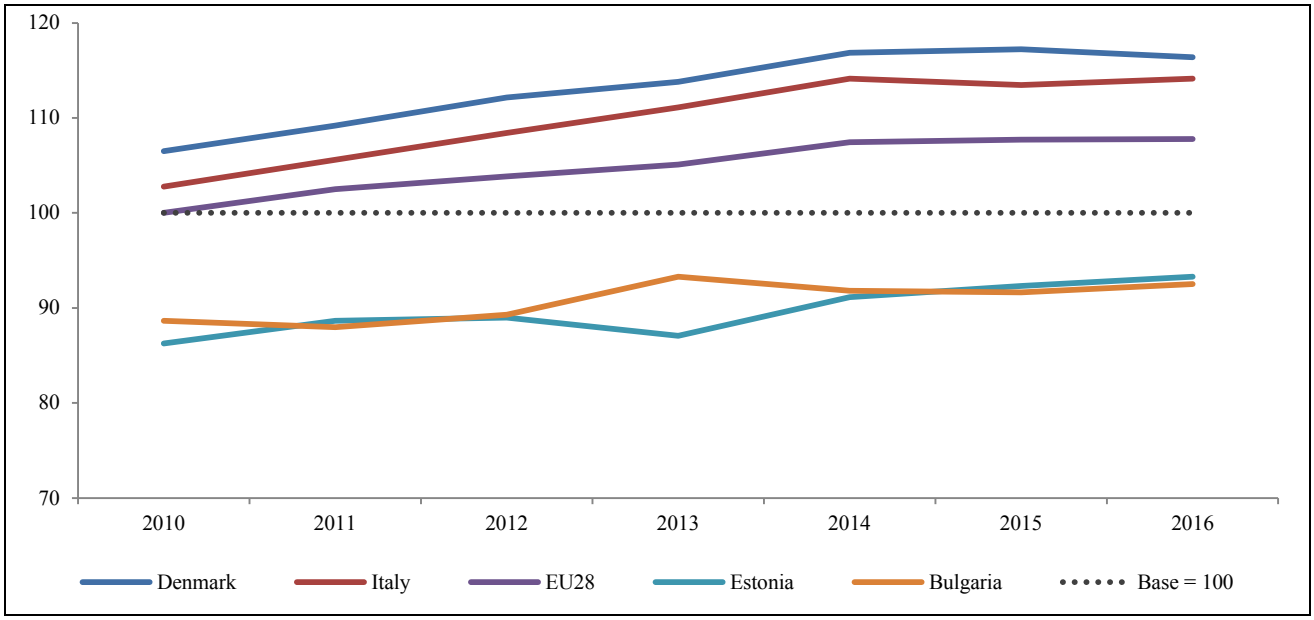
**Table 12.2 – Correlation matrix of elementary indicators of SDG 12**

| | sdg_12_20 | sdg_12_30 | sdg_11_60 | sdg_07_10 | sdg_07_11 | sdg_07_30 | sdg_07_40 |
|---|---|---|---|---|---|---|---|
| **sdg_12_20** | 1.00 | -0.45 | 0.49 | -0.10 | -0.25 | 0.64 | -0.39 |
| **sdg_12_30** | -0.45 | 1.00 | 0.05 | 0.47 | 0.42 | -0.53 | 0.13 |
| **sdg_11_60** | 0.49 | 0.05 | 1.00 | 0.34 | 0.17 | 0.23 | 0.07 |
| **sdg_07_10** | -0.10 | 0.47 | 0.34 | 1.00 | 0.16 | -0.27 | 0.29 |
| **sdg_07_11** | -0.25 | 0.42 | 0.17 | 0.16 | 1.00 | -0.12 | -0.01 |
| **sdg_07_30** | 0.64 | -0.53 | 0.23 | -0.27 | -0.12 | 1.00 | -0.19 |
| **sdg_07_40** | -0.39 | 0.13 | 0.07 | 0.29 | -0.01 | -0.19 | 1.00 |

## Composite indicator

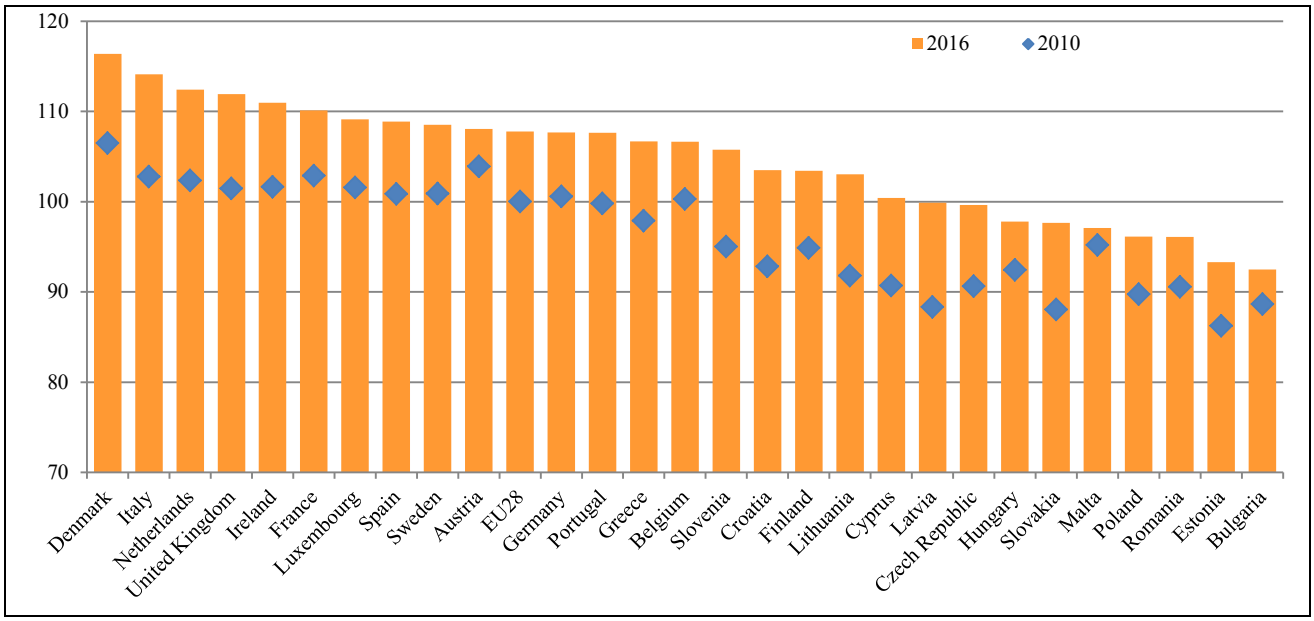
The overall EU28 composite indicator for SDG 12 shows an increasing trend in the observed period (2012-2016), reaching the 107.8 point mark. Analyzing the trend of the elementary indicators of the EU28, there is an overall improvement in all the indicators. In particular, "Resource productivity and domestic material consumption" (sdg_12_20), "Recycling rate of municipal waste" (sdg_11_60) and "Share of renewable energy in gross final energy consumption" (sdg_07_40) have improved, while the indicator "Average CO2 emissions per km from new passenger cars" (sdg_12_30) has fallen, explaining the increasing trend of the composite indicator. It is important to remark that the EU28 composite indicator shows a stable trend from 2014 to 2016 caused by the rise of the indicators related to energy consumption (sdg_07_10, sdg_07_11).
There are no substantial differences between the trends of member states. In fact, both the best performer (Denmark) and the second worst performer (Estonia) improved their situation in the observed period, Denmark by 9.9 and Estonia by 7.0. However, as shown in Fig.12.1, there are differences in terms of distance from the EU28 situation in 2010.

**Fig. 12.1 – Composite indicators, SDG 12. EU28 average, best performers (Denmark, Italy) and worst performers in 2016 (Estonia, Bulgaria). Base EU28 2010=100.**



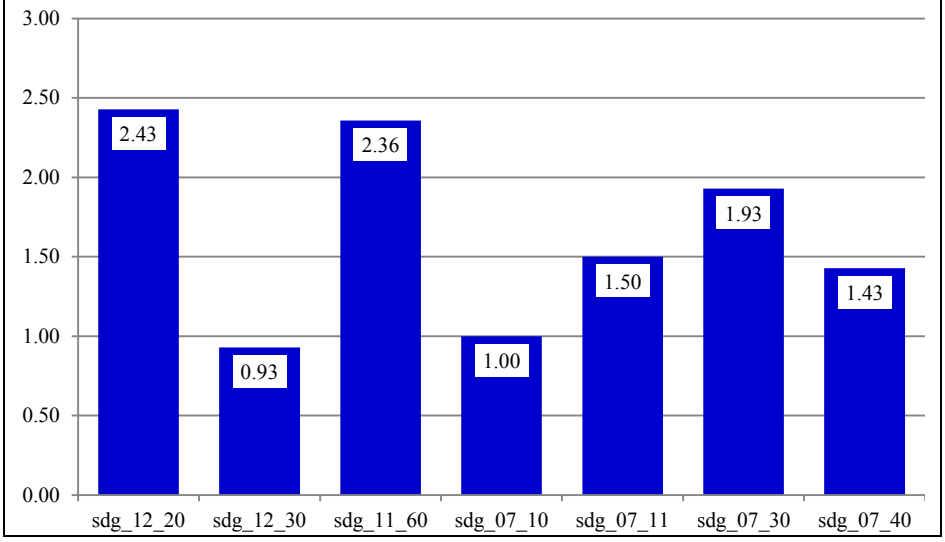

Comparing the composite indicator for all EU28 countries, we can see that the situation improved for all member states. The countries that improved the most are Latvia, Italy and Lithuania. The promising performance of Italy can be explained by the increase in the "Resource productivity and domestic material consumption" (sdg_12_20), "Recycling rate of municipal waste" (sdg_11_60) and "Share of renewable energy in gross final energy consumption" (sdg_07_40) indicators, as well as the fall of the indicator "Average CO2 emissions per km from new passenger cars" (sdg_12_30). For the latter, it is important to point out Greece's remarkable situation, that has seen the average CO2 emissions decrease drastically, bringing the level of CO2 (g/km) from 143.7 to 106.3 in six years.

**Fig. 12.2 – SDG 12 composite indicator scores for EU28 countries, years 2010 and 2016. Base EU28 2010=100**




## Influence analysis of elementary indicators

**Fig. 12.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2016**




The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator. The indicator "Resource productivity and domestic material consumption" (sdg_12_20) has the highest impact on the composite indicator, while "Average CO2 emissions per km from new passenger cars" as well as "Primary energy consumption" (sdg_07_10) have less influence on the composite indicator.

# Appendix

**Table 12.3 – Results of the composite indicator for SDG 12. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 100.3 | 104.0 | 105.5 | 104.8 | 108.2 | 107.5 | 106.6 |
| Bulgaria | 88.6 | 88.0 | 89.3 | 93.3 | 91.8 | 91.6 | 92.5 |
| Czech Republic | 90.6 | 92.5 | 94.8 | 96.0 | 97.8 | 98.6 | 99.6 |
| Denmark | 106.5 | 109.2 | 112.2 | 113.8 | 116.9 | 117.2 | 116.4 |
| Germany | 100.6 | 104.0 | 104.6 | 104.4 | 107.1 | 107.9 | 107.7 |
| Estonia | 86.3 | 88.6 | 89.0 | 87.1 | 91.1 | 92.3 | 93.3 |
| Ireland | 101.6 | 106.2 | 107.8 | 108.1 | 110.5 | 111.8 | 111.0 |
| Greece | 97.9 | 99.8 | 102.4 | 106.2 | 106.3 | 106.3 | 106.7 |
| Spain | 100.9 | 102.1 | 104.9 | 108.3 | 109.3 | 108.6 | 108.9 |
| France | 102.9 | 104.9 | 105.6 | 106.2 | 109.3 | 109.3 | 110.1 |
| Croatia | 92.8 | 95.2 | 99.0 | 100.4 | 103.6 | 102.9 | 103.5 |
| Italy | 102.8 | 105.6 | 108.4 | 111.1 | 114.1 | 113.5 | 114.1 |
| Cyprus | 90.7 | 92.6 | 95.8 | 100.7 | 102.4 | 102.6 | 100.4 |
| Latvia | 88.3 | 91.9 | 92.9 | 96.2 | 97.7 | 99.2 | 99.9 |
| Lithuania | 91.8 | 96.1 | 96.9 | 99.1 | 100.1 | 101.6 | 103.0 |
| Luxembourg | 101.6 | 102.9 | 104.9 | 106.6 | 108.9 | 109.4 | 109.1 |
| Hungary | 92.4 | 94.0 | 97.0 | 98.2 | 98.9 | 97.8 | 97.8 |
| Malta | 95.2 | 95.8 | 94.2 | 97.4 | 97.1 | 95.0 | 97.1 |
| Netherlands | 102.3 | 106.9 | 108.0 | 109.3 | 112.6 | 112.2 | 112.4 |
| Austria | 103.9 | 105.7 | 106.8 | 106.2 | 108.8 | 108.3 | 108.1 |
| Poland | 89.7 | 89.8 | 91.5 | 93.1 | 96.2 | 97.9 | 96.1 |
| Portugal | 99.8 | 102.0 | 105.5 | 106.5 | 108.2 | 107.5 | 107.6 |
| Romania | 90.6 | 90.8 | 92.4 | 95.0 | 95.8 | 95.7 | 96.1 |
| Slovenia | 95.0 | 97.9 | 101.1 | 102.2 | 103.9 | 106.7 | 105.8 |
| Slovakia | 88.0 | 90.7 | 93.4 | 93.1 | 95.0 | 96.5 | 97.7 |
| Finland | 94.9 | 97.9 | 99.1 | 100.4 | 101.4 | 104.6 | 103.4 |
| Sweden | 100.9 | 104.3 | 105.3 | 106.8 | 108.3 | 110.3 | 108.5 |
| United Kingdom | 101.5 | 105.9 | 106.0 | 107.2 | 110.4 | 111.0 | 111.9 |
| **EU28** | **100.0** | **102.5** | **103.9** | **105.1** | **107.5** | **107.7** | **107.8** |

## *Goal 13 – Take urgent action to combat climate change and its impacts*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 13 was built using the indicators listed in Table 13.1. The indicators "Mean near surface temperature deviation" (sdg_13_30), "Climate related economic losses by type of event"(sdg_13_40),"Contribution to the international 100bn USD commitment on climate related expending" (sdg_13_50), "Population covered by the Covenant of Mayors for Climate & Energy signatories" (sdg_13_60) and "Mean ocean acidity" (sdg_14_50) were excluded from the composite indicator because of a significant lack of data availability.

**Table 13.1 – List of the elementary indicators used for the composite indicator of SDG 13**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_13_10 | Greenhouse gas emissions | - | 41.5 | 162.4 | 81.2 | 25.3 |
| sdg_13_20 | Greenhouse gas emissions intensity of energy consumption | - | 61.0 | 123.9 | 86.7 | 9.4 |
| sdg_07_10 | Primary energy consumption | - | 0.7 | 1.3 | 1.0 | 0.1 |
| sdg_07_11 | Final energy consumption | - | 0.8 | 1.2 | 1.0 | 0.1 |
| sdg_07_40 | Share of renewable energy in gross final energy consumption | + | 1.0 | 53.8 | 20.0 | 11.8 |
| sdg_12_30 | Average CO2 emissions per km from new passenger cars | - | 101.2 | 162.0 | 118.8 | 8.0 |

Correlation does not affect the composite indicator. All observed correlations are inferior to 0.75.

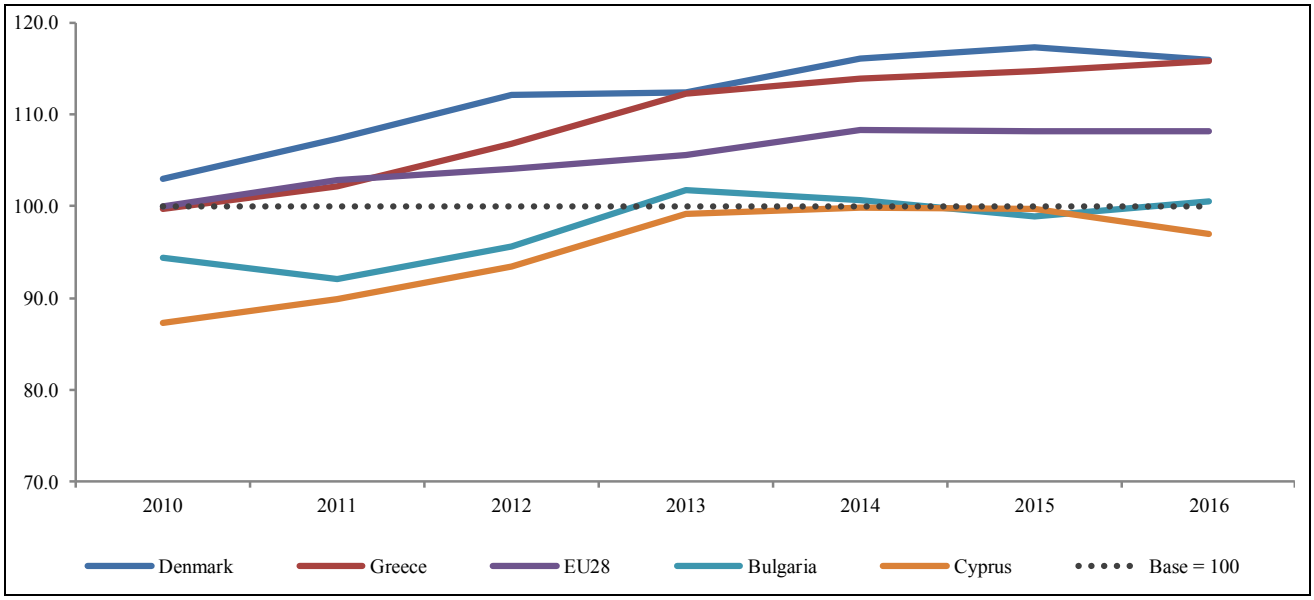
**Table 13.2 – Correlation matrix of elementary indicators of SDG 13**

| | sdg_13_10 | sdg_13_20 | sdg_07_10 | sdg_07_11 | sdg_07_40 | sdg_12_30 |
|---|---|---|---|---|---|---|
| **sdg_13_10** | 1.00 | -0.11 | -0.15 | -0.22 | -0.27 | -0.47 |
| **sdg_13_20** | -0.11 | 1.00 | 0.12 | -0.06 | -0.15 | 0.37 |
| **sdg_07_10** | -0.15 | 0.12 | 1.00 | 0.16 | 0.29 | 0.47 |
| **sdg_07_11** | -0.22 | -0.06 | 0.16 | 1.00 | -0.01 | 0.43 |
| **sdg_07_40** | -0.27 | -0.15 | 0.29 | -0.01 | 1.00 | 0.13 |
| **sdg_12_30** | -0.47 | 0.37 | 0.47 | 0.43 | 0.13 | 1.00 |

## Composite indicator

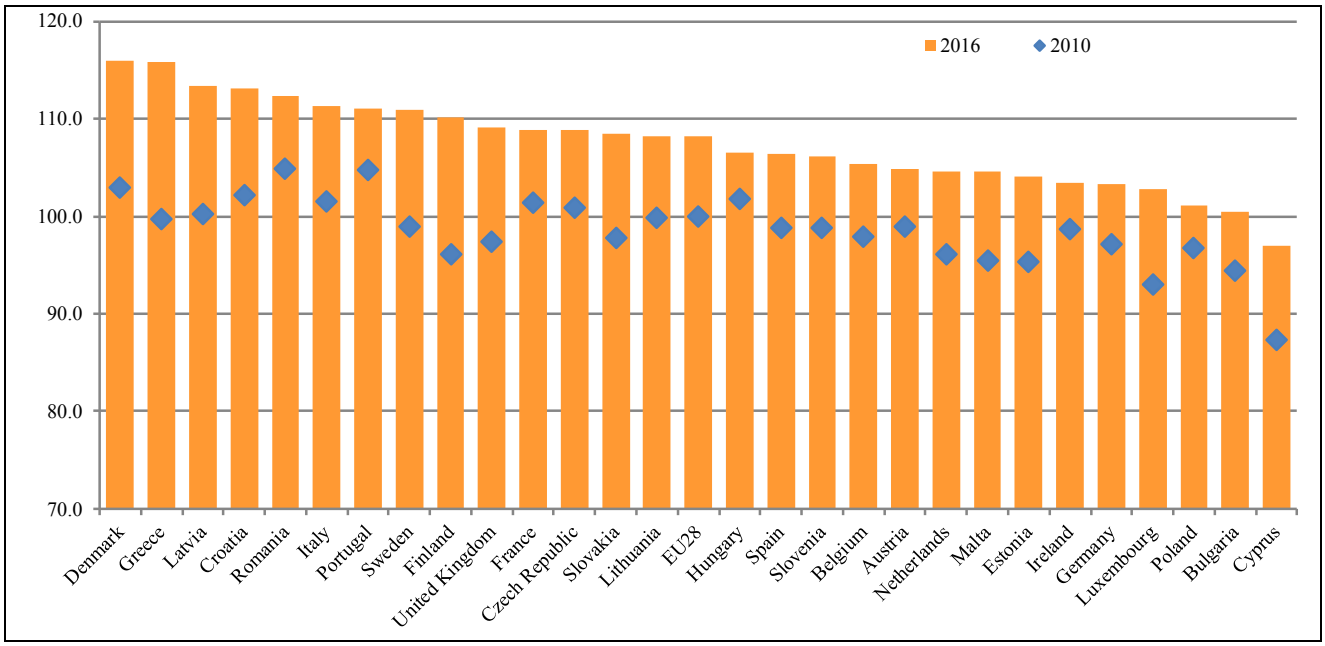
The overall EU28 composite indicator for SDG 13 shows an increasing trend in the observed period (2010-2016), due to the fall of the indicators "Greenhouse gas emissions" (sdg_13_10), "Greenhouse gas emissions intensity of energy consumption" (sdg_13_20), "Primary and final energy consumption" (sdg_7_10; sdg_7_11) and "Average CO2 emissions per km from new passenger cars" (sdg_12_30) as well as the consistent increase of the "Share of renewable energy in gross final energy consumption by sector" (sdg_07_40).
However, in the last observed year, 2015-2016, there has been a steady trend, as shown in the Fig.13.1, where the EU28 composite indicator lies at the 2015 level of 108.1. This stable trend can be attributed to the slight worsening of all composite indicators, except for sdg_07_40 that continues to rise, and sdg_12_30 that keeps reducing.
There are substantial differences between the developing trends of member states in terms of distance from the 2010 EU28 level. While the best performer (Denmark) moved from 102.9 to 115.9 in 6 years, the worst performer (Cyprus) has seen its situation improve until it fell back to the EU28 2010 level in 2013, then suffering a further decrease to the 96.9 point mark in 2016.

**Fig. 13.1 – Composite indicators of SDG 13. EU28 average, best performers (Denmark, Greece) and worst performers in 2016 (Bulgaria, Cyprus). Base EU28 2010=100**




Comparing the composite indicator for all EU28 countries, the situation improved for all member states. The countries that improved the most are, respectively, Greece, Finland and Latvia. In these cases, all the indicators show great improvements, in particular, there is a considerable decrease in the "Greenhouse gas emissions" (sdg_13_10) and "Average CO2 emissions per km from new passenger cars" (sdg_12_30) indicators, while a remarkable increase can be observed in the "Share of renewable energy in gross final energy consumption" (sdg_07_40) indicator.

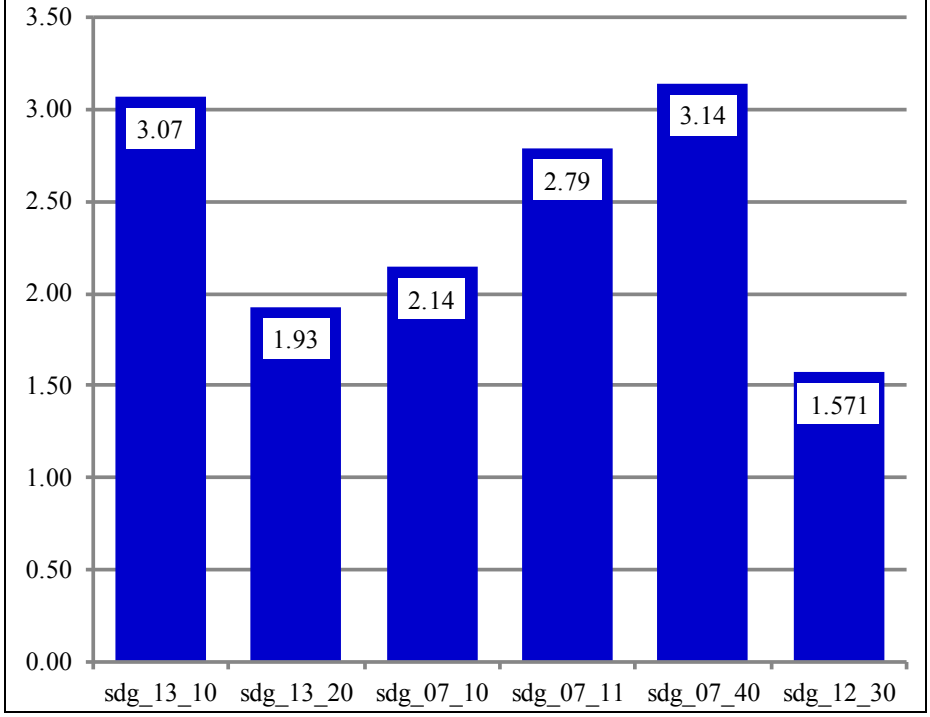
**Fig. 13.2 – SDG 13 composite indicator scores for EU28 countries, years 2010 and 2016. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator. The indicator "Share of renewable energy in gross final energy consumption" (SDG_07_40) has the highest impact, whereas "Average CO2 emissions per km from new passenger cars" (SDG_12_30) has less of an influence on the composite indicator.

**Fig. 13.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2015**



# Appendix

**Table 13.3 – Results of the composite indicator for SDG 13. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 97.9 | 102.9 | 103.6 | 103.3 | 107.1 | 105.4 | 105.4 |
| Bulgaria | 94.3 | 92.1 | 95.7 | 101.8 | 100.6 | 98.9 | 100.5 |
| Czech Republic | 100.9 | 102.9 | 104.7 | 107.0 | 109.1 | 109.2 | 108.8 |
| Denmark | 102.9 | 107.4 | 112.1 | 112.4 | 116.0 | 117.3 | 115.9 |
| Germany | 97.1 | 100.5 | 100.7 | 100.3 | 103.3 | 103.7 | 103.3 |
| Estonia | 95.3 | 97.6 | 100.0 | 97.7 | 100.3 | 104.9 | 104.1 |
| Ireland | 98.7 | 103.4 | 104.3 | 105.3 | 106.3 | 104.8 | 103.5 |
| Greece | 99.7 | 102.1 | 106.8 | 112.2 | 113.9 | 114.7 | 115.8 |
| Spain | 98.8 | 99.5 | 101.7 | 105.9 | 106.8 | 105.3 | 106.3 |
| France | 101.4 | 104.3 | 104.5 | 105.3 | 109.4 | 108.7 | 108.9 |
| Croatia | 102.2 | 104.3 | 108.2 | 110.6 | 114.4 | 113.5 | 113.1 |
| Italy | 101.5 | 103.5 | 105.7 | 108.9 | 111.4 | 110.8 | 111.3 |
| Cyprus | 87.3 | 89.9 | 93.4 | 99.2 | 99.9 | 99.8 | 96.9 |
| Latvia | 100.3 | 106.2 | 107.4 | 109.1 | 111.0 | 112.1 | 113.4 |
| Lithuania | 99.8 | 104.3 | 104.3 | 106.3 | 107.6 | 109.7 | 108.2 |
| Luxembourg | 93.0 | 94.0 | 96.0 | 98.2 | 100.4 | 102.3 | 102.7 |
| Hungary | 101.7 | 103.6 | 106.8 | 109.0 | 109.7 | 107.4 | 106.5 |
| Malta | 95.4 | 95.6 | 92.9 | 97.5 | 98.1 | 100.0 | 104.6 |
| Netherlands | 96.1 | 101.0 | 102.5 | 103.4 | 106.8 | 105.4 | 104.6 |
| Austria | 98.9 | 101.3 | 103.1 | 102.7 | 106.5 | 105.3 | 104.9 |
| Poland | 96.7 | 98.0 | 99.3 | 100.5 | 103.2 | 103.3 | 101.0 |
| Portugal | 104.7 | 106.8 | 109.5 | 111.7 | 112.5 | 110.4 | 111.1 |
| Romania | 104.9 | 104.7 | 106.0 | 110.4 | 111.5 | 111.5 | 112.4 |
| Slovenia | 98.7 | 99.3 | 101.8 | 104.9 | 109.1 | 108.8 | 106.2 |
| Slovakia | 97.8 | 101.0 | 104.0 | 104.5 | 108.2 | 108.7 | 108.4 |
| Finland | 96.1 | 101.4 | 105.0 | 106.7 | 109.3 | 112.6 | 110.1 |
| Sweden | 98.9 | 104.4 | 106.7 | 108.8 | 110.6 | 111.6 | 110.9 |
| United Kingdom | 97.4 | 102.1 | 101.7 | 103.0 | 106.8 | 108.0 | 109.2 |
| **EU28** | **100.0** | **102.9** | **104.0** | **105.5** | **108.3** | **108.1** | **108.1** |

## *Goal 14 – Conserve and sustainably use the oceans, seas and marine resources for sustainable development*

### Descriptive analysis of elementary indicators

EU country data for Goal 14 is scant and poorly available. For this reason, it was calculated only as a composite indicator at the EU level without details for individual countries. Therefore, in this exercise the elementary indicators are standardized using the minimum and maximum calculated on the EU time series only, rather than the minimum and maximum between all the member states. The composite indicator therefore stands in a wider range of values and is not comparable with the composite indicators of the other Goals. Furthermore, the scarceness of available indicators, as well as the absence of reliable indicators on marine pollution, only allows a partial analysis of the context. The composite indicator for SDG 14 was built using the indicators listed in Table 14.1. The indicators "Bathing sites with excellent water quality" (sdg_14_40) and "Mean ocean acidity" (sdg_14_50) were excluded from the composite indicator because of lack of available data in the times series. The indicator "Catches in major fishing areas" (sdg_14_20) was left out since its polarity cannot be clearly explained.

**Table 14.1 – List of the elementary indicators used for the composite indicator of SDG 14**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_14_10 | Sufficiency of marine sites designated under the EU Habitats directive | + | 198,757.0 | 360,350.0 | 278339.6 | 58943.9 |
| sdg_14_30 | Assessed fish stocks exceeding fishing mortality at maximum sustainable yield (FMSY) | - | 40.9 | 58.7 | 46.9 | 6.0 |

Correlation does not affect the composite indicator. The two indicators have a correlation coefficient equal to 0.48 in absolute terms, therefore inferior to 0.75 (Table 14.2).

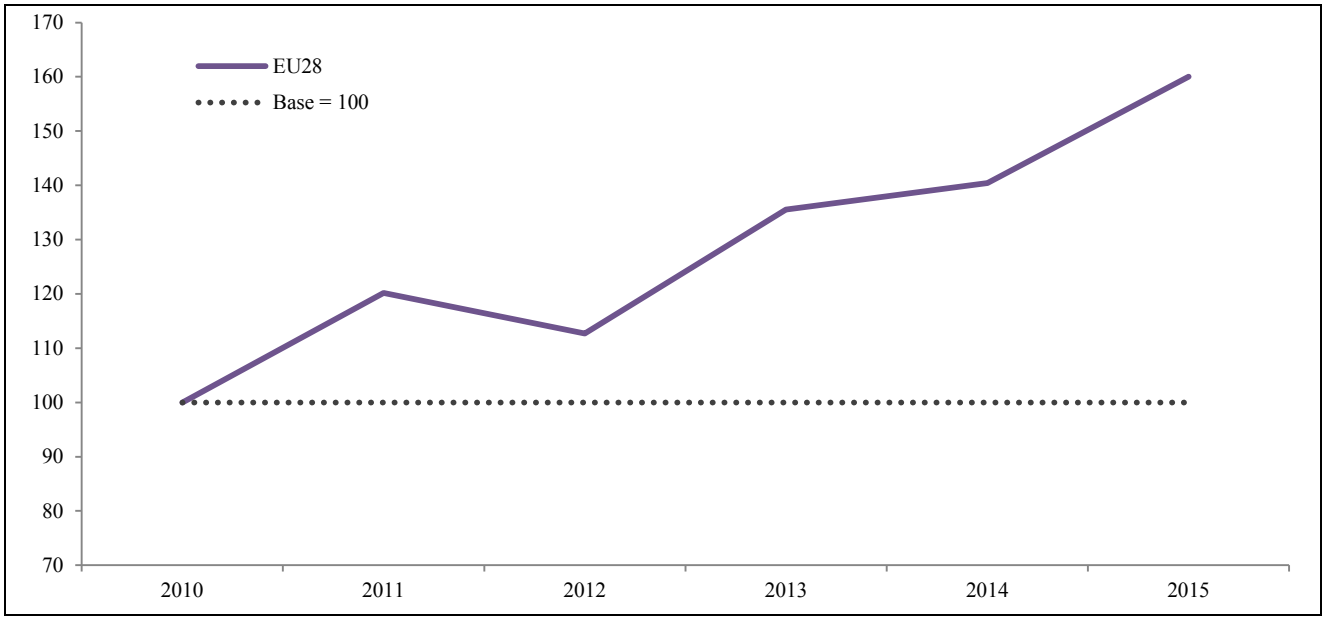
**Table 14.2 – Correlation matrix of elementary indicators of SDG 14**

| | sdg_14_10 | sdg_14_30 |
|---|---|---|
| **sdg_14_10** | 1.00 | -0.48 |
| **sdg_14_30** | -0.48 | 1.00 |

## Composite indicator

The overall EU28 composite indicator for SDG 14 shows an increasing trend in the observed period (2010-2015), reaching the 160 point mark in 2015.
In particular, between 2010 and 2015 the surface of marine protected areas observed in the indicator "Sufficiency of marine sites designated under the EU Habitats directive" (sdg_14_10) almost doubled, while the indicator "Assessed fish stocks exceeding fishing mortality at maximum sustainable yield (FMSY)" (sdg_14_30) revealed a consistent downward tendency explaining the promising trend of the composite indicator.

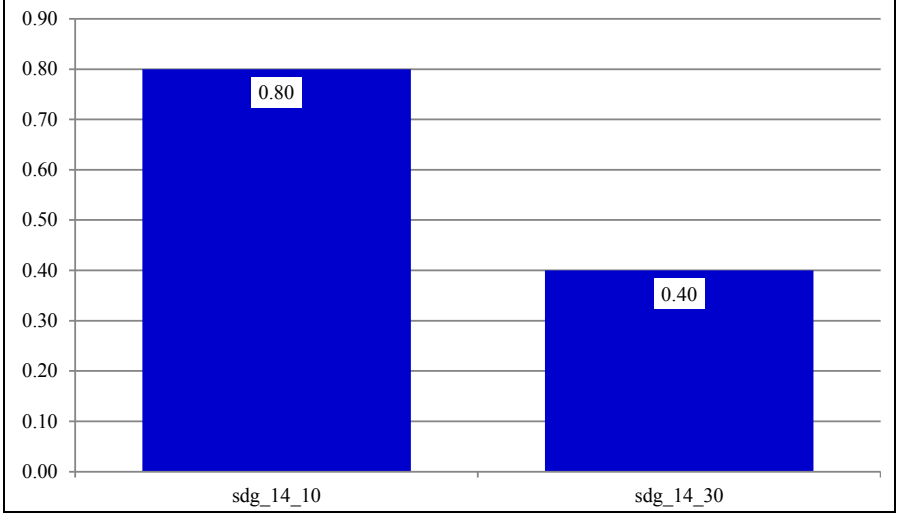
**Fig. 14.1 – Composite indicators of SDG 14. EU28 average. Base EU28 2010=140.**



## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator. The indicator "Sufficiency of marine sites designated under the EU Habitats directive" (sdg_14_10) has a higher impact than "Assessed fish stocks exceeding fishing mortality at maximum sustainable yield (FMSY) by fishing area" (sdg_14_30) on the composite indicator.

**Fig. 14.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2015**




## Appendix

**Table 14.3 – Results of the composite indicator for SDG 14. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| EU28 | 100.0 | 120.2 | 112.7 | 135.5 | 140.4 | 160.0 |

## *Goal 15 – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*

## Descriptive analysis of elementary indicators

The composite indicator for SDG 15 was built using the indicators listed in Table 15.1. "Estimated soil erosion by water" (sdg_15_50), "Common bird index by type of species" (sdg_15_60), "Nitrate in groundwater" (sdg_06_40), "Biochemical oxygen demand in rivers" (sdg_06_30) and "Phosphate in rivers" (sdg_06_50) were excluded from the composite indicator because of lack of available data in the time series and/or in the countries. The indicator "Change in artificial land cover" (sdg_15_40) was used in place of "Artificial land cover by capita" (sdg_15_30) in order to take into account the development of artificial land cover over time, rather than its ratio with population.

**Table 15.1 – List of the elementary indicators used for the composite indicator of SDG 15**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_15_10 | Share of forest area | + | 7.8 | 71.7 | 39.6 | 16.3 |
| sdg_15_20_nt | Sufficiency of terrestrial sites designated under the EU Habitats Directive | + | 0.0 | 0.3 | 0.2 | 0.1 |
| sdg_15_40 | Change in artificial land cover | - | 92.9 | 109.6 | 109.1 | 3.6 |

Correlation does not affect the composite indicator. The highest correlation between elementary indicators is equal to 0.38, which is inferior to 0.75.

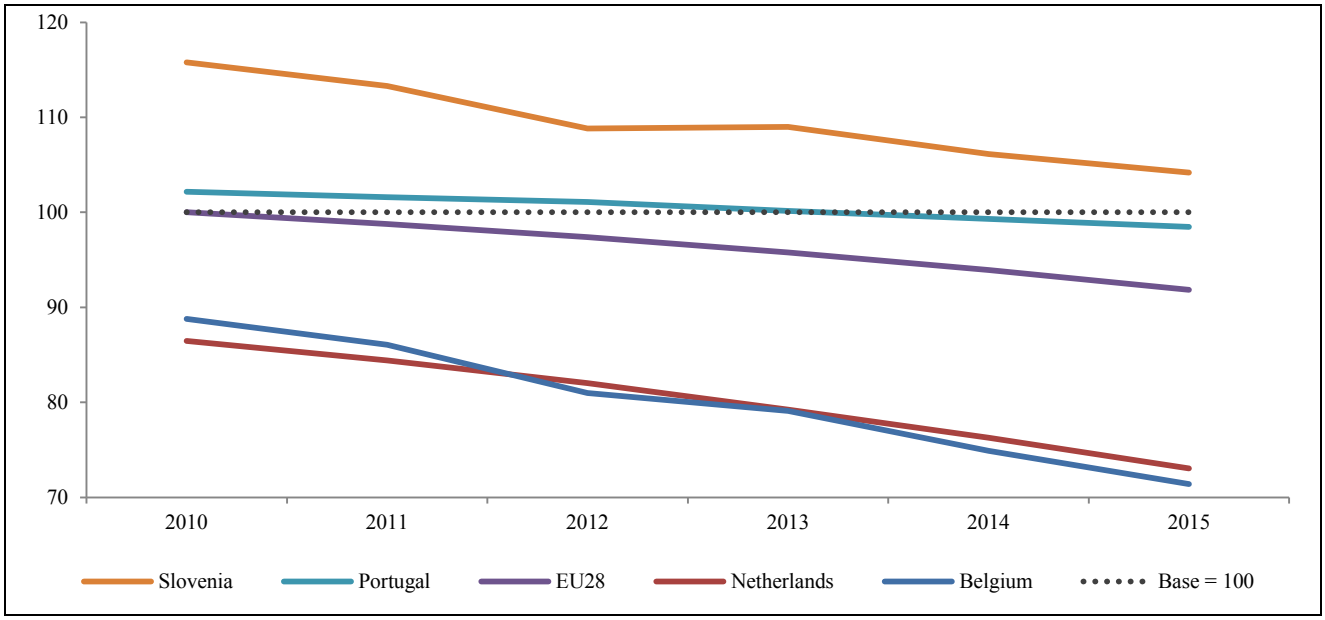
**Table 15.2 – Correlation matrix of elementary indicators of SDG 15**

| Indicatore | sdg_15_10 | sdg_15_20_NT | sdg_15_40 |
|---|---|---|---|
| **sdg_15_10** | 1.00 | 0.34 | -0.03 |
| **sdg_15_20_NT** | 0.34 | 1.00 | 0.38 |
| **sdg_15_40** | -0.03 | 0.38 | 1.00 |

## Composite indicator

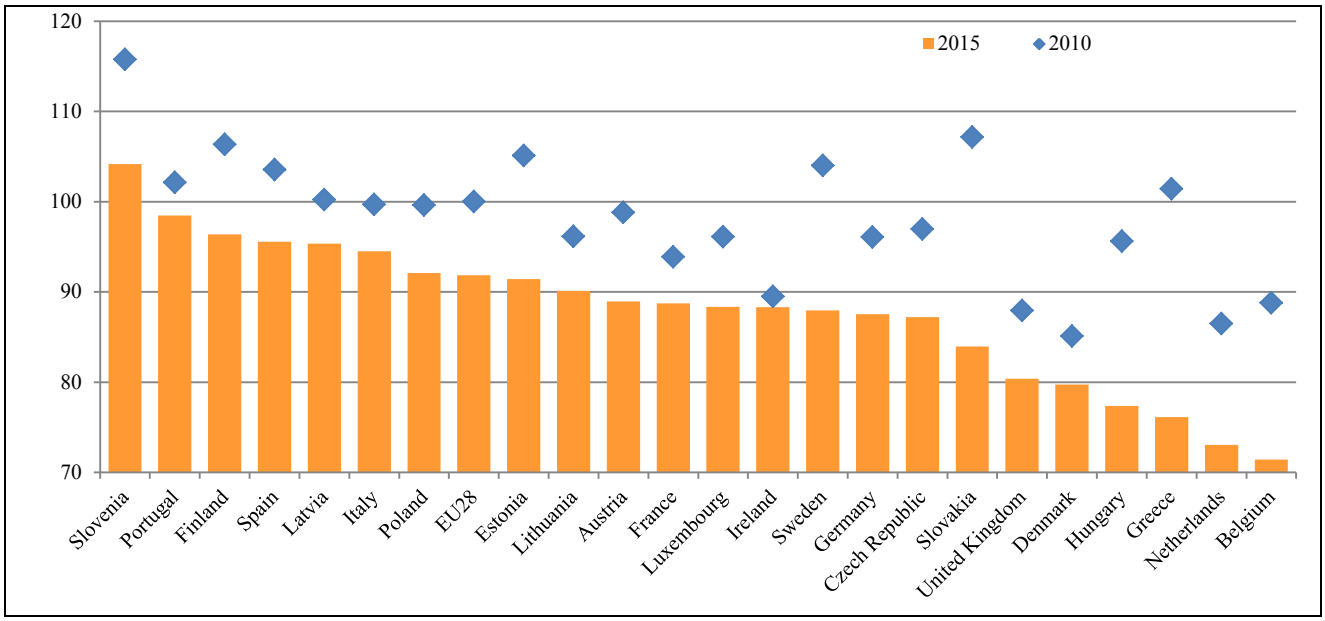
The overall EU28 composite indicator for SDG 15 shows a strong decreasing trend in the observed period (2010-2015), with the loss of more than 8 points over 5 years, by far the worst trend observed among all the 17 Goals. It is important to remark that the absence of available indicators regarding biodiversity, due to the broad lack of data, only allows a partial context analysis.
The decreasing trend showed in Fig. 15.1 is attributable to the linear growth of the indicator "Change in artificial land cover" (sdg_15_40), which increased by more than 6% in the observed period. On the other hand, the indicators "Share of forest areas" (sdg_15_10) as well as "Sufficiency of terrestrial sites designated under the EU Habitats Directive" (sdg_15_20) exhibit a slight increase. There are no substantial differences between the trends of member states. In fact, while the best performer (Slovenia) moved from 115.8 to 104.2 in 5 years, the worst performer (Belgium) saw its situation decrease from 88.8 to 71.4.

**Fig. 15.1 – Composite indicators of SDG 15. EU28 average, best performers (Slovakia, Portugal) and worst performers in 2015 (Belgium, Netherlands). Base EU28 2010=100**




Comparing the composite indicator for all EU28 countries, the situation worsened for all member states. The countries that have declined the most are Greece, Slovakia and Hungary. Analyzing their elementary indicators' trends, despite the slight growth of "Share of forest area" (sdg_15_10), the broad increment of "Change in artificial land cover" (sdg_15_40), observed in all these countries, explains the decreasing trend of the composite indicators.

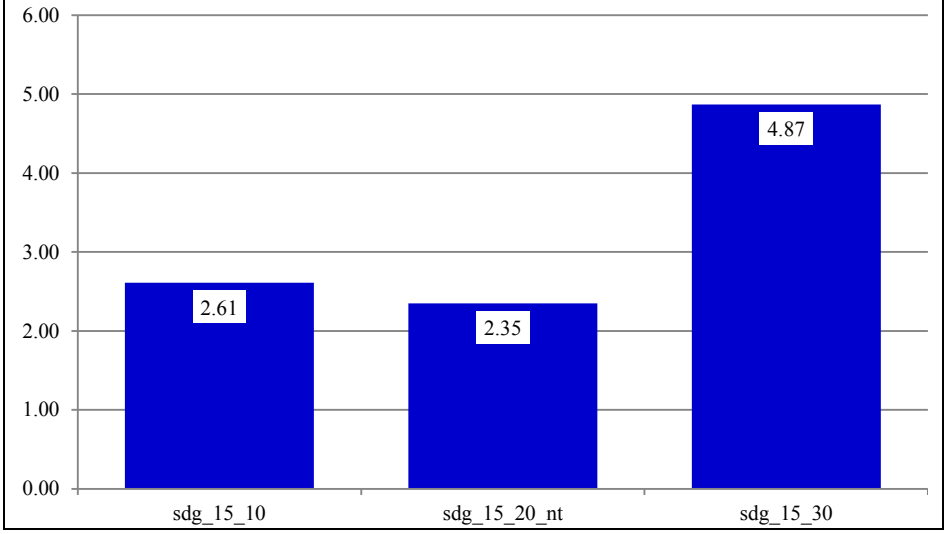
**Fig. 15.2 – SDG 15 composite indicator scores for EU28 countries, years 2010 and 2015. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator. The indicator "Change in artificial land cover" (sdg_15_40) has a high impact, whereas the indicator "Sufficiency of terrestrial sites designated under the EU Habitats Directive" (sdg_15_20_nt) has less of an influence on the composite indicator.

**Fig. 1.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2015**



# Appendix

**Table 15.3 – Results of the composite indicator for SDG 15. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Belgium | 88.8 | 86.1 | 81.0 | 79.1 | 74.9 | 71.4 |
| Bulgaria | | | Not present due to lack of data | | | |
| Czech Republic | 97.0 | 95.4 | 94.3 | 91.8 | 89.8 | 87.2 |
| Denmark | 85.1 | 84.3 | 82.8 | 81.9 | 80.8 | 79.7 |
| Germany | 96.1 | 94.7 | 93.7 | 91.5 | 89.7 | 87.5 |
| Estonia | 105.1 | 102.8 | 100.9 | 97.7 | 94.8 | 91.4 |
| Ireland | 89.5 | 89.4 | 88.8 | 88.8 | 88.5 | 88.3 |
| Greece | 101.4 | 97.1 | 87.2 | 86.5 | 80.1 | 76.1 |
| Spain | 103.6 | 102.2 | 100.6 | 99.1 | 97.3 | 95.6 |
| France | 93.9 | 92.9 | 92.1 | 90.9 | 89.9 | 88.7 |
| Croatia | | | Not present due to lack of data | | | |
| Italy | 99.7 | 98.8 | 97.8 | 96.7 | 95.6 | 94.5 |
| Cyprus | | | Not present due to lack of data | | | |
| Latvia | 100.2 | 99.6 | 99.3 | 97.7 | 96.7 | 95.3 |
| Lithuania | 96.1 | 95.2 | 94.9 | 93.0 | 91.9 | 90.1 |
| Luxembourg | 96.1 | 93.8 | 86.4 | 88.4 | 85.3 | 88.4 |
| Hungary | 95.6 | 92.9 | 91.2 | 86.5 | 82.6 | 77.4 |
| Malta | | | Not present due to lack of data | | | |
| Netherlands | 86.5 | 84.4 | 82.0 | 79.2 | 76.3 | 73.0 |
| Austria | 98.8 | 97.1 | 93.7 | 92.9 | 90.6 | 88.9 |
| Poland | 99.6 | 98.4 | 97.5 | 95.5 | 94.0 | 92.1 |
| Portugal | 102.2 | 101.6 | 101.1 | 100.2 | 99.3 | 98.5 |
| Romania | | | Not present due to lack of data | | | |
| Slovenia | 115.8 | 113.3 | 108.8 | 109.0 | 106.1 | 104.2 |
| Slovakia | 107.2 | 103.7 | 100.1 | 95.0 | 89.9 | 84.0 |
| Finland | 106.3 | 104.6 | 102.9 | 100.8 | 98.7 | 96.4 |
| Sweden | 104.0 | 101.6 | 101.2 | 96.1 | 93.0 | 88.0 |
| United Kingdom | 88.0 | 87.7 | 86.6 | 84.5 | 82.7 | 80.4 |
| **EU28** | **100.0** | **98.8** | **97.4** | **95.8** | **93.9** | **91.8** |

## *Goal 16 – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels*

### Descriptive analysis of elementary indicators

The composite indicator for SDG 16 was built using the indicators listed in Table 16.1. The indicators "Perceived independence of the justice system" (sdg_16_40) and "Physical and sexual violence to women experienced within 12 months" (sdg_05_10) were excluded from the composite indicator because of lack of available data. The indicator "General government total expenditure on law courts" (sdg_16_30) was excluded since its polarity cannot be clearly explained.

**Table 16.1 – List of the elementary indicators used for the composite indicator of SDG 16**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_16_10 | Death rate due to homicide | - | 0.1 | 7.8 | 1.3 | 1.5 |
| sdg_16_20 | Population reporting occurrence of crime, violence or vandalism in their area | - | 2.5 | 27.7 | 11.1 | 4.5 |
| sdg_16_50 | Corruption Perceptions Index | + | 33.0 | 94.0 | 64.6 | 14.9 |
| sdg_16_60 | Population with confidence in EU institutions | + | 18.0 | 76.0 | 46.6 | 10.4 |

Correlation does not affect the composite indicator. The highest correlation observed is equal to 0.25, which is inferior to 0.75.

**Table 16.2 – Correlation matrix of elementary indicators of SDG 16**

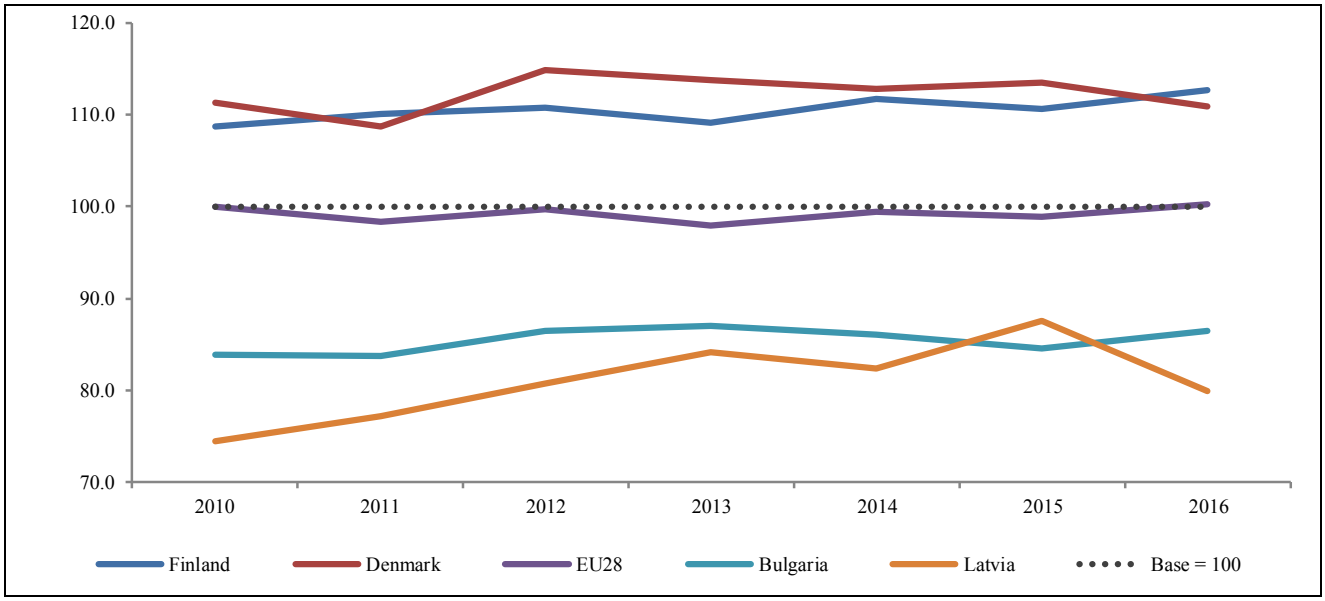
| | sdg_16_10 | sdg_16_20 | sdg_16_50 | sdg_16_60 |
|---|---|---|---|---|
| **sdg_16_10** | 1.00 | -0.24 | -0.18 | 0.15 |
| **sdg_16_20** | -0.24 | 1.00 | 0.01 | -0.15 |
| **sdg_16_50** | -0.18 | 0.01 | 1.00 | 0.38 |
| **sdg_16_60** | 0.15 | -0.15 | 0.38 | 1.00 |

### Composite indicator

During the observed period (2010-2016) the overall EU28 composite indicator for SDG 16 shows an overall stable trend, reaching in 2015 the 98.9 point mark, until it reaches the 2010's level in 2016. Analyzing the trends of the elementary indicators, both the "Death rate due to homicide" (sdg_16_10) and "Population reporting occurrence of crime, violence or vandalism in their area" (sdg_16_20) decreased during the observed period; while the indicator "Corruption Perceptions Index" (sdg_16_50) experienced a slight positive increase. The tiny fluctuations of the composite indicator are mainly explained by the inconstant worsening of indicator "Population with confidence in EU Parliament" (sdg_16_60). Indeed, the percentage of people with confidence in the European Parliament went from 48% in 2010 to 38% in 2015 losing 10 percentage point in 5 years. In the last two years it has improved until reaching the level of 45% in 2017.

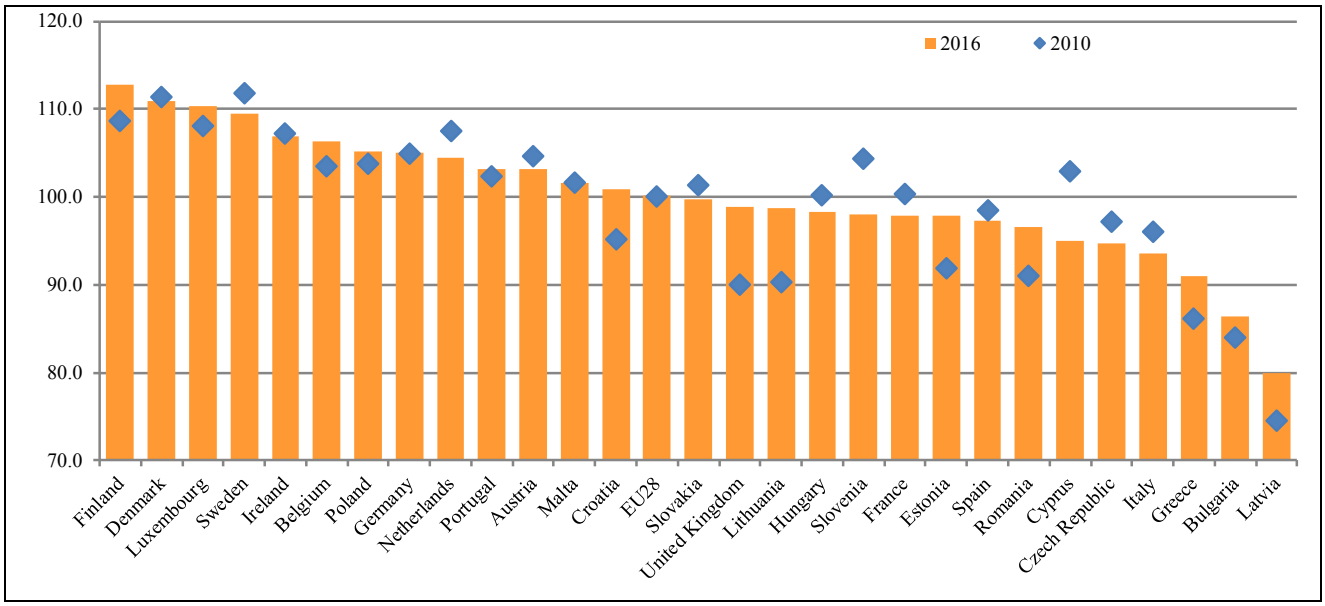
Nonetheless, there are substantial differences between member states. In fact, while the best performer (Finland) moved from 108.7 to 112.7 in 6 years, the worst performer (Latvia) saw a broad increase in its composite indicator moving from 74.5 in 2010 to 80 in the last observed year.

**Fig. 16.1 – Composite indicators of SDG 16. EU28 average, best performers (Finland, Denmark) and worst performers in 2016 (Bulgaria, Latvia). Base EU28 2010=100**




Comparing the composite indicator for all EU28 countries, the situation is different across Europe.
The countries that improved the most are United Kingdom, Lithuania and Estonia. All these highlighted countries experienced a broad improvement on crime indicators, namely "Death rate due to homicide" (sdg_16_10) and "Population reporting occurrence of crime, violence or vandalism in their area" (sdg_16_20). An improvement was noticed also for indicator "Corruption Perceptions Index" (sdg_16_50).
However, in these three states the indicator "Population with confidence in EU Parliament" (sdg_16_60) follows different paths. Indeed, Lithuania experienced a slight increase (from 57% of population in 2010 to 61% in 2016), Estonia saw a worsening in its level of confidence (from 62% to 48%), while United Kingdom had a consistent increase (from 23% to 32%), even though it is still one the lowest level of confidence in Europe.
On the other hand, the situation in Cyprus, Slovenia, Netherlands, France, Czech Republic and Italy worsened drastically. Analyzing the Italian elementary indicators, the "Population reporting occurrence of crime, violence or vandalism in their area" (sdg_16_20) worsened moving from 12.7% of the population in 2010 to 19.4% in 2015. The same declining trend can be noticed for the indicator "Population with confidence in EU institutions" (sdg_16_60), that moved from 55% in 2010 to 40% in 2015, losing 15% points in 5 years. The only indicators that improve are "Death rate due to homicide" (sdg_16_10) and "Corruption Perceptions Index" (sdg_16_50) that went from a score of 39 in 2010 to 44 in the last observed year.

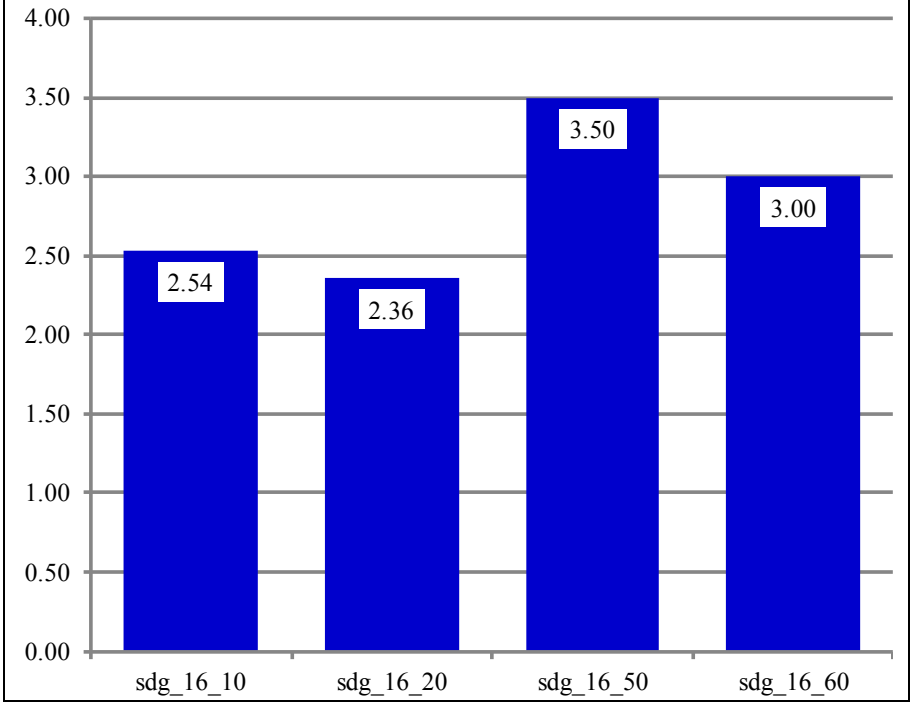
**Fig. 16.2 – SDG 16 composite indicator scores for EU28 countries, years 2010 and 2016. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator.

**Fig. 16.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2016**




The indicator "Corruption Perceptions Index" (sdg_16_50) has a high impact, whereas "Population reporting occurrence of crime, violence or vandalism in their area" (sdg_16_20) has less of an influence on the composite indicator.

# Appendix

**Table 16.3 – Results of the composite indicator for SDG 16. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Belgium | 103.4 | 103.6 | 104.8 | 101.9 | 102.1 | 102.9 | 106.3 |
| Bulgaria | 83.9 | 83.7 | 86.5 | 87.0 | 86.1 | 84.6 | 86.4 |
| Czech Republic | 97.1 | 93.9 | 96.6 | 95.7 | 96.0 | 94.8 | 94.7 |
| Denmark | 111.4 | 108.7 | 114.9 | 113.7 | 112.7 | 113.5 | 110.9 |
| Germany | 104.9 | 102.8 | 104.8 | 102.8 | 103.9 | 101.4 | 105.0 |
| Estonia | 91.9 | 92.0 | 91.6 | 97.1 | 97.7 | 95.9 | 97.9 |
| Ireland | 107.2 | 107.2 | 102.3 | 102.7 | 103.6 | 104.9 | 106.8 |
| Greece | 86.1 | 83.5 | 83.2 | 85.1 | 89.2 | 90.0 | 91.0 |
| Spain | 98.4 | 97.9 | 96.1 | 92.0 | 95.2 | 95.3 | 97.2 |
| France | 100.3 | 99.7 | 102.0 | 98.1 | 98.9 | 98.1 | 97.9 |
| Croatia | 95.2 | 95.1 | 97.4 | 99.6 | 100.5 | 103.6 | 100.8 |
| Italy | 96.1 | 92.9 | 93.1 | 91.1 | 90.8 | 90.5 | 93.6 |
| Cyprus | 102.9 | 96.0 | 95.6 | 92.8 | 96.4 | 94.2 | 95.0 |
| Latvia | 74.5 | 77.2 | 80.7 | 84.1 | 82.4 | 87.6 | 80.0 |
| Lithuania | 90.3 | 90.2 | 95.3 | 93.4 | 99.3 | 98.6 | 98.8 |
| Luxembourg | 108.0 | 111.5 | 108.2 | 109.3 | 104.7 | 107.5 | 110.3 |
| Hungary | 100.1 | 97.6 | 101.4 | 100.4 | 99.0 | 99.0 | 98.2 |
| Malta | 101.6 | 100.2 | 100.5 | 99.7 | 102.0 | 103.3 | 101.6 |
| Netherlands | 107.4 | 103.0 | 103.8 | 101.7 | 103.1 | 103.5 | 104.5 |
| Austria | 104.6 | 103.8 | 104.1 | 104.1 | 104.9 | 100.6 | 103.1 |
| Poland | 103.7 | 102.5 | 105.8 | 103.9 | 104.9 | 103.4 | 105.1 |
| Portugal | 102.3 | 100.9 | 101.2 | 96.2 | 100.4 | 101.0 | 103.2 |
| Romania | 90.9 | 91.1 | 94.0 | 92.3 | 95.1 | 97.2 | 96.5 |
| Slovenia | 104.3 | 100.9 | 103.3 | 98.1 | 99.2 | 96.9 | 98.0 |
| Slovakia | 101.3 | 96.8 | 99.0 | 99.5 | 100.1 | 98.6 | 99.8 |
| Finland | 108.7 | 110.1 | 110.7 | 109.1 | 111.7 | 110.6 | 112.7 |
| Sweden | 111.8 | 111.5 | 111.0 | 110.6 | 109.9 | 110.5 | 109.5 |
| United Kingdom | 90.0 | 90.3 | 92.8 | 93.1 | 96.8 | 96.8 | 98.9 |
| **EU28** | **100.0** | **98.3** | **99.8** | **97.9** | **99.5** | **98.8** | **100.2** |

## *Goal 17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development*

### Descriptive analysis of elementary indicators

The composite indicator for SDG 17 was built using the indicators listed in Table 17.1. The indicator "EU financing to developing countries" (sdg_17_20) was excluded from the composite indicator because of lack of available data. On the other hand, the indicator "EU imports from developing countries" (sdg_17_30) was excluded because its polarity cannot be clearly explained.

**Table 17.1 – List of the elementary indicators used for the composite indicator of SDG 17**

| Code | Name | Polarity | Min | Max | Avg | Std |
|---|---|---|---|---|---|---|
| sdg_17_10 | Official development assistance as share of gross national income | + | 0.0 | 1.4 | 0.3 | 0.3 |
| sdg_17_40 | General government gross debt | - | 6.1 | 180.8 | 68.2 | 37.6 |
| sdg_17_50 | Shares of environmental and labour taxes in total tax revenues | + | 4.3 | 12.2 | 7.5 | 2.0 |

Correlation does not affect the composite indicator. No indicators have a correlation higher than 0,75 in absolute terms.

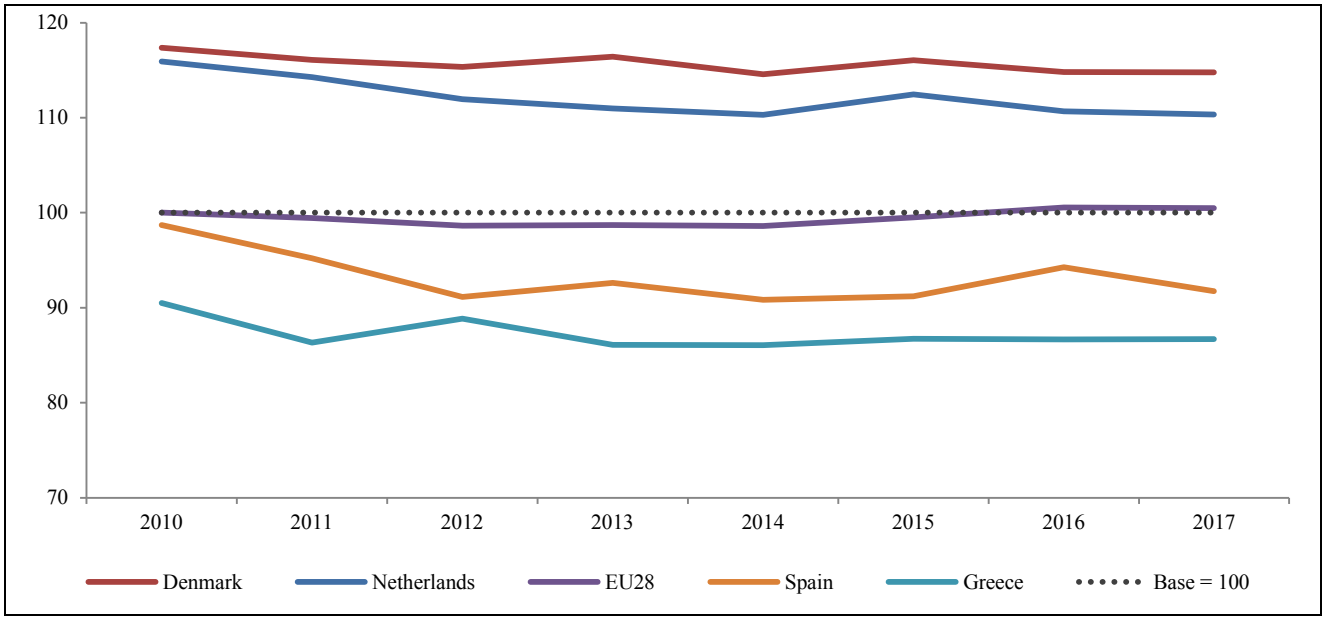
**Table 17.2 – Correlation matrix of elementary indicators of SDG 17**

| | sdg_17_10 | sdg_17_40 | sdg_17_50 |
|---|---|---|---|
| **sdg_17_10** | 1.00 | -0.17 | -0.49 |
| **sdg_17_40** | -0.17 | 1.00 | 0.05 |
| **sdg_17_50** | -0.49 | 0.05 | 1.00 |

### Composite indicator

The overall EU28 composite indicator for SDG 17 shows a stable trend in the observed period (2010-2017), staying near the 100 point mark. Analyzing the trends of the elementary indicators for the EU28, the "Shares of environmental and labour taxes in total tax revenues" (sdg_17_50) did not show any remarkable changes. On the other hand, the "General government gross debt" (sdg_17_40) had a slight increase, as well as the indicator "Official development assistance as share of gross national income" (sdg_17_10), that went from 0.44% of national GDP to 0.5%.
However, there are substantial differences between member state's trends and the EU. In fact, while the EU 28 composite indicator shows a stable trend, the best performer (Denmark) decreased from 117.4 to 114.8 in 7 years, just like the worst performer (Greece), which was subject to a decrease from 90.5 in 2010 to 86.7 in 2017.

**Fig. 17.1 – Composite indicators of SDG 17. EU28 average, best performers (Netherlands, Denmark) and worst performers in 2017 (Greece, Spain). Base EU28 2010=100**



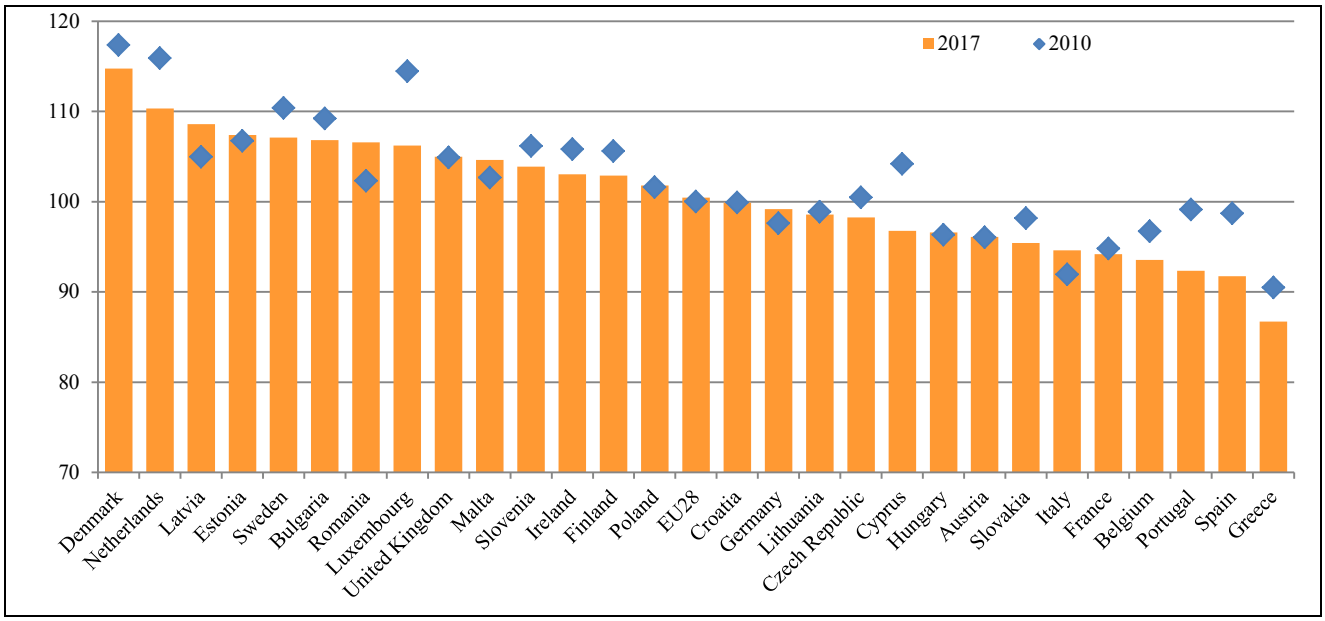

Comparing the composite indicator for all EU28 countries, the situation shows noticeable differences. The countries that improved the most are Latvia, Romania and Italy. These three countries had a consistent increase for the "Official development assistance as share of gross national income" (sdg_17_10) indicator, as well as a slight improvement on the "Shares of environmental and labor taxes in total tax revenues" (sdg_17_50) indicator.

Instead, looking at the indicator "General government gross debt" (sdg_17_40) the situation is not similar for these three countries. In fact, while Italy and Romania's situation worsened through the years, Latvia reduced its gross debt by 6.7% in seven years.

On the other hand, Spain, Portugal and Luxemburg experienced a worsening in their situation. All these countries registered an increase in the indicator "General government gross debt" (sdg_17_40) as well as a decrease in "Official development assistance as share of gross national income" (sdg_17_10) indicator.

The situation is more variable for the indicator "Shares of environmental and labour taxes in total tax revenues" (sdg_17_50). While Spain registered a slight increase in the percentage of environmental taxes, Portugal and Luxemburg experienced a decline on the same indicator.

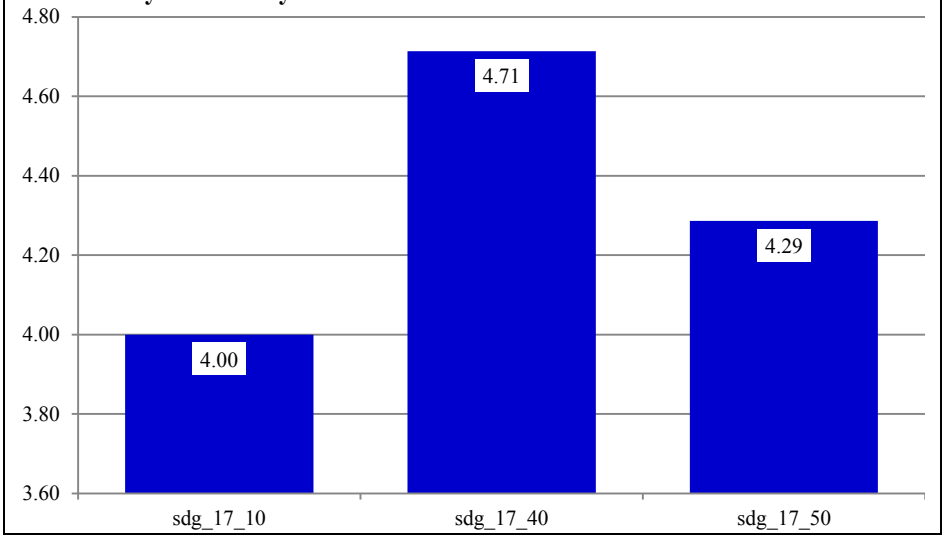
**Fig. 17.2 – SDG 17 composite indicator scores for EU28 countries, years 2010 and 2017. Base EU28 2010=100**




## Influence analysis of elementary indicators

The following graph shows the average of the shifts in the ranking caused by the removal of each elementary indicator. The indicator "General government gross debt" (sdg_17_40) has a high impact, whereas "Official development assistance as share of gross national income" (sdg_17_10) has less of an influence on the composite indicator.

**Fig. 17.3 – Influence analysis: average of the shifts in the ranking of the EU countries by elementary indicator removed. Year 2016**



# Appendix

**Table 17.3 – Results of the composite indicator for SDG 17. Base EU28 2010=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|
| Belgium | 96.7 | 95.3 | 93.3 | 92.1 | 92.1 | 92.0 | 93.9 | 93.5 |
| Bulgaria | 109.2 | 109.2 | 107.8 | 108.0 | 106.2 | 107.1 | 106.8 | 106.8 |
| Czech Republic | 100.5 | 100.2 | 98.5 | 97.3 | 97.7 | 97.8 | 98.4 | 98.3 |
| Denmark | 117.4 | 116.1 | 115.4 | 116.4 | 114.6 | 116.0 | 114.8 | 114.8 |
| Germany | 97.6 | 97.9 | 96.8 | 96.6 | 97.1 | 98.1 | 100.0 | 99.2 |
| Estonia | 106.7 | 106.8 | 106.2 | 105.4 | 106.2 | 106.1 | 108.5 | 107.4 |
| Ireland | 105.8 | 102.1 | 99.5 | 99.7 | 100.0 | 102.1 | 102.3 | 103.1 |
| Greece | 90.5 | 86.3 | 88.9 | 86.1 | 86.1 | 86.7 | 86.7 | 86.7 |
| Spain | 98.7 | 95.2 | 91.1 | 92.6 | 90.8 | 91.2 | 94.3 | 91.7 |
| France | 94.8 | 94.0 | 93.4 | 92.8 | 92.0 | 92.7 | 93.2 | 94.2 |
| Croatia | 99.9 | 97.6 | 96.1 | 97.1 | 99.1 | 99.1 | 99.3 | 99.9 |
| Italy | 92.0 | 93.8 | 93.0 | 92.6 | 93.1 | 93.0 | 94.2 | 94.6 |
| Cyprus | 104.2 | 101.8 | 98.3 | 96.1 | 96.0 | 95.7 | 95.7 | 96.8 |
| Latvia | 105.0 | 105.8 | 105.7 | 107.7 | 108.4 | 109.2 | 108.6 | 108.6 |
| Lithuania | 98.9 | 98.5 | 98.0 | 98.1 | 98.0 | 98.4 | 99.2 | 98.6 |
| Luxembourg | 114.5 | 113.6 | 112.9 | 111.1 | 110.4 | 108.1 | 107.7 | 106.2 |
| Hungary | 96.3 | 96.3 | 95.6 | 96.1 | 96.1 | 96.4 | 97.5 | 96.6 |
| Malta | 102.7 | 104.7 | 103.2 | 101.5 | 102.8 | 103.5 | 103.4 | 104.6 |
| Netherlands | 115.9 | 114.3 | 111.9 | 111.0 | 110.3 | 112.5 | 110.7 | 110.3 |
| Austria | 96.0 | 95.8 | 95.7 | 95.2 | 95.1 | 95.8 | 97.2 | 96.1 |
| Poland | 101.6 | 100.7 | 100.5 | 99.5 | 100.9 | 101.3 | 101.8 | 101.8 |
| Portugal | 99.1 | 95.9 | 92.7 | 90.9 | 90.4 | 90.9 | 91.8 | 92.3 |
| Romania | 102.3 | 99.7 | 100.0 | 100.2 | 103.2 | 103.3 | 105.3 | 106.6 |
| Slovenia | 106.2 | 104.7 | 105.5 | 104.0 | 102.5 | 102.7 | 103.9 | 103.9 |
| Slovakia | 98.2 | 97.6 | 96.3 | 95.0 | 95.1 | 94.9 | 95.5 | 95.4 |
| Finland | 105.6 | 106.8 | 105.7 | 104.8 | 104.9 | 104.0 | 103.5 | 102.9 |
| Sweden | 110.4 | 109.9 | 109.3 | 109.0 | 108.2 | 111.0 | 106.5 | 107.1 |
| United Kingdom | 104.9 | 103.5 | 103.4 | 105.5 | 105.3 | 105.0 | 104.5 | 105.0 |
| **EU28** | **100.0** | **99.4** | **98.6** | **98.7** | **98.6** | **99.5** | **100.6** | **100.5** |

# Appendix

## *List of indicators*

The following tables describe, for each Goal, the list of elementary indicators used for the composite indicators, the units of measure and the estimates of the missing data.
The elementary indicators included in the composite indicators have been selected in order to minimize the imputation of missing values. However, estimates were sometimes necessary, otherwise the number of available elementary indicators would have been greatly reduced. When estimates were necessary, the linear regression imputation method was used.

**Goal 1**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_01_10 | People at risk of poverty or social exclusion | % of total population | - |
| sdg_01_40 | People living in households with very low work intensity | % of total population aged less than 60 | - |
| sdg_01_50 | Housing cost overburden rate | % of total population aged less than 60 | - |
| sdg_01_60 | Population living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames or floor | % of total population | - |
| sdg_03_60 | Self-reported unmet need for medical care | % of population aged 16 and over | - |
| sdg_11_10 | Overcrowding rate by poverty status | % of total population | - |

**Goal 2**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_02_20 | Agricultural factor income per annual work unit (AWU) | Chain linked volumes (2010), euro per annual work unit | - |
| sdg_02_30 | Government support to agricultural research and development | Chain linked volume, million euro to GDP | Poland 2010-2011 |
| sdg_02_40 | Area under organic farming | % of utilised agricultural area | Croatia 2010-2011; EU28 2010-2011 |
| sdg_02_50 | Gross nutrient balance on agricultural land | kg per hectare | Belgium, Bulgaria, Denmark, Germany, Estonia, Ireland, Greece, Spain, Italy, Ciprus, Latvia, Lithuania, Luxembourg, Malta, Poland and EU28 for 2016 |
| sdg_02_60 | Ammonia emissions from agriculture | Index, 2009=100 | - |

**Goal 3**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_03_10 | Life expectancy at birth by sex | years | - |
| sdg_03_20 | Self-perceived health by level of perception | % of population | - |
| sdg_03_50 | Suicide rate by sex | number per 100 000 persons | Denmark 2010; All countries for 2016 |
| sdg_03_60 | Self-reported unmet need for medical care by detailed reason | % of population aged 16 and over | - |
| sdg_08_60 | People killed in accidents at work | number per 100 000 employees | Belgium, France, Portugal, Finland, EU28 for 2016 |
| sdg_11_20 | Population living in households considering that they suffer from noise, by poverty status | % of population | - |
| sdg_11_40 | People killed in road accidents (source: EC services) | Rate | - |

**Goal 4**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_04_10 | Early leavers from education and training | % of population aged 18 to 24 | - |
| sdg_04_20 | Tertiary educational attainment | % of population aged 30 to 34 | - |
| sdg_04_30 | Participation in early childhood education | % of the age group between 4-years-old and the starting age of compulsory education | Belgium 2016; EU28 2016; All countries for 2017 |
| sdg_04_50 | Employment rates of recent graduates | % of population aged 20 to 34 | - |
| sdg_04_60 | Adult participation in learning | % of population aged 25 to 64 | - |
| sdg_08_20 | Young people neither in employment nor in education and training | % of population aged 15 to 29 | - |

**Goal 5**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_05_20 | Gender pay gap in unadjusted form | % of average gross hourly earnings of men | Ireland 2015-2016; All countries for 2017 |
| sdg_05_30 | Gender employment gap | % | France 2010-2013 |
| sdg_05_40 | Inactive population due to caring responsibilities by sex | % of inactive population aged 20 to 64 (females/males) | - |
| sdg_05_50 | Seats held by women in national parliaments and governments | % of seats | - |
| sdg_05_60 | Positions held by women in senior management positions | % of positions | - |

**Goal 7**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_07_10 | Primary energy consumption | Index, 2009=100 | - |
| sdg_07_11 | Final energy consumption | Index, 2009=100 | - |
| sdg_07_20 | Final energy consumption in households per capita | kg of oil equivalent | - |
| sdg_07_30 | Energy productivity | Euro per kilogram of oil equivalent (KGOE) | - |
| sdg_07_40 | Share of renewable energy in gross final energy consumption | % | - |
| sdg_07_60 | Population unable to keep home adequately warm | % of population | - |
| sdg_13_20 | Greenhouse gas emissions intensity of energy consumption | Index, 2000 = 100 | - |

**Goal 8**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_08_10 | Real GDP per capita | Chain linked volumes (2010), euro per capita | - |
| sdg_08_02 | Young people neither in employment nor in education and training | % of population aged 15 to 29 | - |
| sdg_08_30 | Employment rate | % of population aged 20 to 64 | France 2010-2011-2012-2013 |
| sdg_08_40 | Long-term unemployment rate | % of active population | - |
| sdg_08_50 | Involuntary temporary employment | % of employees aged 20 to 64 | - |
| sdg_08_60 | People killed in accidents at work | number per 100 000 employees | Belgium, France, Portugal, Finland, EU28 for 2016 |
| sdg_05_40 | Inactive population due to caring responsibilities | % of inactive population aged 20 to 64 | - |
| sdg_12_20 | Resource productivity and domestic material consumption | Euro per kilogram, chain linked volumes (2010) | - |

**Goal 9**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_09_10 | Gross domestic expenditure on R&D by sector | % of GDP | - |
| sdg_09_20 | Employment in high- and medium-high technology manufacturing sectors and knowledge-intensive service sectors | % of total employment | - |
| sdg_09_30 | R&D personnel by sector | % of active population | Greece 2010; France 2010-2011-2012-2013-2016; Poland 2016 |
| sdg_09_50 | Share of collective transport modes in total passenger land transport by vehicle | % of total inland passenger-km | All countries for 2016 |
| sdg_12_30 | Average CO2 emissions per km from new passenger cars | g CO2 per km | EU28 2010-2011-2012-2013; Croatia 2010-2011-2012 |

**Goal 10**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_01_20 | People at risk of income poverty after social transfers | % of total populatio | - |
| sdg_10_10 | Purchasing power adjusted GDP per capita | Real expenditure per capita (in PPS_EU28) | - |
| sdg_10_20 | Adjusted gross disposable income of households per capita | Purchasing power standard (PPS) per inhabitant | Croazia 2013-2014-2015-2016; Romania 2016; UK 2016; Hungary 2016 |
| sdg_10_30 | Relative median at-risk-of-poverty gap | % distance to poverty threshold | - |
| sdg_10_40 | Gini coefficient of equivalised disposable income | coefficient of 0 (maximal equality) to 100 (maximal inequality) | - |
| sdg_10_50 | Income share of the bottom 40 % of the population | % of income | - |

**Goal 11**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_11_10 | Overcrowding rate | % of population | - |
| sdg_11_20 | Population living in households considering that they suffer from noise | % of population | - |
| sdg_11_40 | People killed in road accidents | Rate | - |
| sdg_11_50 | Exposure to air pollution by particulate matter | µg/m3 | 2011; Ireland 2012; Bulgaria 2015; Hungary 2015. |
| sdg_11_60 | Recycling rate of municipal waste | % of total waste generated | Denmark 2010; Irlanda 2015 |
| sdg_01_60 | Population living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames of floor | % of population | - |
| sdg_09_50 | Share of collective transport modes in total passenger land transport | % of total inland passenger-km | - |
| sdg_16_20 | Population reporting occurrence of crime, violence or vandalism in their area | % of population | - |

**Goal 12**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_12_20 | Resource productivity and domestic material consumption | Euro per kilogram, chain linked volumes (2010) | - |
| sdg_12_30 | Average CO2 emissions per km from new passenger cars | g CO2 per km | EU28 2010-2011-2012-2013, Croatia 2010-2011-2012 |
| sdg_11_60 | Recycling rate of municipal waste | % of total waste generated | Denmark 2010; Ireland 2015-2016 |
| sdg_07_10 | Primary energy consumption | Index, 2009=100 | - |
| sdg_07_11 | Final energy consumption | Index, 2009=100 | - |
| sdg_07_30 | Energy productivity | Euro per kilogram of oil equivalent (KGOE) | - |
| sdg_07_40 | Share of renewable energy in gross final energy consumption | % | - |

**Goal 13**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_13_10 | Greenhouse gas emissions | Greenhouse gas emissions (in CO2 equivalent), base year 1990 | - |
| sdg_13_20 | Greenhouse gas emissions intensity of energy consumption | Index, 2000 = 100 | - |
| sdg_07_10 | Primary energy consumption | Index, 2009=100 | - |
| sdg_07_11 | Final energy consumption | Index, 2009=100 | - |
| sdg_07_40 | Share of renewable energy in gross final energy consumption | % | - |
| sdg_12_30 | Average CO2 emissions per km from new passenger cars | g CO2 per km | EU28 2010-2011-2012-2013, Croatia 2010-2011-2012 |

**Goal 14**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_14_10 | Sufficiency of marine sites designated under the EU Habitats directive | Marine protected area (km2) | - |
| sdg_14_30 | Assessed fish stocks exceeding fishing mortality at maximum sustainable yield (FMSY) by fishing area | % total fishing areas | - |

**Goal 15**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_15_10 | Share of forest area | % of total land area | 2010-20011-2013-2014 for all countries |
| sdg_15_20 | Sufficiency of terrestrial sites designated under the EU Habitats Directive | % Terrestrial protected area (km2) | EU28 2010-2011-2012 |
| sdg_15_40 | Change in artificial land cover | Index, 2009=100 | 2010-20011-2013-2014 for all countries |

**Goal 16**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_16_10 | Death rate due to homicide by sex | number par 100 000 persons | Denmark 2010 |
| sdg_16_20 | Population reporting occurrence of crime, violence or vandalism in their area by poverty status | % of population | - |
| sdg_16_50 | Corruption Perceptions Index | score scale of 0 (highly corrupt) to 100 (very clean) | EU 28 2010-2011-2012-2013-2014-2015 |
| sdg_16_60 | Population with confidence in EU Parliamnet | % of population | - |

**Goal 17**

| Code | Name | Unit | Estimates |
|---|---|---|---|
| sdg_17_10 | Official development assistance as share of gross national income | % of gross national income (GNI) | Croatia 2010-2011; Cyprus 2016-2017; Romania 2017 |
| sdg_17_40 | General government gross debt | % of gross domestic product (GDP) | - |
| sdg_17_50 | Shares of environmental and labour taxes in total tax revenues | % of total taxes | All countries for 2017 |

## *Elaboration*

The following table lists the elementary indicators that were included in the composite indicators with a unit of measure different from the one proposed by Eurostat. These transformations were performed mainly for technical reasons. For example, when the proposed elementary indicator was expressed in absolute terms (i.e. Millions of euro), which are not suitable for the AMPI methodology, it was necessary to transform it in an index number.
The table below shows the name of the indicator, the original unit of measurement and the elaborated unit.

| Code | Name | Original unit | Elaborated unit |
|---|---|---|---|
| sdg_02_30 | Government support to agricultural research and development | Million euro | Chain linked volume to GDP |
| sdg_02_50 | Gross nutrient balance on agricultural land | kg per hectare | Distance from 0 |
| sdg_02_60 | Ammonia emissions from agriculture | Tonne | Chain linked volume to 2009=100 |
| sdg_05_40 | Inactive population due to caring responsibilities | % of inactive population aged 20 to 64 | Ratio females/males |
| sdg_07_10 | Primary energy consumption | Million tonnes of oil equivalent (TOE) | Chain linked volume to 2009=100 |
| sdg_07_11 | Final energy consumption | Million tonnes of oil equivalent (TOE) | Chain linked volume to 2009=100 |
| sdg_15_20 | Sufficiency of terrestrial sites designated under the EU Habitats Directive | Terrestrial protected area (km2) | Chain linked volume to national land |

# 4. Modified AMPI: An example of AMPI composite indicator based on the distance from the EU 2020 targets

One of the main problems of the AMPI methodology is that the baseline is set to an arbitrary point in space and time. In our report, the baseline is set to equal the situation of the EU28 average in 2010. This solution allows to evaluate the improvements of the EU and of member states relative to 2010, but does not allow to evaluate the entity of the improvement relative to a specific target.
For example, the composite indicator for SDG 4 shows significant improvement, whereas the composite indicator for SDG 8 shows a less steep rise. By setting 2010 as the baseline, it is not possible to discern which Goal is closer to reach the targets set by the 2030 Agenda.
Nevertheless, the AMPI methodology can be adapted to measure the distance from a vector of targets. It is possible to set the value of the AMPI composite indicator=100 if all the elementary indicators meet the EU28 target, or if the majority of indicators exceed the target and the rest are relatively close to their target. In this way both the value of individual countries and of the EU28 average for every year can be considered as a composite evaluation of the distance from the target of each elementary indicator.
An assessment of this methodology has been produced on SDG 13 as a test, using only the EU28 average data for each available year. The table below lists the elementary indicators and the corresponding 2020 targets.

**Table 1 – List of the elementary indicators used for the test on SDG 13**

| Code | Name | Polarity | Min | Max | Target |
|---|---|---|---|---|---|
| sdg_13_10 | Greenhouse gas emissions | - | 77.4 | 85.9 | 80.0 |
| sdg_13_11 | Greenhouse gas emissions in ESD sectors | - | 85.8 | 94.7 | 90.7 |
| sdg_07_10 | Primary energy consumption | - | 86.6 | 96.7 | 86.6 |
| sdg_07_11 | Final energy consumption | - | 89.1 | 97.5 | 91.1 |
| sdg_07_40 | Share of renewable energy in gross final energy consumption | + | 12.9 | 20.0 | 20.0 |

This test is carried out only on the EU28 average because countries have different policy targets. The difference from the methodology adopted in the report lies on the use of two different baselines. In this example, the baseline is a fictional vector of targets created using the EU 2020 targets. In all the other sheets of the Report, the baseline is the vector of EU28 in 2010.

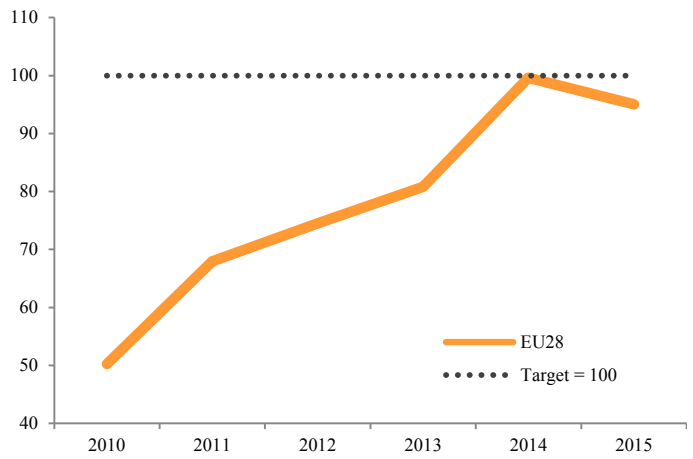
**Table 2 – Results of the composite indicator for SDG 13. EU28 targets=100**

| Country | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| **EU28** | **50.2** | **68.0** | **74.5** | **80.8** | **99.6** | **95.0** |

Therefore, the results of the modified AMPI can be used to build a different narrative with respect to that of the classical AMPI. The results of the test in table 2 show that the EU28 starts from a value of 50.2 in 2010 and in the observed period the composite indicator shows a remarkable rising trend until 2014, when it almost reaches the targets baseline.
Analyzing the elementary indicators and their targets, it is worth noticing that in 2014, all indicators have exceeded their 2020 targets except for “Primary energy consumption” (sdg_07_10) and “Share of renewable energy in gross final energy consumption” that reached 16.1% in 2014, still far from

the 20% required to meet the 2020 target. However, the EU 28 composite indicator shows a decreasing trend in the last observed year, reaching the 95 point mark in 2015.
This decreasing trend is explained by the worsening of all the elementary indicators regarding both GHG emissions and energy consumption, while the only indicator that continues its linear increase is the "Share of renewable energy in gross final energy consumption".
This methodology offers a clear advantage since it allows to measure the performances of a country in relation to a specific set of policy targets.
Nevertheless, there is an important trade-off to consider. In order to use this methodology in a proper way it would be necessary to set policy targets for all the elementary indicators used to monitor the SDGs.

**Fig. 1 - SDG 13 Composite indicator scores for EU28. Years 2010-2015. Target=100**




From the methodological point of view, it is important to point out that it is impossible to compare the results of a classic AMPI with this modified version of the AMPI. Indeed, the value used for the baseline has a different meaning.
Every country can apply this "modified AMPI" methodology in order to assess the distance of a composite indicator from a vector of targets at the EU level.
Moreover, if a country has its own specific targets to achieve within, for example, the year 2030, this methodology can be applied.
However, it would not be possible to compare the EU composite indicator with EU2020 targets and a country's composite indicator with its own targets. In conclusion, AMPI can be re-adapted to create a composite indicator that measures the distance from a vector of targets. Therefore, it is extremely important to set specific targets both at the EU and at country level.